WORLD METEOROLOGICAL ORGANIZATION

MEETING OF THE PUBLIC WEATHER SERVICES IMPLEMENTATION COORDINATION TEAM

Shanghai, China

12-16 May 2008

FINAL REPORT

1. Opening of the meeting.

1.1 Mr Gerald Fleming, Chair of the OPAG on Public Weather Services, opened the meeting at 10.00am on Monday May 12th, in the Jianguo Hotel in Shanghai.

1.2 The Agenda of the ICT meeting can be found in Annex I; the list of participants is contained in Annex II.

1.3 Mr Fleming welcomed the members of the ICT to the meeting, and conveyed the regrets of Mr John Guiney and Mr Dave Robinson, neither of whom could attend the meeting for family reasons. He welcomed Dr Tom Keenan of the Bureau of Meteorology of Australia, who would join the meeting for the first two days, and whose expertise in Nowcasting systems would be of particular value to the ICT. He welcomed Dr Tang Xu, Head of the Shanghai Meteorological Bureau (SMB), Dr Lei Zhaochong of Nanjing University of Information Science and Technology, Dr Yuan Zhaohong, Ms Shi Jianping, and other colleagues from the SMB who joined the meeting as observers. He expressed his thanks to Dr Tang Xu and his team for the efficient manner in which they had made the practical arrangements for the meeting.

1.4 The Chair informed the ICT that the upcoming session of the Commission for Basic Systems had been postponed, and would not now be held until March/April 2009. While this was not ideal from the point of view of the work of the OPAG, it need not delay that work in any way. He would bring any decisions of the ICT to the next meeting of the CBS Management Group to be held in June 2008, and seek approval for any ongoing work not reflected in the existing Terms of Reference (TORs) and Deliverables.

1.5 He recalled the programme concept of “Learning through Doing” which the ICT had developed at its meeting in Muscat, Sultanate of Oman, in June 2007. Since that meeting there had been a number of significant developments. A major Symposium on Public Weather Services had been held in WMO Headquarters in Geneva in December 2007; the recommendations of that Symposium would inform the ICT in its decisions as to the future work of the OPAG. Following that Symposium, there had been a half-day meeting of the ICT, attended by Dr Tang Xu and other colleagues from the CMA, at which a number of projects were proposed in connection with the development of a Multi-Hazard Early Warnings System and with the holding of the World EXPO in Shanghai in 2010. This meeting would examine these proposals in more depth, with a view to defining clearly the tasks relating to this project which might be taken on by the OPAG, and where responsibility for these tasks would lie.

1.6 Finally, the Chair together with the Chair of ET/SPI and C/PWS, had attended a meeting of the Steering Group of the Severe Weather Forecast Demonstration Project held in Geneva in March 2008. While this Demonstration Project had originated with the OPAG on DPFS, it was clear that the projects (both existing and proposed) would have a strong PWS element, and would thus require the engagement of the ICT and the Expert Teams.

1.7 Ms Haleh Kootval, Chief of Public Weather Services, representing the Secretary General of WMO, welcomed the participants to the meeting and concurred with the thanks expressed to the local organising committee. She noted that the scope of potential work

facing the OPAG had expanded greatly, and that it would need to be clear about what work the OPAG could tackle and the resources required for this.

1.8 On behalf of SMB Dr Tang Xu welcomed the participants to Shanghai and noted that the PWS Programme was one of the most important in WMO. He noted that it had played a vital role in promoting improvements in service delivery and in strengthening the work of disaster prevention and mitigation, but that it was possible to further improve Members' performance. The CMA was promoting the strategies of PWS under the heading of "Safer Weather", particularly in the context of the rapid increase of urbanisation and the particular problems which it posed. He recognised that weather information needed to be combined with social and economic factors to contribute fully to human development. The forthcoming World EXPO would take as its theme "Better City, Better Life"; this implied a safer city in every context. He thanked the ICT for its strong support for the Multi-Hazard Early Warnings System project. The focus of the SMB/CMA and WMO engagement with the World EXPO would be the "Meteoworld" pavilion which would demonstrate to the public the full potential of meteorological information and services.

2. Outcome of the Symposium on Public Weather Services.

2.1 The Chair provided a brief review of the Symposium on PWS held in December 2007. An overview of the Symposium and a list of recommendations is given in Annex III. The Symposium had reflected on the successes of the PWS Programme (PWSP) over the 15 years of its existence. The PWSP, through the preparation of guidelines and the provision of training, had helped many NMHSs to prepare and present better information to the public, and had thus raised the visibilities of these NMHSs in a manner that would help to sustain their infrastructure. The resources allocated to the PWSP had always been quite limited but the work of the OPAG members complemented the work of the Secretariat and gave the PWSP a greater reach through Members. By its nature the PWSP was a cross-cutting activitiy which worked closely with many other elements of WMO.

2.2 The Symposium recognised new influences which were coming to bear on PWS. Society was changing rapidly, particularly as regards to urbanisation. The technologies available for product and service delivery were developing at a tremendous rate, but the gap between developed and developing countries was likewise widening. The issue of climate change was now high on national and international political agendas and was of major strategic importance. Water supplies, the environment and human health will all place demands on improved PWS. Many of these are being driven in turn by increased human population. One internal challenge will be to engage more fully with the social sciences in order to better understand and quantify the social and economic benefits of weather-related products and services.

2.3 The Symposium considered the transformation of good products into good services through the four paradigms of Availability, Dependability, Usability and Credibility. It considered the need for NHMSs to engage in partnerships with outside agencies, the media, and the private sector in providing new and innovative services. Noting that useful weather information could now be provided at time scales ranging from minutes out to decades and even centuries, the Symposium considered the need to define a clear cross-over between "weather forecasting" and "climate prediction" and to ensure that the public understood the different ways in which these needed to be interpreted. Indeed a major focus of discussions

at the Symposium was how users, be they the public or more specialised groups of users, might become more involved in the design, evaluation and verification of weather products and services.

2.4 The Symposium had provided a total of twelve specific recommendations which would guide the work and decisions of the ICT.

3. Multi-Hazard Early Warning System Project

3.1 After the briefing by Dr Tang Xu on the Multi-Hazard Early Warning System (MHEWS) project in relation to the 2010 World EXPO in Shanghai, the ICT, in consultation with Dr. Tom Keenan and Dr Tang Xu, drew up a proposal for the 2010 World EXPO Nowcasting Services demonstration project (WENS) following the "Learning through Doing" concept. The agreed objectives of the WENS are to (i) demonstrate how nowcasting applications can enhance multi-hazard early warning services, using the opportunity afforded by the Shanghai 2010 World EXPO, and (ii) to promote the understanding and enhance the capability, as appropriate, of WMO Members in nowcasting services. The ICT tasked ET/DPM to take the lead in the project. Members with nowcasting systems may be engaged either in the research mode for demonstration and/or capacity building or in the operational mode in support of the 2010 World EXPO on a functional real-time basis. A WENS Scientific Steering Group (SSG) and a WENS Working Group would be established to steer and implement the project respectively. An agreed action plan was also established. Detailed description of the WENS is shown in Annex VII.

3.2 The ICT also reviewed the activities required of the PWS OPAG to support the MHEWS project. These included the establishment of an Advisory Group of Experts to provide advice and guidance to the CMA Management Group and the WMO Secretariat Coordination Team of the Shanghai 2010 World EXPO project as well as that relating to the engagement of the International Association of Broadcast Meteorology (IABM) with the "Meteoworld" pavilion at the 2010 World EXPO This Advisory Group would be termed the Shanghai PWS Advisory Group of Experts, (S-PAGE). The TORs of S-PAGE are detailed in Annex VIII. Other activities reviewed included the organisation of training curricula on the management and technology of EWS services, provision of assistance to the SMB/CMA to organise study visits to better understand good practices and experience related to EWS; publication of the experience of PWS projects related to the 2010 World EXPO; provision of case studies and examples of successful multi-agency response practice; advice on out-reach activities related to community safety, training material on social and economic benefit assessment relevant to Shanghai, guidance and training on public awareness and communication relevant to Shanghai, engagement with the IABM on the "Meteoworld" pavilion and the development of the concept for the "Urban Weather Office of the Future" for the "Meteoworld" pavilion. The nowcasting products and services deriving from WENS would be demonstrated in the "Urban Weather Office of the Future". A summary task table is shown in Annex IX.

3.2 **Action**: A formal letter to be sent by WMO to CMA requesting them to designate focal points for the WENS demonstration project.

4. ICT Work Programme

4.1 In the light of the recommendations of the PWS symposium and the proposed engagement in the PWS components of MHEWS project, the ICT reviewed the activities of the ICT and its Expert Teams. The ICT noted with satisfaction that progress had been made by all teams in meeting their deliverables. The ICT then proposed new TORs and deliverables for the OPAG for the forthcoming inter-sessional period. The ICT agreed that the existing structure of the three expert teams be maintained but with the incorporation of public education and outreach functions into the TORs of the ET-COM, which would be renamed ET-COPE (Expert Team on Communication, Outreach and Public Education). The new TORs and deliverables of the ICT and its Expert Teams are shown in Annexes X and XI respectively.

The Chair of the OPAG undertook to notify the upcoming Management Group meeting of CBS in June 2008 of these news TORs and Deliverables, in the light of the fact that work on some of these would need to commence in advance of the next session of the Commission, scheduled for the spring of 2009.

5. Visit to the Suzhou Meteorological Bureau

5.1 The ICT members visited the Suzhou Meteorological Bureau on the 14th May 2008. This visit was useful in providing information to the Team on operational forecasting procedures in the Shanghai region, and on interactions between the meteorological community and with other key government agencies.

5.2 The ICT members toured the forecasting office where Dr Yang Jinbiao, Director of the Suzhou Meteorological Bureau, welcomed and briefed the team on the operation of the centre. This was followed by video-conference presentations from the Shanghai office on severe weather warnings and nowcasting activities in SMB.

5.3 The first presentation described meteorological disasters and associated weather systems in Shanghai. Tropical cyclones, heavy rain, severe convective weather, heat wave and thick fog were highlighted as the main meteorological hazards that affect the Shanghai. Region. The SMB Observing System was also described; 35 radars will be in operation by 2010, including backup radars to be deployed in Shanghai for the MHEWS project. A demonstration was provided on the use of electronic screens to prominently display weather information to the public, including especially severe weather warnings. There was an agreement with the road authorities to display severe weather warnings on traffic information signs.

5.4 The second presentation demonstrated the features of the SMB NowCAsting & Warning System (NoCAWS), including the forecasting tools and dissemination channels for severe weather and nowcast warnings.

6. Visit to 2010 World EXPO site and the Bureau of Shanghai World EXPO Coordination

6.1 The ICT visited the 2010 World EXPO site during the afternoon of the 15th May 2008. The aim of the visit was to get an appreciation of the location and size of the WMO and

SMB/CMA “Meteoworld” pavilion, and use this knowledge to brainstorm some ideas. This visit helped to generate many ideas which were further discussed in the meeting on Friday morning May 16th, including exciting ideas around defining of the concept of the “Urban Weather Office of the Future”. The ICT members toured the site itself and then visited the Bureau of Shanghai World EXPO Coordination, where the team viewed a model of the World EXPO site plan and a virtual demonstration of the pavilions. The briefing also encompassed a history of the World EXPO and outlined the theme of the forthcoming event in Shanghai – Better City, Better Life - which would focus on the urban environment of the future.

7. Discussions concerning the involvement of broadcasters with the “Meteoworld” pavilion.

7.1 The meeting was joined on the morning of Friday 16th May by Ms Shi Yongyi, General Manager of the Huafeng Group of Meteorological Audio and Video Information, CMA, Mr Wang Shaoyun, of the Shanghai Broadcasting Group, and Ms Liu Ouxuan, Deputy Director of the Shanghai Meteorological Media Centre, SMB/CMA. Ms Shi provided an overview of the national weather broadcast arrangements within CMA. This included providing TV broadcasts for 7 national CCTV channels as well as educational programming. A substantial amount of content is also provided for new media. Meteorological reporters are employed who aim to be “first on the scene” in the event of natural disasters etc.

7.2 Mr Wang described arrangements at the municipal level between SMB and his broadcasting group in the provision of weather broadcasting services to the Shanghai region. This includes an agreement signed with the Municipal Government to break into programmes to broadcast weather warnings. He made the point that the provision of a high quality weather forecast service reflected well on the broadcaster as well as the SMB. He also stressed the importance of the information meeting the needs and tastes of the audience.

7.3 Ms Liu gave a presentation on the concepts for the “Meteoworld” pavilion at the 2010 World EXPO. The design of the pavilion has not proceeded beyond preliminary concept stage; the design will need to be finalised by the end of 2008 as construction will begin in early 2009. Other partners in the pavilion are EUMETSAT, GEO and the IPCC. Regarding the provision of ideas/concepts for the “Urban Weather Office of the Future”, the meeting clarified that these would be required from S-PAGE by September 2008.

7.4 Some of the ideas discussed included the concept of an interactive weather experience/exhibit, an operational weather broadcast studio, an operational forecast office demonstrating state-of-the-art research technologies, and a focus on services in the context of “weather information, anywhere, anytime, anyhow”. It was clarified that the “Urban Weather Office of the Future” would deliver real-time weather forecast information for the EXPO site, including information from the nowcast demonstration project WENS.

7.5 The Chair of the ICT provided an overview of the IABM and detailed the possible levels of engagement of the Association with the EXPO project. The IABM had organised the “First World Conference on Broadcast Meteorology” in conjunction with the Universal Forum of Cultures in Barcelona, in June 2004. This encompassed a three-day professional conference and a three-day WMO training course in weather broadcasting.

7.6 The EXPO project provided a challenge to the IABM in that it would last six months. The Chair suggested that the involvement of the IABM might be focussed on a two-week period during the EXPO; one week of conference and one week of training. It also might be possible to provide a lower level of engagement over a longer time span, with just two or three persons involved.

7.7 The meeting welcomed enthusiastically the idea of international broadcasters using the pavilion to broadcast back to their home audiences. It was noted that technical support could be provided locally by the Shanghai media group. The proposal should also encompass the active participation of Chinese weather broadcasters. The Huafeng Group has a professional team of broadcasters ready to work with international colleagues.

7.8 Although financial resources have not yet been authorised, it is anticipated that some funding support will be available through CMA and the Shanghai Municipal Government. It may be possible to leverage resources through the organisers of the various national pavilions; the EXPO organisers will be contacted to pursue this idea.

7.9 **Action**: It was agreed that an official letter will be sent by WMO to CMA asking them to designate an official focal point in relation to the IABM/broadcasters engagement.

8. China Earthquake of May 12th.

8.1 A major earthquake of magnitude 8 on the Richter Scale struck the Sichuan province of China at 14:28 hrs on the opening day of the meeting, May 12th. The meeting was briefed on the earthquake and on the services being provided by CMA in support of the rescue efforts. By the end of the week it was estimated that the disaster had claimed 20,000 lives and that this number was likely to rise significantly. The Chair, on behalf of the ICT, expressed the deep sympathy of WMO to the people of China, and especially to the families of the victims. The meeting commended the significant assistance provided by CMA in support of the rescue operations, which had been hampered by heavy rains.

8. Closure

8.1 The meeting closed at 1700 hours on Friday 16th May, following expressions of appreciation by the ICT to SMB for the kind hospitality, logistical and professional support which has been extended to the ICT which had helped enormously to bring the meeting to a successful conclusion, despite its exceptionally heavy work load.

Public Weather Services Core Implementation and Co-Ordination Team

Shanghai, China, 12-16 May 2008

PROGRAMME

Annex I

	Monday 12 May	Tuesday 13 May	Wednesday 14 May	Thursday 15 May	Friday 16 May
0900 1045	**1**. Opening and welcoming address. **2**. Background information, and Objectives. (H.Kootval)	**7.** Severe Weather Forecasting Demonstration Project (Chair) **8.** Probabilistic forecasting	**13.** New TORs and Deliverables of the ICT (G. Fleming)	**15.** Review of the Expert Teams structures and roles	**19.** Discussions on EXPO project and PWS involvement in the Meteoworld Pavilion and the IABM participation.
1115 1245	**3**. Review the final summary and recommendations from the PWS Symposium for incorporation into TORs as appropriate (Chair, H. Kootval)	**9.** Learning Through Doing Initiatives: Latin America (Annex V); SWFDP initiative (Chair, MC Wong, H. Kootval) **10.** Nowcasting/ FDP (T. Keenan)	**14**. Visit to Suzhou Meteorological Office	**16.** Preparation of ICT Report – Initial Drafts. (All)	**20.** Preparation of ICT Report: continue (All)
	Lunch	**Lunch**	**Lunch**	**Lunch**	**Lunch**

1400 1530	**4**. The MHEWS project and its incorporation into the work of the ICT and ETs (Tang-Xu)	**11.** New TORS and deliverables of ET/COM (J.Gill).	Visit to Suzhou Meteorological Office	**17.** Visit to EXPO site	**21.** Adoption of ICT Report (All)
1600 1730	**5.** Discussions on the MHEWS project **6.** Outline of ICT Report (Chair)	**12.** New TORs and Deliverables of the ET/DPM (MC Wong)	Visit to Suzhou Meteorological Office	**18.** Preparation of ICT Report – Initial Drafts. (All)	**22**. Closure

Explanatory Notes on the Agenda

1. The meeting will open on Monday 12 May 2008.

2. Following the opening statements, the Secretariat will provide a brief overview of the objectives and the expected outcome of the meeting as well as providing some background information.

3. The recommendations of the PWS International Symposium (Geneva, Dec 2007) will be considered by the ICT as inputs into the terms of reference and deliverables for approval by the forthcoming session of CBS.

4. The MHEWS of Shanghai will be discussed (follow-up to the December meeting of ICT with Tang-Xu) for its inclusion in the activities of various ETs .

5. Other projects and activities currently undertaken by PWSP in collaboration with other programmes and activities will be discussed. This will include the follow-up to the Madrid Action Plan, the Learning Through Doing project, Nowcasting including the work of the JONAS Committee, Probabilistic forecasting, the SWFDP. Dr Tom Keenan will brief the meeting on the proposed FDP on nowcasting.

6. The meeting will consider and decide on the new terms of reference and deliverables for each of its ETs and the ICT as a whole for presentation to the next session of CBS..

7. The meeting will prepare, review and adopt its report prior to the closure of the meeting on 16 May.

Annex II

Participants at the meeting of the IMPLEMENTATION / COORDINATION TEAM

Mr Gerald Fleming, **Chair** Irish Met Service, 30 Parkview Wexford Ireland Tel: (353) 53 914 1536 Mobile: (353) 87 220 0815 Fax: (353) 53 914 5721 E-mail: gfleming@eircom.net	Mr Mnikeli Ndabambi **Co-Chair** South African Weather Service Private Bag X097 Pretoria 0001 South Africa Tel: (271-2) 367 6033 Fax: (271-2) 367 6042 / 43 E-mail: mnikeli@weathersa.co.za
Mr Jon Gill Bureau of Meteorology GPO Box 1289 Melbourne, Vic 3001 Australia Tel : (613) 9669 4713 Fax : (613) 9669 4725 Email : j.gill@bom.gov.au	Dr Ming-Chung Wong Hong Kong Observatory 134A Nathan Road Kowloon Hong Kong-China Tel: (852) 2926 8232 Fax: (852) 2721 6557 Email: mcwong@hko.gov.hk

Dr Tang-Xu Shanghai Meteorological Bureau Shanghai Regional Centre, CMA 166 PuXi Road, Shanghai 200030 China, Tel: (86-137) 6422 9911 Fax: (86-21) 648 75 023 Email: tangxu570512@vip.sina.com	Dr Lei Zhaochong Nanjing University of Information Science and Technology Nanjing, Jiangsu Province 210044 China Tel: (86 25) 5873 1403 Fax: (86 25) 5701 0085 Email: zhaochong.lei@gmail.com
Ms Haleh Kootval WMO Secretariat Case Postale No. 2300 CH-1112, Geneva 2 Tel: (41-22) 730 8333 Fax: (41-22) 730 8021 Email: hkootval@wmo.int	Dr Tom Keenan Bureau of Meteorology Research Centre GPO Box 1289 Melbourne , Vic 3001 Australia Tel: (613) 9669 4483 Fax: (613) 9669 4660 Email: T.Keenan@bom.gov.au

Annex III

International Symposium on PWS: A Key to Service Delivery

(Geneva, 3 - 5 December 2007)

SYMPOSIUM OVERVIEW AND RECOMMENDATIONS

Symposium Overview

The International Symposium on PWS: a Key to Service Delivery was held in Geneva from 3 to 5 December 2007. The event was attended by 120 speakers and participants. The purpose of the Symposium was to carry out a thorough review of the achievements of the WMO Public Weather Services Programme (PWSP) during the 13 years of its existence, and to make recommendations that would guide its implementation during the next decade and beyond. The ultimate aim of the Symposium was to ensure improvement of service delivery by National Meteorological and Hydrological Services (NMHSs) and other entities engaged in weather, climate and water issues.

The Symposium addressed major areas of PWS including: best practices in the delivery of weather, climate and water services; education and capacity building; the future of PWS in view of the ever evolving global developments and; service delivery in the next decade. The Symposium benefited greatly from presentations, papers and interventions from 40 highly experienced speakers, in the full range of aspects of service delivery. The Symposium enlisted the assistance of the International Association of Broadcast Meteorologists (IABM).

Achievements of the WMO Public Weather Services Programme

The Symposium noted that, since the formation of the WMO PWSP in 1994, it had achieved impressive results through a range of activities that had proved valuable to WMO Members, in particular the wide range of printed guidance materials, a substantial number of workshops and through a number of training activities that had built capacity in NMHSs to deliver improved PWS.

New developments such as the global web sites that had been established to provide severe weather information and cities forecasts and historical data were increasingly valuable and were pointers to possible future service delivery.

The PWSP had addressed many of the needs identified in the late 1980's and early 1990's for WMO to assist its Members to more clearly articulate and implement their role in delivering a range of public weather and related services that were important socially and economically, and that were only possible because of the continued investment in meteorological infrastructure. This had been and continues to be important in the context of publicly funded versus commercial services, the free international exchange of data, relationships with private sector meteorology and relationships with the media.

The PWSP is now seen to have been successful in raising the visibility of NMHS's

in many countries and in the development of a stronger user focus that encourages development of services that meet end user needs, and make best use of the resources available.

The PWSP had also been influential in building relations between WMO and the global media, which has led to improved understanding of the respective roles of the media and NMHS's.

The representatives of smaller NMHSs and those from LDC's felt that the activities of the WMO PWSP had been especially valuable to them because it had provided capacity building such as the television weather presentation studios, which are vital for packaging and dissemination of weather information, forecasts and warnings. The studios had enabled them to make significant progress in delivering better quality services.

The PWSP was seen to have been greatly successful in increasing the number of NMHSs delivering weather services to the public through television, radio, the print media and the Internet. It was also found to have contributed to the quality of these services in terms of making it easier for the public to understand PWS products, and in equipping NMHSs with skills and capacities to deliver the services in a timely manner.

The Symposium also appreciated the role of PWS in raising the visibility and status of NMHSs in many countries, thus making it easier for them to receive institutional and fiscal support.

These results had been accomplished with quite modest resources through the use of innovative and collaborative approaches involving other WMO programmes, assistance from particular WMO Members, and from links with groups such as the IABM. The Symposium observed that PWSP had effectively linked with the other elements of CBS, Technical Commissions such as CAS, CCl and CHy, and with other cross cutting programmes. The PWSP had also helped give practical effect to the arrangement between WMO and the International Olympic Committee to improve access to international weather data for those attending the Olympics.

New influences on PWS

The Symposium recognised that in recent years, the world has experienced rapid social changes resulting in new influences impacting PWS. Similarly, rapid technological changes have taken place availing potential for the development of new methodologies of service delivery. The Symposium therefore observed that it is necessary to adopt new approaches to service delivery in order to meet modern PWS user needs. In this regard, the Symposium stressed on the following points:

- The pace of change is making it increasingly important to strengthen communication with key stakeholders;

- The issue of climate change is now firmly on national and international agendas as a major strategic issue that will require increasing attention, careful planning and resources;

- Broad issues of water supplies, the environment, human health, and urbanisation will provide new PWS needs for the future;

- Increased human population and vulnerability in many parts of the world is placing new demands on NMHSs to provide new services to meet the new challenges;

- PWS will be influenced in the future by the increased engagement of the social sciences in environmental issues;

- The issue of evaluation of socio-economic aspects is becoming more relevant in determining the effectiveness of services and in justifying existing or increased investment in PWS;

- All NMHSs face significant challenges and opportunities to maximise exploitation of advances in science and technology in order to enhance the range, relevance and quality of PWS.

These influences are likely to lead to demands for increased resources in WMO to support NMHSs in the development of their PWS. WMO and its Members will also need to meet the changing demands, as well as look at innovative ways of accessing resources, and seek to build partnerships that foster PWS delivery.

Strengthening User Focus

The Symposium stressed that NMHSs must continue to give attention to user needs to ensure that public weather services are valued and used and that available resources are used in the most effective way to achieve the desired outcomes.

A key message of the PWSP is that the provision of quality services is much more than the provision of good products. Quality service can be characterised by:

Availability – is the information relevant to the client, and available when the client needs it?

Dependability – can the client expect the information to be delivered on time and without fail?

Usability – is the information presented in a manner which enables the client to fully understand it?

Credibility – does the client have faith in what is (frequently) no more than a professional opinion?

Communicating Effectively with Users and Other Stakeholders

The Symposium agreed that a key feature of building strong relationships with users and decision-makers was to communicate effectively through a variety of mechanisms. NMHSs need not only to understand user needs, but to communicate their capabilities

effectively to users, governments, planners and politicians because many are unaware of the wide capabilities of the NMHS.

It is helpful if NMHS capabilities can be linked to national plans and to internationally agreed priorities such as the UN Millennium Development Goals.

The Value of Partnerships

The limited resources available to NMHS's in the face of demands for services that are increasing in number and complexity make it essential to look at partnerships and collaborations as ways of leveraging resources to achieve more effective results. The climate outlook forums and climate for development activities in Africa (ClimDev Africa) are good examples of the value of such partnerships. There exists a real opportunity for leveraging resources through forming partnerships for climate change related service delivery by the PWSP.

Partnerships with the media continue to be a key success factor in effective delivery of PWS at the national level. The concept of partnership will be increasingly important to the success of service delivery implementation.

Partnerships in Responding to the Issue of Climate Change

The prominence of this issue internationally and for national governments has substantial implications for NMHSs which, in most cases, are not only the principal custodians of the national climate record, but are actively engaged in providing a range of services and information related to weather and climate, and related issues such as water, the environment and research on climate change, and may also be providing policy advice to their governments.

The wide acceptance and awareness of climate issues provides NMHSs with the opportunity to link their activities with national and regional plans and to build partnerships.

NMHSs need to make government planning authorities, politicians, and the users aware of the infrastructure, data and expertise inherent in NMHSs, as well as the capabilities of NMHSs to provide a wide range of relevant information and services. This knowledge will increase demands on the NMHS for advice on important policy and planning issues in both government and the private sector.

NMHSs should take note of the relevant parts of considerations of the IPCC that apply or could be relevant to the future planning of public weather services, in particular the documents submitted by WMO and included in "Nairobi work programme on impacts, vulnerability, and adaptation to climate change". These documents describe the scope for NMHSs to contribute to this issue in a range of ways, and of the need for the NMHSs to be supported more strongly so that they are able to fulfil their potential.

The developments in Climate Risk Management (CRM) approach – especially in Africa have some strong messages to future plans of WMO. They emphasise the importance of the NMHS being able to focus on user needs, and deliver an integrated suite of services ranging from weather and climate services, to the impacts in the areas such as water resources, agriculture, and broader environmental issues. The climate outlook forum process in Africa has developed into a very valuable model for user engagement, the visibility of the NMHS and the role of regional meteorological bodies. Some donors/funding agencies now recognise and even require evidence of services provided as the visible pay-off for their investment.

Increasing Vulnerability of Society

Communities are expected to become more vulnerable due to the combined effects of increasing populations on the one hand, and the impacts of climate change with regard to severe weather, droughts, water supplies, the environment, and energy supplies on the other.

If, as suggested by climate change scenarios, there is likely to be an increase in extreme weather events, NMHSs will need to improve further their PWS in relation to civil defence and disaster mitigation, and provide timely warnings to increasingly vulnerable communities.

Using its links with the media and other outreach activities such as web sites, NMHSs will need to increase their capability to provide an integrated suite of weather, climate and related information and services on all timescales from historical information to nowcasting, medium range, seasonal and climate forecasting.

The continued rapid growth of some very large urban environments is another example of the increasing vulnerability of communities to a range of environmental problems and the need for different kinds of services to help minimise adverse impacts of urbanisation.

There are some indications that issues such as climate change, urbanisation, lack of drinking water, and demographic changes are impacting on human health in ways not adequately considered in the past and this may increase demand for climate and environmental services in vulnerable communities.

Social and Economic Factors in PWS

The climate change issue and increased vulnerability of communities has emphasised the critical importance of NMHSs working more closely with social scientists to understand the human aspects that can impact greatly on the effectiveness of PWS. The need to take account of social and economic factors in the design and effective delivery of public weather services remains a critical issue for the WMO PWS programme.

This need has been further emphasised by the Millennium Development Goals adopted by the UN and by the outcomes of the WMO conference on the social

and economic benefits of weather, climate and water services held in Madrid, Spain in March 2007 and the adoption of a specific Madrid Action Plan.

In addition to the traditionally important linkages with the civil defence authorities, NMHSs need to consider strengthening links with the wider hazard community, such as insurers and academics.

Further work is needed on how to quantify the economic benefits of PWS and how to communicate this to decision makers in government to enhance the prospects of adequate allocation of resources to NMHSs to enable them to carry out the necessary tasks of meeting social and economic needs.

NMHSs can also assist the social science community to bid for the resources needed to undertake important social and economic research.

Developments in Science and Technology

NMHSs have opportunities to improve the range and quality of services delivered to the public because of the advances in science and technology in areas such as observational techniques, satellites, numerical modelling and general improvements in communications and computing.

NMHSs will need to adopt a new service delivery paradigm in order to provide a suite of integrated services to a wider range of audiences and take advantage of new forms of technology, especially in communications and computing and "new media".

The Symposium was given examples of new media such as: the Environment Canada's "SCRIBE" as an "excellent" version of automated products where forecaster will be encouraged to stop "typing words" to deliver a message and start thinking less about the text products and; the US "pod-casting" of the weather. The Symposium learned that the automated delivery of an automated forecast is just around the corner through pushed "personal TV"- where it is programmed to wake you (for example) when there is something occurring that you wanted to hear about – e.g. when it is raining in my city, switch on and play the forecast

The PWS Symposium Recommendations

The overall objective of the PWS Symposium Recommendations is to enable WMO to assist NMHSs adopt a new service delivery paradigm to enable provision of a suite of integrated services to a wide range of users.

WMO should:

Continue providing a range of activities through the PWSP in the form of publication of guidelines, training activities and workshops to support the strengthening of PWS in NMHSs.

Focus on assisting NMHSs to develop capacity in key areas of service delivery including:

- **Effective communication of forecast uncertainty as an important element in enhancing application of forecasts, as well as a tool for fostering the credibility of NMHSs;**
- **Ensuring availability, dependability, usability, and credibility of all the services that NMHSs render to users and;**
- **Regular evaluation of their operations so as to**

continuously modernise the way they deliver services.

Assist NMHSs, in their delivery of service, to design systems that take into account culture changes such as usage of the worldwide web and mobile technology, societal revolution, economic revolution and the changing work culture.

Continuously seek out best practice examples in the communication of forecasts and warnings by NMHSs, and device ways of spreading the knowledge of such examples to other NMHSs for adoption.

Support the new 'Learning through Doing', training approach in order to transfer knowledge beyond the levels achieved through WMO training events and distribution of guidelines. The approach focuses on implementing participative learning projects, involving forecasters and users working together until new service delivery practices are sufficiently established.

Consider how best to assist NMHSs to incorporate the climate and water issues into routine service delivery to the public and how to develop their PWS into a true one stop shop for weather, climate and water services.

Assist NMHSs to develop capacities for resource mobilization through the creation of partnerships for example by seeking partnership for PWS delivery in areas related to understanding and adapting to climate change.

In addition to the WMO mainstream training activities, to also assist NMHSs to train top managers especially on the issue of dealing with government officials and policy-makers, and on how to

work with leaders in the different user sectors.

Assist NMHSs to develop capacities to respond to emerging and future needs such as the education of the public on rare but potentially catastrophic phenomena such as tsunami warnings.

Demonstrate the importance of NMHSs to carefully study their respective government long-term plans and to use such plans as a basis for carrying out public weather services gap analysis aimed at shaping new innovative services.

Note the strategic importance of the UN Millennium Development Goals, the IPCC's Nairobi Work Programme and the Madrid Action Plan on social and economic benefits of weather climate and water services, and consider some further evolution of the PWSP so that it can assist Members to address these strategic issues through modernised, integrated service delivery to the public.

Review and revise the structures of the PWSP OPAG and Expert Teams in a manner that will best respond to:

- **The need to address social and economic aspects of public services including taking advantage social sciences in helping to understand social problems and the best ways for NMHS's to respond to such problems;**
- **The need to harness new science and technology and "new media", and;**
- **The increasing requirement for NMHSs to provide an integrated range of services to meet community needs.**

Annex IV

Report

The Core ICT /PWS

Informal meeting

Geneva, 6 December 2007

The ICT/PWS met in Geneva on 6 December 2007. Present at the meeting were: Gerald Flemming (OPAG Chair), Jon Gill (Chair, ET/COM), John Guiney, (Chair, ET/SPI), MC Wong, (Chair, ET/DPM), Tang-Xu,(DG/ SMB), Dr Xu Xiaofeng (Deputy Director, CMA) L. Jalkannen, P. Chen, S. Muchemi and H. Kootval. The report of the meeting is given in Annex IV.

The agenda of the meeting was to review the work programme of the ICT for 2008 leading to CBS-14. However, in view of several other activities, notably the Shanghai MHEWS, the African SWFDP, probabilistic forecasting, nowcasting, public education and outreach, socio-economic applications, pilot projects on "Learning through Doing" and capacity building it was decided to include these activities in the review process as well and plan an all encompassing work plan.

MHEWS Shanghai Project

Following a presentation by Tang-Xu on the Shanghai Project, the meeting discussed the "expected support from PWS" in this project as follows.

1. **Establish an Advisory Expert Group of the PWSP sub-project for the MHEWS project**

   The meeting agreed that the ICT member (Chair, Co-chair, Expert Team chairs) would form this group. In addition, other experts from any of the other PWS groups and teams could be invited to participate as necessary.

2. **Organize Training Curriculum for Shanghai Government Agencies, CMA, SMB on Management and Technology of EWS Services by 2012**

   The meeting agreed that several training events should take place for different groups as part of the project, before (2008-2009) and during the Shanghai Expo (2010) and the resulting programmes of these trainings will be developed into a curriculum by experts in this field.

3. **Assist SMB to organize Study Visits to other countries for understanding good practices and experiences related to EWS. Also organize study tours and training workshops on EWS in Shanghai.**

   The meeting agreed that study visits will be helpful help the Expo organizers. PWSP will assist with this. Study tours and workshops in Shanghai will help to compile lessons learnt. The opportunity could also be taken to organize a second broadcaster training seminar in Shanghai during Expo.

4. Summarize and publish the lessons learnt and the Shanghai experience

The results of workshops, visits and experiences before and during the Expo will be published at its conclusion.

5. Application of Probabilistic and deterministic forecasting, Nowcasting

The meeting agreed to refer this to expert teams dealing with probabilistic forecasting issues and nowcasting. A set of newly completed guidelines on the communication of uncertainty could be a basis to develop training courses and materials for SMB/CMA personnel as well as for use in media and public education about these products. ET/SPI and ET/COM will include this task as part of their TORs. ET/DPM will follow the nowcasting issue with the help of newly established joint PWS/WWRP steering committee on nowcasting (JONAS).

6. Multi-agency response practice

Various contacts within PWS will be used by PWSP to organize contacts (and visits as needed) in countries with experience in EWS, e.g., USA, UK, France and Australia.

7. Community safety programme

ET/DPM together with the members of public education expert group as well will work with the OPAG Chair to address this item.

8. Social and economic benefit assessment

PWSP to use a set of guidelines being developed by a consultant contracted to WMO on this issue and develop training materials for seminars and workshops.

9. Applications of ensemble prediction and nowcasting

Chair of ET/DPM to follow on this

10. Public awareness, communication and media

OPAG Chair through IABM, and Chair of ET/COM to follow up on this.

The S.E African SWFDP

The meeting was updated on the status of this project which has provided an operational framework to scale the NWP products down to S.E. Africa region, which may be implemented in some other regions as well. The PWS contribution to this project will be through building relationships with the media and civil protection agencies. This project will involve all three PWS expert teams and the participation of PWS has to be coordinated through the teams through an approach similar to "Learning through Doing" pilot project.

WMO Forum: Social and Economic Applications and Benefits of Weather, Climate and Water Services"

The meeting agreed the Forum should operate independently of the OPAG structure since its mandate is much broader than PWS issues such as its involvement in the implementation of the Madrid Action Plan.

"Learning through Doing" Pilot Projects

A pilot project will be funded under this theme for two countries in Latin America through the Spanish funds. A possibility for funding one or two countries in Africa will be explored with the Met Office. All expert teams will have a role in the implementation of these projects.

Meteoalarm

Interest has been expressed by South Africa Weather Service to explore the possibility of setting a system similar to the European Meteoalarm for Africa. PWSP will explore with the SAWS to explore as a first step the interest of some African countries to participate in the SWIC project and to put them in touch with the SWIC coordinators in Hong Kong Observatory.

OPAG /PWS Structure and work plan for 2008

The meeting agreed that the outcome of the PWS symposium would be a major shaping factor for its TORs in preparation for CBS-15. It also agreed to postpone individual expert team meetings until after CBS and instead meet in the ICT format to draw up the TORs and deliverables on the basis of the issues and accompanying tasks identified at the Geneva meeting.

Annex V

“Learning through Doing” Pilot Project Proposal

(Chile)

Haleh Kootval

Chief, Public Weather Services Programme

WMO

"Learning Through Doing" Pilot Project - Chile

1. Introduction

To assist WMO Members, particularly developing countries, in enhancing their Public Weather Services (PWS) capabilities, the Implementation and Coordination Team (ICT) of the Open Programme Area Group (OPAG) on Public Weather Services (PWS) formulated a proposal to develop pilot projects based on the work of various expert teams of the OPAG on PWS and the Madrid Action Plan (MAP). The objective of the pilot projects is to assist NMHSs of the participating Members to improve their communication with users in selected target sectors, and to develop and deliver an improved range of products ad services which would enhance the socio-economic benefits provided through the NMHSs to Members. This proposal was further discussed at the Second Meeting of the Task Force on Socio-Economic Applications of Meteorological and Hydrological Services held in Geneva (11-13 July 2007), and was supported by the Task Force for implementation. Latin America was recommended for the first pilot project, with the WMO Trust Fund for Latin America being identified as a possible source of funding. The proposal was presented to the annual meeting of the directors of NMHSs from the Latin American countries and was supported for implementation in two candidate countries.

The first country where the project will be implemented is Chile. Details of realization of the pilot project, including the planning, implementation and review processes, are described below.

2. The WMO Madrid Conference and Madrid Action Plan (MAP)

The WMO International Conference on "Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water services" took place in Madrid, Spain from 19-22 March 2007. The Conference endorsed a Madrid Action Plan (MAP), with the overall objective of achieving, within five years, a major enhancement of the value to society of weather, climate and water information and services in response to the critical challenges represented by rapid urbanization, economic globalization, environmental degradation, natural hazards, and the threats from climate change.

The main recommendation of MAP is that NMHSs would need to enhance their efforts to make potential users – including their governments – aware of the range of

products and services, including potential new products and services, and their expected benefits for users. This should lead to a dialogue with the users so that the users can specify their requirements and respective service level agreements can be concluded to maximize the benefits provided by the meteorological and hydrological community.

The pilot project "Learning Through Doing" is an integral part of the follow-up actions arising from the MAP, and also takes into account contributions from Regional workshops which preceded it. The Actions from MAP that have direct relevance to the mandate of the PWS Programme of WMO are as follows:

Action 3: Embark on capacity-building endeavours through the creation of education and training opportunities for both users and providers of weather, climate and water information in order to increase awareness of users to the opportunities afforded by weather, climate and water services and to assist the providers of these services to understand more fully user requirements.

Action 7: Facilitate and strengthen dialogue and collaboration between providers and users of weather, climate and water information and services through international, regional and national platforms and programmes, and through the development of appropriate tools and methods.

Action 9: Strengthen existing, and establish new, operating partnerships between users and providers of weather, climate and water services to share responsibility for effective delivery of services, and evaluate their performance.

Action 10: Facilitate and strengthen the ability of NMHSs to effectively communicate weather services and products, through all forms of media, in such a manner as to maximize the benefits provided to society by the meteorological and hydrological community.

Action 11: Encourage the NMHSs and the social science research community to develop knowledge and methodologies for quantifying the benefits of the services provided by NMHSs within the various socio-economic sectors, in particular:

- Develop new economic assessment techniques including especially techniques of economic assessments for developing and least developed countries;
- Develop WMO guidelines on operational use of economic assessment techniques.

3. Regional Workshops

As part of the process leading up to the Madrid Conference, a series of seven regional and sub-regional workshops were organized by WMO during the period November 2005 to February 2007 in the Philippines, Mali, Brazil, Kenya, Tanzania, Kuwait and Croatia. The main goal of these workshops was to provide a forum for promoting interdisciplinary assessment of socio-economic benefits of meteorological and hydrological services involving service providers and users.

The overall findings from the workshops identified the following areas of concern:

- Inadequate understanding of user needs for information and services;
- Lack of awareness of users of the available and potential services;
- The difficulty of integrating Weather Climate and Water services into national development strategies and priorities;
- Lack of capacities and competencies in NMHSs to deliver services to meet user needs;
- Inadequate communication between NMHSs and users.

4. Outline Project Plan

4.1 Project Objective

The objective of the "Learning through Doing" Pilot Project –Chile is to assist participating countries, through learning by doing, and through maximizing their existing capabilities, to make existing and potential end-users aware of the range of both available and potential new products and services, and the benefits for users; and to enhance the capacities of the NMHSs to effectively disseminate and deliver such products and services.

4.2 Key outcomes

a. Improved service delivery (to the benefit of both target sectors and the participating NMHS);
b. Enhanced capacity in the NMHS; and
c. Enhanced brand of the participating NMHS.

4.3 Exclusions

Since this is a pilot project, it is envisaged that the lifetime of the project will not exceed two years. A key output of the project, in this regard, will be to identify the potential of sustainable roll out of the concept in other Member countries in Latin America and other WMO Regions.

4.4 Project Scope

The pilot project would comprise three stages, namely Planning, Implementation and Review stages, as described below. The activities, key deliverables and milestones are included in the description of each stage.

(I) Stage I: Planning

1. Finalization of the project proposal (in English and Spanish), including definition of project scope, duration, milestones and deliverables. **(February 2008)**

2. Choice of consultant on the socio-economic aspects of the project, and Terms of Reference (TORs) of the consultant to be included in the project proposal. **(February 2008)**

3. Formal agreement to be signed between Chile, WMO and INM. **(March 2008)**

4. The project proposal and funding agreement would constitute the key deliverables of Stage I.

(II) Stage II: Implementation

1. Plan and organize the first workshop of the project with the participation of the NMHS Chile and representatives of a wide selection of user sectors, as identified by the PR of Chile. The consultant will work with the NMHS Chile to identify and invite speakers at the workshop. The purpose of the workshop will be to give an opportunity to the user sectors to present their requirements for information and services and likewise for the NMHS to present its current capabilities and services. The workshop will also serve the purpose of identifying the target sectors that will be included in the pilot project and with whom the NMHS will continue to work for the entire length of the project. **(April 2008)**

2. The consultant will develop an initial market survey with the selected user sectors to benchmark the NMHS brand to determine in a formal way, if the selected sectors are aware of and use the products and services of the NMHS. Methodology for socio-economic assessment of benefits to target sectors will then be established and the baseline impact of the existing set of meteorological products and services clarified. The project will use the experiences of countries which might have already started this initiative to see how their experiences could be applied to Chile. **(May/June 2008)**

3. The NMHS will engage the target sectors in dialogue in a systematic manner, to make known an in-depth inventory of the user requirements and NMHS capability to meet the requirement, thus revealing the gaps between user requirements and the NMHS's current capability. **(June 2008)**

4. The results of survey and dialogue will be translated by the consultant into a business plan for the NMHS in dealing with the target sectors, with improvements in PWS through (i) new or enhanced products; (ii) use of new technology in service delivery; (iii) more effective communicative skills and means; and (iv) more public education and outreach. **(June 2008)**

5. The business plan will be put into action, and if needed, consultant (s) will be recruited to the project to work on the technical aspects of the products and services improvement as identified. The improved and/or new products and services will be applied to the areas as identified and the outcome of the business plan will be monitored in a systematic way which will be set up jointly by the consultant and the NMHS. **(July 2008-December 2009)**

6. The initial market survey report, criteria and methodology for the assessment of economic benefits of the target sectors, the business plan and the outcome monitoring plan will be the key deliverables of the Implementation Stage.

(III) Stage III: Review

1. Following the execution of the business plan, a post-project survey to assess impact of the improved PWS will be conducted. Enhanced capacity of the NMHS, improved products and more efficient service delivery are useful indicators. The overall evaluation should use as basis the benchmark brand of the NMHS and the baseline social and economic impact, established earlier. **(March 2010)**

2. A closing workshop will be organized and conducted by the consultant to share experiences and knowledge with the neighbouring NMHSs. **(April 2010)**

3. The post-project survey, the overall evaluation reports and the closing workshop will be the key deliverables of this stage.

4.5 Review and Evaluation

In order to easily assess the success made in the implementation phase of the project, a procedure for ongoing documentation of results will be built into the project. It is intended that an initial report will be prepared for submission to the Fourteenth Session of the Commission for Basic Systems (CBS-XIV), planned to take place during the fourth quarter of 2008.

Note on the selection of Chile as a candidate Member

- The NMHS Chile has an operational forecast office and produces an adequate suite of products and services.
- The NMHS Chile has demonstrated level of commitment – both infrastructure and support from the management.
- The NMHS Chile can identify potential users in the target sectors.
- Ideally, NMHS Chile can co-operate with the relevant RSMC or a regional coordinating centre to assist with access to products that may be necessary for the project.

Annex VI

Report of the Expert Team on

PWS in support of Disaster Prevention and Mitigation (ET/DPM)

The following is an account of work of the expert team since 2005 in respect of the terms of reference (TOR) and deliverables of the ET/DPM:

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 (PWSP). 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;

1. 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.

2. The Implementation Coordination Team (ICT) of the OPAG met in Muscat, Sultanate of Oman, from June 4 - 9 2007 to discuss the new and emerging issues of special importance to the work of the PWSP; 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 major decisions of the ICT were:

(a) The OPAG would initiate a PWS Pilot Project, focusing on "Learning through Doing", aimed at a small number of countries and a defined range of sectors;

(b) Extra responsibilities for Outreach and Public Education are devolved onto ET/COM, to be re-named ET/COPE;

(c) The bringing together of all responsibilities relating to the WWIS and SWIC websites which would henceforth lie with ET/DPM;

(d) ICT members would act as the Programme Committee for the Symposium on PWS to be held in Geneva in December 2007;

(e) ICT would support the constitution of the Task Force on Social and Economic Applications of PWS as an Expert Team within the OPAG;

(f) 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;

(g) 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.

The ICT considered that, as the PWS Pilot Project in (a) above 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.

3. The PWS OPAG Implementation Coordination Team (ICT) meeting was held on 6th December 2007 in Geneva to discuss the future work programmes. The ICT deliberated that one of the main thrusts of future work would be on nowcasting applications, in particular, in relation to the cross-cutting Shanghai 2010 EXPO Multi-Hazard Early Warning System (MHEWS) Project. (See also discussion in TOR(h).)

4. The ET/DPM Chair attended and lectured in the Asia Conference on Disaster Reduction (ACDR) 2006 held in Seoul, Korea as well as the ACDR2007 held in Astana, Kazakhstan.

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;

1. 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 was 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.

2. In 2006, eight meteorologists from Members attended the VCP Training Course on "The Use and Interpretation of City-specific Numerical Weather Prediction Products" also organized by Hong Kong, China.

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 made available on the website of WMO.

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;

1. 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 Meteo-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 31 March 2008, 161 out of a total of 188 WMO Members participated in WWIS, the latest two being Republic of Moldova and Papua New Guinea. A total of 118 Members provide forecasts for 1263 cities, while 161 Members provide climatological data for 1265 cites.

The access statistics of WWIS since 2003 is shown in Annex VI(a). The figure shows that the popularity of WWIS remains very high.

2. 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.

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

4. The WWIS website was one of the 10 finalists in the "Environment" category of Stockholm Challenge 2008. The result will be announced on 22 May. The Stockholm Challenge is an international competition held once every two years to award the best ICT applications for people and society.

5. Twenty WMO Members are presently participating in SWIC. The number of monthly page views reached a record high of 2,937,823 in Aug 2006. The access statistics of SWIC since 2003 is shown in Annex VI(b). The figures show an increasing popularity of the SWIC.

6. 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.

7. 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.

8. 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;

1. The SWIC continues 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.

2. 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;

1. 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.

2. The first and second trial run of the WMO Forecast Demonstration Project in association with the 2008 Olympic Games to be held in Beijing, China (B08FDP) was conducted successfully in 2006 and 2007 respectively. The FDP will enter into full swing this August.

3. As discussed under TOR(b) item 3, the ICT deliberated that one of the main thrusts of future work programmes of the OPAG would be on nowcasting applications. In this respect, a Forecast Demonstration Project on Nowcasting Applications and Services (S2010-FDP) in relation to the cross-cutting Shanghai 2010 EXPO Multi-Hazard Early Warning System Project has been planned. ET-DPM will take lead in the planning and implementation of the S2010-FDP.

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

1. As discussed under TOR (b) item 1, 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.

2. As reported under TOR(h) item 1, the Team will collaborate with WWRP in formulating and implementing a strategy to promulgate the PWS application of nowcasting technology in developing countries.

3. The RAII 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. CURRENT STATUS OF IMPLEMENTATION OF DELIVERABLES

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

As regional roving seminars require a large investment of resources, the ICT, at the 2007 meeting in Muscat (as reported in TOR (b) item 2 above), recommended that this be provided within the context of the proposed PWS Pilot Project.

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 ICT, at the 2007 meeting in Muscat (as reported in TOR (b) item 2 above), recommended that this item be dropped as it is not strictly within the competency of ET/DPM.

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*

A 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 form 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*

A template to facilitate collection of examples of best practices and success stories has been designed and will be posted on the PWSP website. Collected best practices and relevant cases of stories on successful application of effective warnings systems 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 ad disaster communication. The will also serve to facilitate building up of a coherent disaster reduction "community"

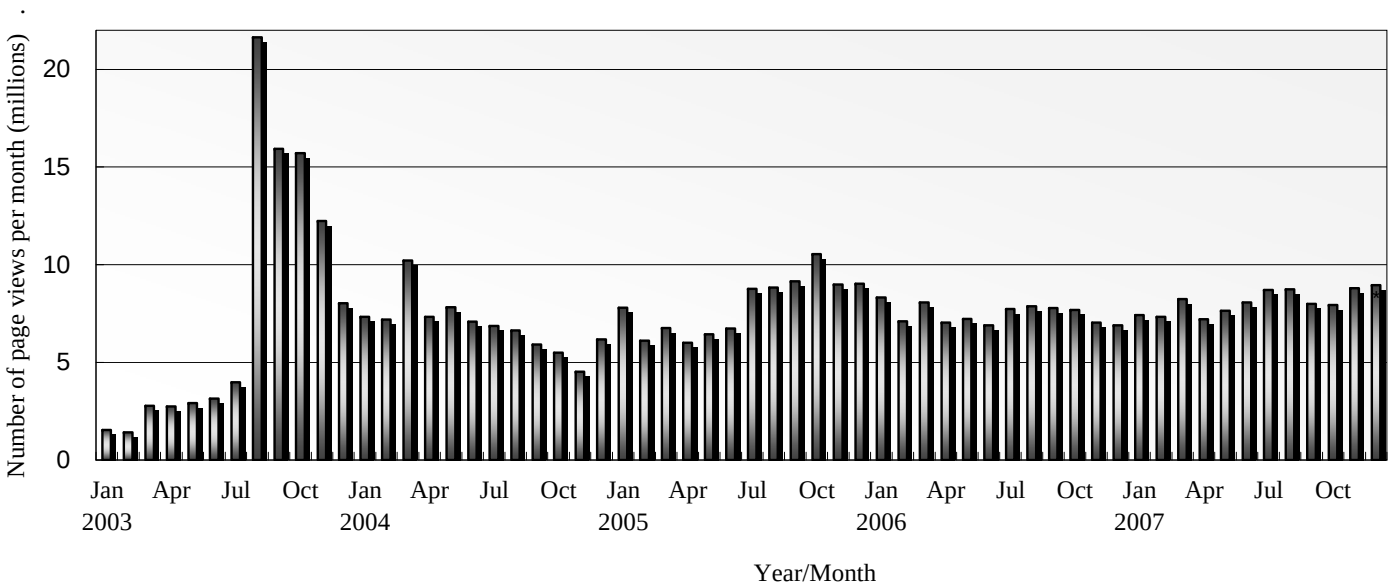
The International Symposium on PWS was held in Geneva from 3-5 December 2007 with the participation of over 100 meteorologists, media and communication experts, disaster risk managers, etc.

M C Wong
Chair, ET/DPM
30 April 2008

Annex VI(a)

Access statistics of the World Weather Information Service (WWIS)

(Jan 2003 – Dec 2007)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10
15
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Jan 2006
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Jan 2007
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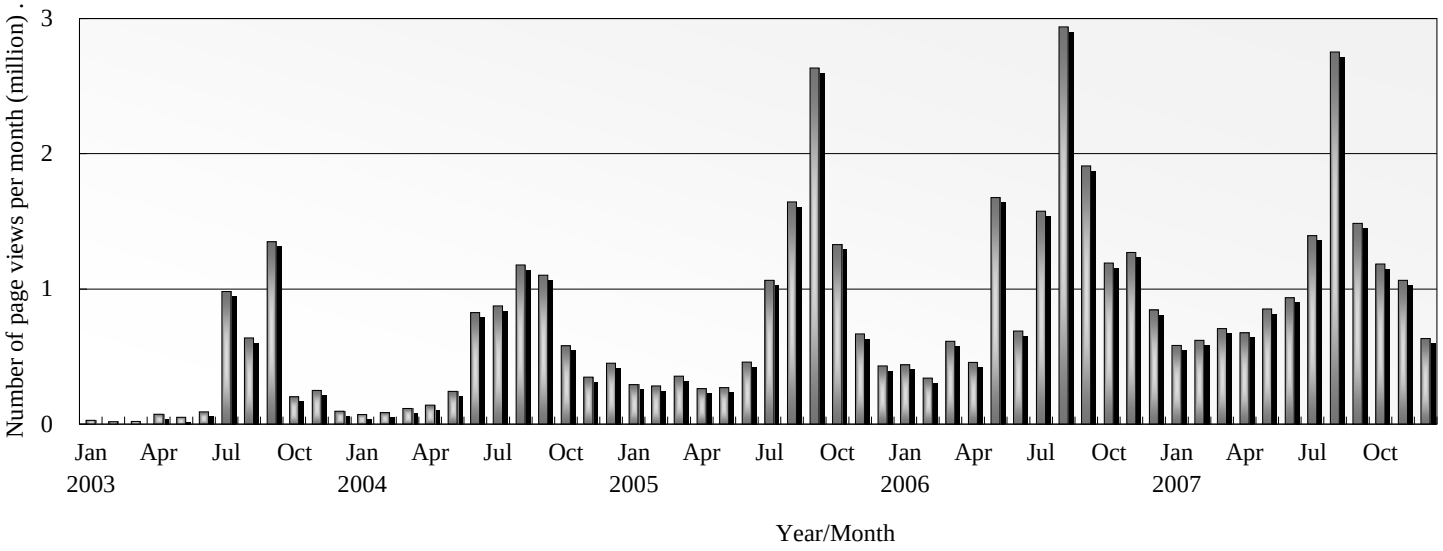
Year/Month

Annex VI(b)

Access statistics of the Severe Weather Information Centre (SWIC)

(Jan 2003 – Dec 2007)


Number of page views per month (million) .
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Year/Month

Annex VII

Shanghai World EXPO Nowcasting Service Demonstration Project (WENS)

Objectives

(1) To demonstrate how nowcasting applications can enhance multi-hazard early warning services, using the opportunity of the Shanghai 2010 World EXPO; and
(2) To promote the understanding and enhance the capability, as appropriate, of WMO Members in nowcasting services.

Mode of operation

Members may be engaged at one of the following 2 levels:

(a) Level 1 – (Research Mode); to engage with nowcasting systems as a concept demonstration (non real time) and/or in a capacity building role in the period before and during the 2010 World EXPO. As mutually agreed, Participating System Owners (PSO) to provide, install and maintain their own hardware/software; provide capacity building materials, or participate in capacity building activities, SMB/CMA to offer logistic support and coordination as required. Stationing of PSO personnel at 2010 World EXPO may or may not be required over a mutually agreed period.

(b) Level 2 – to engage fully with operational nowcasting system(s) in support of 2010 World EXPO on a functional real-time basis. Operational systems will be set up to generate real-time products and to disseminate these to users for the duration of the 2010 World EXPO with capacity building carried out before and afterwards. SMB/CMA to second development staff to specific PSOs to assist in customization, support, maintenance and interfacing of system(s) to operational data feeds and information/dissemination systems as agreed for implementation in Shanghai for 2010 World EXPO. SMB/CMA to provide resources as mutually agreed for travel/per diem support for PSO personnel to participate in agreed activities. PSOs, using their own resources, to support system, offer consultancy / advisory support and undertake agreed interface and capacity building activities. Stationing of PSO personnel at 2010 World EXPO will be required over a mutually agreed period.

Operation Structure (Click here to see Chart)

A WENS Scientific Steering Group (SSG) will be established to plan and steer implementation of the project recognizing a requirement for a focus on service delivery aspects. The SSG will develop an agreed business/project plan based on the MHEWS project plan. The WENS project plan will define project participant roles and responsibilities, agreed timetable and financial arrangements. A WENS Working Group (WENSWG) will

oversee the development of an implementation plan, its execution and will report to the SSG. The Chair of the WENSWG will be appointed by SMB/CMA.

The SSG will comprise SMB/CMA, PWS ICT Chair, JONAS SC Co-chairs and PSOs, capacity building lead, a socio-economic lead, PWS (WMO Secretariat) with the WENSWG Chair serving as secretary. Communication will be mostly by correspondence. Nevertheless, three full SSG meetings are considered necessary: the first a planning meeting to agree TORs and business plan and to define roles; the second, an interim review meeting and the third, a final review meeting. The SMB/CMA and WMO will provide support to facilitate any SSG meetings. The WENSWG will comprise of SMB/CMA experts, PSO representatives, PWS expert(s) and other experts deemed necessary serving as resource agents.

An interim SSG comprising two co-chairs (SMB/CMA, PWS ICT Chair), SMB/CMA management, WMO PWS Secretariat, JONAS co-chairs, and WENSWG chair will draft TORs, business plan and undertake planning for initial full SSG meeting.

Proposed Action Plan

(1) Production of WENS concept document, as a key starting document, highlighting its relationship to the overall MHEWS project. The document will include components such as objectives, governance structure, resources, links between contributors, timetable, respective obligations. An inventory of target user sectors is of primary importance including the initial identification of user requirements, proposed approaches to impacts assessment etc. **(SMB/CMA). To be completed by end of June 2008.**

(2) Consultation with JONAS SC to decide on scope of engagement with WENS **(JONAS SC co-chairs). To be completed by end July 2008**

(3) Official invitations to PSO to participate in WENS **(PWS WMO Secretariat). To be issued by end August 2008**

(4) Establishment of WENS Scientific Steering Group and WENSWG by interim SSG who will also provide draft TORs and draft business plan for WENS. **(Interim SSG). End of September 2008**

(5) SSG Planning Meeting to finalise TORs and WENS Business Plan on project scope, duration, milestones and deliverables as well as funding arrangements **(SSG) Meet by mid December 2008**.

(6) Implementation of Business Plan e.g. benchmark survey to assess baseline impact of nowcast products to target user sectors, system integration, product development, capacity building including experience sharing workshop etc. **(SMB/CMA, WENSWG, PSOs). Jan - May 2009**.

(7) First trial run (WENSWG). June 2009

(8) Interim Review Meeting. Review objectives, undertake validation and performance assessment of systems taking part in trial run; engage key stakeholders/users to provide feedback on products; adjust Business Plan, if appropriate **(SSG). October 2009**

(9) WENS Full Operation **(WENSWG). May-November 2010**

(10) Post-project survey to assess impact of WENS **(WENSWG). December-February**

2011

(11) Final Review Meeting and Report Preparation **(SSG). To be completed by end of March 2011**

(12) Publication of Guidelines on provision of nowcasting services reflecting experience gained from WENS, to be followed by a Capacity Building Workshop for WMO Members **(SSG, WMO Secretariat). To be completed by end of 2011**

Annex VIII

Shanghai - PWS Advisory Group of Experts (S-PAGE)

Composition:

The Advisory Group of Experts will be composed of the members of the ICT; member(s) of senior management of CMA; PWS WMO Secretariat, and other Experts as may be required.

Terms of Reference:

a) Provide advice and guidance to the CMA Management Group and the WMO Secretariat Coordination Team of the Shanghai 2010 World Expo project as follows:
   - Nowcasting project component
   - PWS aspects of partnership with other agencies and communication with Media
   - Communication of Forecast Uncertainty
   - PWS aspects of Public Education and Outreach (for other components of MHEWS demonstration project).

b) Provide advice and guidance on other areas as may be agreed with the WMO Secretariat Coordination Team on the Shanghai 2010 World Expo project.

c) Provide advice and guidance relating to the engagement of the IABM with the “Meteoworld” pavilion at EXPO 2010.

d) Help to define a vision of the “Urban Weather Office of the Future” (Weather Information anywhere, anytime, anyhow).

Annex IX

Task Table relating to the Shanghai MHEWS and Expo Pavilion projects

Task No	Description	MHEWS / NowCasting	Pavilion	Other
1	Establish an Advisory Expert Group for the PWSP Shanghai Projects; S-PAGE			Advisory Group established and Terms of Reference drafted
2	Organise training curriculum on the management and technology of EWS Services by 2012 (keeping in mind the possible establishment of a WMO designated training centre in Nanjing University of Information Science and Technology)	1. Distil a half-day training programme from existing Guideline documents to facilitate workshops / study tours etc **(Secretariat, ET/COPE)** 2. Identify the training needs associated with EWS services and develop a set of questions and proposals for ETR to work on with their curriculum development experts with a view to establishing a curriculum for a longer and more defined course **(ET/COPE)**		
3	Assist hosts to organise Study Visits for SMB and other Shanghai municipal government officials to better understand good practices and experience related			On-going (Secretariat with assistance from individual experts in the OPAG)

	to EWS.			
4	Summarise and publish the experience of Shanghai PWS Projects (by 2012)	Prepare reports on Nowcasting sub-project as it develops **(WENS SSG, ET/DPM)**	Prepare reports on Pavilion sub-projects as they develop **(ET/COPE, Chair ICT)**	Merge reports into one or more synthesis documents in 2011 with a distillation of lessons learned for future reference **(Deliverable for ICT / Advisory Group)**
5a	Demonstration project on Nowcasting services.	WENS project concept developed, with associated timeline / action plan. To be a joint project with WWRP, coordinated through JONAS. Interim Scientific Steering Group established. **SMB/CMA** to finalise the MHEWS concept document by end June 2008.		
5b	Demonstration project on Mesoscale Ensemble NWP	Primarily a project of WWRP, but ET/COPE will bring forward proposals on the optimum presentation of the forecast products to enhance their usability. **(Secretariat, ET/COPE)**	Prepare public education material for use during 2010 World EXPO **(ET/COPE)**	
6	Provide case studies and examples of successful multi-agency response practice			ICT Co-Chair to organise information from South Africa; Secretariat to organise information from France and the UK Chair, ET/COPE to provide information from Australia Chair, ET/SPI available to facilitate information from the US, if required.
7	Community Safety Programme			OPAG Chair and Co-Chair, together

				with Chairs of ET/DPM, ET/SPI and ET/COPE, will provide, upon request, advice on the implementation of an outreach programme on end-to-end-to-end implementation of multi-hazard Early Warning Systems. **(ICT)**
8	Social and Economic Benefit Assessment			A consultant is currently developing a set of Guidelines on this topic following the Madrid conference. These Guidelines to be "localised" into specific (training seminar and workshop) material relevant to Shanghai. **(Secretariat, together with WMO Forum on SEA).**
9	Subsumed into 5 above			
10	Public Awareness, Communication and Media			Consider how best to bring "uncertainty-type" information to the public (5a above). Identify examples of best practice relevant to the Shanghai projects. Possibly conduct workshops and training activities relevant to Shanghai. **(Secretariat, ET/COPE)**
A	IABM / Meteoworld Pavilion		Provide guidance on the engagement of the IABM with the "Meteoworld" pavilion at EXPO	

			2010, and coordinate OPAG and IABM activities **(PWS Secretariat, S-PAGE)**	
B	Urban Weather Office of the Future		Develop a concept of the “Urban Weather Office of the Future” and propose a scenario(s) which might be presented in the “Meteoworld” pavilion in EXPO 2010 **(S-PAGE)**	

Annex X

Draft TORS - OPAG on 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) Ensure coordination of the work of the OPAG with that of other WMO Programmes which relate to PWS;

(c) Continue to consult and collaborate as required, with other technical commissions and with other CBS OPAGs to ensure coordination of services and systems;

(d) Continue to encourage stronger dialogue between NMHSs and the private sector - in particular the media - in areas relevant to PWS;

(e) Continue to provide guidance to Members on the importance of NMHSs as the sole authority in the provision of official severe weather warnings;

(f) 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;

(g) Review and report on the improvements in national and regional PWS activities as a result of demonstration projects and other WMO initiatives (following the "Learning through Doing" project concept) contributed to by the PWS Programme;

(h) Review and report on the effectiveness of PWS training activities;

(i) Assist NMHSs in the identification and assessment of the societal and economic benefits of Public Weather Services and promotion of the benefits to be gained by users;

(k) *Explore the mechanism to strengthen dialogue between WMO and International Olympics Committee (IOC) in the context of meteorological support for the Olympic Games; (For attention – John Guiney)*

(l) Continue to promote awareness of the PWS community of all relevant material arising from the work of the expert teams.

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

(a) Monitor and report on the progress of previous ET/SPI initiatives and make recommendations as appropriate to OPAG/PWS;

(b) Monitor and report on aspects of services and products improvements that relate to support of major WMO activities; including the Shanghai 2010 World Expo Multi-Hazard Early Warning Systems project;

(c) Provide guidance in the development of training materials on the applications of probabilistic forecasting products and services for multi-hazard early warning systems;

(e) Report and advise on how to assist developing countries with building an integrated approach to PWS products and services to improve service delivery;

(f) Explore and advise on the further development of probabilistic and other non-deterministic forecast products and services

(h) Identify, report and provide recommendations on emerging needs for new and improved products and services with emphasis on key PWS user groups;

(i) Continue to encourage the use of verification for PWS;

(j) Keep under review the development of quality management procedures and practices relevant to PWS;

(k) Report and advise on collaborative activities with other CBS OPAGs and other technical commissions;

(l) *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; (For attention – John Guiney)*

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

(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 activities, including the Shanghai 2010 World Expo Multi-Hazard Early Warning Systems project;

(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 the World Weather Information System and the Severe Weather Information Centre (SWIC) to promote improved international availability and access to NMHSs' official forecasts and severe weather information via the Internet;

(e) Provide guidance on the role of PWS in the early warning process, including the development of appropriate reference material based on current practices in early warning, highlighting communication and technology aspects;

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

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

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

4. Expert Team on Communication, Outreach and Public Education Aspects of PWS (ET-COPE) (Formerly Expert Team on Communication, ET-COM)

(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, outreach and public education aspects of PWS that relate to support of major WMO activities, including the relevant Shanghai 2010 World Expo project components;

(c) Identify ways to meet the needs of developing countries in their efforts to improve communication, outreach and public education relating to PWS products and services;

(d) Examine, report and recommend on how best to continue the development of positive partnerships with national and international media organisations, and of assisting NMHSs to improve relations with the media;

(e) Examine, report and recommend on the use of emerging new technologies for the communication of early warnings and other public weather services products and services;

(f) Report and advise on ways of assisting NMHSs to enhance outreach and public education with a view to ensuring more effective use of PWS and enhancing the usefulness of new products and services;

(g) Promote awareness of the impact of high quality, well-communicated and well-delivered public weather services on the image and visibility of the NMHS;

(h) Study and report on how best to educate end users on the concepts of forecast uncertainty in a manner which enhances the usability of PWS products and services and strengthens the credibility of the service provider;

(j) Examine how to ensure improved media attribution of the role of NMHSs in providing basic services and infrastructure which support weather presentation to the public;

(k) Continue to advise on how NMHSs might more effectively educate, and 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.

Draft PWS OPAG Deliverables

Implementation Coordination Team (ICT)

1. Consider matter of Private Sector – NMHS relationships in the light of decisions by ECLX and decide on future actions.

2. Prepare a synthesis document on the various components of the PWS Programme activities related to the Shanghai 2010 World EXPO with a distillation of lessons learned for future reference.

3. Contribute actively to the work of the WENS SSG according to the agreed schedule of activities outlined in the WENS document.

4. Contribute to the S-PAGE as required.

5. Contribute to the SWFDP Steering Group as required.

6. Report to CBS on the effectiveness of PWS material and initiatives, based on feedback received from the network of PWS Focal Points.

Expert Team on Services and Products Improvements (ET/SPI)

1. Contribute to the Shanghai Multi-hazard Early Warning System (MHEWS) as part of the Shanghai 2010 World EXPO project.

2. Collaborate with ET/COPE to develop and host a workshop on probabilistic forecasting and communicating forecast uncertainty for China Meteorological Agency personnel in support of Shanghai MHEWS 2010 World EXPO project.

3. Participate in the PWS “Learn through Doing” pilot project for Chile as required.

4. Contribute to the PWS verification and evaluation aspects of Phase 2 of SWFDP in southeast Africa.

5. Provide a synthesis report, by 2011, which reflects the experiences gained in the improvement of products and services through projects following the “Learning through Doing” concept, with a particular emphasis on the lessons learned.

Expert Team on Communication, Outreach and Public Education Aspects of PWS (ET/COPE)

1. Prepare Guidelines on promoting and communicating the value of PWS products and services. (including how to communicate to key groups the socio-economic value of services and how to communicate verification information).

2. Prepare a series of one-page ready guides, and other training material, on effective public communication, working with the media, communicating forecast uncertainty,

effective NMHS attribution, and other relevant subjects addressed in various PWS Guideline Documents.

3. Following on from work of the Expert Group on Public Education and Outreach, develop generic public education material on PWS, suitable for adaptation to different languages and cultures; this material to include a number of best-practice examples.

4. Contribute to the development of public education, outreach, and media communication strategies as part of the Shanghai 2010 World EXPO project.

5. Contribute to the development of curricula (together with WMO ETR Programme) and the delivery of presentation and public education workshops in support of the Shanghai 2010 World EXPO project.

6. Contribute to the preparation of a symposium on weather information for natural disaster response (jointly with ET/DPM) (in partnership with other on-going initiatives within the WMO Secretariat).

7. Collaborate with ET/SPI to develop and host a workshop on probabilistic forecasting and communicating forecast uncertainty for China Meteorological Agency personnel in support of Shanghai MHEWS 2010 World EXPO project.

Expert Team on Disaster Preparedness and Mitigation (ET/DPM

1. Publish on the Internet the collection of success stories / good practices on early warning systems.

2. Enhance the WWIS/SWIC websites to include more participants, more language versions, and more hazard types.

3. Convene a meeting of the WWIS hosts to facilitate coordination and the introduction of new technology.

4. Contribute actively to the Shanghai 2010 World EXPO Nowcasting services demonstration project as laid out in the agreed WENS document.

5. Contribute to the preparation of a symposium on weather information for natural disaster response (jointly with ET/COPE) (in partnership with other on-going initiatives within the WMO Secretariat).

6. Contribute to a training workshop on Nowcasting application and services for developing countries.

7. Contribute to the preparation of WMO Guidelines on Disaster Risk Reduction.

Shanghai World EXPO Nowcasting Service Demonstration Project (WENS)

Project Implementation Structure Chart