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25 March to 2 April 2009

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**FUTURE WORK PROGRAMME**

**Report to Plenary on item 12.2**

**REFERENCE: CBS-XIV/G-WP 12.2**

**APPENDICES:**

- A. Draft text for inclusion in the general summary of CBS-XIV
- B. Draft Resolution 12.2/1 (CBS-XIV) – Open Area Programme Groups

**ACTION PROPOSED:**

It is proposed that the draft text provided in Appendix A be included in the general summary of the work of the session and that Resolution 12.2/1 (CBS-XIV) – Open Area Programme Groups – given in Appendix B be approved.

## **DRAFT TEXT FOR INCLUSION IN THE GENERAL SUMMARY OF CBS-XIV**

### **12.2 FUTURE WORK PROGRAMME** (*agenda item 12.2*)

**12.2.1** The Commission thanked all the chairs and members of the expert teams and the rapporteurs for their contribution to the CBS Open Programme Area Groups (OPAGs), and in particular those who will no longer serve within the CBS OPAGs. The Commission expressed its sincere gratitude to those chairpersons and co-chairpersons of the OPAGs who were no longer able to continue serving in these positions for their important contribution to the work of the Commission over many years.

**12.2.2** The Commission agreed on its work programme, taking into account the detailed discussions under the various agenda items. The Commission decided to re-establish the four Open Programme Area Groups on Integrated Observing Systems, on Information Systems and Services, on Data Processing and Forecasting System, and on Public Weather Services. It also decided to appoint a Rapporteur on Quality Management Framework, a Coordinator on Disaster Risk Reduction, a Coordinator on Capacity Building and a Coordinator on GEO/GEOSS activities related to WMO, and to establish an Inter-Programme Coordination Team on Space Weather. The Commission adopted Resolution 12.2/1 (CBS-XIV).

**12.2.3** With a view to making the necessary arrangements for efficiently carrying out the various tasks under the agreed work programme and the corresponding activities, the Commission agreed to establish teams as well as coordinators and rapporteurs within each of the OPAGs and to allocate them tasks as given in Annex to this paragraph.

**12.2.4** The list of chairpersons, co-chairpersons, coordinators and rapporteurs who were designated by the Commission, is given in the Annex to this paragraph.

**12.2.5** The Commission requested the CBS Management Group to establish the membership of the teams. It invited the chairpersons of the OPAGs and teams, in cooperation with the Secretariat, to develop targets for deliverables, and adequate working mechanisms to ensure that all experts could actively participate and contribute to the work programme and assist the respective teams.

## Annex to paragraph 12.2.3 of the general summary

### TERMS OF REFERENCE OF OPAG TEAMS, COORDINATORS AND RAPORTEURS

#### OPAG on Integrated Observing Systems

##### Implementation Coordination Team on Integrated Observing Systems (ICT-IOS)

- (a) To contribute to the development and implementation planning of concept of the WMO Integrated Global Observing System (WIGOS) and coordinate with the Sub-group on the WIGOS of the EC Working Group on the WIGOS and WIS; and provide relevant advice and support to the President of CBS.
- (b) Monitor, report and make recommendations on the capability and utilization of composite observing systems comprising different observing networks to meet the requirements of the WMO and other international programmes/projects such as THORPEX and IPY, including the plan for the evolution of the GOS taking into account the development with respect to GEOSS;
- (c) Review deficiencies in coverage and performance of the existing GOS, in particular in the implementation of the RBSNs, the GSN and GUAN (of GCOS) as well as related RBCNs, on the basis of monitoring results and regional studies, to make proposals to improve the availability of data to meet stated requirements, and to monitor and report on progress in the evolution of the GOS;
- (d) Coordinate and consolidate the development of standardized high quality observing practices and prepare related recommendations;
- (e) Assess the impacts of introducing new technology systems into the GOS on the status of regional observing networks, particularly those affecting the role of developing countries;
- (f) Consider and report on the issues of costing, joint funding and management of the GOS;
- (g) Strengthen collaboration between CBS and the regional associations, by providing advice on possible solutions for newly identified requirements.

##### Expert Team on Requirements and Implementation of AWS Platforms (ET-AWS)

- (a) Address the evolution of the AWS observing network;
- (b) Address requirements for integration, interoperability, standardization and homogeneity of the WIGOS concept;
- (c) Monitor advances in AWS technology;
- (d) Develop draft recommendation for updating of the *Manual* and the *Guide on the GOS* in the context of WIGOS concept;
- (e) Provide advice to ET-EGOS and OPAG-IOS on surface in situ contributions to the GOS to address the identified requirements and overcome known deficiencies and gaps;
- (f) Provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

##### Expert Team on Evolution of the Global Observing System (ET-EGOS)

- (a) Update and report on observational data requirements of the WWW as well as other WMO and international programmes supported by WMO;
- (b) Review and report on the capability of both surface-based and space-based systems that are candidate components of the evolving composite GOS;
- (c) Carry out the rolling requirements review of several application areas using subject area experts (including atmospheric chemistry through liaison with CAS, marine meteorology and oceanography through liaison with JCOMM, aeronautical meteorology through liaison with CAeM, agrometeorology through liaison with CAgM, hydrology through liaison with CHy, and climate variability and change detection through liaison with CCI and GCOS);

- (d) Review the implications of the Statements of Guidance concerning the strengths and deficiencies in the existing GOS and evaluate the capabilities of new observing systems and possibilities for improvements and efficiencies in the GOS;
- (e) Carry out studies of real and hypothetical changes to the GOS with the assistance of NWP centres;
- (f) Develop new version of the Implementation Plan for Evolution of the GOS based on the Vision for the GOS in 2025, taking into account developments with respect to WIGOS and GEOSS; monitor progress against the Plan, report progress and updated Plan through the ICT-IOS to CBS;
- (g) Prepare documents to assist Members, summarizing the results from the above activities;
- (h) Provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

#### **Expert Team on Satellite Systems (ET-SAT)**

- (a) Provide technical advice with respect to both operational and R&D environmental satellites to assist in the integration of WMO-coordinated observing systems;
- (b) Advise CBS through ICT-IOS on matters requiring feedback to the WMO Consultative Meetings on High-level Policy on Satellite Matters;
- (c) Assess the observation, collection, and analysis systems relating to the use of operational and R&D environmental satellites contributing, or with the potential to contribute, to the space-based subsystem of the GOS, and to suggest improvements of system capabilities, particularly with respect to developing countries;
- (d) Assist CBS in assessing the status of implementation of the space-based subsystem of the GOS and the adequacy of plans for implementation for meeting established requirements for satellite data and products;
- (e) Make recommendations with respect to the transition of relevant R&D instruments to operational environmental satellites;
- (f) Coordinate with other relevant CBS teams with a view to making recommendations on matters, such as the exchange, management, and archiving of satellite data and products, radio frequency utilization, as well as education and training and other appropriate capacity-building measures related to satellite meteorology;
- (g) Identify and assess opportunities and/or problem areas concerning satellite technology and plans of relevant satellite operators, and inform CBS timely and comprehensively through the ICT-IOS;
- (h) Provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

#### **Expert Team on Satellite Utilization and Products (ET-SUP)**

- (a) In support of the strategy to improve satellite data utilization:
  - Formulate a biennial questionnaire on the availability and use of satellite data, for the purpose of gathering information from WMO Members on current capabilities and deficiencies (and trends of these aspects);
  - Analyze the questionnaire responses;
  - Compare and combine this analysis with a summary analysis from the Centres of Excellence of the Virtual Laboratory for Satellite Data Utilization;
  - Compile a list of recommendations based on these analyses;
  - Prepare a new WMO SP Technical Document to publish the findings to WMO Members.
- (b) Review present and future R&D satellite data and products including their availability and applications in view of increased utilization by WMO Members;

- (c) Initiate activities to improve the availability of operational and R&D satellite data according to user needs, monitor these activities in close coordination with the relevant CGMS working group(s) and with WIS activities;
- (d) In conjunction with the WMO Space Programme Office further clarify the needs of WMO Members for information regarding access to and utilization of satellite data, including the associated capacity building, and consider the best ways to meet these needs;
- (e) Keep under review the needs of WMO Members for training in satellite meteorology and engage with the Management Group of the Virtual Laboratory for Education and Training in Satellite Meteorology to address these needs, including:
  - (i) Reviewing plans for regular training events in all WMO Regions aimed at enhancing the full utilization of satellite data, from both operational and R&D satellites;
  - (ii) Helping to ensure WMO Members have access to training materials and courses, as well as providing advice on ways to access data, products, and algorithms from both operational and R&D satellites;
  - (iii) Evaluating, with the support of the Virtual Laboratory Management Group, the continued adequacy and relevance of the components of the Virtual Resource Library, suggesting strategies for improving its contents as necessary;
  - (iv) Reviewing the implementation and achievements of the 2009-2014 Virtual Laboratory Training Strategy;
- (f) Coordinate with ET-SAT and ET-EGOS on the Evolution of the GOS;
- (g) Assess and further the concept of Sustained Co-ordinated Processing of Environmental Satellite Data (SCOPE) {previously named R/SSC};(h) Prepare documents to assist Members, summarizing the results from the above activities;
- (i) Provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

#### **Expert Team on Surface-based Remotely-Sensed Observations (ET-SBRSO)**

In the area of weather radar and other surface-based remotely-sensed observations, the team should:

- (a) Assess the potential capabilities of such observing systems, in terms of their observing characteristics (spatial and temporal resolution, accuracy, timeliness, etc.);
- (b) Assess the status of implementation of and plans for such observing systems by WMO Members;
- (c) Document the above capabilities and implementation status/plans, through updates to the WMO/CEOS database of observing system capabilities;
- (d) In collaboration with ET-EGOS, assess the contribution of such observing systems to meeting the user requirements for observations for all application areas represented by WMO and WMO-sponsored programmes, as captured by the WMO/CEOS database of user requirements for observations and the Statements of Guidance;
- (e) Make recommendations on how the integration of such observing systems within the GOS might be taken forward;
- (f) Assess the systems for collection and distribution of data from such observing systems, and make appropriate recommendations;
- (g) Monitor the status of operational networks of such observing systems and provide technical advice on such systems, including both operational and R&D systems, to WMO Members and RAs;
- (h) Provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

#### **Expert Team on Aircraft-based Observations (ET-AIR)**

- (a) Coordinate with the AMDAR Panel to develop a harmonized AMDAR work plan;

- (b) Review and report to CBS on the AMDAR Programme activities including the integration of AMDAR into WIGOS;
- (c) Develop future governance for the AMDAR Programme;
- (d) Steer the implementation of the WIGOS AMDAR Pilot Project;
- (e) Develop a data policy for AMDAR;
- (f) Develop standard practices for AMDAR;
- (g) Provide input into the EGOS-IP for AMDAR;
- (h) Report on training requirements and activities for AMDAR;
- (i) Provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

#### **Co-Rapporteurs on Scientific Evaluation of Impact Studies undertaken by NWP Centres**

- (a) Prepare and maintain reviews of OSEs, OSSEs and other studies that are being undertaken by various NWP Centres around the globe and provide information for consideration by the OPAG on IOS;
- (b) Organize the fifth Workshop on the Impact of Various Observing Systems on Numerical Weather Prediction in 2012 and chair the organizing committee;
- (c) Provide input to the ET-EGOS regarding the Evolution of the GOS and to the ET-SAT on findings that might influence future satellite missions
- (d) Provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

#### **Rapporteur on GCOS Matters**

- (a) Continue the preparation and maintenance of reviews of observing systems that are being designed under the auspices of GCOS, e.g. GUAN, GSN, GRUAN and space-based observing systems (GOSSP and CGMS); and provide feedback to Members in maintaining the quality of the networks;
- (b) Provide input to the ET-EGOS on user requirements relevant to climate monitoring and to the OPAG-IOS on issues relevant to CBS;
- (c) Provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

#### **Rapporteur on Regulatory Material**

Review and update regulatory and guidance material on the GOS, as required, and make recommendations for amendments; and provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

#### **Co-Rapporteurs on the Impacts of New Instrumentation on the GOS**

Liaise with the HMEI, CIMO and others as appropriate for the development and introduction of new in situ surface-based instrumentation, and provide information and advice to the OPAG on IOS on the possible impacts of these on the GOS and strategies for mitigating any adverse impacts. Provide advice and support to the Chairperson of OPAG-IOS on development and implementation of WIGOS concept.

#### **OPAG on Information Systems and Services**

**Comment [KP1]:** TORs as given in Doc 6.2(1) and Doc 9

#### **Implementation Coordination Team on Information Systems and Services (ICT-ISS)**

- (a) Assess the implementation aspects at the regional and global levels, including sustainability, of the recommendations and proposals developed by the ISS Teams;

- (b) Review and consolidate the recommendations and proposals developed by the ISS Teams with a view to their submission to CBS;
- (c) Monitor, assess and take follow-up action on ISS requirements emerging from the cross-cutting WMO Programmes and other international Programmes/projects such as THORPEX, IPY, DPM and GEOSS;
- (d) Identify matters requiring the urgent consideration of the OPAG on ISS, and develop proposals for tasks and organization of activities.

#### **Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC)**

(Requirements for changes to representation forms should be provided by the WMO Programmes)

- (a) Maintain WMO data representations and further develop table-driven codes in particular BUFR, CREX, and GRIB edition 2, by defining descriptors, common sequences and data templates, including the data representation of regional practices, so they meet the requirements of all Members and other concerned international organizations, such as ICAO, most efficiently;
- (b) Adapt and update the alphanumeric code regulations for table-driven code forms; coordinate with the OPAG on IOS to ensure their observation representation requirements are met;
- (c) Invite, coordinate and assist Members to validate modified or new formats, and provide Members with guidance on data representation of national practices;
- (d) Monitor and coordinate the progress of migration to TDCF;
- (e) Update the content of the Manual on Codes (WMO-No. 306) and associated reference and guidance materials as required and publish in suitable electronic formats;
- (f) Publish the Code Tables in appropriate processable electronic formats;
- (g) In collaboration with IPET-MDI, review and clarify the WMO data representations, to ensure efficient and effective implementations, interoperability and consistency with the WMO Metadata Core Profile and with the WMO data model that it is starting to be developed.

#### **Inter-Programme Expert Team on Metadata and Data Interoperability (IPET-MDI)**

- (a) Development of a WMO core profile of the ISO 191xx series of standards for metadata and data, encompassing the WMO Metadata core profile of the ISO metadata standard, including relevant ISO 191xx feature catalogues, application schema(ta) and data product specification(s);
- (b) Further develop procedures and guidance for the interoperability of metadata and data, including BUFR, CREX, GRIB, XML, NetCDF and HDF, and liaise with the NetCDF and the Climate and Forecast (CF) communities in this respect, in particular develop and maintain a WMO conceptual data model to facilitate the interoperability of metadata and data;
- (c) Develop a WMO inter-programme metadata and data representation policy, including governance;
- (d) Coordinate extensions to the WMO core profile needed to satisfy the requirements of all WMO Programmes;
- (e) Develop guidance for the implementation and use of the data representation systems, metadata and the WMO core profile, including training aspects;
- (f) Propose extensions to the ISO 191xx series of standards required for the WMO core profile and liaise with ISO and OGC as required.

### **Expert Team on WIS-GTS Communication Techniques and Structure (ET-CTS)**

(Co-chairperson on Data Communication Techniques; co-chairperson on WIS-GTS data communication structure.)

- (a) Develop recommended practices and technical guidance material for data communication techniques and procedures (GTS, WIS and Internet), including security aspects, with a view to ensuring efficient and safe operations of information systems, and inform Members of relevant developments in standard bodies in particular ITU and ISO;
- (b) Review standard TCP/IP procedures and applications, including new developments (e.g. IPv6) that are relevant to WIS and WMO Programme requirements, and develop recommended practices especially for the GTS;
- (c) Review and further develop recommended practices for data communication and access procedures, including exchange of high priority data and products in support of a virtual all hazards network within WIS-GTS;
- (d) Maintain the file naming convention, in particular for operational routing and distribution;
- (e) Develop the organization and design principles for the WIS data communication structure, and coordinate related pilot projects;
- (f) Review and further develop the organization and design principles for the WIS data communication structure, in particular the smooth evolution of the GTS and the WIS core network;
- (g) Provide guidance on technical, operational, administrative and contractual aspects of data communication services for WIS implementation, especially for the GTS at the global, regional and national levels, including dedicated and public services (e.g. satellite-based telecommunications, managed data-communication network services, the Internet);
- (h) Advise and assist ICG-WIS on the relevant technical aspects of the Manual on WIS.

### **Expert Team on WIS Centres (ET-WISC)**

- (a) Further develop technical and operational specifications for the different components of the WIS Centres and criteria for interoperability and certification for actual implementation;
- (b) Further develop specifications for the GISC, DCPC and NC interfaces, including a unified user interface for WIS components;
- (c) Coordinate related pilot projects;
- (d) Determine the monitoring requirements for the WIS and develop the WIS monitoring scheme;
- (e) Advise and assist ICG-WIS on the relevant technical aspects of the Manual on WIS.

### **Ad hoc expert team on GISC and DCPC Demonstration Processes (ET-GDDP)**

- (a) Develop guidance and management procedures for the CBS demonstration and assessment of capabilities of candidate GISC and DCPC centres in the framework of the GISC-DCPC designation procedure as endorsed by Cg-XV;
- (b) Organize demonstrations of capabilities of candidate WIS centres as required, including demonstration at CBS sessions.

### **Expert Team on WIS-GTS Operation and Implementation (ET-OI)**

(Activities to be carried out in particular by the focal points of RTHs located on the MTN, in close coordination with the IPET-DRC chairperson with the assistance of the Secretariat, mainly by correspondence/ e-mail.)

- (a) Monitor the WIS-GTS operational information flow and coordinate management of operational information exchange procedures, routing and traffic, with a particular

attention to the exchange of high priority data and products in support of a virtual all hazards network within WIS-GTS;

- (b) Assist in the migration to TDCF, in particular in a step-by-step migration by zones;
- (c) Coordinate the implementation of the file naming convention;
- (d) Coordinate the implementation of the WMO core profile of 191xx series of standards as regards the relevant exchange of data and metadata;
- (e) Coordinate and further develop recommended practices and guidance on the management of, and access to, operational information related to WMO Programmes' information exchange, especially for WIS-GTS operation (abbreviated heading tables, catalogue of bulletins and files, routing directories, etc.);
- (f) Develop recommendations for coordinated implementation and planning of techniques, procedures and systems for the MTN and MTN centres, including towards the core communication component of WIS;
- (g) Review, coordinate and further improve the WWW monitoring, in particular the AGM, SMM and IWM;
- (h) Review the standard and recommended procedures and practices of the Manual on the GTS related to the operation of the GTS, and propose amendments as required;
- (i) Develop guidance for planning and implementation of observation data collection systems for NMHSs, including interfaces with observation platforms, methods, formats and data-communication protocols;
- (j) Identify implementation issues requiring the urgent consideration of the OPAG on ISS.

#### **Steering Group on Radio-Frequency Coordination (SG-RFC)**

- (a) Keep under review allocations of radio-frequency bands and assignments of radio-frequencies to meteorological activities for operational requirements (telecommunications, instruments, sensors, etc.) and research purposes, in close coordination with other technical commissions, especially CIMO and the CBS/OPAG on IOS;
- (b) Coordinate with WMO Members, with the assistance of the WMO Secretariat, to:
  - (i) Ensure the proper notification and assignment of frequencies used for meteorological purpose;
  - (ii) Determine their future use of the radio spectrum for meteorological purpose;
- (c) Keep abreast of the activities of the Radio-communication Sector of the International Telecommunication Union (ITU-R), and in particular of the Radio-communication Study Groups, on frequency matters pertaining to meteorological activities, and represent WMO in ITU-R work;
- (d) Prepare and coordinate proposals and advice to WMO Members on radio-regulation matters pertaining to meteorological activities with a view to ITU Radio-communication Study Groups, Radio-communication Assembly, World Radio-communication Conferences and related regional/global preparatory meetings;
- (e) Facilitate the coordination between WMO Members for the use of frequency bands allocated to meteorological activities with respect to:
  - (i) Coordination of frequency use/assignments between countries;
  - (ii) Coordination of frequency use/assignments between various radio communication services (e.g. meteorological aids and data collection platforms (DCPs)) sharing the same band;
- (f) Facilitate the coordination of WMO with other international organizations which address radio spectrum planning, including specialized organizations (e.g. CGMS, the Space Frequency Coordination Group (SFCG) and regional telecommunication organizations, such as the European Conference of Postal and Telecommunications Administrations (CEPT), the Inter-American Telecommunication Commission (CITEL), and the Asia-Pacific Telecommunity (APT));

- (g) Assist WMO Members, upon request, in the ITU coordination procedure of frequency assignment for radio-communication systems sharing a frequency band with meteorological radio communication systems.

### **OPAG on Data-Processing and Forecasting System**

**Comment [KP2]:** TORs as given in Doc. 6.3(1)

#### **Implementation Coordination Team on Data-Processing and Forecasting System**

- (a) Identify new emerging requirements (input required from RAs and other bodies);
- (b) Determine how GDPFS Centres can best contribute to fulfil emerging requirements;
- (c) Participate in THORPEX planning groups as appropriate to advise on conditions and requirements for practical implementations in operational systems;
- (d) Identify needs for training through workshops and other means of delivery;
- (e) Coordinate the implementation of decisions by CBS related to GDPFS;
- (f) Review of Expert Teams and rapporteurs and make recommendations to CBS concerning future work.

#### **Coordination Group on Forecast Verification**

- (a) In consultation with the relevant Expert Teams, review procedures for verification of the performance of forecasting systems to ensure that they are adequate and meet CBS needs;
- (b) Ensure that verification systems are appropriate to emerging forecast types such as probabilistic forecasts, very high resolution NWP products, and nowcasting products;
- (c) Develop suitable verification procedures for severe weather forecasts and warnings;
- (d) Review Lead Centre activities and provide guidance as appropriate;
- (e) Liaise with WWRP/WGNE as required;
- (f) Provide guidance on how to implement verification systems.

#### **Expert Team on Ensemble Prediction Systems**

- (a) Provide advice on EPS in relation to probabilistic forecasts in the context of short- and medium-range EPS products, focusing on applications concerned with all aspects of the EPS systems which forecast the weather on a daily basis;
- (b) Review progress on EPS and its application to severe weather forecasting including progress on multi-centre ensembles and on regional model based EPS, and prepare ways to make best operational usage of these developments;
- (c) Propose guidance for the generation of EPS products (e.g. EPS-grams, presentation of cyclone tracks and strike probabilities, hazard maps, calculation of probability, calibration methodologies, etc.) to ensure compatibility of EPS products supplied to WMO Members by different centres;
- (d) Develop education and training material for forecasters including rationale of concepts and strategies of EPS, and on the nature, interpretation and application of EPS products;
- (e) In consultation with the Coordination Group on verification, review verification system for EPS products and provide guidance on the interpretation of verification;
- (f) Support the further development of the Lead Centre on Verification of EPS by reporting on verification measures and determining the best way of presenting skill of ensemble forecasting systems. Provide relevant software to NMHSs through the Lead Centre Website;
- (g) To review the Manual on the GDPFS (WMO-No. 485) and propose updates as necessary concerning EPS;
- (h) Develop specifications for the introduction of probabilistic information into products from RSMCs with geographical specialization;
- (i) Participate in THORPEX Working Groups;

- (i) To ensure that the proposed GIFS (Global Interactive Forecast System) is suitable for operational implementation and application;
- (ii) To review progress on the use of EPS for targeting of observations.

#### **Rapporteur on Infrastructure for Numerical Weather Prediction (NWP)**

- (a) In consultation with the relevant Expert Teams and in coordination with the Regional Rapporteurs on GDPFS, provide guidance on the NWP products to be exchanged on the GTS (WIS);
- (b) Review the need for establishing standards and guidelines for the provision of initial and boundary conditions to NMCs for limited area models for operational NWP;
- (c) Communicate the resulting user requirements to the OPAG/ISS to help them determine appropriate technical means of meeting these requirements;
- (d) Provide guidance on the benefits of different options for capacity building concerning the infrastructure requirements for operational implementation of new NWP systems.

#### **Expert Team on Extended- and Long-range Forecasting**

- (a) On the basis of requirements from Regional Climate Centres (RCCs), Regional Climate Outlook Forums (RCOFs) and NMHSs, guide future development, outputs and coordination of components in the production of LRF. The components include Global Producing Centres (GPCs), Lead Centres for Long-range Forecast Multi-model Ensembles (LC-LRFMME), and the Lead Centre for the Standard Verification System for Long-range Forecasts LC-SVSLRF);
- (b) In coordination with CCI, promote the use of GPC and LC forecast and verification products by RCCs, RCOFs and NMHSs, develop new interpretation guidance to facilitate their use, and encourage feedback on usefulness and application;
- (c) Report on production, access, dissemination and exchange and provide recommendations for future consideration and adoption by CAS, CCI, CBS and other appropriate bodies;
- (d) In consultation with relevant experts in CAS and CCI and with the Coordination Group on Forecast Verification, review developments in verification scores and practices with a view to updating the Standard Verification System for Long-range Forecasts (SVSLRF);
- (e) Assess applications for GPC status against the designation criteria and make recommendations on designation to CBS;
- (f) Review the rules regarding user access to GPC and LC-LRFMME forecasts products;
- (g) Establish the status of extended-range forecasting activities and recommend a timetable for developing an exchange of extended-range forecasts and verification products;
- (h) Review the *Manual on the GDPFS* (WMO-No. 485) and propose updates as necessary concerning extended and long-range forecasts.

#### **Coordination Group on Nuclear Emergency Response Activities (ERA)**

- (a) Test and improve the collective ability of all RSMCs, the IAEA, the RTH Offenbach and NMHSs in the ERA to fulfil the operational requirements specified in global and regional arrangements, according to adopted standards and procedures;
- (b) Implement and explore further improved distribution/access methods for specialized products to NMHSs, and the IAEA in collaboration with the IAEA and other relevant organizations;
- (c) Collate the individual capabilities of RSMCs to produce enhanced products in support of nuclear emergencies, including ensemble techniques;
- (d) Explore the operational availability of radiological monitoring data for use in the RSMC operational environment;

- (e) Develop concepts of operational arrangements for atmospheric transport modelling backtracking products;
- (f) Continue testing and evaluating the operational arrangements with CTBTO.

#### **Expert Team on Modelling of Atmospheric Transport for Non-nuclear ERA**

- (a) Monitor the needs of the NMHSs for atmospheric transport modelling and identify those areas in which RSMCs can be of assistance;
- (b) Identify and promote technical resources which can assist NMHSs in developing their atmospheric transport modelling capabilities, particularly for limited area non-nuclear emergencies such as chemical releases to the atmosphere;
- (c) Monitor the atmospheric transport modelling capabilities of RSMCs and other centres for support to transboundary non-nuclear emergencies, related to emissions from various sources such as volcanic eruptions, dust storms, large fires, and biological incidents, with the goal of improving operational arrangements;
- (d) Develop strategies to strengthen operational links with international organizations relevant to non-nuclear ERA, and between NMHSs and relevant national authorities.

#### **Rapporteur on the Application of NWP to Severe Weather Forecasting**

- (a) Review the application of NWP to severe and high impact weather forecasting at all ranges in consultation with relevant expert teams;
- (b) Report on new developments and advances in severe and high impact weather forecasting;
- (c) Provide advice on the proposed demonstration project(s).

#### **OPAG on Public Weather Services**

##### **Implementation and Coordination Team on Public Weather Services (ICT-PWS)**

- (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 on 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) Develop and maintain a database of PWS Experts who are willing to provide contributions to training activities and workshops;
- (j) 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 mechanisms to strengthen dialogue between WMO and the International Olympics Committee (IOC) in the context of meteorological support for the Olympic Games;
- (l) Continue to promote awareness in the PWS community of all relevant material arising from the work of the Expert Teams.

**Expert Team on Services and Products Improvements (ET-SPI)**

- (a) Monitor and report on the progress of previous ET-SPI initiatives and make recommendations as appropriate to ICT-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;
- (d) Report and advise on how to best assist developing countries with building an integrated approach to PWS products and services to improve service delivery;
- (e) Explore and advise on the further development of probabilistic and other non-deterministic forecast products and services;
- (f) Identify, report and provide recommendations on emerging needs for new and improved products and services with emphasis on key PWS user groups;
- (g) Continue to encourage the use of verification for PWS;
- (h) Keep under review the development of quality management procedures and practices relevant to PWS;
- (i) Develop and maintain a list of experts in Services and Products Improvements who are willing to contribute to PWS training activities;
- (j) Report and advise on collaborative activities with other CBS OPAGs and other WMO Technical Commissions;
- (k) Keep abreast of advances in, and promote as appropriate, the application of emerging technology to the delivery of public weather services, with particular emphasis on the application of the database concept and the workstation and their implications for the changing role of the forecaster.

**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 ICT-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 (WWIS) 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) Develop and maintain a list of experts in PWS aspects of Disaster Prevention and Mitigation who are willing to contribute to PWS training activities;
- (i) Report and advise on the collaborative activities with other CBS OPAGs and technical commissions.

**Expert Team on Communication, Outreach and Public Education Aspects of PWS (ET-COPE)  
(formerly Expert Team on Communications, ET-COM)**

- (a) Monitor and report on the progress of earlier initiatives of ET-COM and make recommendations as appropriate to ICT-PWS;
- (b) Monitor and report on communication, outreach and public education aspects of PWS that relate to support of major WMO activities, including the relevant Shanghai 2010 World EXPO demonstration project components;
- (c) Identify ways to meet the needs of developing countries in their efforts to improve their 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 NMHSs;
- (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;
- (i) Examine how to ensure improved media attribution of the role of NMHSs in providing basic services and infrastructure which support weather presentations to the public;
- (j) 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;
- (k) Develop and maintain a list of experts in Communication, Outreach and Public Education who are willing to contribute to PWS training activities;
- (l) Report and advise on collaborative activities with other CBS OPAGs and with other WMO Technical Commissions.

Following the discussion on agenda item 11.2 (Other cross-cutting activities; Disaster Risk Reduction) the Commission agreed to establish two Task Teams under the OPAG on PWS as follows:

- (a) **Task Team on Meteorological Services for Improved Humanitarian Planning and Response** with the following Terms of Reference (TORs):
  - (1) Review and document the needs and requirements of the international humanitarian agencies for:
    - a. Meteorological services and information for operational procedures for contingency planning, coordination and response to potential disasters;
    - b. Dissemination mechanisms for exchange of meteorological services and information; and,
    - c. Training with regards to the effective utilization of meteorological services and information;
  - (2) Review the institutional mechanisms and the documented procedures which were established through PWS in 1995 so as to allow the UN Department of Humanitarian Assistance (DHA), the predecessor of United Nations Office for Coordination of

Humanitarian Affairs (UN-OCHA) request meteorological assistance and information from the National Meteorological Centres and Regional Specialized Meteorological Centres (RSMC) serving that region;

- (3) Considering the needs and requirements of humanitarian agencies,; lessons learnt from the experiences of PWS initiative ; new institutional and operational mechanisms resulting from the humanitarian reforms,; new technologies; and other relevant issues; to develop an implementation plan to facilitate the provision of meteorological assistance and information to the international humanitarian agencies from NMHSs and GDPFS.
- (b) **Task Team on the preparation of prototype Guidelines on Meteorological Hazards,** with the following TORs:
  - (1) Study the methodologies and feasibility of development of guidelines for meteorological hazards and develop a list of hazards for which the Task Team will provide prototype guidelines for database, metadata, mapping, and statistical analysis methodologies;
  - (2) Review, analyze and evaluate existing methodologies for monitoring, archiving, mapping, and the statistical analysis of the selected hazards;
  - (3) Review, analyze and evaluate methodologies for dissemination of hazard information and statistical analyses being utilized by NMHSs;
  - (4) Develop prototype guidelines for monitoring, archiving, mapping and statistical analysis methodologies for the selected hazards;
  - (5) In consultation with CCI, CHy, CAgM, and JCOMM, propose a prototype methodology for collection of hazard information from NMHSs, , for the preparation of statistical reports aimed at informing specialized agencies of the United Nations.

**Annex to paragraph 12.2.4 of the general summary****DESIGNATION OF CHAIRPERSONS, CO-CHAIRPERSONS, RAPORTEURS AND CBS REPRESENTATIVES**

Rapporteur on Quality Management Framework	
Co-chair of the Inter-Programme Coordination Team on Space Weather (ICTSW)	
Coordinator for Disaster Risk Reduction	
Coordinator on Capacity Building	
Coordinator on GEO/GEOSS activities related to WMO	

<b>OPAG on Integrated Observing Systems (OAPG-IOS)</b>		
	Chairperson	Co-Chair or Vice-Chair
Implementation Coordination Team on Integrated Observing Systems (ICT-IOS)		
Expert Team on Requirements and Implementation of AWS Platforms (ET-AWS)		
Expert Team on Evolution of the Global Observing System (ET-EGOS)		
Expert Team on Satellite Systems (ET-SAT)		
Expert Team on Satellite Utilization and Products (ET-SUP)		
Expert Team on Surface-based Remotely-Sensed Observations (ET-SBRSO)		
Expert Team on Aircraft-based Observations (ET-AIR)		
Co-Rapporteurs on Scientific Evaluation of Impact Studies undertaken by NWP Centres		
Rapporteur on GCOS Matters		
Rapporteur on Regulatory Material		
Co-Rapporteurs on the Impacts of New Instrumentation on the GOS		

<b>OPAG on Information Systems and Services (OPAG-ISS)</b>		
	Chairperson	Co-Chair or Vice-Chair
Implementation Coordination Team on Information Systems and Services (ICT-ISS)		
Inter-Programme Expert Team on Data Representation and Codes (IPET-DRC)		
Inter-Programme Expert Team on Metadata and Data Interoperability (IPET-		

MDI)		
Expert Team on WIS-GTS Communication Techniques and Structure (ET-CTS)		
Expert Team on WIS Centres (ET-WISC)		
Ad hoc expert team on GISC and DCPC Demonstration Processes (ET-GDDP)		
Expert Team on WIS-GTS Operation and Implementation (ET-OI)		
Steering Group on Radio-Frequency Coordination (SG-RFC)		

<b>OPAG on Data Processing and Forecasting System (OPAG-DPFS)</b>		
	Chairperson	Co-Chair or Vice-Chair
Implementation Coordination Team on Data-Processing and Forecasting System		
Coordination Group on Forecast Verification		
Expert Team on Ensemble Prediction Systems		
Rapporteur on Infrastructure for Numerical Weather Prediction (NWP)		
Expert Team on Extended- and Long-range Forecasting		
Coordination Group on Nuclear Emergency Response Activities (ERA)		
Expert Team on Modelling of Atmospheric Transport for Non-nuclear ERA		
Rapporteur on the Application of NWP to Severe Weather Forecasting		

<b>OPAG on Public Weather Services (OPAG-PWS)</b>		
	Chairperson	Co-Chair or Vice-Chair
Implementation and Coordination Team on Public Weather Services (ICT-PWS)		
Expert Team on Services and Products Improvements (ET-SPI)		
Expert Team on PWS in Support of Disaster Prevention and Mitigation (ET-DPM)		
Expert Team on Communication, Outreach and Public Education Aspects of PWS (ET-COPE)		
Task Team on Meteorological Services for Improved Humanitarian Planning and Response		
Task Team on the preparation of prototype Guidelines on Meteorological Hazards		

**DRAFT RESOLUTION**

**Res. 12.2/1 (CBS-XIV) – OPEN PROGRAMME AREA GROUPS**

**THE COMMISSION FOR BASIC SYSTEMS,**

**Considering** that there is a need for the continued development and coordination of:

- (1) The surface- and space-based components of the global observing systems,
- (2) The information systems and services,
- (3) The data processing and forecasting systems,
- (4) The public weather services,

**Recalling** that the working structure implemented by CBS-Ext.(98) has been maintained according to Resolution 2 (CBS-Ext.(98)) – Working Structure of the Commission for Basic Systems, and Resolution 1 (CBS-XII) – Working Structure of the Commission,

**Noting** Resolutions 9 (EC-LVI), 18 ((EC-LVII) and 15 (EC-LVIII) - Global Earth Observation System of Systems (GEOSS),

**Decides:**

- (1) To re-establish:
  - (a) The OPAG on Integrated Observing Systems (IOS);
  - (b) The OPAG on Information Systems and Services (ISS);
  - (c) The OPAG on Data Processing and Forecasting System (DPFS);
  - (d) The OPAG on Public Weather Services (PWS);
- (2) To maintain the terms of reference for each OPAG as given in Resolution 4 (CBS-Ext.(98)), and in addition, to request:
  - (a) The OPAG on ISS to contribute to the development and implementation planning of the WMO Information System (WIS) and coordinate with the Intercommission Coordination Group on WIS (ICG-WIS);
  - (b) The OPAGs on IOS and ISS to contribute to the development and implementation planning of the concept of the WMO Integrated Global Observing System (WIGOS) and coordinate with the Sub-group on the WIGOS of the EC Working Group on the WIGOS and the WIS;
  - (c) Each OPAG to develop contributions to the activities of the Disaster Risk Reduction Programme;
- (3) To select, in accordance with Regulation 32 of the General Regulations:
  - (a) L-P. Riishojaard (USA) as chairperson and J. Dibbern (Germany) as co-chairperson of the OPAG on Integrated Observing Systems;

- (b) P. Shi (China) as chairperson and S. Foreman (UK) as co-chairperson of the OPAG on Information Systems and Services;
- (c) B. Strauss (France) as chairperson and Y. Honda (Japan) as co-chairperson of the OPAG on Data Processing and Forecasting System;
- (d) G. Fleming (Ireland) as chairperson and M. Ndabambi (South Africa) as co-chairperson of the OPAG on Public Weather Services;

**Decides further:**

- (1) To designate a Rapporteur on Quality Management Framework with the following Terms of Reference:
  - (a) To review, as appropriate, CBS documents addressing quality issues so as to ensure that the terminology used in them is in agreement with the definitions of the quality related terms given in the ISO 9000:2005 standard;
  - (b) To represent the Commission and actively participate in the work of the ICTT-QMF;
  - (c) To update yearly, in coordination with the OPAGs, the list of valid CBS guidance documents to be used by Members;
  - (d) To report to the Commission and advise the Commission on activities that should be undertaken to support the WMO QMF as integral part of the Commission activities;
- (2) To select ..... to serve as the Rapporteur on Quality Management Framework;
- (3) To establish an Inter-Programme Coordination Team on Space Weather (ICTSW) with the following Terms of Reference:
  - (a) Standardization and enhancement of Space Weather data exchange and delivery through the WMO Information System (WIS);
  - (b) Harmonized definition of end-products and services, including e.g. quality assurance guidelines and emergency warning procedures, in interaction with aviation and other major application sectors;
  - (c) Integration of Space Weather observations, through review of space- and surface-based observation requirements, harmonization of sensor specifications, monitoring plans for Space Weather observation;
  - (d) Encouraging the dialogue between the research and operational Space Weather communities;
- (4) To designate ... .. to serve as co-chair of the Inter-Programme Coordination Team on Space Weather (ICTSW);
- (5) To designate a Coordinator on Disaster Risk Reduction with the following Terms of Reference:
  - (a) To coordinate Commission activities, across its relevant OPAGs, related to Disaster Risk Reduction (DRR) and advise Commission members on activities that will contribute fully to the DRR Programme including relevant enhanced operation of the WWW;

**Comment [KP3]:** TORs as given in Doc. 7, Appendix A

- (b) To provide the CBS Management Group with appropriate information and recommendations on the Commission's DRR-related activities;
- (6) To designate M Jean (Canada) to serve as Coordinator on Disaster Risk Reduction;
- (7) To designate a Coordinator on Capacity Building with the following Terms of Reference:
  - (a) To review and consolidate the CBS contribution to Technical Cooperation Programme and the Programme for the Least Developed Countries;
  - (b) To identify the technical support required for project implementation plans, including guidance materials, technical specifications and project documentation for resource mobilization activities.
- (8) To designate ... .. to serve as Coordinator on Capacity Building;
- (9) To designate a Coordinator on GEO/GEOSS activities related to WMO with the following Terms of Reference:
  - (a) To coordinate Commission activities, across its relevant OPAGs, related to implementation aspects of the GEOSS 10-Year Implementation Plan and advise OPAGs on activities that will contribute fully to the development and implementation of GEOSS including enhanced operation of the World Weather Watch relevant to GEOSS;
  - (b) Through the GEO Secretariat and with the support of the WMO Secretariat, to keep GEO informed on the relevant activities of the Commission;
  - (c) To liaise with other regional and technical commission GEOSS rapporteurs, with the support of the WMO Secretariat, on relevant GEOSS activities;
  - (d) To provide the CBS Management Group with appropriate information and recommendations on the Commission's GEOSS related activities;
- (10) To select A. Gusev (Russian Federation) to serve as the Coordinator on GEO/GEOSS activities related to WMO;

**Requests:**

- (1) The chairpersons of the OPAGs to act upon matters referred to the OPAG by the president of CBS;
- (2) The chairpersons of the OPAGs, the Rapporteur on Quality Management Framework, the chairperson of the Inter-Programme Coordination Team on Space Weather, the Coordinator on Disaster Risk Reduction, the Coordinator on Capacity Building and the Coordinator on GEO/GEOSS activities related to WMO:
  - (a) To prepare an activity report at the end of 2009 for distribution to CBS members;
  - (b) To submit a report to the Commission not later than three months prior to its session.