WMO OMM



World Meteorological Organization Organisation météorologique mondiale Organización Meteorológica Mundial Всемирная метеорологическая организация المنظمة العالمية للأرصاد الجوية 世界气象组织 Secrétariat

7 bis, avenue de la Paix – Case postale 2300 CH 1211 Genève 2 – Suisse Tél.: +41 (0) 22 730 81 11 Fax: +41 (0) 22 730 81 81 wmo@wmo.int – public.wmo.int

Our ref.: OBS/CBS-16/Expert-Nomination

GENEVA, 25 August 2016

Annexes: 2

- Subject: Preparations for CBS-16 (Guangzhou, China, 23-29 November 2016) -Nomination of experts for CBS expert teams or of rapporteurs
- Action required: To return to the WMO Secretariat before **17 October 2016** completed PDF nomination forms for experts from your country proposed to be considered for nomination as a member of an expert team or as a rapporteur at CBS-16

Dear Sir/Madam,

The activities of the Commission for Basic Systems (CBS) are organized under four Open Programme Area Groups (OPAGs) on: Integrated Observing Systems, Information Systems and Services, Data Processing and Forecasting Systems and Public Weather Services. The work of the Commission is carried out by small and task-focused expert teams, OPAG focal points or coordinators and an implementation coordination team under each OPAG, which are established at sessions of CBS.

In this context the current chairpersons of the four OPAGs, considering the work that needs to be accomplished during the period 2017-2020, will again propose that CBS-16 should establish certain expert teams, OPAG focal points and coordinators. The Terms of Reference for the teams that the CBS Management Group will recommend to the Commission will be provided in CBS-16/Doc. 5.10(1). An early draft of the Terms of Reference is attached herewith in Annex 1 and is available from http://wis.wmo.int/page=CBSHome.

The selection of individuals at the session of CBS to serve as members of the teams in these areas of expertise is considerably facilitated and improved if information is available on the national experts ready to work in the various fields of the Commission's activities. In assigning experts to expert teams, the Commission will consider regional and gender balance. CBS-16/INF. 5.4(1) will provide information on the distribution of experts during the period 2013-2016. Members are encouraged to consider nominating both male and female experts. Members from Regions I, III and V, that were underrepresented during the last intersessional period, are encouraged to nominate experts.

To: Permanent Representatives (or Directors of Meteorological or Hydrometeorological Services) of Members of WMO (PR-6918) Director-General, Agency for Air Navigation Safety in Africa and Madagascar (ASECNA) Director-General, European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) Director-General, European Centre for Medium-Range Weather Forecasts (ECMWF) Secretary-General, International Civil Aviation Organization The Secretariat is circulating this material to Members before CBS-16 to permit them to propose experts as potential members of CBS expert or implementation coordination teams, or as rapporteurs that may be established at the Commission session. Members proposing candidates should realize that this implies a commitment that the person will be able to spend the time required to complete the tasks assigned to him/her. For example, the minimum commitment might be:

- An expert team chairperson 30 days a year;
- An expert team member or rapporteur 25 days a year; and
- Other experts 15 days a year.

In this regard, relevant recommendations for the nomination of experts that were agreed by EC-LX are provided for your attention in Annex 2. Since most teams will consist of a small number of members there is no guarantee that a nominated expert will actually be selected as a team member by the Commission. However, your nominated expert(s) will become registered member(s) of the corresponding OPAG(s) and as such will be included in the exchange of information and consultations by correspondence (e-mail and web) conducted within an OPAG.

It would be appreciated if you could propose your candidates by completing one nomination form for each expert. This form includes a brief CV on his/her professional profile that you should use to demonstrate why your expert is suitable for the proposed role. Please send this to the Secretariat as soon as possible, but no later than **17 October 2016**.

You are requested to use electronic submission by downloading, filling in and saving the PDF form at http://wis.wmo.int/ExpertForm and sending it by e-mail to cbs-16@wmo.int.

I would like to remind you that the information and documentation for CBS-16 are being published under: http://meetings.wmo.int/cbs-16.

In line with the Organization's policy on gender equality (Resolution 59 (Cg-17)) aiming at a minimum of 30% of women in WMO constituent bodies and their working structures, I would like to encourage you to nominate female candidates.

Finally, I should like to refer to Regulation 6 that authorizes you, as the normal channel of communication between the Organization and your country, to propose as rapporteurs or members of working groups individuals who also work in other governmental and non-governmental establishments in your country, subject, of course, to their personal agreement and that of their employer.

I look forward to receiving your nomination as an attached PDF file sent to cbs-16@wmo.int.

Yours faithfully,

(E. Manaenkova) for the Secretary-General



World Meteorological Organization COMMISSION FOR BASIC SYSTEMS

Team ToRs 18.VII.2016 Preliminary DRAFT

Sixteenth Session Guangzhou, China, 23 to 29 November 2016

PRELIMINARY TERMS OF REFERENCE FOR CBS EXPERT TEAMS

These Terms of Reference for the proposed expert teams in CBS are intended to help Members decide on appropriate people to nominate as experts. The Terms of Reference are being reviewed by the management teams of the Open Area Programme Groups and the versions in the document for CBS are likely to differ from those in this paper.

OPAG IOS

TERMS OF REFERENCE FOR THE IMPLEMENTATION-COORDINATION TEAM ON INTEGRATED OBSERVING SYSTEM (ICT-IOS)

- (a) Contribute to the implementation of the WMO Integrated Global Observing System (WIGOS), in response to WMO Strategic Planning, and guidance from CBS, ICG-WIGOS and in coordination with other relevant WMO Programmes and TCs; provide relevant advice and support to the president of CBS;
- (b) Coordinate the work of the OPAG-IOS Expert Teams, Inter-Programme Expert Teams, Steering Groups and Coordinators, provide advice to the work of these groups and report on results to the Commission for Basic Systems; in particular with regard to Capacity Development Strategy and the WMO Programme for the Least Developed Countries;
- (c) In cooperation with CIMO, give guidance to the CIMO IPET on Operational Weather Radar;
- (d) Monitor, report and make recommendations regarding the development of the composite observing systems under WIGOS and their capability to meet the requirements of all relevant WMO and co-sponsored programmes; and contribute to the WIGOS priority areas of the pre-operational phase;
- (e) Review deficiencies in coverage and performance, including cost-effectiveness, of the existing GOS; make proposals to improve the availability and coverage of data to meet stated requirements; monitor and report on progress in the evolution of the GOS; coordinate with the GCOS implementation activities;
- (f) Coordinate and consolidate the development of standardized high quality observing practices and prepare related recommendations;
- (g) Coordinate and assess impact studies and provide recommendations and guidance on the evolution of global and regional observing networks;
- (h) Contribute to strengthening the collaboration between CBS and the regional associations, by increasing engagement with regional experts;
- (i) To coordinate as needed CBS observations implementation aspects of the GEOSS Implementation Plan and report to the Management Group on activities that can contribute to the development and implementation of GEOSS.

TERMS OF REFERENCE OF THE WMO CBS OPAG-IOS INTER-PROGRAMME EXPERT TEAM ON OBSERVING SYSTEM DESIGN AND EVOLUTION (IPET-OSDE)

- (a) Under the direction of the Chairperson of the OPAG-IOS, undertake tasks and provide advice on and support for the implementation of the WIGOS framework and the priority activities of the WIGOS pre-operational phase; in particular:
 - Review and report on the observational data requirements of application areas within the scope of WIGOS;
 - Review and report on the capability of both surface-based and space-based systems that are components or candidate components of the evolving observing systems within the scope of WIGOS;
 - (iii) Carry out the rolling requirements review of application areas leading to Statements of Guidance concerning the extent to which present and planned observing systems meet user requirements for observations;
 - (iv) Review the implications of the Statements of Guidance concerning the strengths and deficiencies in the existing observing systems and evaluate the capabilities of new observing systems and possibilities for improvements and efficiencies;
 - (v) Carry out impact studies of real and hypothetical changes to observing systems with the assistance of NWP centres;
 - (vi) Monitor and report progress against the Implementation Plan for Evolution of Global Observing Systems, based on the "Vision for the GOS in 2025"; identify new actions as necessary, taking into account developments within WIGOS;
 - (vii) Support ICG-WIGOS in the preparation of a "Vision for the observing system components of WIGOS in 2040";
 - (viii) Contribute to further elaboration of WIGOS guidance regarding observing network design; and
 - (ix) Promote activities which enhance progress against the Implementation Plan for Evolution of Global Observing Systems;
- (b) Prepare documents to assist Members, technical commissions, and regional Aassociations, summarizing the results from the above activities;
- (c) Provide advice and support to the Chairperson of OPAG-IOS, and report on all activities relevant to its Terms of Reference.

TERMS OF REFERENCE OF THE EXPERT TEAM ON AIRCRAFT BASED OBSERVING SYSTEMS (ET-ABO)

- Under the direction of the Chairperson of the OPAG-IOS, undertake tasks and provide advice on and support for the implementation of the WIGOS framework and the priority activities of the WIGOS pre-operational phase;
- (b) In collaboration with the CIMO Expert Team on Aircraft-based Observations, manage and coordinate the Aircraft Based Observations (ABO) programme, including the development and implementation of the ET-ABO work plan and the

budget for the corresponding expenditure of the AMDAR Trust Fund in line with its ToR;

- (c) Provide technical and scientific resources in support of further development of the Aircraft Based Observing System and assist in ABO training and outreach activities, and contribute to the CIMO ET-AO Activities;
- (d) Oversee and assist in the maintenance, enhancement and optimization of the Aircraft Based Observing System, including the AMDAR observing system, in line with the requirements of Members and the recommendations and actions of the EGOS-IP;
- (e) Coordinate the development and maintenance of the ABO quality monitoring system as a component of the WIGOS Data Quality Monitoring System;
- (f) Coordinate with and report to the work groups of CBS and other technical commissions as appropriate and relevant to the ET-ABO work plan and as directed by the Chairperson of the OPAG-IOS;
- (g) Provide advice and support to the Chairperson of OPAG-IOS, and report on all activities relevant to its Terms of Reference.

TERMS OF REFERENCE FOR THE STEERING GROUP ON RADIO-FREQUENCY COORDINATION (SG-RFC)

- Under the direction of the Chairperson of the OPAG-IOS, undertake tasks and provide advice on and support for the implementation of the WIGOS framework and the priority activities of the WIGOS pre-operational phase;
- (b) Review allocations of radio frequency bands and frequency assignments of systems and applications for meteorological activities including their operational requirements (telecommunications, instruments, sensors, etc.) and research purposes, in close coordination with other technical commissions, especially CIMO, and the CBS/OPAG-ISS;
- (c) Coordinate with WMO Members, with the assistance of the WMO Secretariat, to:
 - (i) Ensure the availability of radio-frequency spectrum to meteorological and other environment monitoring radiocommunication services;
 - (ii) Ensure the proper notification and registration of frequency assignments used for meteorological purpose; and
 - (iii) Identify the future use of the radio-frequency spectrum for meteorological purpose;
- (d) Keep abreast of the activities of the Radiocommunication Sector of the International Telecommunication Union (ITU-R), and in particular of the Radiocommunication Study Groups, on radio frequency matters pertaining to meteorological activities, and represent WMO in ITU-R work;
- (e) Prepare and coordinate proposals and advice to WMO Members on radio regulation matters pertaining to meteorological activities in ITU Radiocommunication Study Groups, radiocommunication Assemblies (RA), World Radiocommunication Conferences (WRC) and related global and regional preparatory meetings;

- (f) Facilitate the cooperation among WMO Members for the use of frequency bands allocated to meteorological and environment monitoring radiocommunication services with respect to:
 - (i) Coordination of radio-frequency spectrum use and frequency assignments between countries; and
 - (ii) Sharing the same frequency bands between various radiocommunication services;
- (g) Facilitate the coordination of WMO frequency use activities with other international organizations which address radio spectrum management issues, 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), the Asia-Pacific Telecommunity (APT), the Regional Commonwealth in the Field of Communications (RCC); the African Telecommunication Union (ATU), and the Arab Spectrum Management Group (ASMG);
- (h) Assist WMO Members, upon request, on issues related to the assignment of frequency bands to radiocommunication systems;
- Increase the understanding of the role of NMHSs in radio frequency coordination and the importance of the close collaboration with the ITU Radiocommunication Sector (ITU-R) and the Telecommunication Development Sector (ITU-D) in the accomplishment of the WMO priority activities, and in particular review and propose updates to the WMO Guide to Participation in Radio Frequency Coordination (WMO-No. 1159), and the WMO/ITU Handbook on the "Use of radio spectrum for meteorology: weather, water and climate monitoring and prediction";
- (j) Provide advice and support to the Chairperson of OPAG-IOS, and report on all activities relevant to its Terms of Reference.

TERMS OF REFERENCE OF THE EXPERT TEAM ON SURFACE-BASED OBSERVING SYSTEMS (ET-SBO)

- (a) Under the direction of the Chairperson of the OPAG-IOS, undertake tasks and provide advice on and support for the implementation of the WIGOS framework and the priority activities of the WIGOS pre-operational phase;
- (b) Develop and update relevant elements of the WIGOS Regulatory and Guidance materials, including the Manual and the Guide on the GOS and incorporating WIGOS data quality monitoring system recommendations;
- Monitor and assess the status of operational and planned surface-based observing systems and advise how Members could submit related information in OSCAR/Surface;
- (d) In collaboration with IPET-OSDE, assess the contribution of current and planned SBO systems to meeting user requirements for all Application Areas;
- (e) Contribute to the delivery of those EGOS-IP actions identified as priorities by OPAG-IOS;
- (f) Monitor the status of operational networks of SBO systems, promote best practice among WMO Members and provide advice on operational matters;

(g) Provide advice and support to the Chairperson of OPAG-IOS, and report on all activities relevant to its Terms of Reference.

TERMS OF REFERENCE OF THE COORDINATOR ON MARINE OBSERVING SYSTEMS (C-MAR)

- (a) Under the direction of the Chairperson of the OPAG-IOS, undertake tasks and provide advice on and support for the implementation of the WIGOS framework and the priority activities of the WIGOS pre-operational phase;
- (b) Collect information on the status of marine (i.e. marine meteorological and oceanographic) observations from the JCOMM approved sources;
- (c) Liaise with appropriate JCOMM Expert Teams, Groups, Observation Panels (DBCP, SOT, GLOSS), and associated Programmes (Argo, IOCCP, OceanSITES) to ensure that the actions from the EGOS-IP are being addressed and that JCOMM Implementation Goals are being considered by the OPAG-IOS;
- (d) Liaise with the RRR point of contact for Ocean Applications concerning user requirements and gap analysis;
- Keep abreast of developments in marine observing systems and advise the Chairperson of ICT-IOS on coordinated assessment and implementation developments;
- (f) Provide advice and support to the Chairpersons of OPAG-IOS and IPET-OSDE, and report on all activities relevant to its Terms of Reference.

TERMS OF REFERENCE FOR COORDINATORS ON SCIENTIFIC EVALUATION OF IMPACT STUDIES UNDERTAKEN BY NWP CENTRES (C-SEIS)

- (a) Under the direction of the Chairperson of the OPAG-IOS, undertake tasks and provide advice on and support for the implementation of the WIGOS framework and the priority activities of the WIGOS pre-operational phase;
- (b) Prepare and maintain reviews of OSEs, OSSEs and other observational data impact studies undertaken by various NWP centres around the globe and provide information for consideration by the OPAG-IOS;
- (c) Organize regular workshops on the Impact of Various Observing Systems on Numerical Weather Prediction and chair the organizing committee;
- (d) Provide input to the ICT-IOS and the IPET-OSDE relevant for the evolution of the WIGOS observing system components;
- (e) Provide advice and support to the Chairperson of OPAG-IOS, and report on all activities relevant to its Terms of Reference.

TERMS OF REFERENCE FOR THE EXPERT TEAM ON SATELLITE SYSTEMS (ET-SAT)

- Under the direction of the Chairperson of the OPAG-IOS, undertake tasks and provide advice on and support for the implementation of the WIGOS framework and the priority activities of the WIGOS pre-operational phase;
- (b) Assess and document, in the framework of the WMO Rolling Review of Requirements, the actual and planned capabilities of operational and R&D satellites

constituting the space-based component of WIGOS and their adequacy to meet the WMO requirements for satellite data and products. This will be achieved in considering the information provided by participating agencies as well as the outcome of the Coordination Group for Meteorological Satellites (CGMS) and the Committee on Earth Observation Satellites (CEOS), including, for example, the progress of CEOS constellations. The feedback from WMO should be communicated to CGMS and CEOS;

- (c) Provide technical advice with respect to both operational and R&D environmental satellites to assist in the implementation of integrated WMO-coordinated observing systems;
- (d) Assess progress of R&D and demonstration satellite systems, and identify opportunities and/or problem areas concerning satellite technology and plans;
- (e) Coordinate with IPET-SUP and other relevant teams on satellite related matters;
- (f) Provide advice and support to the Chairperson of OPAG-IOS, and report on all activities relevant to its Terms of Reference.

TERMS OF REFERENCE FOR THE INTER-PROGRAMME EXPERT TEAM ON SATELLITE UTILIZATION AND PRODUCTS (IPET-SUP)

- Under the direction of the Chairperson of the OPAG-IOS, undertake tasks and provide advice on and support for the implementation of the WIGOS framework and the priority activities of the WIGOS pre-operational phase;
- (b) Monitor the progress of satellite data availability and use by WMO Members, related issues and expectations, with the aim to publish findings and recommendations in a WMO document;
- (c) Coordinate with ET-SAT and IPET-OSDE on the evolution of the space-based component of Global Observing Systems;
- (d) Initiate and promote 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 working groups, regional associations and with WIS activities;
- Review present and future R&D satellite data and products including their availability and potential applications, and provide advice with a view to increased utilization by WMO Members;
- (f) Review, and assist in addressing, the needs of WMO Members and regional associations for information regarding satellite capabilities and in particular access to and utilization of satellite data and products;
- (g) Promote development and harmonization of satellite data and products responding to WMO Members' needs, and develop and update relevant elements of the WIGOS Regulatory and Guidance materials, including the Manual and the Guide on the GOS, and the WIGOS Data Quality Monitoring System;
- (h) Keep under review the needs of WMO Members for training in satellite meteorology and related fields, and engage with the Management Group of the Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) to address these needs, towards full utilization of satellite data from operational and R&D satellites, in accordance with the 2015-2019 Virtual Laboratory Training Strategy;

- (i) Holding joint and/or overlapping meetings with ET-SAT as appropriate, to facilitate interaction between users and providers of satellite systems, data and products;
- (j) Coordinate with ET-SAT with a view to making recommendations and receiving input 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 the use of satellite data in all WMO Programmes, including support to resource mobilization activities;
- (k) Coordinate with WMO Technical Commissions and Programmes, including cosponsored Programmes, activities related to satellite utilization and products, through ex-officio membership on the Team;
- (I) Provide advice and support to the Chairperson of OPAG-IOS, and report on all activities relevant to its Terms of Reference.

OPAG ISS

IMPLEMENTATION COORDINATION TEAM FOR INFORMATION SYSTEMS AND SERVICES (ICT-ISS)

- (a) Assess the implementation aspects at regional and global levels, including sustainability and necessary capacity-building, 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 WMO Programmes and other international programmes/projects supported by WMO, including cross-cutting activities such as GFCS, WIGOS and DRR;
- (d) Identify matters requiring the consideration of the OPAG on ISS and develop proposals for tasks and organization of activities;
- (e) Advise the technical commissions on information management and data communications issues, especially in respect of the WIS, and collaborate with technical commissions to develop and document appropriate standards and practices in information management;
- (f) Provide guidance for the ISS teams on requirements and priorities for development of the WIS;
- (g) Develop and maintain a strategic plan for the evolution of the WIS and explore and extend WIS functionality to build on new technology and applications to meet the needs of WMO Programmes;
- (h) Coordinate the work of OPAG ISS related to the implementation and evolution aspects of GEO and ICAO infrastructure, including maintenance of interoperability with GEOSS and SWIM to the benefit of Members;
- (i) Develop and maintain procedures for addressing security and incident management events with in WIS.

EXPERT TEAM ON WIS CENTRES (ET-WISC)

Note: ET-WISC may perform some of its work though sub-teams (called task teams) that work by correspondence.

- (a) Review and further develop the technical and operational specifications for the components and interfaces of WIS Centres; develop criteria for interoperability, certification and service quality management of WIS Centres;
- (b) Maintain guidance and management procedures for the CBS demonstration and assessment capabilities of candidate GISC and DCPC centres in the framework of the GISC/DCPC demonstration procedure described in the Manual on WIS;
- Review and develop the *Manual on WIS* (WMO-No. 1060), the *Guide to WIS* (WMO-No. 1061) and associated informal guidance to better meet the needs of Members;
- Maintain WIS competencies related to WIS centre operations and associated training and learning guides; facilitate training on WIS by GISCs and Regional Training Centres;

- (e) Review, further develop and oversee routine WIS monitoring activities, including those aspects of monitoring relating to the effectiveness of information exchange on behalf of the WWW and other Programmes, and take action to address issues that are identified by monitoring and auditing;
- (f) Review, develop and coordinate recommended practices and guidance on access to, and management of, operational information related to exchange of information through the WIS;
- (g) Foster collaboration among WIS centres;
- (h) Advise the technical commissions, regional associations and partner organizations on roles, responsibilities and implementation of WIS centres;
- (i) Monitor and explore evolving new service monitoring and user management technologies with the aim of improving the efficient operation and usability of WIS;
- (j) Raise awareness of Members of the opportunities and risks associated with new service monitoring and user management technologies;
- (k) Identify implementation and operational issues requiring the urgent consideration of the OPAG on ISS;
- Contribute to the implementation and evolution aspects of GEO and ICAO infrastructure, including maintenance of interoperability with GEOSS and SWIM to the benefit of Members.

EXPERT TEAM ON CENTRE AUDIT/CERTIFICATION (ET-CAC)

- (a) Operate the procedures for technical endorsement of WIS Centres and advise CBS on centres' level of technical compliance with standards and procedures:
 - (i) Validate and monitor the conformance of WIS Centres' interfaces to the agreed specifications and practices;
 - (ii) Coordinate and organize demonstrations of capabilities of candidate WIS centres as required, including onsite audits of GISCs;
- (b) Make recommendations to ICT-ISS regarding continuous improvement of the procedures for certification and periodic assessment of WIS centres;
- (c) Advise ICT-ISS on systematic issues identified during certification and assessment activities.

INTER-PROGRAMME EXPERT TEAM ON CODES MAINTENANCE (IPET-CM) (WAS IPET-DRMM)

Note: IPET-CM may perform some of its work though sub-teams (called task teams) that work by correspondence.

- (a) Review and maintain the Table Driven Code Forms by defining descriptors, common sequences, data templates and the regulations supporting these, including data representation of regional practices, so they meet the requirements of all Members, WMO Programmes and other concerned international organizations, such as ICAO;
 - (i) Raise awareness of Members of the opportunities and risks associated with new technologies;

- (b) Review and update guidance to Members and technical commissions on data representation, including national practices, and invite, coordinate and assist Members to validate modified or new data representations;
- (c) Review, develop and update the *Manual on Codes* (WMO-No. 306), the code tables in the *Manual on WIGOS* (WMO-No. 1160) and associated reference and guidance material as required, and publish these in suitable electronic formats for human and automated use including codes.wmo.int;
- (d) Review and develop procedures and guidance to enable the interoperability of metadata and data between WMO standards and formats used within other communities, such as NetCDF, using the WMO Logical Data Model as a tool to achieve this;
- (e) Monitor conformance of data exchanged within the WIS and metadata records published to the WIS DAR catalogue with WMO data representation standards for utility and conformance with the guidance and WMO Core Metadata Profile, and develop action plans, including capacity-building, to address issues identified by monitoring;
- (f) Review and update the procedures used to maintain WMO data representations, taking into account opportunities presented by the WMO Logical Data Model;
- (g) Monitor progress towards and coordinate actions to implement migration to Table Driven Codes Forms;
- (h) Identify implementation issues requiring the urgent consideration of the OPAG on ISS;
- (i) Review and maintain the data designators in abbreviated headings in *Manual on the GTS* (WMO-No. 386);
- (j) Review and maintain the Graphical Representation of Data, Analyses and Forecasts in the attachment to Manual on Codes in cooperation with OPAG-DPFS;
- Assist the WIGOS Data Quality Monitoring System (WDQMS) in understanding and dealing with erroneous BUFR messages as and when they are identified by WDQMS;
- (I) Contribute to the maintenance of WIS competencies related to use of codes and associated training and learning guides and facilitate training.

INTER-PROGRAMME EXPERT TEAM ON DATA REPRESENTATION DEVELOPMENT (IPET-DD) (WAS IPET-MDRD)

Note: IPET-DD may perform some of its work through sub-teams (called task teams) that address specific issues.

- Review and further develop the WMO Core Metadata Profile, model driven code forms and WMO standards for metadata and data exchange to meet the needs of Members, WIS, WMO Programmes and cooperating organizations such as ICAO;
- (b) Contribute to the review of and recommend updates to the Part D of the Manual on Codes (WMO-No. 306) and the Manual on the WMO Information System (WMO-No. 1060) and associated reference and guidance material as required, publishing these in suitable electronic forms for human and automated use including codes.wmo.int;

- Facilitate proposals to standards development organizations, such as ISO TC 211 and OGC, changes to their respective standards that are required to meet the needs of WIS;
- (d) Advise Members, technical commissions and ICG-WIGOS on WIS Discovery Metadata, the model driven code forms and associated application schema and data interoperability issues;
- (e) Monitor metadata quality within the WIS DAR Catalogue and take follow-up action to address systematic issues identified;
- (f) Identify implementation issues requiring the urgent consideration of the OPAG on ISS;
- (g) Monitor and explore evolving data exchange and discovery technologies with the aim of improving the efficient operation and usability of WIS;
- (h) Raise awareness of Members of the opportunities and risks associated with new data exchange and discovery technologies;
- (i) Contribute to the maintenance of WIS competencies related to use of metadata and new model based data representation and associated training and learning guides and facilitate training.

EXPERT TEAM ON COMMUNICATION TECHNIQUES AND SYSTEMS (ET-CTS)

Note: ET-CTS may perform some of its work through sub-teams (called task teams) that address specific issues.

- (a) Maintain and develop recommended practices and technical guidance material for data communication techniques and procedures for use in the WIS, with a view to ensuring efficient and safe operations of information systems, and inform members of recent developments in standards bodies, in particular W3C, IETF, ITU and ISO;
- (b) Review and further develop the organization and design principles for the WIS data communication and access structure, and coordinate related pilot and implementation projects
- (c) Contribute to the development and maintenance of networks-related WIS monitoring;
- (d) Review and amend as required the telecommunications components of the *Manual* on WIS (WMO-No. 1060), the *Manual on the GTS* (WMO-No. 386) including the General File Naming Convention, their associated Guides and other guidance material;
- (e) Provide guidance on the technical, operational, security, administrative and contractual aspects of data communications services for WIS implementation at national, regional and global levels, including among others satellite telecommunications, managed data communications network services, cloud services and the Internet and coordinating cooperation with other organizations where appropriate to obtain operational benefits;
- Review and further develop guidance and practices for planning, implementation and operation of data collection systems for observing systems for NMHSs, including interfaces with observation platforms, methods and data communications protocols;

- (g) Monitor the effectiveness of data exchange on the WIS in relation to the expected standards, and take follow-up action, including capacity-building activities, to address issues identified;
- (h) Facilitate the interaction between Members and international organizations on telecommunications issues, including ensuring remote communities and areas with limited access to modern communication systems are properly catered for;
- (i) Identify implementation issues requiring the urgent consideration of the OPAG on ISS;
- (j) Contribute to the maintenance of interoperability with GEOSS and SWIM and liaison with SATCOM to the benefit of Members;
- (k) Monitor and explore evolving infrastructure technologies with the aim to improving the efficient operation and usability of WIS;
- (I) Raise awareness of Members on the opportunities and risks associated with new infrastructure technologies;
- (m) Contribute to the maintenance of WIS competencies related to network and cloud management and the associated training and learning guides and facilitate training.

ICT-ISS TASK TEAM ON INFORMATION MANAGEMENT (TT-IM)

- (a) Collaborate with technical commissions to review available information management practices and develop and document appropriate standards and practices in information management;
- (b) Recommend procedures for the long-term maintenance and development of standards and best practices related to information management.
- (c) Replace the *Guide on World Weather Watch Data Management* (WMO-No. 788) with a new guide on best practices for information management across all WMO Programmes;
- Propose updates to incorporate standards and practices for information management under WIS Part C in the *Manual on WIS* (WMO-No. 1060) and *Guide* to the WIS (WMO-No. 1061);
- (e) Recommend updates to the WIS competencies related to information management and associated training and learning guides.

ICT-ISS TASK TEAM ON EVOLUTION OF THE WIS (TT-EWIS)

- (a) Develop an implementation plan, with schedule and key deliverables, that is in line with the WIS 2.0 strategy and guide implementation of the plan that is approved;
- (b) Consolidate stakeholder requirements;
- (c) Communicate with stakeholders about the strategy and plan.

AD HOC INTER-COMMISSION TASK TEAM ON WIS (ICTT-WIS)

 Recommend to ICT-ISS a process for making decisions impacting on the management of the capacity of WIS networks, including the process for agreeing that data may be designated as for global exchange (using the "GlobalExchange" keyword in the associated WIS Discovery Metadata record that controls routinely exchange between GISCs and contents of the WIS cache);

- (b) Recommend to ICT-ISS an escalation process for resolving issues that result from decisions made through the collaborative mechanisms established between the GISCs;
- (c) Propose to ICT-ISS a mechanism for gathering the expectations of technical commissions and regional associations for their requirements of what WIS would provide for them in the 2020s and beyond;
- (d) Inform ICT-ISS of the headline services that technical commissions and rRegional associations expected WIS to provide in the 2020s that could be used to guide the strategy for WIS before the detailed expectations had been gathered.

OPAG DPFS

IMPLEMENTATION COORDINATION TEAM ON DATA-PROCESSING AND FORECASTING SYSTEM (ICT-DPFS)

- (a) Consider the requests and WMO priorities from Cg/EC;
- (b) Identify new emerging requirements as a contribution to the implementation of the WMO Strategy for Service Delivery (input required from RAs and other bodies);
- (c) Determine how GDPFS Centres can best contribute to fulfil emerging requirements;
- (d) Coordinate the implementation of decisions by CBS related to GDPFS and ERA;
- (e) Make recommendations to CBS concerning future work;
- (f) Review requirements and propose the establishment and activities of Task Teams, including Joint Task Teams;
- (g) Recommendations on technical regulations including the implementation of the new Global Data-Processing and Forecasting System Manual and Quality Management Framework;
- (h) Recommendation on strategy for Future GDPFS.

EXPERT TEAM ON THE OPERATIONAL WEATHER FORECASTING PROCESS AND SUPPORT (ET-OWFPS)

- (a) Review the *Manual on the GDPFS* (WMO-No. 485) and propose updates as necessary concerning nowcasting to medium-range forecasting to ensure that procedures are adequate;
- (b) Review GDPFS and Lead Centres' activities, support their developments and provide guidance as stated in the Manual;
- (c) Assess applications for GDPFS status against the designation criteria and make recommendations on designation to CBS;
- (d) Review new developments and advances in NWP and related systems, particularly with regard to severe and high impact weather forecasting;
- (e) Liaise with relevant WMO Programmes, technical commissions and international organizations as required to advise on requirements for practical implementations in operational systems;
- (f) Provide advice to NMHSs on NWP products, including EPS and post-processing, particularly with regard to seamless forecasting of severe and high impact weather;
- (g) Monitor and review requirement for observation monitoring by NWP centres in collaboration with WIGOS;
- Liaise with the PWS programme to promote and support the use and communication of NWP products, including EPS, available from the GDPFS Centres; develop interpretation guidance to facilitate their use, and encourage feedback on usefulness and application;

- (i) Promote and support the education and training of forecasters on the use and interpretation of NWP products, including EPS, and their strengths and weaknesses;
- (j) Provide guidance on capacity-building concerning the implementation of operational NWP systems, including verification systems, and/or the use of NWP products.

EXPERT TEAM ON OPERATIONAL PREDICTIONS FROM SUB-SEASONAL TO LONGER-TIME SCALES (ET-OPSLS)

- (a) On the basis of requirements from Regional Climate Centres (RCCs), Regional Climate Outlook Forums (RCOFs) and NMHSs, and in the context of the Climate Services Information System (CSIS) of the Global Framework for Climate Services (GFCS), guide future development, outputs including, for example, the GSCU and coordination of components in the production of LRF. The components include Global Producing Centres (GPCs), Lead Centres for Long-range Forecast Multimodel Ensembles (LC-LRFMME), the Lead Centre for the Standardized Verification System for Long-range Forecasts (LC-SVSLRF) and other relevant bodies generating and providing LRF products;
- (b) Support CCI and CBS to collaboratively promote the use of GPC and LC forecast and verification products by RCCs, RCOFs and NMHSs, develop interpretation guidance to facilitate their use, and encourage feedback on usefulness and application;
- (c) Support CBS in the implementation of a seamless GDPFS;
- (d) Report on production, access, dissemination and exchange of LRF products and provide recommendations for future consideration and adoption by CAS, CCI, CBS, WCRP and other appropriate bodies;
- In consultation with relevant experts in CAS and CCI and with the CBS Expert Team on Operational Weather Forecasting Process and Support (ET-OWFPS), review developments in verification scores and practices with a view to updating the Standardized Verification System for Long-range Forecasts (SVSLRF);
- (f) Assess applications for GPC status against the designation criteria and make recommendations on designation to CBS;
- (g) Review the rules regarding user access to GPC and LC-LRFMME forecasts products;
- (h) Review the status of sub-seasonal forecasting activities, and promote the availability and exchange of sub-seasonal forecasts and verification products;
- (i) In close collaboration with WCRP, promote international cooperation and research on initialized predictions for timescales longer than seasonal and report on potential for operational predictions to CBS and CCI;
- (j) Review the *Manual on the GDPFS* (WMO-No. 485) and propose updates as necessary concerning extended and long-range forecasts.

EXPERT TEAM ON EMERGENCY RESPONSE ACTIVITIES (ET-ERA)

(a) Review the *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485) to ensure that procedures for ERA are adequate and meet CBS needs, and propose updates as necessary;

- (b) Promote and support the education and training of users on the use and interpretation of ERA products, and their strengths and weaknesses;
- (c) Identify and promote technical resources which can assist NMHSs in developing their ERA capabilities for supporting national agencies in their preparedness, planning, response and recovery activities;
- (d) Continue to develop and test new products as well as Ensemble and Transfer Coefficient Matrix (TCM) methods for atmospheric transport and dispersion modelling;
- (e) Test and improve the collective ability of all RSMCs, the IAEA, CTBTO, the RTH Offenbach and NMHSs in the environmental ERA to fulfil the operational requirements according to adopted standards and procedures stated in the Manual.

CBS TASK TEAM ON THE PROVISION OF OPERATIONAL METEOROLOGICAL ASSISTANCE TO HUMANITARIAN AGENCIES

The CBS Task Team on the Provision of Operational Meteorological Assistance to Humanitarian Agencies is established under the joint leadership/responsibility of the OPAGs on DPFS and PWS, and in liaison with other relevant technical commissions and Programmes. The CBS Task Team is chaired by the CBS Coordinator on DRR:

- Based on the identified needs and requirements of humanitarian agencies, develop designation criteria and functions for existing GDPFS Centres that could specialize in the development and provision of operational meteorological products and services for mitigating the impacts of meteorological-related hazards;
- (b) Develop, in consultation with NMHSs, global and regional operational arrangements that would assist humanitarian agencies and disaster managers in mitigating disasters, taking into consideration the WMO Strategy for Service Delivery and the success of ERA, and provide assistance and support to strengthen NMHSs in this regard;
- (c) Assist Members, with or without NMHSs, in developing their capacity for supporting their government and humanitarian agencies in emergency preparedness efforts, including identifying the gaps in current capabilities and the opportunities to realize the benefits of addressing these gaps through close cooperation at regional and national levels. Coordinate with relevant United Nations and international organizations on collecting and responding to their requirements;
- (d) Promote and support the education and training of users on the use, interpretation and delivery of meteorological products and services, and their strengths and limitations.

TERMS OF REFERENCE OF THE STEERING GROUP ON SEVERE WEATHER FORECASTING DEMONSTRATION PROJECT (ESTABLISHED BY CBS-15): MEMBERS INCLUDE PWS FOCAL POINT, REPRESENTATIVES OF GLOBAL AND REGIONAL PROJECTS)

- (a) Giving guidance and monitoring the further development of existing and new regional projects;
- (b) Managing the integration of new components in the SWFDP, including addressing synergies with other WMO Programmes;

- (c) Developing recommendations to support the full and sustainable participation of NMHSs, including those from LDCs and SIDSs, in the SWFDP;
- (d) Review and make recommendations on the scope of the cascading forecasting process.

TERMS OF REFERENCE OF FOCAL POINTS SUPPORTING OPAG DPFS

- (a) Provide support and guidance relevant to GDPFS to (a participating group);
- (b) Coordinate with [ICT/ET] to meet the requirements from (a participating group).

TERMS REFERENCE OF IPT-SWISS

Scope

The responsibility of the Inter-Programme Team on Space Weather Information, Systems and Services (IPT-SWISS) is to coordinate space weather activities within the WMO Programmes, to maintain linkage with the constituent bodies and their relevant subsidiary groups, to maintain linkage with partner organizations, and to provide guidance to WMO Members. IPT-SWISS is established under the Commission for Basic Systems (CBS) and the Commission for Aeronautical Meteorology (CAeM) which will provide joint oversight in consultation with each other via their presidents.

Main tasks

- (a) Integration of Space Weather observations, through review of space- and surfacebased observation requirements, harmonization of space-based sensor specifications, monitoring plans for Space Weather observations;
- (b) Standardization and enhancement of Space Weather data exchange and delivery through the WMO Information System (WIS);
- (c) Coordinating the development of SPW best practices for end-products and services, including, for example, quality assurance guidelines and emergency warning procedures, in collaboration with aviation and other major application sectors;
- (d) Encouraging the dialogue between the research and operational space weather communities;
- (e) Organization of capacity-building, training and outreach activities towards WMO Members and Space Weather potential users;
- (f) Provision of guidance to WMO Members and Programmes on Space Weather matters, and conduct appropriate actions as requested by CBS and CAeM.

Composition

IPT-SWISS will be composed of members nominated by the relevant technical commissions, selected WMO Members and points of contacts nominated by the regional associations and associate members including representatives of ISES and other partners or major user applications.

IPT-SWISS members shall cover the various fields of expertise necessary to address space weather matters within WMO and will contribute to the relevant expert teams or other groups

of WMO technical commissions including: Commission for Basic Systems (CBS)¹; Commission for Aeronautical Meteorology (CAeM)²; Commission for Instruments and Methods of Observation (CIMO); Commission for Atmospheric Sciences (CAS).

IPT-SWISS will form ad hoc teams as appropriate focusing on topics requiring a particular field of expertise, for a particular time frame.

¹ Such as the Inter-Programme Expert Teams on Observing System Design and Evolution (IPET-OSDE), on WIGOS Framework Implementation (IPET-WIFI), on Data Representation Maintenance Monitoring (IPET-DRMM), on Metadata and Data Representation Development (ET-MDRD), or the Steering group on Radio-Frequency Coordination (SG-RFC).

² Such as the Expert Team on Aviation, Science and Climate (ET-ASC), on Information & Services for Aviation (ET-ISA), on Education, Training and Competencies (ET-ETC).

OPAG PWSD

IMPLEMENTATION-COORDINATION TEAM ON PUBLIC WEATHER SERVICE DELIVERY (ICT-PWSD)

- Coordinate the implementation of the decisions of Congress, the Executive Council and the Commission for Basic Systems (CBS) with respect to Public Weather Services;
- (b) Consult and collaborate to ensure coordination of the work of the Open Programme Area Group (OPAG) on PWSD with that of other CBS OPAGs, technical commissions (TCs), EC working groups, regional associations (RAs) and WMO Programmes and initiatives;
- (c) Support a strengthening of partnerships between National Meteorological and Hydrological Services (NMHSs), other agencies, and user sectors (e.g., media, health, emergency management) in areas relevant to PWSD;
- Through the constituent teams of the OPAG, promote the implementation of the WMO Strategy for Service Delivery in the context of Public Weather Services, and making full use of emerging technologies;
- (e) Keep under review the work of the PWSD Expert Teams and coordinate and guide their work programmes;
- (f) Continue to encourage and provide guidance to Members to assert the authority of NMHSs as the sole providers of official high-impact weather warnings;
- (g) Facilitate the development of guidance and training material to underpin and support those elements of the WMO competency framework relevant to PWS-related activities;
- (h) Support and promote excellence in communication as a key enabler of quality service delivery;
- Collaborate with development partners and other WMO entities to assist NMHSs in the identification and assessment of societal, economic and environmental benefits of hydrometeorological services;
- Continue to promote the awareness and use of guidance documents developed through the work of the OPAG, in collaboration with regional associations, and by other means;
- (k) Guide the work of the OPAG to assist Members in developing their capacity to deliver improved services through the use of the best science and emerging technologies.

EXPERT TEAM ON SERVICE PROVISION INNOVATION AND IMPROVEMENT (ET-SPII)

- (a) Monitor, evaluate and advise on challenges and opportunities for Public Weather Service Delivery presented by developing science and technology;
- Address the user requirements identified by ET/IMPACT for data provision, management and visualization, through collaboration with DPFS and other partners as necessary;

- (c) Take responsibility for, and review PWS guidance on, scientific and technical aspects of Service Delivery improvement, including nowcasting, uncertainty, CAP and mobile/web services;
- (d) Identify experts to advise on technical aspects of Service Delivery improvement as required;
- (e) Provide oversight, quality assurance and coordination of the continuing development of WWIS/SWIC.

EXPERT TEAM ON IMPACT-BASED FORECASTING AND RISK-BASED WARNING (ET-IMPACT)

- (a) Building on the WMO Guidelines on Multi-hazard Impact-Based Forecast and Warning Services (WMO-No. 1150), develop an implementation strategy which describes next actionable steps and evolution;
- (b) Develop and maintain an expert resource to facilitate activities and projects in the area of Impact-Based Forecasting, including representatives from the social sciences;
- (c) Create a network of champions, ambassadors, and change agents within NMHSs, their partners, and users to support and promote Impact-Based Forecasting;
- (d) Actively promote Impact-Based Forecasting by sharing best practices through symposiums, journal papers and communication outlets;
- (e) Provide NMHSs with guidance on how to standardize Impact-Based Forecasting messaging protocols and formats (e.g. colour-coding, language, icons, etc.);
- (f) Working with technical commissions, regional associations, and ET/SPII within the OPAG/PWSD, establish user requirements for service improvements through science and technological innovation;
- (g) Evolve current methodologies for verification and evaluation to incorporate a focus on socioeconomic benefits.

COORDINATOR ON THE COMPETENCY FRAMEWORK (C-CF)

(a) Facilitate the development of guidance and training material to underpin and support those elements of the WMO competency framework relevant to activities related to PWS.

PWSD COORDINATOR ON REGIONAL ASSOCIATION LIAISON (R-RAL)

(a) Consult and collaborate to ensure coordination of the work of the Open Programme Area Group (OPAG) on PWSD with regional associations (RAs) and their subsidiary bodies.

Annex to Resolution 4 (EC-LX)

VOLUNTEERISM IN THE WORK OF TECHNICAL COMMISSIONS AND REGIONAL ASSOCIATIONS

General

It is recognized that volunteerism plays an important role in the subsidiary bodies of the technical commissions and regional associations.

Recommendations

The following is recommended as per nominations, performance monitoring and recognition in order to improve the current situation with volunteerism, especially the declining number of volunteers:

Nominations:

- That the work of WMO be better advertised and promoted within National Meteorological and Hydrological Services and other weather, climate, water and environment communities, in order to ensure contributions from a wide spectra of expertise and appropriate geographic coverage;
- That prospective candidate experts and their Permanent Representatives should be aware of responsibilities and commitments, especially as far as coordination and participation is concerned;
- That in seeking nomination for membership in the subsidiary bodies of technical commissions and regional associations, especially prior to a constituent body session, for the procedure to ensure that the commitment of the Permanent Representatives and the proposed experts are confirmed, as well as the availability of the professional profile, through a brief curriculum vitae of the latter, to help ascertain their specific expertise, and willingness to contribute; and that nomination committees are established early to allow sufficient time to look at all experts' personal information prior to a constituent body session;
- That team members should be chosen in such a way that their volunteer work corresponds to their daily activities in their home institutions;
- That if time and opportunity allow, the list of proposed names has been agreed at regional level by the president of the regional association prior to submission to the nomination committees, when possible;
- That an indication of time commitment, for example in terms of minimum percentage of overall activity or time slots, might be useful for the agreement of the Permanent Representative to secure the necessary time for WMO work;
- That Permanent Representatives should provide complete and up-to-date expert details, especially working e-mail addresses, to facilitate establishing subsidiary bodies;
- That candidate experts not selected by nomination committees should be informed, thanked and encouraged to apply again to some other WMO work.

Performance monitoring:

• That the WMO Secretariat manage the organization of subsidiary body meetings as early as possible within the intersessional period, in order to finalize action plans

drafted following e-mail communication or teleconferences, and that the budget is set up accordingly, in order to have work assigned appropriately;

- That evaluation of each subsidiary body and involved experts be conducted by the appropriate chairpersons according to the rules of results-based management, in particular to decide on the continuation of an entity or the membership of an expert, taking into consideration the need for a balance between continuity and new activities and experts. This evaluation is also important for experts involved, especially for the recognition of their work by their Permanent Representatives;
- That should an expert not contribute at the expected level, or in case of a totally silent expert, there should be a mechanism, for example led by management groups or relevant open programme area groups, known to all appointed experts, allowing for their replacement, for example after one year of insufficient contribution;
- That peer-reviewed reports produced should be published as soon as possible, at least on subsidiary body websites, preferably in appropriate publication series with names of contributors, for monitoring purposes and in order to recognize the work of the authors.

Recognition:

- That Permanent Representatives should give recognition to their staff of work conducted for WMO activities. As in most National Meteorological and Hydrological Services an individual evaluation procedure is in place for rating staff members, the contribution to WMO work should be included in the list of criteria used;
- That other incentives are needed, such as issuing certificates or addressing letters of appreciation to the experts concerned, with copy to their Permanent Representatives. This should be made generally at technical commission or regional association president level, following proposals by chairpersons of open programme area groups or working groups. Applicable rules should be established by WMO and templates should be designed.
