

WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR BASIC SYSTEMS

Management Group

Seventeenth Session

(CBS-MG-17)

**Geneva, Switzerland
27 February - 1 March, 2017**

FINAL REPORT



COPYRIGHT AND DISCLAIMER

© World Meteorological Organization, 2017

The right of publication in print, electronic and any other form and in any language is reserved by WMO. Short extracts from WMO publications may be reproduced without authorization, provided that the complete source is clearly indicated. Editorial correspondence and requests to publish, reproduce or translate this publication in part or in whole should be addressed to:

Chairperson, Publications Board

World Meteorological Organization (WMO)

7 bis, avenue de la Paix

Tel.: +41 (0) 22 730 84 03

P.O. Box 2300

Fax: +41 (0) 22 730 80 40

CH-1211 Geneva 2, Switzerland

E-mail: publications@wmo.int

NOTE

The designations employed in WMO publications and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of WMO concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Opinions expressed in WMO publications are those of the authors and do not necessarily reflect those of WMO. The mention of specific companies or products does not imply that they are endorsed or recommended by WMO in preference to others of a similar nature which are not mentioned or advertised.

This document (or report) is not an official publication of WMO and has not been subjected to its standard editorial procedures. The views expressed herein do not necessarily have the endorsement of the Organization.

CONTENTS

Agenda		p. 5
Executive Summary		p. 9
General Summary		p. 11 - p. 11
Annex I	List of Participants	p. 35
Annex II	Action sheet from CBS-MG-17	p. 39
Annex III	Approved membership of the CBS Teams	p. 45
Annex IV	Approved work plans of the CBS Teams	p. 57
Annex V	Elements to be included in the CBS Workplan concerning Disaster Risk Reduction	p. 99
Annex VI	List of Decisions to be made at possible CBS Ext. (2018)	p. 102
Annex VII	Deliverables and key performance indicators to be included in the CBS Operating Plan 2016-2019	p. 106
Annex VIII	Draft CBS Statement to EC-SOP	p. 116
Annex IX	CBS Approach to Service Delivery	p. 118
Annex X	Rationale for a CBS Extraordinary Session	p. 120
Acronyms		p. 122



(Group photo, 1 March 2017)

AGENDA

1 Organization of the meeting

- 1.1 Opening of the session
- 1.2 Adopt the agenda
- 1.3 Working arrangements for the session

2 Goals and Objectives for the Meeting

3 Responsibilities of management group members

4 Work plans of the OPAGs

- 4.1 OPAG-IOS
 - 4.1.1 Approve membership of IOS Expert Teams
 - 4.1.2 Approve work plan of IOS 2016-2017
- 4.2 OPAG-ISS
 - 4.2.1 Approve membership of ISS Expert Teams
 - 4.2.2 Approve work plan of ISS 2016-2017
- 4.3 OPAG-DPFS
 - 4.3.1 Approve membership of DPFS Expert Teams
 - 4.3.2 Approve work plan of DPFS 2016-2017
- 4.4 OPAG-PWSD
 - 4.4.1 Approve membership of PWSD Expert Teams
 - 4.4.2 Approve work plan of PWSD 2016-2017

5 Supporting infrastructure activities, including cross-cutting

- 5.1 Service Delivery
- 5.2 Climate Services Information System (CSIS) and future collaboration for supporting infrastructure
- 5.3 Disaster Risk Reduction (DRR)
 - 5.3.1 Outcome of DRR focal Points meeting
- 5.4 WMO Integrated Global Observing System (WIGOS)
- 5.5 Space Weather issues
- 5.6 Future Seamless Global Data Processing and Forecasting System (GDPFS)
- 5.7 CBS Contribution to the Future Global MeteoAlarm System (GMAS)

- 5.8 Requirements for future WMO data architecture and provision of supporting infrastructure
- 5.9 WIS Strategy
- 5.10 Recommendations of the Task Team on Upper Air BUFR (UAB)
- 6 Rationale for an Extraordinary Session**
 - 6.1 Rationale for a CBS Ext. (2018)
 - 6.2 Decisions to be made at the Extraordinary Session (if CBS Ext. decided)
 - 6.3 Arrangements for next CBS meeting (if CBS Ext. decided)
- 7 CBS contribution to the EC Working Group on Strategic and Operational Planning**
 - 7.1 Lessons learned from CBS-16
 - 7.2 CBS Operating Plan 2016-2019
 - 7.3 CBS Input to WMO Strategic Plan 2020-2023
 - 7.3.1 Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis
 - 7.3.2 Key elements to be considered in CBS Operating Plan 2020-2023
 - 7.3.3 Deliverables and key performance indicators
 - 7.4 Agree statement from CBS for presentation to EC WG SOP
- 8 Working with the regional Associations and other Technical Commissions**
 - 8.1 How to strengthen relationship between the Technical Commissions and the Regional Associations
 - 8.2 Requirements from other Technical Commissions
 - 8.2.1 ICAO requirements concerning XML as carried out via CAeM
 - 8.2.2 Future Aviation Services and needed supporting infrastructure
 - 8.2.3 CHy requirements
 - 8.2.4 JCOMM Requirements
- 9 CBS Input to EC-69**
 - 9.1 Review of relevant Decisions and Recommendations from CBS-16
 - 9.2 Other possible recommendations
 - 9.3 Approaches to Technical Governance
- 10 Date and venue for next session of CBS Management Group**
- 11 Other Business**

11.1 Emerging data issues

11.2 Engagement with the private sector

12 Closure of the meeting

[page left intentionally blank]

EXECUTIVE SUMMARY

The seventeenth Session of the Commission for Basic Systems (CBS) Management Group was held in Geneva, Switzerland at the headquarters of WMO from 27 February to 1 March 2017. This was the first meeting of the Group after the Sixteenth Session of the CBS (CBS-16) in Guangzhou, China, November 2016.

In particular, the meeting decided on:

- i. The membership of the four Open Programme Area Groups (OPAGs) for the period 2016-2020;
- ii. The work plan of the four OPAGs for the period 2016-2020;
- iii. The work plan of the Disaster Risk Reduction (DRR) Coordinator for the period 2016-2020;
- iv. To develop a viable approach to achieving progress in the implementation of the WMO Strategy for Service Delivery;
- v. To enhance efforts for more rapid realization of impact-based forecast and warning services through the development of a strategy for implementation of such services;
- vi. The meeting considered the outcome and recommendations of the DRR focal points meeting, and agreed on the elements to feed in the CBS workplan;
- vii. The Group requested the OPAG on Integrated Observing Systems (OPAG-IOS) to plan its contribution to some WMO Integrated Global Observing System (WIGOS) deliverables. In particular, the development of Regulatory Materials for the Regional Basic Observing Network (RBON) should be a priority;
- viii. The Group provided guidance to the OPAG on Data Processing and Forecasting System (OPAG-DPFS) with regard to provision of Space Weather information;
- ix. The Group agreed that the approach taken with regard to the development of the Seamless Global Data Processing and Forecasting System (S/GDPFS) was on the right track and made further decisions in this regard, including the organization of a side event during EC69;
- x. The Group agreed that the TT-HUM should take on responsibility concerning the Global MeteoAlarm System (GMAS), and should address the concerns and questions raised by the CBS-MG; a side EC-69 event on GMAS was proposed to be organized;
- xi. With regard to the WMO Information System (WIS) strategy towards the implementation of WIS 2.0, including WIS Part C (Information Management) in light of CBS-16 decisions, the Group noted how the CBS teams would manage the preparation and implementation of the roadmap for WIS 2.0 and Information Management. It further noted that close involvement of Global Data Processing and Forecasting System (GDPFS) would be needed to make sure the standard interface specifications of WIS 2.0 were kept aligned with the evolving needs of the GDPFS;
- xii. The areas of concerns for the Coordinator on Emerging Data Issues;
- xiii. The development of a CBS Operating Plan;
- xiv. Approaches to Technical Governance;
- xv. CBS input to EC-69.

The Group made recommendations on:

- i. Strategic priorities 2020-2023
- ii. Organizing an Extraordinary Session of the Commission in 2018, with rationale.

The Group also discussed the requirements of the Technical Commissions. In particular, a joint Session was organized with the Commission for Hydrology Advisory Group, which according to both Groups was considered fruitful.

[page left intentionally blank]

GENERAL SUMMARY

1 ORGANIZATION OF THE MEETING

1.1 Opening of the session

The Meeting of the CBS Management Group opened at 09.00 hours on Monday, 27 February 2017 at the WMO Headquarters in Geneva, Switzerland.

The Assistant Secretary General, Dr Wenjian Zhang opened the meeting on behalf of WMO. He welcomed the participants and explained the significant developments relevant to CBS and its OPAGs following the outcome of the CBS Sixteenth Session.

He explained that this meeting was an excellent opportunity for the Management Group to provide input to the Executive Council working Group on WMO Strategic and Operational Planning (EC-SOP) and the Sixty-Ninth Session of the Executive Council (EC-69). He also explained that should the CBS wish to organize an Extraordinary Session in 2018, it should then develop a strong rationale for it. In closing, Dr Zhang wished for a successful and productive session and an agreeable stay in Geneva.

The CBS President and vice-President, Mr Michel Jean (Canada) and Ms Meiyang Jiao (China) respectively welcomed the participants and wished for a successful meeting. Mr Jean thanked the previous CBS management team for leaving the CBS in excellent state, and explained that while strategic discussion will have to take place during this meeting, it will also have to focus its discussion on some immediate topics such as deciding on the Teams membership and the four OPAGs work plans.

The list of participants is given in **Annex I**.

1.2 Adopt the agenda

The meeting adopted its Agenda.

1.3 Working arrangements for the session

The Group agreed on its working hours and adopted a tentative time table for consideration of the various agenda items.

The Secretariat introduced the documentation plan of the meeting¹. The President thanked all those who have contributed to the documentation plan.

The meeting also established sub-groups to consider the following issues:

- **Group A:** OPAG on Integrated Observing Systems (OPAG-IOS) Membership and Workplan (agenda item 4.1);
- **Group B:** OPAG on Information Systems and Services (OPAG-ISS) Membership and Workplan (agenda item 4.2);
- **Group C:** OPAG on Data-Processing and Forecasting System (OPAG-DPFS) Membership and Workplan (agenda item 4.3);
- **Group D:** OPAG on Public Weather Services Delivery (OPAG-PWSD) Membership and Workplan (agenda item 4.4);
- **Group E:** CBS Operating Plan 2016-2019 (agenda item 7.2); and
- **Group F:** CBS Input to WMO Strategic Plan 2020-2023 (agenda item 7.3).

2 GOALS AND OBJECTIVES FOR THE MEETING

The President of CBS provided an overview of the meeting goals and objectives, including:

- Adjustment-modification of existing work plans to take into considerations the outcome of CBS-16;

¹ <https://wiswiki.wmo.int/tiki-index.php?page=CBS-MG-17>

- Evolution of service delivery taking into consideration WMO reform (role and evolution of Technical Commissions (TCs), role of Regional Associations (RAs)), role of the private sector and emergence of public-private partnership;
- CBS activities in support of cross cutting priorities such as DRR and the Global Framework for Climate Services (GFCS);
- Future vision for WIS, WIGOS and GDPFS;
- Taking advantage of prototyping to accelerate evolution of systems and service development for Members; and
- Operational issues requiring short term attention.

The President explained that the meeting will be expected to decide on

- i. The membership of the OPAGs for the period 2016-2020
- ii. The work plan of the OPAGs for the period 2016-2020
- iii. The work plan of the DRR Coordinator for the period 2016-2020
- iv. The areas of concerns for the Coordinator Emerging Data Issues
- v. The development of a CBS Operating Plan
- vi. Other decisions as appropriate and required

and make recommendations on:

- i. Strategic priorities 2020-2023
- ii. CBS Extraordinary Session in 2018 (CBS Ext. (2018))
- iii. And other recommendations as appropriate and required

3 RESPONSIBILITIES OF MANAGEMENT GROUP MEMBERS

The meeting recalled that per Resolution 5.10(1)/1 (CBS-16), the Commission re-established the CBS Management Group and adopted its Terms of Reference. The Group is required to ensure the integration of the programme areas, to prioritize activities, to evaluate the working progress achieved, to coordinate strategic planning, and to decide on necessary adjustments to the working structure during the intersessional period.

The meeting discussed specific responsibilities to be given to the management group members, and agreed with the following:

- The Group decided to accept the Coordinator on Emerging Data Issues, Dr Sue Barrell (Australia) as Associate Member of the Management Group.

The Group requested the President to inform CBS members in writing about this decision (**action; M. Jean; asap**).

4 WORK PLANS OF THE OPAGS

Under this agenda item, the meeting reviewed and approved membership of the various OPAGs Expert Teams. It also reviewed and approved the work plans of each OPAG on the basis of the Expert Teams work plans that have already been submitted prior to CBS-16, and on the basis of the CBS-16 outcome and guidance.

The Group agreed that, in general, all experts nominated by a Permanent Representative or head of international organization should be recognized as an associate member of the teams for which he or she was nominated. There would be exceptions to this practice: expert teams whose membership is limited to a closed group (such as the Implementation Coordination Teams (ICTs)), and experts who were nominated for large number of teams; OPAG DPFS Co-Chairs are also allowed to choose from the nominated experts. The President CBS reminded the Group that attendance at a meeting should be determined by the contribution to be made by an expert, rather than by their status as a "core" or "associate" member.

4.1 OPAG-IOS

4.1.1 Approve membership of OPAG-IOS Expert Teams

The Group approved membership of the OPAG-IOS Teams as reflected in **Annex III**.

The CBS President with assistance from the OPAG-IOS Chair and Secretariat (**action; A. Rea & Secr.; asap**) was requested to write to the Presidents of JCOMM and CHy in order to seek nominations for representing the two Commissions in IPET-SUP (**action; M. Jean; asap**) (note that for JCOMM there is an interim member).

The Group also agreed that the Inter-Programme Expert Team (IPET) on the Observing System Design and Evolution (IPET-OSDE) needs to have the Chairs of the IPET on Satellite Utilization and Products (IPET-SUP) and the Expert Team on Satellite Systems (ET-SAT) as Associated Member.

4.1.2 Approve work plan of OPAG-IOS 2016-2017

It was noted that the OPAG-IOS coordinates some of the activities that are under the responsibility of the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS).

The Group advised the OPAG-IOS to review the various Implementation Plans (EGOS-IP², GCOS³, GCW⁴, GFCS, GAW⁵) and prepare a synthesis document for the Members to understand what CBS is doing to address these various plans (**action; A. Rea; April 2018**).

The Group approved the work plan of the OPAG-IOS as reflected in **Annex IV**.

4.2 OPAG-ISS

4.2.1 Approve membership of OPAG-ISS Expert Teams

The Group agreed the membership of the expert teams in OPAG-ISS given in table 4.2.1. It agreed that Mr Tsunoda (Japan) and Mr de Rezende (Brazil) should be core members of ICT ISS.

The Group approved membership of the OPAG-ISS Teams as reflected in **Annex III**.

4.2.2 Approve work plan of OPAG-ISS 2016-2017

The Group agreed the work plan for OPAG-ISS given in table 4.2.2.

Mr Honda commented that although OPAG-ISS and the Management Group Task Team on the Migration of Upper Air Reports to BUFR has responsibility for migration to table driven code forms, migration would only be achieved if all OPAGs encouraged their adoption in their areas of activity.

The Group agreed to include the following elements in the OPAG-ISS work plan:

- Continue the work on the monitoring of WIS
- Improve the way the users are using the WIS, and user interface of the Global Information System Centres (GISCs) to facilitate them
- Develop an emergency security response strategy
- Monitor big data and cloud technology, and see how it could be used in WIS
- Continue develop and maintain Table Driven Codes to meet the requirements of Members
- Finalize migration to Table Driven Code Forms (TDCs). Recommendations of the CBS Management Group (CBS-MG) Task Teams (TTs) for migration of upper air reports to TDCs to be considered (see also item 5.10).

2 Implementation Plan for the Evolution of Global Observing Systems

3 WMO-IOC-UNEP-ICSU Global Climate Observing System

4 Global Cryosphere Watch

5 Global Atmosphere Watch

- WMO Data Model to be improved to take into account WIGOS and the International Civil Aviation Organization (ICAO) requirements
- Develop generic certification process for GISCs and Data Collection and Production Centres (DCPCs) to be improved to facilitate their auditing.
- Standards and best practices for information management
- Implementation of WIS 2.0, review stakeholders requirements, and develop implementation plan

The Group approved the work plan of the OPAG-ISS as reflected in **Annex IV**.

4.3 OPAG-DPFS

4.3.1 Approve membership of OPAG-DPFS Expert Teams

The Group approved membership of the OPAG-DPFS Teams as reflected in **Annex III** although formal nomination of some members is still required. The Group requested the Secretariat to contact related Permanent Representatives to seek the formal nomination of the proposed experts who had not been nominated so far (**action; Secretariat; asap**).

The Group discussed the Inter-Programme Team on Space Weather Information, Systems and Services (IPT-SWeISS) membership. The Group recommended and approved to change the IPET structure from Chair-Co-chair to two Co-chairs. This issue is not of CBS-MG alone, considering the role of the Commission for Aeronautical Meteorology (CAeM). The Group agreed in principle with IPT-SWeISS membership pending approval by CAeM. Secretariat was requested to check approval with CAeM (**action; Secretariat; asap**).

The Group also discussed the Task Team on the provision of meteorological assistance to Humanitarian Agencies (TT-HUM) membership as well as the new project for the development of Global MeteoAlarm System. The Group agreed that the technical activities related to the global meteo-alarm system should be under the responsibility of TT-HUM.

The Group approved establishment of the following two Task Teams under the Implementation Coordination Team on Data Processing and Forecasting System (ICT-DPFS), and requested OPAG-DPFS Co-chairs to identify the membership for these two Task Teams and submit its list to CBS President for approval (**action; Y. Honda & P. Davies; asap**):

- (1) Task Team on Development of Centre Audit Procedure and Review of WMO Technical Progress Report on GDPFS and Numerical Weather Prediction (NWP) Research

Terms of Reference:

- Develop the efficient and effective procedure for regular audit of the GDPFS Centres' compliance
- Review WMO Technical Report on GDPFS and NWP Research in consideration with the revision of the Manual and the proposed audit procedure, and propose a revised reporting mechanism

- (2) Task Team on Renew of the Guide on GDPFS (WMO-No.305)

Terms of Reference:

- Renew the Guide on GDPFS (WMO-No.305) in line with the new revised Manual on GDPFS(WMO-No.485)
- Identify thematic areas that require the development of guidelines

The Group approved establishment of four Task Teams under the Expert Team on the Operational Weather Forecasting Process and Support (ET-OWFPS), and requested OPAG-DPFS Co-chairs to identify the membership for these four Task Teams and submit its list to CBS President for approval (**action; Y. Honda & P. Davies; asap**):

- (1) Task team on Development of Standard Verification (TT-SV)
 - Development of Guidelines on use of additional observation for verification
 - Investigation on the use of more surface observation and satellite data for verification
- (2) Task Team on Development of Guidelines for Nowcasting Technique (TT-DGNT)
 - Development of Guidelines for Nowcasting Technique
- (3) Task Team on Development of Guidelines for High-resolution NWP (TT-HR-NWP)
 - Development of Guidelines for High-resolution NWP
- (4) Task Team on Development of a Strategy for EPS Data Exchange and Guidelines on post-processing/calibration (Tentative) (TT-EPS-PP)
 - Development of a strategy for EPS data exchange
 - Development of Guidelines on post-processing including calibration of model output

It was noted that there was no ICT-DPFS representation from RA-V. However, the Task Team on Review of the Guide on GDPFS (WMO-No.305) is established and Mr Andrew Tupper (Australia) has been invited to be appointed as its Chair. Formal confirmation on his appointment by PR is necessary (**action; Y. Honda, P. Davies & S. Barrell; asap**). Then ICT members cover all regions and it will solve the issue on regional representation.

4.3.2 Approve work plan of OPAG-DPFS 2016-2017

The Group approved the work plan of the OPAG-DPFS as reflected in **Annex IV**.

4.4 OPAG-PWSD

4.4.1 Approve membership of OPAG-PWSD Expert Teams

The Management Group agreed to add Mr Roger Deslandes (Australia) as a Core Member of the Expert Team on Impact-Based Forecasting and Risk-Based Warning (ET-IMPACT).

The Group approved membership of the OPAG-PWSD Teams as reflected in **Annex III**.

4.4.2 Approve work plan of OPAG-PWSD 2016-2017

The Group approved the work plan of the OPAG PWS as reflected in **Annex IV**.

4.5 All OPAGs

The Group requested the CBS President to inform the Presidents of regional associations about the membership of CBS concerning their respective regions (**action; M. Jean; end Marc. 2017**).

The Group requested the Secretariat to update database according to the decision of the MG, and to publish the membership on the Website (**action; Secr.; end March 2017**).

The Group requested the Secretariat to update the CBS-16 report (editorial changes) with the agreed team memberships (**action; Secr.; end March 2017**).

5 SUPPORTING INFRASTRUCTURE ACTIVITIES, INCLUDING CROSS-CUTTING

5.1 Service Delivery

The meeting reviewed requirements for Service Delivery that are relevant to CBS, including consideration of CBS-16 decisions, Public Private Partnership (PPP) for service delivery, integration and harmonization of activities with the Technical Commissions, the Regional Associations and Programmes with regard to service delivery, and action oriented capacity ready WMO service delivery strategy.

The Group discussed how best to progress with advancing the Service Delivery concept through the Organization, noting the advice from CBS-16 that the achievement of a holistic WMO-wide approach to Service Delivery at technical commission level must be via cooperation and collaboration and should start within CBS itself.

Recognizing that the first practical and achievable step would be to establish a mechanism within CBS to develop a harmonized and joined-up approach to service delivery within the OPAGs of the Commission, the Chair of the OPAG-PWSD undertook to prepare a concept note which would distil the Service Delivery concepts in the context of the work of the other three OPAGs, and then work with the OPAG chairs to map their user engagement processes against the principles of Service Delivery (**action; G. Fleming; end 2017**). This process should act as a "pilot project" to inform the approach that might be taken when extending the concept to other Technical Commissions.

The Group agreed that this task was achievable within 2017, with a view to formulating an approach to the other TCs in time for the President of Technical Commissions (PTC) meeting in January 2018.

The Management Group decided on the following:

- i) Keeping in mind reporting requirements to Cg-18, to develop a viable approach to achieving progress in the implementation of the WMO Strategy for Service Delivery according to the steps outlined in **Annex IX (action; President CBS in consultation and collaboration with Chair OPAG-PWSD, PTC Meeting 2018; end 2017)**;
- ii) To enhance efforts for more rapid realization of impact-based forecast and warning services through the development of a strategy for implementation of such services through the ET-IMPACT of OPAG-PWSD (**Action; Chair, OPAG-PWSD; end 2017**);
- iii) To collaborate with other on-going efforts in WMO in order to integrate and harness new and emerging science and technology for the improvement of service delivery (**Action; Chair, OPAG-PWSD; end 2017**);
- iv) OPAG-PWSD to collaborate with the WMO Education and Training Programme to prepare relevant guidance and appropriate training materials for Members on the implementation of competency requirements based on the PWS Competency Framework, to enable timely implementation of the Recommended Practices appropriate to PWS forecasters and advisors (**Action; chair, OPAG-PWSD; end 2017**).

5.2 Climate Services Information System (CSIS) and future collaboration for supporting infrastructure

The meeting discussed the role of CBS in the development and implementation of the Climate Services Information System (CSIS) as a major WMO contribution to the Global Framework for Climate Services (GFCS) with lead role played by the Commission for Climatology (CCI) in collaboration with the CBS and the Commission for Atmospheric Science. The CBS President also reported that the WMO Secretariat Climate and Water Department (CLW) and CCI had discussed on how to integrate, where appropriate, the elements of CSIS into the seamless GDPFS.

The Management Group advised on the following approach to integrate CSIS in the future seamless GDPFS (see also agenda item 5.6):

- There is a need to avoid duplication of effort and integrate relevant CSIS aspects in the Future Seamless GDPFS;
- Data exchange requirements ought to be considered, and the OPAG-ISS engaged; and
- Clarification is needed on the scope and role of the CBS at the forthcoming WMO International Workshop on Climate Services Information System (CSIS), Operations and Coordination to be held in Nanjing, China from 21 to 25 March 2017. The Group recommended that CBS ought to be represented at the workshop and requested the Secretariat and the CBS President to investigate this opportunity (**action; Secr. & M. Jean; asap**).

5.3 Disaster Risk Reduction (DRR)

5.3.1 Outcome of DRR focal Points meeting

The Coordinator on Disaster Risk Reduction, Mr Fred Branski (USA) briefed the Management Group about the outcome of the third meeting of the Disaster Risk Reduction Focal Points of Regional Associations, Technical Commissions and Programmes which took place in Geneva, Switzerland from 14 to 16 December 2016.

The meeting considered the outcome and recommendations of the DRR focal points meeting, and agreed on the elements to feed in the CBS workplan (see **Annex V**). The Group noted that DRR Roadmap document is being finalized and will be submitted to WMO President by end of March. The Group stressed that we need to separate the strategic elements from those for implementation plan.

In particular, the Management Group considered promoting regional and sub-regional pilot project(s) on multi-hazard warning systems and the proposed global meteoalarm system, and providing guidance on a mechanism to support humanitarian organizations. For example, we should be leveraging on the work that has been done in Regional Association VI (RA-VI).

See also agenda item 5.7 on the Global MeteoAlarm System (GMAS).

5.4 WMO Integrated Global Observing System (WIGOS)

The meeting discussed the contribution of CBS to the development of the WIGOS Pre-Operational Phase 2016-2019, and its five priority areas. It also discussed the state of development of the WIGOS Vision 2040, and future contribution of CBS in this regard.

WIGOS Regulatory Material complemented with necessary guidance material

The Group requested the OPAG-IOG to plan its contributions to the following WIGOS deliverables (**action; A. Rea; 2018**):

- a) A new edition of the "Manual on WIGOS" (WMO-No. 1160) by Cg-18, covering a full integration of the existing *Manual on the Global Observing System* (WMO-No. 544), and new standards and recommendations on the Regional Basic Observing Networks (RBON), remote sensing, and for improving observational data and products quality (WIGOS Data Quality Monitoring), supported by related best practices and procedures for their implementation by regional associations (RBON) and Members; developed by end of 2017 (see Annex 1 of [CBS-MG-17 Doc 05.04\(1\)](#) – Timeline for further development of the WIGOS Regulatory Material for the Manual on WIGOS and the guidance material for the Guide to WIGOS);
- b) Further development of the WIGOS guidance on Data Partnerships, Lifecycle Data Management and Data Stewardship, including integration of observations from multiple sources;
- c) Guidance on the transition of existing observing systems to meet WIGOS requirements and standards, by end of 2017;

Furthermore the Group noted the following CBS-16 requests:

- OPAG-IOG leading the ongoing development of the RBON concept incorporating feedback from all stakeholders, as provided;
- OPAG-IOG to initiate the development of regulatory material describing the RBON⁶ and the obligations of the WMO Members in its implementation, to be included in the next version of the *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160) that will be submitted to the Eighteenth World Meteorological Congress in 2019, and to coordinate this development with other technical commissions through the Inter-commission Coordination Group on the WMO Integrated Global Observing System;

6 Development of draft RBON regulatory material has been initiated by the Secretariat (see Annex 2 of [CBS-MG-17 Doc 05.04\(1\)](#) and the [Final Report from Regional Basic Observing Network \(RBON\) Workshop](#); Appendix IV)

Further development of the WIGOS Information Resource (WIR), with special emphasis on OSCAR databases

The Group agreed with the following prioritization regarding CBS contributions to the following elements of OSCAR:

- Maintenance and further development of the three components of the Observing System Capability Analysis and Review (OSCAR) tool (OSCAR/Requirements, OSCAR/Space and OSCAR/Surface).
- OSCAR/Analysis development from 2017;
- Integration of the online presence of OSCAR/Space and OSCAR/Surface by end of 2017;
- Initial development of the "Standardization of Observations" Reference Tool (SORT) by end of 2017;
- Migration of Volume A to OSCAR/Surface to be completed by end of 2017;
- Integration of application areas, variables and requirements from GAW, GCOS, WHOS⁷ and GCW in OSCAR/Requirements.

The Group agreed that the RBON development is the responsibility of ICG-WIGOS with support from the OPAG-IOOS. The Group agreed that the development of Regulatory Materials for the RBON should be a priority for CBS since RBON is a major extension of the Regional Basic Synoptic Network (RBSN) and the Regional Basic Climatological Network (RBCN) that will require proper draft technical regulations being submitted through CBS. The Group recommended promoting implementation of pilot RBON networks at the regional level through the Regional Associations, starting with Regional Associations II, IV, V and VI. Action has already started with RA-II where the association adopted a Resolution establishing a pilot RBON. The Group requested the Secretariat to keep track and to publish the state of the pilot RBONs (**action; Secr.; 2018**).

Regarding the request from CBS-16 to develop a stand-alone client of OSCAR, the Group agreed that it would be complicated and costly to undertake such developments. Instead, it recommended establishing a registry of existing software developed nationally in relation to national WIGOS metadata databases related to OSCAR and Machine to Machine interfaces (**action; Secr; end 2017**).

Reporting of snow data

The Group recalled that CBS-16 discussed and decided on the reporting of snow cover and snow depth 4 times a day where snow is experienced (see Recommendation 41 (CBS-16)). The final decision of CBS-16 was that reporting be a non-binding recommended practice ("should") while the GCW was promoting this as a binding practice ("shall"). Based on the positive impact of snow depth data collected on NWP, using the BUFR template 3 07 101 (Snow observation), the Group recognized the importance of promoting the reporting of snow, and favored the following approach:

- Executive Council Panel of Experts on Polar and High Mountain Observations, Research and Services (EC PHORS) to propose a revised version of the wording adopted by CBS-16 through Recommendation 41 (CBS-16);
- Demonstration must be made that the Members who expressed concerns at the CBS-16 session were consulted and that they are in agreement with the revised proposal;
- The same revised version ought to be submitted to ICG-WIGOS, for their review, in parallel with the EC-PHORS review, and in time for the 69th Session of the Executive Council (EC-69) in 2017;
- If these steps are taken, and successful, EC-69 should be invited to approve the revised version. If not, then pending consultation with the focal points of the

7 WMO Hydrological Observing System

affected members, a conditional approval could be requested, with inclusion of an invitation for the pre-operational exchange of data.

The WIGOS Data Quality Monitoring System (WDQMS)

The Group noted the TT-WDQMS Work Programme and Action Plan and agreed to plan its contributions to this WIGOS element according to the Task Team on the WDQMS (TT-WDQMS) Work Programme/Action Plan for 2017 – 2018 (See Annex 3 of [CBS-MG-17 Doc 05.04\(1\)](#)). Many elements of the Work Programme will require close coordination with the work of Expert Team on Surface-Based Observing Systems (ET-SBO), and ICT-IOS is requested to take this into account when planning its work for the coming intersessional period (**action; A. Rea; asap**).

Impact Workshop

The Group noted the recommendations in the Final Report from the Sixth WMO Workshop on the Impact of Various Observing Systems on NWP and requested OPAG-IOS to lead in formulating the CBS response accordingly (see 6th Workshop on the Impact of Various Observing Systems on NWP, Shanghai, China, 10-13 May 2016⁸).

In particular, the Group noted that the Sixth WMO Impact Workshop agreed on a number of formal recommendations addressed partly to WMO and the National Meteorological and Hydrological Services (NMHSs), partly to the space agencies, and partly to the NWP community itself. In most cases the recommendations to WMO should be addressed by CBS before being passed on to other bodies within the organization. The Group requested the ICT-IOS to take into account in particular the following recommendations in the planning of its work (**action; A. Rea; asap**):

- **Recommendation 7**; *WMO is strongly encouraged to investigate and publicize the benefits of aircraft observations in general and of humidity observations in particular, in order to help sustain and further expand the AMDAR program.*
- **Recommendation 8**; *WMO to develop specific alternative scenarios for radiosonde launch schedules; NWP centres were encouraged to perform data impact experiments for such scenarios*
- **Recommendation 10**; *All data providers are encouraged to continue to share all observations internationally, especially those observations that are essential for numerical weather prediction, e.g. all GNSS-RO soundings.*
- **Recommendation 12**; *WMO to articulate the requirement for international sharing of all observations used in NWP systems, e.g. via the new RBON (Regional Basic Observing Network) development; data providers (including NMHSs and space agencies) are encouraged to make these data available to all NWP centers.*
- **Recommendation 13**; *NWP community to carry out impact studies regarding proposed observing systems for high-resolution sensing of the atmospheric boundary layer; WMO to document and record the requirements for such observations through its Rolling Review of Requirements.*
- **Recommendation 16**; *WMO is encouraged to continue and strengthen its efforts on the development of protocols and formats for both national and international exchange of weather radar data.*
- **Recommendation 17**; *WMO and the Global Cryosphere Watch (GCW) to investigate possibilities of obtaining additional soundings over the Arctic.*
- **Recommendation 18**; *Further investigation into the use of impact studies for the design of climate observing networks is encouraged.*
- **Recommendation 19**; *Longer range (seasonal to decadal range prediction) observation impact studies are encouraged.*

⁸ http://www.wmo.int/pages/prog/www/WIGOS-WIS/reports/6NWP_Shanghai2016/WMO6-Impact-workshop_Shanghai-May2016.html

- **Recommendation 21**; *WMO is strongly encouraged to foster further coordination between impact studies undertaken by different NWP centers; this should extend also to issues such as common methodologies and diagnostics and common quantities used when presenting the results.*

WIGOS Vision 2040

The Group discussed CBS contribution on the further development of the Vision for WIGOS in 2040, based on the CBS-16 recommendations. It particularly recalled that CBS-16 recommended that:

1) The current draft of the "Vision for the WIGOS space-based component observing systems in 2040", in conjunction with the evolving draft "Vision for the WIGOS surface-based components in 2040", be used as the basis for further consultation with Members, satellite operators, and user communities, in line with the roadmap agreed by ICT-IOS⁹.

2) The Inter-commission Coordination Group on the WMO Integrated Global Observation System (ICG-WIGOS) take ownership of the further development of the Vision, including the work necessary for the integration of the two drafts into one coherent Vision document, with a view to have it approved by the Cg-18 in 2019

CBS-16 further requested OPAG-IOS to contribute to the further development of the Vision according to ICG-WIGOS guidance¹⁰.

The Management Group is invited to take note of the fact that the Chairs of ET-SAT and IPET-OSDE are requested to finalize their respective contributions to the draft Vision by April 2017. (**action; ET-SAT & IPET-OSDE; April 2017**)

Furthermore, it should be noted that the Vision Roadmap assumes that an extraordinary session of CBS will take place in 2018. Should this not be the case, the Vision will be submitted to the CBS President, who will be requested to organize a review following the process used for the initial version of the WIGOS Regulatory material in 2014.

EC-69 will be informed on the process for developing the Vision, and near-final version will be submitted EC-70.

5.5 Space Weather Information issues

The Group recalled that CBS-16 established the Inter-Programme Team on Space Weather Information, Systems and Services (IPT-SWeISS) under OPAG-DPFS 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-SWeISS 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.

The meeting discussed Space Weather Information issues (Budget, human resources) and provided the following guidance to the OPAG-DPFS, including considerations on the WMO's framework for enhancing observation, data dissemination, and training:

- The purpose is to provide an aviation-focused service. The centres should be registered as RSMC for aviation-based services, and use the Regional Specialized Meteorological Centre (RSMC) designation process in holistic view. What WMO is doing will be submitted to ICAO as a recommendations but ICAO will also designate centres on its side.

The Group agreed that the link with the Observing Systems also needs to be introduced, e.g. (i) there is a need to maintain observational user requirements and statement of guidance for Space Weather and (ii) there are significant surface-based space weather observing components.

The Group discussed the International Civil Aviation Organization (ICAO) plans for establishment of operational Space Weather Information Centres and related WMO role

9 [See OPAG-IOS/ICT-IOS-9, Annex IV](#)

10 See Annex 1 to [CBS-MG-17 Doc. 05.04\(2\)](#)- WIGOS Vision Roadmap (future action plan) - XI.2016 - V.2019

under agenda item 8.2.2.

5.6 Future Seamless Global Data Processing and Forecasting System (GDPFS)

The Group recalled that CBS-16 adopted Decision 5.6(1)/1 – Implementation Plan of the future Seamless GDPFS, which decided to speed up the process by using the results of the first and second meetings of the Steering Group on the seamless GDPFS (Geneva, Switzerland, February and November 2016, respectively), and to urge that the Steering Group on the Seamless GDPFS first order of priority is the completion of the white paper and the development of the implementation plan, which includes a communication plan, for tabling at EC-69.

The Management Group discussed the role of the Commission in the development of the future seamless GDPFS, and immediate actions required in order for the Steering Group on the Seamless GDPFS to be able to complete its requested task in time for submitting required input to EC-69. It also reviewed progress made with the development of the White Paper and the Implementation Plan in addition to providing advice on integration of CSIS.

The Group agreed that the approach was on the right track and agreed with the model of Seamless GDPFS (S/GDPFS) that is proposed, including how it fits with WIGOS, Research and WIS requirements. The Group also agreed on the following:

- i) There is a need to clarify what we mean by “the Platform”;
- ii) It is important to be clear about the Seamless GDPFS will NOT be doing;
- iii) Policy consideration should be addressed in parallel with technical solutions;
- iv) Efforts are needed on data policy issues (**action; EC Steering Group; asap**);
- v) EC-69 side meeting shall be organized (**action; Secr.; May 2017**);
- vi) The OPAG-DPFS was requested to suggest to the Steering Group what Task Teams under the Steering Group should be established (**action; OPAG-DPFS; April 2017**);
- vii) Consultation with other Technical Commissions, e.g. the Commission for Atmospheric Sciences (CAS) will be needed for feedback on draft implementation plan;
- viii) OPAG-DPFS will also recommend to the Management Group what “options” to implement, by whom and with what time frame. A risk analysis will also be required in that framework;
- ix) There is a requirement for WIS 2.0 to facilitate discovery of information by users. Data, information, applications (post-processing) need to be make discoverable on the platform. The CSIS will have to be a fundamental part of WIS 2.0. The Group recommended to identify seamless GDPFS requirements for a common platform to be addressed by WIS 2.0;
- x) The need to incorporate non-conventional data for impact-based forecast and risk-based warnings into WIGOS requirements. Impact-based observations and metadata will have to be considered in the future WIGOS 2.0;
- xi) Some capability development activities will also have to be put in place in order to allow all Members to be able to use the future WIS 2.0 Platform;
- xii) It will also be important to facilitate access to data, not just discovery metadata;
- xiii) It is proposed to adopt a Software as a Service (SaaS) approach; and
- xiv) It is also important to involve CAS and CCI in the development of the IP

5.7 CBS Contribution to the Future Global MeteoAlarm System (GMAS)

The meeting discussed plans for the development of the future Global MeteoAlarm System (GMAS) with considerations of existing models such as those in RA-VI, and their possible extension. Future development of the World Weather Information System (WWIS) and the Severe Weather Information Centre (SWIC) might also accommodate the Global MeteoAlarm System (GMAS). Various possible models of GMAS architecture (e.g., distributed or centralized approaches) are to be discussed.

The Group noted that the PTC/PRA¹¹ meeting (Geneva, Jan. 2017) gave its support to the development of GMAS, and agreed that establishment of a WMO Global Meteo Alarm

11 Presidents of Technical Commissions and Regional Associations

Implementation Project should be explored. The Project should consider work being undertaken by other bodies (e.g. EUMETNET¹², Roshydromet, ALERT-AS, RIMES, etc.) and will require engagement of all Regional Associations and relevant Technical Commissions. Project implementation should follow step by step approach (or phased approach), with realistic targets established that might be reached before end of this financial period (before 2019). At the next Congress WMO might consider a clear roadmap to the development and improvement of the GMAS.

Noting establishment by CBS-16 of the CBS Management Task Team on DRR, which should play a role in the development of GMAS, the meeting noted the plans of the Secretariat for the first consultative meeting on GMAS in March 2017.

The Group agreed on the following:

- GMAS is an aggregator, not taking over the responsibilities of NMHSs. It will also provide a contribution of WMO to other UN Organizations. GMAS should focus on gathering warnings from NMHSs;
- Resource implications need to be considered;
- Efforts must be made to better understand the end user requirements, agree on how to serve the users, and how to sustain the system;
- There is a need to use best practices and standards based on the Common Alert Protocol (CAP). Training will be key;
- There will be the need to standardize and harmonize codes, and agree on the mechanism to achieve this;
- The capability of the system and responsibilities at the national, regional, and global levels need to be clarified, with special attention to respecting national mandates;
- A data sharing common platform, and expert facility could be developed as the initial building block;
- Once could consider changing the name of GMAS to one that would be more widely accepted, and not already protected;
- WMO will need to address governance issues and clarify strategy concerning its approach to Google (data policy, quality of data, engaging with a bid private company) and the private sector, and look at data policy implications;
- Synergies with regard to infrastructure, WIS and WIGOS and big data will have to be considered, and the OPAG-IOG and OPAG-ISS should therefore also be involved. For example, implementation of a warning system in the WIS Platform might be investigated;

The Group also agreed that TT-HUM should take on responsibility concerning the GMAS, and should address the concerns and questions raised by the CBS-MG, and that might be later raised by Executive Council (**action; TT-HUM; end 2017**).

The Group further agreed that the CBS Focal Point on Disaster Risk Reduction, Mr Fred Branski (USA), should be a part of the Advisory Group that has been established to develop the concept of a GMAS or global warnings portal.

While recognizing that many questions remain to be resolved, the Group agreed that consultation with Members is needed, and their feedback will be useful to clarify how things ought to be implemented. As a first step, the Group recommended organizing a side event during EC-69 (**action; Secr.; EC-69**), with a strong focus on understanding the user requirements as a first step towards further development of the concept.

The Group recognized that the WMO was very early in the process of developing the concept of establishing GMAS. RA-II has discussed the issue, and other regional associations such as RA-IV to begin with, also need to discuss it. As of early March 2017, CBS is not yet ready to propose any decision for submission to EC-69. At this stage, EC-69

could only be invited to note the developments underway. This said, CBS MG agreed that any developments that occur in the period leading to EC 69 should be included in the President report to Executive Council; the Council may then decide to provide further guidance and recommendation to the Commission.

The Group requested Fred Branski to advise on how to develop concept note, which preliminary version ought to then be presented to EC-69 for the Executive Council to note. Terms of Reference of the GMAS should also be developed (**action; F. Branski; asap**).

Finally, the Group agreed that the following three approaches ought to be considered (i) promoting MeteoAlarm system to other regions, (ii) considering implications for WMO information systems and severe weather information systems, and (iii) encouraging NMHSs to use and share best practices.

5.8 Requirements for future WMO data architecture and provision of supporting infrastructure

The Group discussed requirements for future WMO data architecture and provision of supporting infrastructure for the seamless Global Data Processing and Forecasting System (GDPFS) and the requirements it places on the WIS, especially its planned Information Management and on the facilities and interfaces proposed for WIS 2.0 component of the WIS. The Group noted that development of the seamless GDPFS would need to form a significant component of the future architecture as it impacts the development of the WMO Strategic Plan 2020 – 2023.

The Group noted that the meeting of the Steering Group of the Seamless GDPFS (SG-GDPFS), which was held at the WMO Headquarters, in Geneva, Switzerland, from 1 to 4 November 2016, had noted that there were various platforms that provide GDPFS information, products and tools, including:

- Web Portals developed within the context of the Severe Weather Forecasting Demonstration Project (SWFDP) regional subprojects:
- Web sites of the Lead Centres for Deterministic NWP Verification; for Ensemble Prediction System (EPS) Verification; for Long-range Forecast Multi-Model Ensemble; for Standardized Verification System for Long-range Forecasts; etc.;
- Web sites for displaying nuclear ERA products.

The SG-GDPFS had stressed the need to develop a common technical platform that brings together all these elements and addressing the existing gaps for a seamless GDPFS. The SG-GDPFS expected that development of WIS 2.0, and in particular WIS Information Management ("WIS Part C"), would include the facilities and interfaces to allow the shared use and processing of information needed to support the seamless and integrated GDPFS. The Group noted that development of the seamless GDPFS would change the requirements placed on GDPFS centres, requiring them to implement new interfaces and standards developed for WIS 2.0 and WIS Information Management, and that under WIS 2.0 some of the required functionality might be achieved through the facilities provided by GISCs. As such development may impact on the role and functions of GISCs and DCPCs. The requirement to move to impact-based forecasts and risk-based warnings would necessitate the inclusion of non-conventional information, such as vulnerability and exposure, in the conventional meteorological dataset. This requirement would need to be addressed by WIS and WIGOS and their respective components.

The Group agreed that (i) there is a need for a strategy to identify all elements of information data management, including consideration of the WIS Strategy, and (ii) there is a list of existing centres, and we need to also organize a list of databases.

The Group noted that WIS 2.0 is planning to make more efficient use of existing data; it will provide all mechanisms and processes to get access to data.

5.9 WIS Strategy

CBS-MG discussed the WIS strategy¹³ towards the implementation of WIS 2.0, including WIS Part C (Information Management) in light of CBS-16 decisions. It noted how the teams approved at CBS-16 would between them manage the preparation and implementation of the roadmap for WIS 2.0 and Information Management. It further noted that close involvement of GDPFS would be needed to make sure the standard interface specifications of WIS 2.0 were kept aligned with the evolving needs of the GDPFS. A non-technical aspect of WIS 2.0 that CBS may need to address was its potential use of shared infrastructure and the funding and governance mechanisms to allow that. CBS would need to recommend amendments to Cg-18 amendments to Technical Regulations in order to implement Information Management and WIS 2.0.

5.10 Recommendations of the Task Team on Migration of Upper Air Reports to Table Driven Code Forms

The Group reviewed the recommendations of the Task Team on Migration of Upper Air Reports to Table Driven Code Forms (TT-UABUFR) that was re-established by CBS-16. It commented that communication with observation providers was important, not only communicating the conclusions of the team, but also communicating with producers to resolve issues as they were identified. The Group supported the expected recommendation to endorse the current regulations for producing reports, and to introduce a feedback process as part of the WIGOS data quality monitoring procedures. The Group also emphasized that TT-UABUFR should introduce an interim procedure to manage the resolution of issues identified by the NWP centres. It recognized that the "issues page" would be a help, but emphasized that a management mechanism was needed (whether run by the team or other bodies). The Management Group therefore requested the Secretariat to set up a centralized web page or wiki page for centralizing all notified problems, so that all actors engaged can access and use information, and react to identified problems (**action; Secr.; asap**). The Group recognized that for the longer term, we'll eventually have to feed into the WDQMS and use the WDQMS to report faults, and seek correction of the noted problems.

The Group also requested the CBS President to write to the Presidents of the Regional Associations to inform them about the issues, current mechanism, and efforts for the future (**action; M. Jean; asap**).

6 RATIONALE FOR AN EXTRAORDINARY SESSION

6.1 Rationale for a CBS Ext. (2018)

The meeting discussed whether there was the need to organize an Extraordinary Session of the Commission in 2018, taking into account the decisions of CBS-16 and the need to make recommendations to the Executive Council 70th Session (EC-70) and the 18th World Meteorological Congress in 2019 (Cg-18).

After discussion, the Group agreed that the Commission needs to meet before Cg-18, in order to prepare for the key decisions to be brought to Congress and allow the Organization to respond to and to factor in the rapid advancements in new technologies and the changes they are bringing about in weather, climate and water operations and services. Full rationale is provided in **Annex X**.

6.2 Decisions to be made at the Extraordinary Session (if CBS Ext. decided)

As the Group recommended organizing an Extraordinary Session of the Commission in 2018, it agreed on the scope of the Extraordinary Session and on a list of decisions to be made at that Session. Details are provided in **Annex VI**.

6.3 Arrangements for next CBS meeting (if CBS Ext. decided)

Should an Extraordinary Session of the Commission take place in 2018, the Group agreed that there will be the need to assess the cost of the Session, and financial implications. The Group requested the President to discuss the details with the Secretariat, and explore other scenarios if necessary (**action; M. Jean; asap**).

13 See annex 1 of [CBS-MG-17 Doc- 05.09](#)

7 CBS CONTRIBUTION TO THE EC WORKING GROUP ON STRATEGIC AND OPERATIONAL PLANNING

7.1 Lessons learned from CBS-16

The Group considered the draft report on lessons learned from CBS-16. These were taken into account for the development of the CBS Operating Plan 2016-2019. This lessons learned report assesses the conduct of CBS-16 with the intention of providing guidance to organizers of future constituent body sessions. The information used to prepare the report was gathered from a questionnaire distributed to staff supporting the session (whether or not they attended the session) and members of CBS Management Group, together with documents used in the preparations for and running of the session.

The Group noted the following key issues identified in this report:

- All staff supporting the session should be required to demonstrate competence in the tasks assigned to them before their attendance is approved;
- WMO IT support is needed to support the session organizers in their interactions with the local IT suppliers;
- Organizing the agenda to place the most important decisions early in the agenda improved the effectiveness of the session;
- Not translating documents during the session worked, but on-screen editing of most documents had to be used to allow clear interpretation of changes.

The Group confirmed that the draft CBS-16 Lessons Learned report covered the key issues, and proposed addition of the following issues;

- Where we know that there are critical issues, a working group should be set up ahead of time in order to come to the Session better prepared.
- Time for discussion was limited, and compressing the Session more would not be realistic for being able to deal with all of the issues to be discussed.
- It was necessary to give delegates at least an overnight period to review the updated documents for which translated versions were not made available. It is critical to make sure that Members understand the discussion and the changes proposed to the documents.
- The Management Group thanked again China for having hosted the Session, and having provided such good hospitality. China also learned a lot from organizing the Session. The importance of signing the host country agreement well in advance of the Session was noted. More detail need to be provided also in the host Country agreement (e.g. on schedule) as annex to the host agreement.
- The Group noted that the IT issue seems to be recurring between Technical Commissions and Regional Associations Sessions, and requires particular attention. The Internet, including WIFI requirements (e.g. bandwidth) will have to be clarified in advance.
- The Group noted expected reduced budget for future years, and possible consequences with regard to organizing future CBS Session.

7.2 CBS Operating Plan 2016-2019

The Commission discussed development of the CBS integrated Operating Plan 2016-2019, and agreed on a workplan for finalizing the Operating Plan. It was noted with appreciation that a contractor has been recruited to compile input from the OPAG chairs and the Management Group and develop a first draft of the Operating Plan.

The group agreed that there is a need to formalize the relationship with the co-sponsored programmes such as GCOS, and invite them at CBS meetings as needed, e.g. by mean of an exchange of letters (**action; M. Jean; end May 2017**).

The meeting discussed and identified deliverables and key performance indicators to be included in the CBS Operating Plan 2016-2019. These are provided in **Annex VII**.

7.3 CBS Input to WMO Strategic Plan 2020-2023

7.3.1 Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis

The meeting reviewed the Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis undertaken by the four OPAGs, and took them into account for providing CBS input to the WMO Strategic Plan 2020-2023.

7.3.2 Key elements to be considered in CBS Operating Plan 2020-2023

The meeting identified the following key elements to be considered in the CBS Operating Plan 2020 – 2023:

- Assuring continuity with the previous operating plan 2016-2019
- Evolution of WIGOS towards the 2040 Vision, with RBON implementation and consideration of bringing benefits of WIGOS implementation
- Information management, and the development and implementation of WIS 2.0 in support of the wide basic systems requirements, and its interoperability with other systems
- Emerging data issues and new technologies, opportunities and threats
- Governance with (i) increased focus from research to operations, (ii) increased focus on service delivery and the required competency framework to support it, (iii) clarification of the role of the Regional Associations in the implementation of the CBS work programme, and (iv) enhanced partnerships and clarifying the role of the private sector for the Weather/Water/Climate Enterprise
- Seamless GDPFS development with strong emphasis on implementing recent research developments and supporting technologies (e.g. WIS 2.0)
- Capacity Development and continued work on identifying the socio economic benefits of NMHSs
- Increased focus on quality management

- CBS President will finalize the list of priorities and circulate to MG (*action; M. Jean; 7 Mar. 2017*).

7.4 Agreed statement from CBS for presentation to EC WG SOP

Based on discussions during previous agenda items, the Management Group developed and agreed on a CBS statement to be presented to the Executive Council Working Group on Strategy and Operational Planning (EC-SOP). The draft statement is provided in **Annex VIII**.

8 WORKING WITH THE REGIONAL ASSOCIATIONS AND OTHER TECHNICAL COMMISSIONS

8.1 How to strengthen relationship between the Technical Commissions and the Regional Associations

The meeting agreed that we need to strengthen the relationship between the Technical Commissions, and the CBS in particular with the Regional Associations. The Group noted that the issue is being discussed in the framework of the WMO reform.

8.2 Requirements from other Technical Commissions

8.2.1 ICAO requirements concerning XML as carried out via CAeM

The meeting discussed the requirements of the International Civil Aviation Organization (ICAO) as carried out via the Commission for Aeronautical Meteorology (CAeM) concerning the Extensible Markup Language (XML) for the exchange of aeronautical meteorology observations and forecasts.

The Group recalled that ICAO establishes the requirements for meteorological information to be provided to the international civil aviation community. WMO assists ICAO in this connection through the establishment of meteorological technical methods and practices to fulfil the aeronautical requirements. This is achieved through ICAO Annex 3 (which is reproduced as WMO-No 49 Vol 2). ICAO is moving to “digital exchange” of information that requires the use of XML/GML¹⁴ for the representation of information. CBS has already developed two versions of this (called IWXXM) , but the next amendment (Amendment 78) to Annex 3 is expected to introduce requirements for the exchange of information supporting space weather activities that will require additions to IWXXM to be developed by IPET-DD.

The Group requested OPAG-ISS to use the “between sessions” approval procedure for the amendments to IWXXM that had been requested by ICAO (**action; M. Dell’Acqua; Mar. 2018**).

In the context of IWXXM, the Management Group noted that ICAO (and hence WMO) efforts at present were mainly concerned with supporting the translation of existing OPMET information from Traditional Alphanumeric Code (TAC) code form into IWXXM-compliant XML/GML, consistent with the latest and upcoming amendments to ICAO Annex 3/WMO-No. 49, Technical Regulations, Volume II. There was an acknowledgement however that over the coming years more attention was expected to be placed on the meteorological data-/information-centric approach to support global air traffic management. In this connection, the Management Group noted that the ICAO Meteorology Panel had recently recommended freezing TAC code changes *unless* there was a strong safety case. This was seen as one way of encouraging the global transition to IWXXM and to provide the benefit of improved information content for users.

8.2.2 Future Aviation Services and needed supporting infrastructure

The Group recalled that the International Civil Aviation Organization (ICAO) has a 15 year plan for the period 2016-2030. The plan is divided into four sequential time-bound “blocks” that each implement enhancements to all of four areas of aviation activity.

The Group reviewed key components of the meteorology-related elements of the Global Air Navigation Plan that are likely to impact on the systems supported by CBS, i.e. regional production, trajectory based operations, System-Wide Information Management (SWIM), and space weather.

The Group agreed that the implications for CBS of changes in the ICAO infrastructure had to be considered, and requested the OPAG-ISS and OPAG-DPFS to address them (**action; M. Dell’Acqua, Y. Honda; 2019**), and in particular:

- SWIM developments, and making sure that the WIS interoperability requirements will be included;
- Impact on DPFS regional operations of the trajectory based operations, and in the framework of the GDPFS;
- The cost implications of the implementation of the ICAO requirements will have to be examined.

8.2.3 Commission for Hydrology (CHy) requirements

A joint session with the Commission for Hydrology (CHy) Advisory Working Group (AWG) was organized on 28 February 2017 from 09:00 to 11:00, opened by the Assistant Secretary General, Dr Wenjian Zhang. He welcomed the two Commissions working on establishing better synergies, in particular in the framework of the development of the new Strategic Plan 2020-2023.

The Group noted that collaborations in areas of interest of the two Commissions has increased in recent years due to evolution of technology and common use of technology. The Group agreed that collaborations between the two Commission is indeed likely to

14 Geography Markup Language

increase in the future. The joint meeting welcomed increased engagement of CHy in the activities of CBS.

The joint Session discussed topics of common interest, and in particular:

An update on Phase II of the WMO Hydrological Observing System (WHOS)

The meeting noted that WHOS Phase II is a complex system intended for operational hydrology. It can be used at the global level but is targeted to be used at the basin and national level as well. WHOS is facilitating interactions between data users and data providers. Ontology is used to describe how the water cycle is observed and is facilitating data discovery.

Users of the hydrological server can register end points, according to their profiles, including agreed standards, and provide their observing systems to WIGOS for water management activities. Users can also create catalogues by selecting data sets on the basis of their needs, e.g. selecting specific variables, geographical region, and observational period.

Cloud technology and big data are also planned to be used, and CHy is looking at how to address the "five Vs" of big data.

WHOS will also provide mechanism for quality assurance to be part of the global focus. Compliance with Res. 25 (Cg-13), Res 60 (Cg-17) and Res 40 (Cg-12) is essential to implement WHOS as a part of future GDPFS/WIGOS/WIS. Cooperation in motivating Members to respect these data resolutions is needed.

There is a great diversity in the ability of Members to engage in a process like WHOS. Countries are already making their data available but the system is incomplete, and there is a need to reach out to enhance engagement of Members in this regard.

ICG-WIGOS co-Chair also welcomed the contribution of CHy in the development of the WIGOS Pre-Operational Phase. WIGOS and WIS will have also to evolve, and take into account developments in hydrology. The Management Group welcomed the CHy plan to use the WIGOS Metadata Standard to describe hydrological observations. Web services are also planned to be used to feed such metadata in OSCAR.

The meeting noted that some mechanism could be developed for the two Commissions to be working on common projects and activities related to WIS 2.0 and the implementation and future evolution of WIGOS, and development of the Seamless GDPFS.

The Management Group invited CHy to consider proposing and presenting CHy WIGOS related Pilot Project in La Plata river basin to the next ICG-WIGOS meeting (***action; CHy; end 2017***).

The meeting invited the Management Group to identify a prioritized list where CHy engagement is needed (***action; CBS MG; asap***). It was noted that the CBS Management Group welcomes prototyping of projects affiliated to CBS. The meeting proposed establishing a Joint Task Team under the CBS MG and the CHy Advisory Working Group leveraging on existing members of CHy and CBS engaged in joint activities, and invited the CBS President and CHy President to discuss the details and the way forward (***action; M. Jean & H. Lins; end 2017***).

The meeting noted that there will be no CHy session before Cg-18, and CHy is investigating what mechanism to use in order to propose new technical regulations through an intergovernmental mechanism.

Representation of CHy in relevant IPETs and other CBS and CHy groups

The Chair of the OPAG-IO, Dr Anthony Rea (Australia) explained that CHy has been engaged in ICG-WIGOS. There would be benefits in having CHy to engage in OPAG-IO and in ICT-IO and IPET-OSDE e.g. as Associate Members. IPET-SUP would also benefit from increased engagement in this team with regard to Satellite Utilization and Products.

Engagement of CHy in the Rolling Review of Requirements (RRR), and development of Statement(s) of Guidance for Hydrology

The Group noted that Decision 4.1(3)/1 (CHy-15) requested the AWG to prepare a new version of the observational requirements and the Statement of Guidance for the Application Area « Hydrology », taking into consideration the implementation plan of WHOS Phase II, to be presented to IPET-OSDE in the second half of 2017 and made available to NHSs through the WHOS web page. It was noted that the next meeting of the IPET-OSDE will take place in early 2018, and that such materials should be provided by then.

Contribution/participation of CHy in the new Seamless Data-Processing and Forecasting System

The CBS President introduced the new Seamless GDPFS to the joint meeting, and the activities of the Steering Group on the Seamless GDPFS.

CHy has initiated consultation in this regard, and some support was noted.

The meeting noted that the CHy Resolution 4.2(1)/1 (CHy's contribution to the future GDPFS) had requested in particular the president of CHy or delegated AWG members to ensure that all hydrological aspects and specifics and in particular the needs and concerns of NHSs are properly reflected in the development of the new Seamless Data-processing and Forecasting System. They were also requested to develop a proposal of a comprehensive structure for hydrology within the new Seamless Data-processing and Forecasting System that would encompass hydrological data, analysis and forecasting and could include new entities such as World, Regional, and National Hydrological Centres, with clearly defined roles and responsibilities.

The Joint meeting further noted the following:

- The new revised GDPFS Manual (WMO-No.485) is more understandable. CBS/OPAG-DPFS will offer the support to develop the draft text for the new Manual when CHy establishes new types of Centres for hydrology.
- The collaborative activity with SWFDP might be useful for establishing GDPFS for hydrology.
- The role and responsibility of National Meteorological Centres are removed from the new revised Manual on GDPFS. In this regard, OPAG-DPFS will address a task to renew the Guide on GDPFS (WMO-No.305) for this intersession period. Since the scope of GDPFS is expanded beyond WWW in the new Manual, it needs to be decided whether the scope of the Guide covers other application areas such as hydrological services.

The Group welcomed the Participation of CHy in the Steering Group, and thanked CHy for its contribution in this regard.

The meeting noted with appreciation that there is a strong desire of the CHy community to be engaged in the development of the S/GDPFS.

CHy's contribution to the CBS initiative on Multi-hazard Impact-based Forecast and Warning Services

Mr Pilon (C/HFWR) indicated that he had had discussions with Ms H. Kootval concerning the CBS strategy for impact-based forecasting systems and services. Following those discussions, it was thought that the joint CHy AWG - CBS MG meeting would be an opportunity to share views and develop a common strategy for addressing this area. Mr Pilon recounted that impact-based warnings is not new to the area of hydrology and water resources, and he noted that the results of weather and climate can be floods and droughts. It was noted that setting of thresholds is sometimes a subject of legislative definition and might be the responsibility of civil protection agencies. This implies a need for substantial coordination efforts, and adopting a user centric approach is important.

CHy expressed its desire to work closely with CBS on developing the hydrological aspects of multi-hazard impact based forecast and warning systems and their capabilities.

The Management Group recognized that there is a huge gap for Public Weather Services in that area of Multi-hazard Impact-based Forecast and Warning Services, which relates to hydrological services, and the CBS Management Group welcomed the contribution of CHy in helping to address such gap.

It was noted that Southeast Europe has a project (SEE-MHEWS-A) supported by the World Bank and US-Aid, which includes severe weather and flood forecasting component.

SWFDP is another example where joint action could be developed. Support from Members is needed in any case.

Efforts to advance operational sub-seasonal to seasonal prediction

Mr Pilon recounted that over the last few years there have been Regional Climate Outlook Forum's (RCOFs) with subsequent Water User Forums held in South Asia. There is the need from the Hydrology and Water Resources Programme for quantitative, objective, systematic seamless gridded forecasts/predictions of weather and climate for use in hydrological forecasting for water resources management purposes. The intent would be to develop seamless zero day to seasonal hydrological forecasts/predictions that can be used for planning purposes by governments to avert losses from flooding or droughts. Given the strong role that water availability has on society's prosperity (e.g., agricultural productivity, energy production, navigation, water availability for domestic use), developing a seamless system would be most beneficial. It was suggested that use be made of pilot project to demonstrate the utility of technological advances in seamless prediction to water resource practitioners and disaster management agencies, for instance in the Brahmaputra-Ganges Rivers. This demonstration project will need linkages to WHOS for access to real time data. Mention was also made that there were a number of activities underway in different programmes and Commissions in this area, and it would be beneficial to bring the developments and advances together within the pilot. **(action; M. Jean to liaise with CCI and WWRP on this matter and subsequently follow-up with H. Lins; Sep. 2017).**

Conclusion of joint meeting

The joint meeting agreed that this had been a fruitful discussion. It requested to circulate the report of the CBS Management Group meeting with the CHy Advisory Group **(action; Secr.; Mar. 2017).**

The two Presidents will keep discussing issues of common interest, and make proposals to their respective Commissions on how to further develop joint activities **(action; M. Jean & H. Lins; ongoing).**

8.2.4 Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) requirements

The Group recalled that WMO is mandated under the International Convention for Safety of Life at Sea (SOLAS) to provide relevant marine meteorological services to help Members make the best decisions with respect to marine safety hazards. Beyond the regulatory framework, WMO marine meteorological services also support Members with information to reduce the vulnerability of people at risk in coastal areas, for example with early warning information on hazardous storm surge. WMO works in close collaboration with the UNESCO-Intergovernmental Oceanographic Commission (IOC) through the Joint UNESCO-IOC and WMO Technical Commission for Oceanography and Marine Meteorology (JCOMM) to ensure the relevant observations and up to date data are available for use in the marine service products. As well, WMO also works closely with the International Maritime Organization (IMO) to advance the safety of life at sea, through the development of new systems and services for maritime users.

The Group also recalled the importance of having satellite data requirements in particular for observations made over the oceans to be considered using existing WMO

mechanisms such as CBS ET-SAT and IPET-SUP. It therefore welcomed the nomination of JCOMM Experts in those Team, and particularly in IPET-SUP, which is looking at cross-Technical Commission user requirements. The Group therefore invited JCOMM to nominate an expert in IPET-SUP.

The Group requested the CBS President to write to the JCOMM Co-Presidents regarding the following issues (**action; M. Jean; asap**):

- Participation of JCOMM in IPET-SUP and IPET-OSDE and additional points to be provided by the OPAG-IOS Chair (**action; A. Rea; asap**);
- Consideration of JCOMM contribution to the GDPFS; and
- Avoiding multiplication of initiatives with regard to coastal applications.

8.2.5 Commission for Instruments and Methods of Observation (CIMO) requirements

The Group noted that CIMO is organizing, in close collaboration with CBS and WIGOS, and with support from other technical commission, an international conference on automatic weather stations. The aim of the conference is to address, through WIGOS multi-disciplinarity, different WMO Application Areas, covering topics such as instruments and methods of observation, network management, data transmission, quality control, homogeneity of time series, etc. The event will be held in Offenbach (Germany) from 23 to 26 October, 2017.

Mr Krunoslav Premec (Secretariat) reported on the plans for the conference, and the Management Group advised on its engagement in the event through the following:

- The Group nominated Ms Pei Chong (China) as CBS representative in the international programme committee
- The Group agreed in due course to seek relevant contributions from CBS experts for submission to the call of abstract, and requested to OPAG-IOS Chair to coordinate CBS input in this regard (**action; A. Rea; May 2017**).

9 CBS INPUT TO EC-69

9.1 Review of relevant Decisions and Recommendations from CBS-16

The meeting reviewed the decisions and recommendations of CBS-16, which require immediate attention and action.

The Group noted that the report of the CBS President to EC-69 should reflect Decisions of CBS-16. The Group requested the Secretariat to circulate the list of CBS-16 Decisions to the Group (**action; Secr.; asap**). The Group also requested the CBS President to circulate his draft report to the Group for their review, comments and additions (**action; M. Jean; asap**).

9.2 Other possible recommendations

Except with the following, the Group had no additional recommendation to make to the Executive Council than those made by CBS-16.

- Coming changes in the aviation community, and submitting a draft Resolution on how to address them.
- Operationalization of the Space Weather centres; and
- Re-energizing the DRR governance.

The Group requested the Secretariat in consultation with the relevant OPAG chairs to draft the corresponding input to EC-69 (**action; Secr.; asap**).

9.3 Approaches to Technical Governance

The meeting recalled that CBS-16 established the Management Group Task Team on Approaches to Technical Governance (TT-ATG), chaired by Mr Jeremy Tandy (United Kingdom). The Task Team has engaged in a series of teleconferences since CBS-16, and has made recommendations to the Management Group.

The Group reviewed the recommendations of the Task Team and decided on the following:

- i. That a robust and comprehensive internal review of existing Technical Regulations be undertaken by the Secretariat in coordination with TT-ATG, and some changes be proposed if necessary to the Technical Regulations for consistency with the proposal, and possible update of the proposal for submission to the Management Group (**action; Secr. & TT-ATG; end March 2017**);
- ii. That a guide for change management be developed, and the MG to consider developing a workplan for developing it (**action; MG; April 2017**);
- iii. That a formal contribution to EC-69 (May 2017), EC-SOP (2018) and PTC (2018) should also be prepared (**action; MG; May 2017**);

The CBS President requested the Group to review and provide feedback on a subset of the recommendations provided by TT-ATG (**action; MG; end March 2017**). The Group also recommended that after this review by the Group, the subset of the recommendations provided by TT-ATG be proposed to the Executive Council Working Group on Strategic and Operational Planning (EC WG SOP) as their application beyond CBS may provide benefit to the wider organisation, in particular:

- clarification of the role of technical commissions and regional associations in supporting Member's implementation of Technical Regulations (recommendations 5 and 6);
- establishing standard approaches within technical commissions and regional associations for work planning, prioritisation and budgeting in support of the WMO strategic plan (recommendations 11, 12, 14, 15, 16 and 20), noting that the Secretariat should play a key role in coordinating and collating the supporting information in a meaningful way to enable Executive Council to direct resources, and to monitor and evaluate progress etc.; and
- increasing expert participation in the work of WMO from outside the NMHS community (recommendations 23 – 31).

The Group noted that it will always have the opportunity to oversee the work that will be done by the Task Team, its successor, or whatever governance mechanism will be implemented in the future under CBS, in the best interest of WMO Members and according to WMO's mandate.

The Group also noted that although the Commission most likely already has the necessary permissions to implement many of the proposed recommendations, further efforts need to be made to ensure consistency in our approach across the Commission.

The Group agreed with the following:

- There will be a need to provide objective criteria for the validation of proposed amendments to Technical Regulation, and to monitor success and level of compliance with Member's implementation of Technical Regulation; introducing performance indicators in this regard.
- We need to better communicate the work plan, and also be able to accept changes to the work plan subject to robust review.
- Caution must be exercised with regard to the participation of the Private Sector in the work of the Commission. The intergovernmental nature of CBS was noted, and while private sector is welcome to contribute to activities, they don't have voting rights under the current regime. We'll also have to be careful not to give competitive advantage to specific companies by having them engaged in the specifications setting exercise. Building on CIMO expertise, using private sector associations or brokers such as the Association of Hydro-Meteorological Equipment Industry (HMEI) or the International Association of Broadcast Meteorology (IABM) could be a solution.

- Engagement of national experts in experimental projects will also help developing capacities of Members, and facilitate acceptance of the proposed technical specifications.
- We noted that the Open Programme Area Groups were established with authority to draft in experts to respond to emerging needs and that the use of Task Teams has been promoted to provide the necessary flexibility, but there is more that can be done in supporting this desired outcome.

10 DATE AND VENUE FOR NEXT SESSION OF CBS MANAGEMENT GROUP

The meeting agreed to organize the next Session of the Management Group in Geneva in June 2018, just after EC-70 (**action; Secr.; June 2018**).

The meeting also recommended that those Management Group members who will be attending EC-69 should meet informally on side of the event (**action; M. Jean; May 2017**).

11 OTHER BUSINESS

The Meeting considered the following additional items of business requiring attention of the Management Group, but not covered above.

11.1 Emerging data issues

The Coordinator on Emerging Data Issues, Dr Sue Barrell (Australia) reported on latest discussions regarding the CBS Led Review on Emerging Data Issues (CBSLR-EDI). She explained that progress since the August meeting of the team has been slow, and a scheduled teleconference on Wed 1 March will provide an opportunity to reassess the agreed approach and assigned responsibilities.

The issue of the number of different teams currently addressing data-related issues in WMO was highlighted, and the need to (a) avoid overlap and duplication wherever possible, and (b) ensure the ongoing responsibilities are aligned best within the organizational structures of WMO, with policy issues raised to the Executive Council and operational issues managed within technical bodies, especially CBS. The relationship with the ICG-WIGOS Task Team on WIGOS Data Partnerships was especially noted and it was agreed that the CBSLR-EDI could helpfully contribute to enhancing the understanding of the implications of data issues raised by PWSD and S/GDPFS.

The Management Group decided that the team would continue its work and also:

- That the CBS Coordinator for Emerging Data Issues will assume chairpersonship of the designated task team and re-energise its members in relation to the Work Plan agreed at the first meeting of the team (September 2016), with the aim of reporting on progress by December 2017 to the chair of the Executive Council Task Team on Data Policy and Emerging Issues (**action; S. Barrell; Dec. 2017**);
- That a policy vs operational lens should be used in the team's review of the impact and treatment of emerging data issues;
- To incorporate, in collaboration with co-chairs of ICT-PWSD and ICT-DPFS, additional themes related to service delivery systems, impact-based forecasting and S/GDPFS in its assessment of emerging data issues;
- To ensure that the team gives due consideration to how basic system and service elements of emerging data issues are addressed through guidance material, possibly using the WIGOS Guide as a vehicle; and
- That, depending on resources, a meeting of the task team be scheduled for third quarter 2017, preferably coincident with the Task Team on WIGOS Data Partnerships (**action; Secr.; Q3 2017**).

11.2 Engagement with the private sector

Dr Barrell also reported on the status of the White Paper on Public-Private Engagement, which is under development. In accordance with WMO Resolution 67 (Cg-17) and Decision 73 (EC-68), an informal drafting team (which includes Sue Barrell, in her EC member

capacity) has been brought together to assist in developing a policy framework on public-private engagement, for consideration by EC-69. In accordance with Decision 73 (EC-68), the policy framework is intended to take into account:

- Draft principles for private sector engagement based on the key issues;
- Proposed mechanisms and structures to foster dialogue and consultations, taking into consideration global, regional and national contexts, with a focus on national circumstances;
- Options for future governance of public-private partnerships and directions for development of WMO guidance to Members.

The zero draft of the policy framework (dated 21 February 2017) has only been distributed to PRAs and EC-WG-SOP members at this stage. It will be available for discussion at CBS MG meeting, but is marked as 'restricted', for initial consideration at EC-WG-SOP on 3 March 2017. The document will be further refined after the EC-WG-SOP discussion and after any further input from PRAs.

The CBS Management Group noted this update on the development of a policy framework to guide WMO Members in public-private engagement, and comments from members of the GROUP will be carried into the EC-WG-SOP discussion.

12 CLOSURE OF THE MEETING

The President and vice-President thanked the Group members and the Secretariat for contributing to the successful outcome of the meeting. The Group members thanked the President and vice-President for their leadership. The meeting, while expressing its appreciation to all Secretariat staff who contributed to the discussion, also wished to pay special thanks to Mr Steve Foreman for his past contributions to the work of the Commission, including preparations of and support provided to CBS-16.

The President invited each Group member to provide his/her feedback on the conduct of the GROUP business. The feedback was very positive, and the following was noted:

- The Wiki is a useful information sharing tool;
- The joint meeting with CHy has been useful and productive;
- It was useful to look at all the issues and cross pollination issues;
- Teleconferences focusing on two or three topics should be organized on a monthly basis;
- While the duration of the meeting was reduced to three working days, the Group agreed that it would not be realistic to reduce the duration further.

The session closed at 16:00 on Wednesday 1 March 2017.

LIST OF PARTICIPANTS

(CBS-MG-17, Geneva, Switzerland, 27 February - 1 March 2017)

1. MANAGEMENT GROUP MEMBERS:

**Michel JEAN
(President)**

Meteorological Service of Canada
Canadian Meteorological Centre
2121 Route Transcanadienne
H9P 1J3 Dorval
Quebec
Canada
Fax: +1 514 421 7250
Tel: +1 514 421 4601
Email: michel.jean2@canada.ca
prezcbs@gmail.com

**Meiyan JIAO
(vice-President)**

China Meteorological Administration
46 Zhongguancun Nandajie
100081 BEIJING
China
Fax: +86 10 6217 4797
Tel: +86 10 6840 6662 / 6146
Email: jiaomy@cma.gov.cn,
guoji@cma.gov.cn

**Susan BARRELL
(Coordinator on Emerging Data
Issues)**

Bureau of Meteorology
G.P.O. Box 1289
3001 MELBOURNE
VIC
Australia
Fax: +61 3 9669 4168
Tel: +61 3 9669 4444
Email: sue.barrell@bom.gov.au

**Fredrick BRANSKI
(Coordinator on DRR)**

NOAA - National Weather Service
1325 East-West Highway
SILVER SPRING
MD 20910
United States of America
Fax: +(1 301) 713 9450
Tel: +(1 301) 713 3538, ext. 121
Email: fred.branski@noaa.gov

**Paul Andrew DAVIES
(co-Chair OPAG-DPFS)**

Met Office
FitzRoy Road
EXETER EX1 3PB
United Kingdom
Email: paul.davies@metoffice.gov.uk

Matteo DELL'ACQUA
(Chair, OPAG-ISS)

Météo-France
42, avenue Gaspard Coriolis
31057 TOULOUSE CEDEX
France
Fax: (+33) 5 6107 8109
Tel: (+33) 5 6107 8124
Email: matteo.dellacqua@meteo.fr

Jochen DIBBERN
(co-Chair OPAG-IOS)

Deutscher Wetterdienst
Frankfurter Strasse 135
D-63067 OFFENBACH
Germany
Fax: +49 69 8062 3836
Tel: +49 69 8062 2824
Email: jochen.dibbern@dwd.de

Gerald FLEMING
(chair OPAG-PWSD)

Met Eireann
30 Parkview
WEXFORD
Ireland
Fax: +353 1 80 64 275
Tel: +353 1 80 64 208
Email: gerald.fleming@met.ie,
gfleming@eircom.net

Hassan HADDOUCH
(co-Chair OPAG-ISS)

Chef du Centre National de Recherches
météorologiques et Systèmes
d'information
Direction de la Météorologie Nationale,
DSI. BP 8106. Oisis. CASABLANCA-
MOROCCO
Tel: +212 522 654 884
Fax: +212 522 91 34 35
Email: haddouchh@yahoo.com

Yuki HONDA
(co-Chair OPAG-DPFS)

Japan Meteorological Agency (JMA)
1-3-4 Otemachi, Chiyoda-ku
100-8122 TOKYO
Japan
Fax: +81-3 3211 8407
Tel: +81-3 3212 8341, ext.3332
Email: honda.yuuki@met.kishou.go.jp

Dmitry KIKTEV
(co-Chair OPAG-PWSD)

Hydrometeorological Research Centre of
the Russian Federation
11-13, B. Predtechensky per.
Moscow, 123242
Russian Federation
Tel.: +7(499) 255-13-54
Fax: +7(499) 255-15-82
Email: kiktev@mecom.ru

Anthony REA
(Chair, OPAG-IOS)

Bureau of Meteorology
G.P.O. Box 1289
3001 MELBOURNE
VIC
Australia
Fax: +61 3 9669 4548
Tel: +61 3 9669 4222
Email: a.rea@bom.gov.au

2. SECRETARIAT

World Meteorological Organization (WMO)
7 bis, Avenue de la Paix
1211 Case Postale No. 2300
GENEVA 2
Switzerland

Wenjian ZHANG
(Assistant Secretary General)

Fax: +41 22 730 8021
Tel: +41 22 730 8400
Email: wzhang@wmo.int

Fernando BELDA
(D/OBS)

Fax: +41 22 730 8021
Tel: +41 22 730 8567
Email: fbelda@wmo.int

Stephan BOJINSKI
(SO/SUP)

Fax: +41 22 730 8181
Tel : +41 22 730 8319
Email : SBojinski@wmo.int

Etienne CHARPENTIER
(C/OSD)

Fax: +41 22 730 8081
Tel: +41 22 730 8223
Email: echarpentier@wmo.int

Steve FOREMAN
(C/DRMM)

Fax: +41 22 730 8021
Tel: +41 22 730 8171
Email: sforeman@wmo.int

Abdoulaye HAROU
(C/DPFS)

Fax: +4 22 730 8021
Tel: +41 22 730 8231
Email: aharou@wmo.int

Greg BROCK
(SO/AEM)

Tel: +41 22 730 8408
Email: gbrock@wmo.int

Haleh KOOTVAL
(C/PWS)

Fax: +41 22 730 8021
Tel: +41 22 730 8333
Email: hkootval@wmo.int

Toshiyuki KURINO
(C/SBOS)

Tel: +41 22 730 8228
Fax: +41 22 730 8181
Email: tkurino@wmo.int

Samuel MUCHEMI
(SO/PWS)

Tel: +41 22 730 8137
Email: smuchemi@wmo.int

Taoyong PENG
(C/TCP)

Tel: +41 22 730 8145
Fax: +41 22 730 8021
Email: tpeng@wmo.int

Krunoslav PREMEC
(SO/IMO)

Fax: +41 22 730 8081
Tel: +41 22 730 8436
Email: kpremec@wmo.int

Peiliang SHI
(D/WIS)

Fax: (+41 -22) 730-8021
Tel: (+41 -22) 730-8219
Email: pshi@wmo.int

Alice SOARES
(SO/DPFS)

Tel: +41 22 730 8449
Email: asoares@wmo.int

Xu TANG
(D/WDS)

Fax: +41 22 730 8021
Tel: +41 22 730 8264
Email: xtang@wmo.int

David THOMAS
(C/ITS)

Fax: +41 (0) 22 730 8021
Tel: +41 (0) 22 730 8241
Mobile: +41 (0) 79 425 59 60
Email: dthomas@wmo.int

Claudio CAPONI
(C/CBHWRMO)

Tel: +41 (0) 22 730 8407
Email: ccaponi@wmo.int

LIST OF ACTION ITEMS ARISING FROM THE MEETING*(CBS-MG-17, Geneva, Switzerland, 27 February - 1 March 2017)*

No.	Ref.	Action item	By	Deadline
1.	3	CBS President to inform CBS members in writing about the decision to accept the Coordinator on Emerging Data Issues, Dr Sue Barrell (Australia) as Associate Member of the Management Group	M. Jean	asap
2.	4.1.1	OPAG-IOS chair with assistance from Secretariat to draft CBS President letter to JCOMM and CHy for seeking their nominations for representing the two Commissions in IPET-SUP	A. Rea, Secretariat (OBS)	asap
3.	4.1.1	CBS President to write to the Presidents of JCOMM and CHy in order to seek nominations for representing the two Commissions in IPET-SUP	M. Jean	asap
4.	4.1.2	OPAG-IOS to review the various Implementation Plans (EGOS-IP, GCOS, GCW, GFCS, GAW) and prepare a synthesis document for the Members to understand what CBS is doing to address these various plans	A. Rea	April 2018
5.	4.3.1	Secretariat to contact related Permanent Representatives to seek the formal nomination of the proposed experts who had not been nominated so far	Secretariat	asap
6.	4.3.1	Secretariat was requested to check approval with CAeM regarding IPT-SWeISS membership	Secretariat (WDS)	asap
7.	4.3.1	OPAG-DPFS Co-chairs to identify the membership for the two OPAG-DPFS Task Teams and submit its list to CBS President for approval	Y. Honda & P. Davies	asap
8.	4.3.1	OPAG-DPFS Co-chairs to identify the membership for the four Task Teams under ET-OWFPS and submit its list to CBS President for approval	Y. Honda & P. Davies	asap
9.	4.3.1	OPAG-DPFS Co-chairs to confirm the appointment of Mr Tupper (BoM) as Chair of TT-Guide with the PR of Australia.	Y. Honda , P. Davies & S. Barrell	asap
10.	4.5	CBS President to inform the Presidents of regional associations about the membership of CBS concerning their respective regions	M. Jean	end March 2017
11.	4.5	Secretariat to update database according to the decision of the MG, and to publish	Secretariat	end March

CBS-MG-17, Final report

No.	Ref.	Action item	By	Deadline
		the membership on the Website	(OBS)	2017
12.	4.5	Secretariat to update the CBS-16 report (editorial changes) with the agreed team memberships	Secretariat (OBS)	end March 2017
13.	5.1	OPAG-PWSD to prepare a concept note which would distil the Service Delivery concepts in the context of the work of the other three OPAGs, and then work with the OPAG chairs to map their user engagement processes against the principles of Service Delivery	G. Fleming	end 2017
14.	5.2(1)	President CBS in consultation and collaboration with Chair OPAG-PWSD, PTC Meeting 2018 to develop a viable approach to achieving progress in the implementation of the WMO Strategy for Service Delivery according to the steps outlined in Annex IX	M. Jean	end 2017
15.	5.2(2)	To enhance efforts for more rapid realization of impact-based forecast and warning services through the development of a strategy for implementation of such services through the ET/IMPACT of OPAG/PWSD	G. Fleming	end 2017
16.	5.2(3)	To collaborate with other on-going efforts in WMO in order to integrate and harness new and emerging science and technology for the improvement of service delivery	G. Fleming	end 2017
17.	5.2(4)	OPAG/PWSD to collaborate with the WMO Education and Training Programme to prepare relevant guidance and appropriate training materials for Members on the implementation of competency requirements based on the PWS Competency Framework, to enable timely implementation of the Recommended Practices appropriate to PWS forecasters and advisors	G. Fleming	end 2017
18.	5.2	Secretariat and the CBS President to investigate this opportunity of CBS being represented at the WMO International Workshop on Climate Services Information System (CSIS), Operations and Coordination to be held in Nanji, China from 21 to 25 March 2017	Secretariat (WDS) M. Jean	asap
19.	5.4	OPAG-IOS to plan its contributions to the following WIGOS deliverables: <ul style="list-style-type: none"> a) A new edition of the "Manual on WIGOS" (WMO-No. 1160) by Cg-18; b) Further development of the WIGOS guidance on Data Partnerships, Lifecycle Data Management and Data Stewardship; and c) Guidance on the transition of existing observing systems to meet WIGOS requirements and standards, by end of 2017. 	A. Rea	2018

CBS-MG-17, Final report

No.	Ref.	Action item	By	Deadline
20.	5.4	Secretariat to keep track and to publish the state of the pilot RBONs	Secretariat (OBS)	2018
21.	5.4	to establish a registry of existing software developed nationally in relation to national WIGOS metadata databases related to OSCAR and Machine to Machine interfaces	Secretariat (OBS)	end 2017
22.	5.4	ICT-IOS, when planning its work for the coming intersessional period, to take into account the fact that many elements of the TT-WDQMS Work Programme will require close coordination with the work of ET-SBO	A. Rea	asap
23.	5.4	ICT-IOS to take into account the recommendation of the Obs. Impact Workshop in the planning of its work	A. Rea	asap
24.	5.4	Chairs of ET-SAT and IPET-OSDE to finalize their respective contributions to the draft Vision by April 2017.	J. Kaye E. Andersson	April 2017
25.	5.6(4)	Efforts are needed on data policy issues	Steering Group on GDPFS	asap
26.	5.6(5)	EC-69 side meeting on Seamless GDPFS shall be organized	Secretariat (WDS)	May 2017
27.	5.6(6)	OPAG-DPFS to suggest the Steering Group what Task Teams under the EC Steering Group should be established	Y. Honda, P. Davies	April 2017
28.	5.7	TT-HUM to take on responsibility concerning the GMAS, and to address the concerns and questions raised by the CBS-MG, and might be raised later by the Executive Council	F. Branski	end 2017
29.	5.7	To organize a side event on GMAS during EC-69	Secretariat (WDS)	EC-69
30.	5.7	Fred Branski to advise on how to develop concept note, which preliminary version ought to then be presented to EC-69 for the EC to note. Terms of Reference of the GMAS should also be developed	F. Branski	asap
31.	5.10	Secretariat to set up a centralized web page or wiki page for centralizing all noticed problems with regard to Migration of Upper Air Reports to Table Driven Code Forms,	Secretariat	asap

CBS-MG-17, Final report

No.	Ref.	Action item	By	Deadline
		so that all actors engaged can access and use information, and react to identified problems	(OBS)	
32.	5.10	CBS President to write to the Presidents of the Regional Associations to inform them about the issues, current mechanism, and efforts for the future	M. Jean	asap
33.	6.3	CBS President to discuss the cost and implications of CBS Ext.(2018) with the Secretariat, and explore other scenarios if necessary	M. Jean	asap
34.	7.2	to formalize the relationship with the co-sponsored programmes such as GCOS, and invite them at CBS meetings as needed, e.g. by mean of an exchange of letters	M. Jean	end May 2017
35.	7.3.2	CBS President to finalize the list of priorities and circulate to MG	M. Jean	7 Mar. 2017
36.	8.2.1	OPAG-ISS to use the "between sessions" approval procedure for the amendments to IWXXM that had been requested by ICAO	M. Dell' Acqua	Mar. 2018
37.	8.2.2	The Group agreed that the implications for CBS of changes in the ICAO infrastructure had to be considered, and requested the OPAG-ISS and OPAG-DPFS to address them	M. Dell' Acqua, Y. Honda	2019
38.	8.2.3	CHy to consider proposing and presenting CHy WIGOS related Pilot Project in La Plata river basin to the next ICG-WIGOS meeting	H. Lins	end 2017
39.	8.2.3	CBS-MG to identify a prioritized list of Expert Teams where CHy engagement is needed (CBS President to approach OPAG Chairs, and then email to CHy President)	M. Jean & MG	asap
40.	8.2.3	CBS President and CHy President to discuss the details and way forward for establishing a Joint Task Team under the CBS MG and the CHY Advisory Working Group leveraging on existing members of CHy and CBS engaged in joint activities	M. Jean & H. Lins	end 2017
41.	8.2.3	CBS President to liaise with CCI and WWRP and subsequently follow-up with H.Lins to bring the developments and advances together within the pilot to demonstrate the utility of technological advances in seamless prediction to water resource practitioners and disaster management agencies.	M. Jean	Sep. 2017
42.	8.2.3	Secretariat to circulate the report of the CBS Management Group meeting with the CHy Advisory Group	Secretariat (OBS)	Mar. 2017
43.	8.2.3	CBS and CHy Presidents to keep discussing issues of common interest, and make proposals to their respective Commissions on how to further develop joint activities	M. Jean & H. Lins	ongoing

CBS-MG-17, Final report

No.	Ref.	Action item	By	Deadline
44.	8.2.4	CBS President to write to the JCOMM Co-Presidents regarding the identified issues	M. Jean	asap
45.	8.2.4	Participation of JCOMM in IPET-SUP and IPET-OSDE and additional points to be provided by the OPAG-IOS Chair	A. Rea	asap
46.	8.2.5	OPAG-IOS Chair to seek and coordinate relevant contributions from CBS experts for submission to the call of abstract for the international conference on automatic weather stations	A. Rea	May 2017
47.	9.1	Secretariat to circulate the list of CBS-16 Decisions to the Group	Secretariat (OBS)	asap
48.	9.1	CBS President to circulate his draft report to the Group for their review, comments and additions	M. Jean	asap
49.	9.2	Secretariat in consultation with the relevant OPAG chairs to draft the corresponding input to EC-69	Secretariat	asap
50.	9.3	To undertake a robust and comprehensive internal review of existing Technical Regulations in coordination with TT-ATG, and to propose some changes if necessary to the Technical Regulations for consistency with the proposal, and possible update of the proposal for submission to the Management Group	Secretariat, J. Tandy	end March 2017
51.	9.3	CBS MG to review and provide feedback on a subset of recommendation provided by TT-ATG	MG members	end March 2017
52.	9.3	CBS MG to develop a guide for change management, and to consider developing a workplan for developing it	M. Jean	April 2017
53.	9.3	CBS MG to prepare formal contribution EC-69 (May 2017), EC-SOP (2018) and PTC (2018)	M. Jean	May 2017
54.	10	to organize the next Session of the Management Group in Geneva in June 2018, just after EC-70	Secretariat (OBS)	June 2018
55.	10	Those Management Group members who will be attending EC-69 should meet informally on side of the event	M. Jean	May 2017
56.	11	CBS Coordinator for Emerging Data Issues to assume chairpersonship of the designated task team and to re-energize its members in relation to the Work Plan agreed at the first meeting of the team (September 2016), with the aim of reporting on progress by December 2017 to the chair of the Executive Council Task Team on	S. Barrell	Dec. 2017

CBS-MG-17, Final report

No.	Ref.	Action item	By	Deadline
		Data Policy and Emerging Issues		
57.	11	Depending on resources, to schedule a meeting of CBS-Led Review of Emerging Data Issues for third quarter 2017, preferably coincident with the ICG-WIGOS Task Team on WIGOS Data Partnerships	Secretariat (OBS)	Q3 2017

APPROVED MEMBERSHIP OF THE CBS TEAMS

1. OPAG-IOS

<i>Team</i>	<i>Name</i>	<i>Country</i>	<i>Role</i>
ICT-IOS	REA	Australia	Chair
ICT-IOS	DIBBERN	Germany	Co-chair
ICT-IOS	MICHELSON	Canada	Core member
ICT-IOS	ANDERSON	ECMWF	Core member
ICT-IOS	ENGLISH	ECMWF	Core member
ICT-IOS	ALLAIX	France	Core member
ICT-IOS	PARK	Korea, Rep	Co-coordinator
ICT-IOS	GOLDSTRAW	United Kingdom	Core member
ICT-IOS	TURTON	United Kingdom	Associate member
ICT-IOS	BOUKABARA	United States	Associate member
ICT-IOS	KAYE	United States	Core member
ICT-IOS	MARSHALL	United States	Core member
IPET-OSDE	ANDERSSON	ECMWF	Chairperson
IPET-OSDE	KLINK	Germany	Co-chairperson
IPET-OSDE	LI	China	Core member
IPET-OSDE	FAHMY	Egypt	Core member
IPET-OSDE	MUNRO	EUMETSAT	Associate member
IPET-OSDE	SATO	Japan	Core member
IPET-OSDE	PARK	Korea, Rep	Core member
IPET-OSDE	LARSEN	SAON	Associate member
IPET-OSDE	EYRE	United Kingdom	Core member
IPET-OSDE	GOLDSTRAW	United Kingdom	Core member
IPET-OSDE	BOUKABARA	United States	Associate member
IPET-OSDE	MARSHALL	United States	Associate member
IPET-OSDE	MA	China	Associate member
IPET-OSDE	ENGLISH	ECMWF	Associate member
IPET-OSDE	KAYE	United States	Associate member
IPET-SUP	ENGLISH	ECMWF	Chairperson
IPET-SUP	FANG	China	Co-Chairperson
IPET-SUP	DIOP KANE	Senegal	Core member
IPET-SUP	DONOHO	USA	Core member
IPET-SUP	JANG	Korea, Rep	Core member
IPET-SUP	OMORI	Japan	Core member
IPET-SUP	MACHADO	Brazil	Core member
IPET-SUP	ADRIYANTO	Indonesia	Core member
IPET-SUP	KEOGH	United Kingdom	Core member
IPET-SUP	ECKMAN	United Sates	Associate member
IPET-SUP	WANNOP	EUMETSAT	Associate member
IPET-SUP	TBD		Associate member
IPET-SUP	HOLLMANN	Germany	Associate member
IPET-SUP	TBD		Associate member

CBS-MG-17, Final report

ET-SAT	KAYE	United States	Chairperson
ET-SAT	KIM	Korea, Rep	Co-Chairperson
ET-SAT	KROUPNIK	Canada	Core member
ET-SAT	LU	China	Core member
ET-SAT	PETITEVILLE	ESA	Core member
ET-SAT	BOJKOV	EUMETSAT	Core member
ET-SAT	VON BARGEN	Germany	Core member
ET-SAT	YOSHIDA	Japan	Core member
ET-SAT	KUNIMATSU	Japan	Core member
ET-SAT	OKI	Japan	Core member
ET-SAT	USPENSKIY	Russia	Core member
ET-SAT	BOUKABARA	USA	Core member
ET-SAT	TBD	India	
ET-SAT	TBD	France	
ET-ABO	MARSHALL	United States	Chairperson
ET-ABO	MOUHTADI	Morocco	Vice-chair
ET-ABO	RIVABEN	Argentina	Core member
ET-ABO	BODY	Australia	Core member
ET-ABO	CERQUEIRA	Brazil	Associate member
ET-ABO	CAO	China	Associate member
ET-ABO	BESSON	France	Associate member
ET-ABO	HOFF	Germany	Associate member
ET-ABO	FORD	HMEI	Associate member
ET-ABO	HENDRICKS	HMEI	Associate member
ET-ABO	JACOBS	HMEI	Associate member
ET-ABO	LEE	Hong Kong, China	Core member
ET-ABO	SONNABEND	IATA	Associate member
ET-ABO	HALSEY	ICAO	Associate member
ET-ABO	KUMAGAI	Japan	Core member
ET-ABO	GROOTERS	Netherlands	Core member
ET-ABO	VAN DER MEULEN	Netherlands	Associate member
ET-ABO	PELACHO	Spain	Associate member
ET-ABO	STRINGER	United Kingdom	Core member
ET-ABO	TYSON	United Kingdom	Associate member
ET-ABO	FARRAR	United States	Associate member
ET-ABO	STRAHAN	United States	Associate member
ET-ABO	ILBOUDO	Senegal	Associate member
ET-ABO	MOSETLHO	South Africa	Associate member

CBS-MG-17, Final report

ET-SBO	GOLDSTRAW	United Kingdom	Chairperson
ET-SBO	PEI	China	Co-Chairperson
ET-SBO	MONNIK	Australia	Core member
ET-SBO	LUCAS	Brazil	Associate member
ET-SBO	TORRES	Chile	Core member
ET-SBO	GUO	China	Associate member
ET-SBO	ABDALLAH	Egypt	Associate member
ET-SBO	HUUSKONEN	Finland	Core member
ET-SBO	KLEINERT	Germany	Core member
ET-SBO	MAERZ	Germany	Associate member
ET-SBO	HAYASHI	Japan	Associate member
ET-SBO	IRIE	Japan	Associate member
ET-SBO	OTA	Japan	Associate member
ET-SBO	KARANJA	Kenya	Core member
ET-SBO	CHO	Korea, Rep	Associate member
ET-SBO	NOUNI	Morocco	Associate member
ET-SBO	HASHMI	Pakistan	Associate member
ET-SBO	KATS	Russian Fed.	Associate member
ET-SBO	RUFFIEUX	Switzerland	Core member
ET-SBO	INGLEBY	United Kingdom	Associate member
ET-SBO	OAKLEY	United Kingdom	Core member
ET-SBO	SCHMITT	United States	Associate member
ET-SBO	SZYNBORSKI	United States	Associate member
SG-RFC	ALLAIX	France	Chairperson
SG-RFC	FRANC	United States	Co-Chairperson
SG-RFC	HETTRICK	Australia	Core member
SG-RFC	HODGE	Australia	Associate member
SG-RFC	SANTOS	Brazil	Core member
SG-RFC	FOURNIER	Canada	Associate pending replacement nomination
SG-RFC	ZHANG	China	Core member
SG-RFC	NIE	China	Associate member
SG-RFC	FAHMY	Egypt	Associate member
SG-RFC	MARELLI	ESA	Associate member
SG-RFC	TRISTANT	EUMETNET	Core member
SG-RFC	DREIS	EUMETSAT	Core member
SG-RFC	MOHR	Germany	Associate member
SG-RFC	POOL	HMEI	Associate member
SG-RFC	SALMIVAARA	HMEI	Associate member
SG-RFC	NOZDRIN	ITU	Core member
SG-RFC	KAJIWARA	Japan	Associate member
SG-RFC	KARANJA	Kenya	Core member
SG-RFC	CHOI	Korea, Rep	Core member ?
SG-RFC	AZAROV	Russian Fed.	Associate member
SG-RFC	DASHKOV	Russian Fed.	TBD
SG-RFC	USPENSKY	Russian Fed.	TBD
SG-RFC	GORBE	South Sudan	Associate member
SG-RFC	HERVO	Switzerland	Core member

CBS-MG-17, Final report

SG-RFC	PETSUWAN	Thailand	Associate member
SG-RFC	BEWLEY	United Kingdom	Core member
SG-RFC	METZNER	United States	Associate member
SG-RFC	GIBSON	United States	Interested expert
SG-RFC	HUNEYCUTT	United States	Interested expert
SG-RFC	LECK	United States	Interested expert
SG-RFC	VON DEAK	United States	Associate member
C-SEIS	BOUKABARA	United States	Co-coordinator
C-SEIS	PARK	Korea, Rep	Co-coordinator
C-MAR	TURTON	Jonathan	Co-ordinator

Note: The cost of ET-SAT members' participation is borne by their respective organizations.

2. OPAG-ISS

Team	Name	Country	Role
ICT-ISS	DELL'AQUA	France	Chair
ICT-ISS	HADDOUCH	Morocco	Co-chair
ICT-ISS	HASEGAWA	Japan	Core member
ICT-ISS	PELLETIER	Canada	Associate member
ICT-ISS	WILSON	Australia	Core member
ICT-ISS	KLARIC	Croatia	Associate member
ICT-ISS	LI	China	Core member
ICT-ISS	TSUNODA	Japan	Core member (Expert)
ICT-ISS	FRANCIS	UK	Associate member
ICT-ISS	ALDER	New Zealand	Core member
ICT-ISS	WOLF	EUMETSAT	Associate member
ICT-ISS	GIRAUD	France	Core member
ICT-ISS	GLASER	Germany	Associate member
ICT-ISS	SCHRÖDER	Germany	Core member
ICT-ISS	WRIGHT	Australia	Associate member
ICT-ISS	BUNGE	United States	Core member
ICT-ISS	TANDY	United Kingdom	Associate member
ICT-ISS	DE REZENDE	Brazil	Core member (Region III)
IPET-CM	HASEGAWA	JAPAN	Chair
IPET-CM	PELLETIER	CANADA	Co-chair
IPET-CM	ZHAO	CHINA	Core member
IPET-CM	LEMKHENTER	MOROCCO	Core member
IPET-CM	ATOR	UNITED STATES	Core member
IPET-CM	KATS	RUSSIA	Core member
IPET-CM	FERREIRA	BRAZIL	Core member
IPET-CM	WEEDON	UNITED KINGDOM	Core member
IPET-CM	ELLIOTT	EUMETSAT	Core member
IPET-CM	KREBER	GERMANY	Core member
IPET-CM	WANG	AUSTRALIA	Core member
IPET-CM	FUCILE	ECMWF	Core member

CBS-MG-17, Final report

IPET-DD	WILSON	AUSTRALIA	Chair
IPET-DD	KLARIC	CROATIA	Co-chair
IPET-DD	PEROUTKA	UNITED STATES	Core member
IPET-DD	AUBERT	EUMETSAT	Core member
IPET-DD	HOKASE	JAPAN	Core member
IPET-DD	KAMIL	MOROCCO	Core member
IPET-DD	CHOY	HONG KONG, CHINA	Core member
IPET-DD	HEDLEY	UNITED KINGDOM	Core member
IPET-DD	PIRES CASTRO FILHO	BRAZIL	Core member
ET-WISC	LI	CHINA	Chair
ET-WISC	TSUNODA	JAPAN	Co-chair
ET-WISC	FRANCIS	UNITED KINGDOM	Co-chair
ET-WISC	QU	AUSTRALIA	Core member
ET-WISC	SPEARS	CANADA	Core member
ET-WISC	HOFSTADLER	ECMWF	Core member
ET-WISC	SACLIER	FRANCE	Core member
ET-WISC	SANTOS	BRAZIL	Core member
ET-WISC	CHAN	HONG KONG, CHINA	Core member
ET-WISC	SHEETS	UNITED STATES	Core member
ET-WISC	WIRT	GERMANY	Core member
ET-CAC	ALDER	NEW ZEALAND	Chair
ET-CAC	WOLF	EUMETSAT	Co-chair
ET-CAC	SPEARS	CANADA	Core member
ET-CAC	BENSAID	MOROCCO	Core member
ET-CAC	ZHU	CHINA	Core member
ET-CAC	ANQUETIL	FRANCE	Core member
ET-CAC	FRANCIS	UNITED KINGDOM	Core member
ET-CAC	QU	AUSTRALIA	Core member
ET-CTS	GIRAUD	FRANCE	Chair
ET-CTS	GLASER	GERMANY	Co-chair
ET-CTS	SILVA	CANADA	Core member
ET-CTS	GORWITS	ECMWF	Core member
ET-CTS	OHNO	JAPAN	Core member
ET-CTS	DO	REPUBLIC OF KOREA	Core member
ET-CTS	AIYNA-AKILOTAN	ASECNA	Core member
ET-CTS	BRUNNER	UNITED STATES	Core member
ET-CTS	LOYBER	ARGENTINA	Core member

CBS-MG-17, Final report

TT-IM	SCHRÖDER	GERMANY	Chair
TT-IM	WRIGHT	AUSTRALIA	Co-chair
TT-IM	GAO	CHINA	Core member
TT-IM	MOOSAKHANIAN	UNITED STATES	Core member
TT-IM	PERES	FRANCE	Core member
TT-IM	TANDY	UNITED KINGDOM	Core member
TT-IM	TELYUK	RUSSIA	Core member
TT-eWIS	BUNGE	UNITED STATES	Chair
TT-eWIS	TANDY	UNITED KINGDOM	Co-chair
TT-eWIS	RAOULT	ECMWF	Core member
TT-eWIS	LUO	CHINA	Core member
TT-eWIS	REZENDE	BRAZIL	Core member
TT-eWIS	BELOV	RUSSIA	Core member
TT-eWIS	HALLETT	NEW ZEALAND	Core member
TT-eWIS	FAVENNEC	FRANCE	Core member
TT-eWIS	MERROUCHI	MOROCCO	Core member

3. OPAG-DPFS

Team	Name	Country	Role
ICT-DPFS	HONDA	Japan	Co-chair
ICT-DPFS	DAVIES	United Kingdom	Co-chair
ICT-DPFS	RICHARDSON	ECMWF	Core member
ICT-DPFS	WANG	China	Core member
ICT-DPFS	KUMAR	United States	Core member
ICT-DPFS	COELHO	Brazil	Core member
ICT-DPFS	MUSCAT	United Kingdom	Core member
ICT-DPFS	SERVRANCKX	Canada	Core member
ICT-DPFS	SEBEGO	South Africa	Core member
ICT-DPFS	BRANSKI	United States	Core member
ICT-DPFS	RUTLEDGE	United States	Core member
ICT-DPFS	ZHANG	China	Associate member (CAeM)
ICT-DPFS	TUPPER	Australia	(TBD)
ET-OWFPS	RICHARDSON	ECMWF	Chair
ET-OWFPS	WANG J.	China	Co-chair
ET-OWFPS	HAIDEN	ECMWF	Core member
ET-OWFPS	WANG Y.	Austria	Core member
ET-OWFPS	SATO	Japan	Core member
ET-OWFPS	ZHOU	USA	Core member
ET-OWFPS	ERFANI	Canada	Core member
ET-OWFPS	TUPPER	Australia	Core member
ET-OWFPS	MYLNE	United Kingdom	Core member
ET-OWFPS	(TBD)		Associate member (ET Task Teams' members)

CBS-MG-17, Final report

IP-OPSLS	KUMAR	United States	Chair
IP-OPSLS	COELHO	Brazil	Co-chair
IP-OPSLS	ZHANG	China	Core member (GPCLRF)
IP-OPSLS	KNIGHT	United States	Core member (GPCLRF)
IP-OPSLS	CHO	Korea, Rep.	Core member (GPCLRF)
IP-OPSLS	TAKAYA	Japan	Core member (GPCLRF)
IP-OPSLS	SOUBEYROUX	France	Core member (GPCLRF)
IP-OPSLS	FERRANTI	ECMWF	Core member (GPCLRF)
IP-OPSLS	DENIS	Canada	Core member (GPCLRF)
IP-OPSLS	KRYJOV	Russian Federation	Core member (GPCLRF)
IP-OPSLS	(TBD)	Germany	Core member (GPCLRF)
IP-OPSLS	(TBD)	South Africa	Core member (GPCLRF)
IP-OPSLS	(TBD)	Australia	Core member (GPCLRF)
IP-OPSLS	CERON	France	Core member (CCI)
IP-OPSLS	SAHAI	India	Core member (CCI)
IP-OPSLS	RODRIGUEZ	Spain	Core member (CCI)
ET-ERA	MUSCAT	United Kingdom	Chair
ET-ERA	SERVRANCKX	Canada	Co-chair
ET-ERA	SONG	China	Core member (RSMC)
ET-ERA	KAMAEV	Russian Federation	Core member (RSMC)
ET-ERA	FOERSTNER	Germany	Core member (RSMC)
ET-ERA	SAKAMOTO	Japan	Core member (RSMC)
ET-ERA	NICOLAU	France	Core member (RSMC)
ET-ERA	NILS	Canada	Core member (RSMC)
ET-ERA	MCQUEEN	United States	Core member (RSMC)
ET-ERA	(TBD)	Austria	Core member (RSMC)
ET-ERA	(TBD)	Australia	Core member (RSMC)
ET-ERA	(TBD)	Argentina	Core member
ET-ERA	WINKLER	IAEA	Core member
ET-ERA	PIERRICK	CTBTO	Core member
ET-ERA	(TBD)	ICAO	Core member

CBS-MG-17, Final report

SG-SWFDP	SEBEGO	South Africa	Chair (RSMT Chair)
SG-SWFDP	HONDA	Japan	Core member (DPFS Co-chair)
SG-SWFDP	DAVIES	United Kingdom	Core member (DPFS Co-chair)
SG-SWFDP	FLEMING	Ireland	Core member (PWS Co-chair)
SG-SWFDP	LUNNY	New Zealand	Core member (RSMT Chair)
SG-SWFDP	AMBEJE	Keyna	Core member (RSMT Chair)
SG-SWFDP	HUNG	Viet Nam	Core member (RSMT Chair)
SG-SWFDP	MOHAPATRA	India	Core member (RSMT Chair)
SG-SWFDP	KIKTEV	Russian Federation	Core member (RSMT Chair)
SG-SWFDP	ZENG	China	Core member (Global Centre)
SG-SWFDP	GHELLI	ECMWF	Core member (Global Centre)
SG-SWFDP	DEGRACE	France	Core member (Global Centre)
SG-SWFDP	SHIN	Korea, Rep	Core member (Global Centre)
SG-SWFDP	KOIDE	Japan	Core member (Global Centre)
SG-SWFDP	SHEPHERD	Australia	Core member (Global Centre)
SG-SWFDP	BEARDSLEY	United States	Core member (Global Centre)
SG-SWFDP	BOUCHER	Canada	Core member (Global Centre)
SG-SWFDP	STRAUSS	France	Core member
SG-SWFDP	DALL'ANTONIA	Brazil	Core member
TT-HUM	BRANSKI	United States	Chair
TT-HUM	MILTON	Canada	Core member
TT-HUM	FLEMING	Ireland	Core member
TT-HUM	KIKTEV	Russian Federation	Core member
TT-HUM	HONDA	Japan	Core member
TT-HUM	DAVIES	United Kingdom	Core member
TT-HUM	DELL'ACQUA	France	Core member
TT-HUM	(TBD)	Hong Kong, China	Core member
TT-HUM	(TBD)		Core member (CCI)
TT-HUM	(TBD)		Core member (CHy)
TT-HUM	(TBD)	UNOCHA	Core member
TT-HUM	POOLMAN	South Africa	Associate member
TT-HUM	(TBD)	(RA-III)	Associate member
TT-HUM	(TBD)	(RA-V)	Associate member
TT-Guide	TUPPER	Australia	Chair
TT-Guide	(TBD)		Core member
TT-CentreAudit	HONDA	Japan	Chair
TT-CentreAudit	(TBD)		Core member

CBS-MG-17, Final report

IPT-SWeISS	ZHANG	China	Co-chair (CAeM)
IPT-SWeISS	RUTLEDGE	United States	Co-chair (CBS)
IPT-SWeISS	DASSO	Argentina	Core member
IPT-SWeISS	TERKILDSEN	Australia	Core member
IPT-SWeISS	NARDIN	Brazil	Core member
IPT-SWeISS	TRICHTCHENKO	Canada	Core member
IPT-SWeISS	VILMER	France	Core member
IPT-SWeISS	BERDERMANN	Germany	Core member
IPT-SWeISS	BIRON	Italy	Core member
IPT-SWeISS	ISHII	Japan	Core member
IPT-SWeISS	KIM	Korea	Core member
IPT-SWeISS	YOON	Korea	Core member
IPT-SWeISS	STANISLAWSKA	Poland	Core member
IPT-SWeISS	BUROV	Russia	Core member
IPT-SWeISS	MCKINNELL	South Africa	Core member
IPT-SWeISS	HABERREITER	Switzerland	Core member
IPT-SWeISS	ACKSON	United Kingdom	Core member
IPT-SWeISS	VAN DEN OORD	Netherland	Associate member
IPT-SWeISS	RODGER	New Zealand	Associate member
IPT-SWeISS	NOZDRIN	ITU	Associate member
IPT-SWeISS	LINDEN	Belgium	Core member
IPT-SWeISS	YATINI	Indonesia	Core member
IPT-SWeISS	GIBBS	United Kingdom	Core member
IPT-SWeISS	(TBD)	ISES	Associate member
IPT-SWeISS	(ROMERO)	ICAO	Associate member
IPT-SWeISS	(TBD)	UNOOSA	Associate member
IPT-SWeISS	(TBD)	ESA	Associate member

Notes:

- Some members need to be confirmed by their PRs
- The financial support from WMO to core members regarding their participation in meetings depends on the available resource.
- The cost of ET-SAT members' participation is borne by their respective organizations. The cost of IPT-SWeISS members' participation is borne by their respective organizations.

4. OPAG-PWSD

Team	Name	Country	Role
ICT-PWSD	FLEMING	Ireland	Chairperson
ICT-PWSD	KIKTEV	Russian Fed.	Co-Chairperson
ICT-PWSD	LANG	United Kingdom	Chair ET-SPII
ICT-PWSD	JACKS	United States of America	Chair ET-IMPACT
ICT-PWSD	MILTON	Canada	Coordinator
ICT-PWSD	CACIC	Croatia	Coordinator
ET-SPII	LANG	United Kingdom	Chairperson
ET-SPII	LI	China	Co-Chairperson
ET-SPII	TANAKA	Japan	Core Member
ET-SPII	CHEN	Hong Kong China	Core Member
ET-SPII	HAGEDORN	Germany	Core Member
ET-SPII	RYAN	Ireland	Core Member
ET-SPII	MORGAN	Australia	Core Member
ET-SPII	KOCH	United States of America	Core Member
ET-SPII	DUDLEY	Canada	Core Member
ET-SPII	SABAI	Morocco	Core Member
ET-SPII	PORTILLO	Spain	Core Member
ET-SPII	LIU	China	Associate Member
ET-IMPACT	JACKS	United States of America	Chairperson
ET-IMPACT	LEE	Hong Kong, China	Co-Chairperson
ET-IMPACT	MILTON	Canada	Core Member
ET-IMPACT	DAVIES	United Kingdom	Core Member
ET-IMPACT	CHEN	China	Core Member
ET-IMPACT	WANG	China	Core Member
ET-IMPACT	HONORÉ	France	Core Member
ET-IMPACT	GOOLAUP	Mauritius	Core Member
ET-IMPACT	NOBLE	New Zealand	Core Member
ET-IMPACT	CERRUDO	Argentina	Core Member
ET-IMPACT	DESLANDES	AUSTRALIA	Core Member
C-CF	MILTON	Canada	Coordinator
C-RAL	CACIC	Croatia	Coordinator
TT-IPWSD	MARTIN	Canada	Core Member
TT-IPWSD	LIU	China	Core Member
TT-IPWSD	BROWN	United Kingdom	Core Member
TT-PPP	DOUBLET	Norway	Core Member
TT-PPP	HARROWSMITH	United Kingdom	Core Member
TT-PPP	SOCIAL MEDIA TBD	TBD	Core Member

APPROVED WORK PLANS OF THE CBS TEAMS

1. OPAG-IOS

1) UPDATED WORK PLAN WITH STATUS FOR THE INTER PROGRAMME EXPERT TEAM ON OBSERVING SYSTEM DESIGN AND EVOLUTION (IPET-OSDE) FOR THE PERIOD 2012-2016

(Workplan as decided by IPET-OSDE-1, April 2014; status of tasks as of 16 April 2016)

Id	Priority	Objective	Outcome	Deliverable	Activity	Leader	Due	Other ETs	Effort	Status Report
1	1	To contribute to the implementation of WIGOS, including WIGOS Manual, and provide relevant advice and support to the chairperson of ICT-IOS	Address relevant items of WIGOS Implementation Activities agreed by Congress XVI, and then ICG-WIGOS	Relevant WIP activities addressed	Meeting	Chairperson IPET-OSDE	Ongoing	ICG-WIGOS , IPET-WIFI		<p>OND Principles included in WIGOS Manual</p> <p>OND Guidance addressing the Principles almost complete</p> <p>Vision 2040 Space well developed and reviewed at IPET-OSDE-2</p> <p>Vision 2040 Surface preparation initiated at IPET-OSDE-2</p>

CBS-MG-17, Final report

Id	Priority	Objective	Outcome	Deliverable	Activity	Leader	Due	Other ETs	Effort	Status Report
2	1	Survey and collate user requirements for observations for WMO and WMO-sponsored programmes	Review and update WMO database of observational user requirements, through Points of Contact for application areas.	OSCAR/ Requirements up-to-date	Review by FPs	Chairperson IPET-OSDE	Ongoing / Annual review			Ongoing; PoCs regularly contacted for updates
3	1	Survey and collate observing systems capabilities for surface-based and space-based systems that are components or candidate components of WIGOS	Review and update WMO database of observing system capabilities, in collaboration with other OPAG-IOS ETs and other Technical Commissions as appropriate.	OSCAR/Space & OSCAR/Surface up to date	Review by Members (coordination via NFPs)	Chairperson IPET-OSDE	Ongoing / Annual review	ICT- IOS, ET- ABO, ET- SBO, ICG- WIGOS /TT- WMD		Ongoing for space-based, and recorded in OSCAR/Space. Ongoing for surface-based through new developments with OSCAR/Surface, to be used when operational in 2016
4	1	Maintain Rolling Review of Requirements (RRR) for observations in several application areas, using subject area experts, including appropriate liaison with Technical Commissions and programmes and co-sponsored programmes (e.g. CAS, JCOMM, CAeM, CAgM, CHy, CCI, GCOS, GFCS, and GCW)	Continue RRR process for the listed application areas and expand to new areas as required: review and update as necessary Statements of Guidance on the extent to which present/ planned observing system capabilities meet user requirements, through Points of Contact on	Statements of Guidance for all Application Areas	Application Area Contact Points; Meeting	Chairperson IPET-OSDE	Ongoing / Annual review			Ongoing; some SoG reviewed. Overall review done by IPET-OSDE-1 and IPET-OSDE-2. Some updates to user requirements and SoGs made during the period.

CBS-MG-17, Final report

<i>Id</i>	<i>Priority</i>	<i>Objective</i>	<i>Outcome</i>	<i>Deliverable</i>	<i>Activity</i>	<i>Leader</i>	<i>Due</i>	<i>Other ETs</i>	<i>Effort</i>	<i>Status Report</i>
			application areas.							
5	1	Prepare and maintain reviews of observation impact studies undertaken by NWP centres and provide information for consideration by IPET-OSDE and OPAG-IOS	Rapporteurs on Impact Studies and NWP experts, review results of impact studies relevant to the evolution of observing systems. Organize and hold next NWP Impact Studies Workshop in 2016.	Findings of impact studies	Impact studies	Rapporteurs on Scientific Evaluation of Impact Studies undertaken by NWP Centres	2016: workshop			Report of the 5 th NWP "Impact" workshop (Sedona, 2012) published. Ongoing: recent findings, and proposals for new impact studies discussed at IPET-OSDE1 and approved by CBS Ext.(2014). Preparations well advanced for 6 th workshop (Shanghai, May 2016)
6	1	Promote CBS activities in support of GCOS goals	Review the implications of the progress on the GCOS Implementation Plan for the activities of CBS. Bring relevant issues to the	RRR consistent with GCOS	Meeting	Rapporteur on GCOS matters	2013 2016			Ongoing interactions between IPET-OSDE Chairperson and GCOS.

CBS-MG-17, Final report

<i>Id</i>	<i>Priority</i>	<i>Objective</i>	<i>Outcome</i>	<i>Deliverable</i>	<i>Activity</i>	<i>Leader</i>	<i>Due</i>	<i>Other ETs</i>	<i>Effort</i>	<i>Status Report</i>
			attention of the IPET-OSDE							
7	1	Promote CBS activities in support of GFCS goals	Review the implications of the GFCS IP for the activities of CBS. Bring relevant issues to the attention of the IPET-OSDE	RRR consistent with GFCS	Meeting	Chairperson IPET-OSDE	2016			Relevant activities reviewed at IPET-OSDE1. GCOS/GFCS interaction encouraged.
8	1	Promote CBS activities in support of GCW goals	Review the implications for the activities of CBS of the GCW developments, including the GCW Implementation Strategy, and the Cryosphere theme report for the IGOS partnership. Bring relevant issues to the attention of the IPET-OSDE	RRR consistent with GCW	Meeting	Chairperson IPET-OSDE	2016			Relevant activities reviewed at IPET-OSDE-1 and IPET-OSDE-2. CBS CWP submitted to the AOS1.

CBS-MG-17, Final report

<i>Id</i>	<i>Priority</i>	<i>Objective</i>	<i>Outcome</i>	<i>Deliverable</i>	<i>Activity</i>	<i>Leader</i>	<i>Due</i>	<i>Other ETs</i>	<i>Effort</i>	<i>Status Report</i>
9	1	Monitor progress and actions by Members and partner Organizations per the approved Implementation Plan for the Evolution of the Global Observing Systems (EGOS-IP), fully responding to the "Vision for the GOS in 2025", and promote activities in support of progress	Seek feedback from National Focal Points, Expert Teams, relevant Technical Commissions, and other groups on the implementation of EGOS-IP, and keep the EGOS-IP progress report up to date. Initiate and monitor activities which promote progress.	EGOS-IP progress report	Survey with FPs, TCs; meeting	Chairperson IPET-OSDE	Ongoing / Annual review			Ongoing. Feedback against the new EGOS-IP requested to the NFPs for 2013, 2014 and 2015. 2013 input reviewed at IPET-OSDE-1. 2014 and 2015 input reviewed by IPET-OSDE-2. New feedback by EGOS-IP action "owners" reviewed by IPET-OSDE-2.
10	1	Propose guidance regarding observing system network design principles	Draft guidance document on network design (to be further discussed at IPET-OSDE-1 in 2014)	Guidance document on network design	Meeting	Chairperson IPET-OSDE	End 2013 2014			2 workshops organized in Nov. 2013 and Feb. 2015. OND Principles approved with WIGOS Manual. Draft OND guidance almost complete.

2) WORK PLAN FOR THE SUB-GROUP ON RADIO-FREQUENCY COORDINATION (SG-RFC) FOR THE PERIOD 2012-2015

WORK PLAN FOR THE SG-RFC FOR THE PERIOD 2016-2019

Id	Priority	Objective	Outcome	Deliverable(s)	Activity	Leader	Due	Other ETs	Effort
1	1	WRC-19	Radio Regulations ensure WMO observing and communications systems have uninterrupted access to necessary frequencies	<ul style="list-style-type: none"> • WMO Position Paper on WRC-19 Agenda. • Studies and inputs relating to future WRC items, including Space Wx. 	<ul style="list-style-type: none"> • Representation at Conference Preparations meetings for WRC-19 • Preparation of a preliminary position paper on WRC-19 agenda, maintain and update for final submission to WRC-19. • Organization of studies and submission of contributions supporting the WMO position at ITU-R Working Parties involved) • Participation in ITU-R study groups • Representation of WMO at ITU-R Regional Organizations meetings. 	Chair	Various times throughout the period. WRC-19 scheduled for Nov 2019		

CBS-MG-17, Final report

Id	Priority	Objective	Outcome	Deliverable(s)	Activity	Leader	Due	Other ETs	Effort
2	1	Monitor and address Spectrum issues related to meteorological and Earth exploration applications/systems	Present and future meteorological and related needs for spectrum are met		<ul style="list-style-type: none"> • Participation in ITU-R study groups and working parties. • Participate in national activities in support of ITU-R processes. 	<ul style="list-style-type: none"> • Chair • Focal points (See Attachment 1) 	On-going	<ul style="list-style-type: none"> • ICT-IOS, • ET-WISC, • ET-CTS • CIMO 	
3	2	Monitor ITU-R regional organization activities and represent WMO issues where possible	Regional organizations take into account WMO's needs	Regional organization representation for WMO	<ul style="list-style-type: none"> • Bring to the attention of SG-RFC any regional issues affecting WMO and vice versa 	<ul style="list-style-type: none"> • Focal points, (see attachment 3) 	On going		
4	2	Cooperation with other organizational entities such as GEO, SFCG, CGMS	WMO needs are taken into consideration of other environmental related activities	Participation and representation of WMO	<ul style="list-style-type: none"> • Bring to the attention of SG-RFC any issues from other earth observations related organizations affecting WMO and vice versa 	<ul style="list-style-type: none"> • Focal points, (see attachment 2) 	On going		
5	2	Update the joint WMO/ITU Handbook "Use of radio spectrum for meteorology : weather, water and climate	Members have current information on the applications and needs of radio spectrum	Revised joint handbook on spectrum usage ...	<ul style="list-style-type: none"> • Coordinate the review of chapters with relevant experts. • Collaborate with ITU-R SG07 to ensure joint ownership of handbook • Review by CBS 	<ul style="list-style-type: none"> • Gilles Fournier 	CBS-14		

CBS-MG-17, Final report

Id	Priority	Objective	Outcome	Deliverable(s)	Activity	Leader	Due	Other ETs	Effort
		monitoring and prediction”			XIV • Review by EC-69				
6	2	Conduct joint workshop of ITU regulators and NMHS frequency experts	New regulators and NMHS frequency experts are familiar with meteorological and frequency management	Joint Workshop	• Utilise WMO/ITU handbook on spectrum use in meteorology ... and new Guide to Participation in RFC (WMO No	• E.Allaix, V. Nozrin, D.Thomas	June 2017		
7	1	Identify WMO Space Wx frequency requirements and ensure present and future needs are addressed in relevant Radio Regulations	Space Wx frequency requirements are address in Radio Regulations	Studies, questionnaires, information needed for WRC-23 cycle on space wx.	• Work with space wx experts to identify frequency usage, present and future • Work in ITU processes on the question of space wx • Prepare input for WRC-23 on space wx	• Dave Franc	On going	WMO Space Programme & Aviation programme Joint AEM/CBS TT on space wx.	

CBS-MG-17, Final report

Attachment 1 – Focal points on SG-RFC specific activities

- Meteorological-satellite service (MetSat): Markus DREIS, David FRANC
- Earth exploration-satellite service (EESS) (passive): Thomas Von DEAK, David FRANC, Markus DREIS
- EESS (active): Bryan HUNEYCUTT,
- Radars (weather radars and wind profilers): Eric ALLAIX, Neil BEWLEY
- Meteorological aids service (MetAids) - Radiosondes: David FRANC, Paul HETTRICK, Neil BEWLEY,
- Lightning detection: Neil BEWLEY, Paul HETTRICK
- Space Weather: David FRANC, Neil BEWLEY, Bryan HODGE
- Handbook ["Use of radio spectrum for meteorology: weather, water and climate monitoring and prediction"](#)– Gilles FOURNIER, Eric ALLAIX

Attachment 2 – SG-RFC Focal Points for cooperation with other organizations

- Commission for Instruments and Methods for Observations (CIMO)
 - Mr Oguzhan Sireci (Turkey TSMS) and Mr David Franc are CIMO's Theme Leaders on radio-frequency matters.
- Group on Earth Observations (GEO)
 - Mr Jose Arimatea de Sousa Brito.
- Coordination Group of Meteorological Satellites (CGMS)
 - Mr Markus DREIS
- Inter-commission Coordination Team on Space Weather (ICTSW)
 - Mr Dave FRANC, Mr Neil BEWLEY, Mr Bryan HODGE
- Space Frequency Coordination Group (SFCG)
 - Secretariat (Mr David THOMAS)

Attachment 3 – WMO focal points in WRC regional preparation meetings:

- CITEL: Jose Arimatea DE SOUSA BRITO, Dave FRANC and Carmelo RIVERA
 - APT: Paul HETTRICK, Bryan HODGE
 - CEPT: Markus DREIS and Philippe TRISTANT
 - African group (including SADC): Henry KARANJA
 - RCC: Alexandre AZAROV
- ASMG: None (to be defined)

3) DRAFT WORK PLAN FOR THE EXPERT TEAM ON SURFACE-BASED OBSERVING SYSTEMS (ET-SBO) FOR THE PERIOD 2017 – 2020 (VERSION 0.1)

(Generated at ICT-IOS-9 April 2016)

No.	Task	Deliverable/Activity	Due	Responsible	Status	Comment
1.	<u>Helping WIGOS Succeed</u> Agreed ToR: Contribute to the implementation of WIGOS by undertaking those tasks assigned to it by the OPAG-IOS Chairperson as part of the WIGOS pre-operational phase priority activities.	Address relevant items of WIGOS Pre-Operational Phase Activities assigned to ET-SBO, details to be forthcoming during work plan period, see individual task sheets for more detail.	Ongoing	Co-ordination Lead: Chairperson ET-SBO for overall delivery with lead and contributors for each task identified		
	1.1 Notes: ToR Changes made by CBS-MG and supported by ET. Activities will support the 5 priority areas for WIGOS defined by Congress.	Detailed tasks	TBD	Task Lead: TBD Task Contributors: TBD		
2.	<u>Improving Technical Documents</u> Draft ToR: Develop and update relevant elements of the WIGOS Regulatory and Guidance materials, including the Manual and the Guide to the GOS <i>and incorporating WIGOS data quality monitoring system recommendations.</i>	Review and update the technical regulations and associated guidance material. Priority technologies to be defined early in new intersessional period but will definitely include Radiosonde and will likely include lightning detection systems & GNSS systems.	In time for WIGOS approvals mechanism	Task Lead: TBD Task Contributors: TBD		
	2.1 Notes: Changes proposed to ToR to remove specific reference to technologies in the ToR.	Update the Radiosonde regulatory material currently recorded in the Manual on the GOS WMO No.544 and Guide to the GOS WMO No. 488	Draft material generated 2017 and passed to WIGOS EB in 2018	Task Lead: TBD Task Contributors: TBD		30 working days to be assigned to this task.

CBS-MG-17, Final report

No.	Task	Deliverable/Activity	Due	Responsible	Status	Comment
2.2		Other tasks to be identified	TBD	Task Lead: TBD Task Contributors: TBD		Likely to include a review of lightning detection systems and GNSS based measurement systems
3.	<u>Status of Implementation</u> Draft ToR: Monitor and assess the status of operational and planned surface-based observing systems and ensure this is adequately described in OSCAR/Surface and associated observational metadata databases.	Establish and implement a review mechanism to enable regular assessment of the status of the ET-SBO technology implementation, as described in OSCAR/Surface can be reported against assigned EGOS-IP Actions	Ongoing / Annual review	Task Lead: TBD Task Contributors: TBD		60 days provisionally allocated to this action.
3.1	Notes: Minor modification of ToR to reflect the use of OSCAR/Surface as the official source of observational metadata.	Make recommendations to OSCAR/Surface 'maintenance and development' team for the further enhancement of OSCAR/Surface to improve its functionality	Ongoing	Task Lead: TBD Task Contributors: TBD		
3.2		Further tasks to be confirmed	TBD	Task Lead: TBD Task Contributors: TBD		
4.	<u>Meeting User Requirements</u> Agreed ToR: In collaboration with IPET-OSDE, assess the contribution of current and planned SBO systems to meeting user requirements for all Application Areas; Notes: No change to ToR.	Provide expert input and reports to IPET-OSDE on the suitability of each observing system in meeting each Application areas requirement	Ongoing	Task Lead: TBD Task Contributors: TBD		
4.1		Contribute to the evolutionary development of the Vision for the	2017 and	Task Lead: TBD		

CBS-MG-17, Final report

No.	Task	Deliverable/Activity	Due	Responsible	Status	Comment
		GOS, being led by IPET-OSDE		Task Contributors: TBD		
5.	<u>Delivering the EGOS-IP</u> Draft ToR: Facilitate the delivery of those EGOS-IP actions identified as priorities by OPAG-IOG, including the identification as appropriate of the technical support required for project implementation plans, including guidance materials, technical specifications and project documentation for resource mobilization activities;	Identify EGOS-IP Actions for ET-SBO as lead co-ordination body.		Co-ordination Lead: TBD		
5.1	Notes: ToR now includes new CBS-MG ToR 8	Co-ordinate delivery of EGOS-IP Action G10 – Optimizing the global radiosonde schedule See EGOS-IP G10 for details.	Ongoing	Task Lead: (Tim Oakley) Task Contributors: (RongKang Yang)		Significant consultation with RAs, TCs etc. needed.
5.2		Other actions to be identified.	TBD	Task Lead: TBD Task Contributors: TBD		
6.	<u>Promoting Best Practice</u> Agreed ToR: Monitor the status of operational networks of SBO systems, promote best practice among WMO Members and provide advice on operational matters;	Establish an improved source for technical advice documents “The SBO Portal” as part of the WIGOS Information Resource. Populate Portal with national best practice documents. Respond to requests for advice from members	Ongoing	Task Lead: TBD Task Contributors: TBD		
6.1	Note: No change to ToR from previous inter-sessional period.	Specific tasks to be included at a later date.	TBD	Task Lead: TBD Task Contributors: TBD		

CBS-MG-17, Final report

No.	Task	Deliverable/Activity	Due	Responsible	Status	Comment
8.	<p><u>Reporting Progress to ICT-IOS</u></p> <p>Agreed ToR: Provide advice and support to the Chairperson of OPAG-IOS on the implementation of the WIGOS pre-operational phase priority activities.</p>	<p>Deliver progress reports and recommendations for changes to operating practices, technical documents and guidance to ICT-IOS during inter-sessional period.</p>	<p>2018 and 2020</p>	<p>Task Lead: Chairperson ET-SBO</p>		
8.1	<p>Note: This is the reporting mechanism</p>	<p>Deliver contribution to ICT-IOS-10.</p>	<p>April 2018 (tbc)</p>	<p>Chairperson ET-SBO with review of report by all members.</p>		

4) CBS EXPERT TEAM ON AIRCRAFT-BASED OBSERVING SYSTEMS (ET-ABO) WORK PLAN FOR THE PERIOD 2017-2020
(Version D4, July 2016 - Based on Terms of Reference Proposed by ICT-IOS-9, April 2016)

ToR	Task	Deliverable/Activity	Comment
(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.	1) Provide representation to relevant IGC-WIGOS work groups, including the TT-WMD and TT-WRM	1) Representation at meetings and input to work programs of work groups	Ongoing from previous inter-sessional period.
	2) Contribute to OSCAR/Surface development & implementation.	2) Contribution to OSCAR/Surface ABO metadata development	
	3) Contribute to WIGOS ABO regulatory and guidance development.	3) Publication and maintenance of the Guide to Aircraft-Based Observations.	
(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.	1) Hold two sessions of ET-ABO with a possible joint session held with ET-AO.	1) Final report of sessions	Ongoing from previous inter-sessional period.
	2) Harmonize annual work plan and budget for ET-ABO with ET-AO annual work plan and budget.	2) Progress with work program 3) Work plans and budgets	
	3) Maintain the ABOP Strategy and Implementation Plan.	4) Maintained ABOP Strategy and Implementation Plan (A-SIP).	

CBS-MG-17, Final report

ToR	Task	Deliverable/Activity	Comment
(c) Provide technical and scientific resources in support of further development of the Aircraft Based Observing System, assist in ABO training and outreach activities and contribute to the CIMO ET-AO Activities.	<ol style="list-style-type: none"> 1) Assist in the development and coordination of regional and national ABO programmes. 2) Undertake regional workshops on ABO/AMDAR. 3) Contribute to national and regional ABO & AMDAR development projects. 4) Under the WMO/EUMETNET MoU, collaborate with E-AMDAR on regional and global development of AMDAR. 5) Promote ABO and AMDAR to relevant aviation bodies. 6) Promote ABO and AMDAR through the AMDAR newsletter. 7) Maintain and enhance the COMET AMDAR Learning module. 	<ol style="list-style-type: none"> 1) Development of ABOP Regional Implementation Plans. 2) Establishment of RA ABO work groups. 3) Two regional workshops held annually. 4) Employ part-time ABOP Development Officer under E-AMDAR Program. 5) Establishment of AMDAR programmes in Kenya, Ethiopia and Morocco. 6) Two projects with FLYHT for trial of the AFIRS system in regions I and V. 7) Expanded operational use of WMO AMDAR Onboard Software for B777. 8) Attendance at and reports from AEEC Data-Link User Forum meetings bi-annually. 9) Two volumes annually of the WMO AMDAR Observing System Newsletter. 10) Possible update of the COMET AMDAR Learning Module focussing on data use. 	Ongoing from previous inter-sessional period.
(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.	<ol style="list-style-type: none"> 1) Liaise with ICAO on data management of ICAO aircraft observations, including input to the ICAO Met. Panel. 2) Work with national and regional programmes to optimize ABO reporting and coverage. 	<ol style="list-style-type: none"> 1) Establishment of WAFC authorized regional ABO data processing centres. 2) Improved QC of AIREP and ADS-C aircraft observations. 3) Ongoing supplementary AMDAR data provision, particularly focussed on Region I. 	Ongoing from previous inter-sessional period.

CBS-MG-17, Final report

ToR	Task	Deliverable/Activity	Comment
(e) Coordinate the development and maintenance of the ABO quality monitoring system as a component of the WIGOS Data Quality Monitoring System.	<ol style="list-style-type: none"> 1) Establish the ABO Global Data Centre (GDC-ABO). 2) Enhance data monitoring and QC in collaboration with monitoring and lead center. 	<ol style="list-style-type: none"> 1) Agreement with NOAA on operation of GDC-ABO. 2) GDC-ABO operational. 3) Enhanced functions of GDC-ABO. 4) Introduce daily monitoring and reporting by Lead Centre for ABO. 	Ongoing from previous inter-sessional period.
(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.	<ol style="list-style-type: none"> 1) Represent ABO and contribute to the activities of CBS/IPET-OSDE. 	<ol style="list-style-type: none"> 1) Representative attendance at IPET-OSDE sessions. 	Ongoing from previous inter-sessional period.
(g) Provide advice and support to the Chairperson of OPAG-IOS, and report on all activities relevant to its Terms of Reference.	<ol style="list-style-type: none"> 1) Report to sessions of ICT-IOS. 	<ol style="list-style-type: none"> 1) Representative of ET-ABO to attend and provide report to ICT-IOS sessions. 	Ongoing from previous inter-sessional period.

5) PROPOSED EXPERT TEAM ON SATELLITE SYSTEMS (ET-SAT) WORK PROGRAMME FOR THE PERIOD 2016-2019 (LAST UPDATE: 29 FEB 2016)

(this work plan is to be presented to the OPAG-IOS Chairperson, then updated by the Team to assign responsibilities, deadlines, and indicate status)

No.	Task (ToR)	Deliverable/Activity	Due	Responsible	Status	Comment
1	<p>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.</p> <p>This will be achieved in considering the information provided by participating agencies as well as the outcome of CGMS and CEOS, including e.g. the progress of CEOS constellations; the feedback from WMO should be communicated to CGMS and CEOS.</p>	<p>Guide the development and maintenance of OSCAR/Space Serve as beta-testing group of OSCAR/Space version 2.0</p> <p>Perform gap analyses (i) in the CGMS baseline, (ii) against the Vision of the GOS/ WIGOS space-based component systems, to inform WMO Members on a regular basis</p> <p>Perform gap analyses in areas of specific or evolving interest to WMO, such as hydrology, atmospheric composition, space weather</p>	<p>Continuous</p> <p>1 April – 31 May 2016</p>	ET-SAT and WMO Secretariat	WMO Secretariat to release OSCAR/Space Version 2.0 in September 2016. Options for long-term maintenance of OSCAR/Space under development	
2	Provide technical advice on implementation of integrated satellite observing systems	<p>Guide the development of the Vision of the WIGOS space-based component systems in 2040, in coordination with IPET-OSDE;</p> <p>Support WMO information needs on satellite systems, including CBS and WMO Programme guidance material (e.g., Manual on WIGOS)</p>	<p>Continuous until late 2018, as required</p> <p>Continuous</p>	ET-SAT and WMO SP Secretariat	Developed first draft of Vision, for discussion by CM-13 and IPET-SUP-2 (Jan/Feb 2016)	

CBS-MG-17, Final report

3	Assess progress of R&D and demonstration satellite systems, and identify opportunities and/or problem areas concerning satellite technology and plans	Present and discuss novel sensor, mission or space technology concepts and their potential utility to WMO Discuss radio frequency issues and highlight them to the SG-RFC as appropriate Keep abreast of developments regarding private operators of basic satellite systems, and provide guidance to WMO	2016 onwards	ET-SAT and WMO SP Secretariat		
4	Coordinate with IPET-SUP and other relevant CBS teams on satellite related matters	Joint session on Vision 2040 and OSCAR/Space Version 2.0 in 2017	3-7 April 2017 (tentative)			

6) NEW PROPOSED WORK PLAN FOR THE INTER PROGRAMME EXPERT TEAM ON SATELLITE UTILIZATION AND PRODUCTS FOR THE PERIOD 2016-2019

No.	Task (ToR)	Deliverable/Activity	Due	Responsible	Status
1	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	Quadrennial survey Analysis of responses Findings and recommendations Advice to Regional Associations on follow-up actions WMO document for publication Next survey	Feb 2016 Apr 2016 Apr 2016 Sep 2016 Jan 2017 2020	WMO SP Secretariat and IPET-SUP	Survey carried out in the period 8 Feb – 15 Mar 2016; More than 400 responses received
2	Provide advice and support to the development and implementation of WIGOS, from a satellite user's perspective and coordinate with ET-SAT and IPET-OSDE on the evolution of the space-based component of Global Observing Systems;	Contribute to the evolving EGOS IP, the Manual on the GOS, WIGOS Regulatory Material, the Vision for the WIGOS component systems 2040, and the WIGOS IP Support WMO Programmes (both operational and research) in their satellite data and product-related needs, with focus on marine meteorology and oceanography, climate, hydrology, and atmospheric composition	As required Continuous	IPET - SUP and WMO SP Secretariat	IPET-SUP provided input to the initial Vision for the WIGOS space-based components in 2040

CBS-MG-17, Final report

3	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	<p>Promote the development and maintenance of Regional Satellite Data Requirements Groups and satellite data requirements in all Regions, as appropriate</p> <p>Promote activities to advance the Satellite Data Dissemination Strategy:</p> <ul style="list-style-type: none"> - Information and guidance - Data requirements - Enhancing data availability - Description and Registration - Dissemination and User Access <p>Encourage and assist Regional Satellite Data Requirements Coordination Groups in carrying out Region-based user surveys</p>	2016 onwards	<p>IPET - SUP and WMO SP Secretariat, with assistance from Int'l WGs</p> <p>IGDDS and RARS implementation groups</p>	<p>Regional Groups active in RA I, II, III/IV</p> <p>Development of progress indicators ongoing, including for DBNet</p> <p>Ongoing</p>
4	Review present and future R&D satellite data and products including their availability and potential applications, and provide advice with a view of increased utilization by WMO Members;	<p>Review of relevance and availability of R&D satellite data, based on global/regional requirements;</p> <p>Strengthen interaction with R&D agencies in the area of altimetry, soil moisture, precipitation, and climate</p> <p>Make recommendations for improved availability, information and training, especially for developing countries</p> <p>Collect case studies to demonstrate the value of satellite data for hydrological applications</p>	Ongoing 2017	IPET - SUP and WMO SP Secretariat	Participation in relevant fora, focus WMO survey on these topics and interaction with CEOS as appropriate
5	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;	<p>Maintain OSCAR/Space and a list of satellite data access points, processing and analysis software tools on WMO webpage</p> <p>Support activities to achieve user readiness for the new generation of meteorological satellites, including the development of guidelines for users and satellite operators</p>	2016/2 (continued yearly)	IPET - SUP and WMO SP Secretariat	Best practices for achieving user readiness (Reference User Readiness Project) published; Next-generation of OSCAR/ Space, Product Access Guide and SATURN online

CBS-MG-17, Final report

6	<p>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 to the GOS and the WIGOS quality data monitoring system</p>	<p>Provide guidance to Sustained Co-ordinated Processing of Environmental Satellite Data (SCOPE) for Climate Monitoring as a key contribution to the architecture for climate monitoring from space.</p> <p>Continue to develop and promote the SCOPE-Nowcasting, initiative and support the work of the coordinating group.</p> <p>Collaborate with WIGOS, WIS and CGMS on developing data format and metadata standards, as well as procedures for monitoring satellite data availability and quality</p> <p>Promote the exploitation of commonalities of instruments on the new meteorological satellites in generation of product and training material</p>	2016-2018	<p>IPET - SUP and WMO SP Secretariat, SCOPE-CM Executive Panel, and SCOPE-Nowcasting Coordination Group</p>	<p>SCOPE-CM IP under review</p> <p>Four Pilot Projects in progress</p>
7	<p>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;</p>	<p>Regular reviews of the VLab status, activities and plans (training resources, courses, meetings, newsletters);</p> <p>Support existing VLab CoEs and the establishment of new ones;</p> <p>Provide guidance to meet users' needs, especially from less developed Members and for the next generation of satellites;</p> <p>Explore training partnerships</p> <p>Contribution to training resource development</p>	Continuous activity	<p>VLMG, WMO SP Office and IPET-SUP</p>	<p>VLab 2015-2019 strategy updated</p> <p>Events on user preparedness planned</p> <p>Joint COSPAR/VLab training event on space weather planned for August 2016</p>
8	<p>Holding joint and/or overlapping meetings with ET-SAT as appropriate, to facilitate interaction between users and providers of satellite systems, data and products</p>	<p>Plan for joint session of ET-SAT and IPET-SUP in 2017</p>	2017/4	<p>WMO SP Office</p>	

CBS-MG-17, Final report

9	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;	As above Exchange meeting reports Engage with ET-SAT on specific issues as required, such as developing the Vision for WIGOS space-based component systems in 2040	Ongoing	WMO SP Office, IPET-SUP Chairperson	
10	Coordinate with WMO Technical Commissions and Programmes, including co-sponsored Programmes, activities related to satellite utilization and products, through ex-officio membership on the Team	Increase engagement with WMO Technical Commissions, including JCOMM, CCI and CHy Develop and implement communications strategy	Ongoing 2015/4	IPET-SUP Chairperson and WMO SP Office IPET-SUP Chairperson	

2. OPAG-ISS

OPAG-ISS Work Plan				
No.	Task	Deliverable/Activity	Due	Responsible
<i>ET-WISC01</i>	Review, further develop and oversee routine WIS monitoring activities	Pilot implementation of WIS monitoring in the operational WIS centres. Proposals on monitoring the time of transmission of emergency messages (Tsunami) through WIS.	Q4 2017	ET-WISC
<i>ET-WISC02</i>	Harmonization of user interface.	Proposals on the harmonization of user interface functionality to help user find data from any GISCs and improve user experience	Q2 2018	ET-WISC
<i>ET-WISC03</i>	Improvement of metadata catalogue consistency	Procedure to ensure the consistency and completeness of Metadata catalogue at each GISC	Q4 2018	ET-WISC
<i>ET-WISC04</i>	Improvement of 24h cache completeness	Mechanism to ensure that GISC cache contain all global data exchanged during the past 24h	Q2 2018	ET-WISC
<i>ET-WISC05</i>	Implementation of data policies management	Recommendation for Data policies management	Q2 2018	ET-WISC
<i>ET-WISC06</i>	Harmonization of user registration parameters	Standard WIS authentication and authorization design and candidate implementation solutions.	Q4 2017	ET-WISC
<i>ET-WISC07</i>	Operational GISCs communication.	Procedures for intra-GISCs communication in case of events such as: scheduled updates, maintenance work, changes in the set WIS-GISC-XXX if members/ organization are added or removed	Q4 2017	ET-WISC
<i>ET-WISC08</i>	GISC backup procedures	Recommended GISC-GISC backup procedures	Q4 2017	ET-WISC
<i>ET-WISC09</i>	Review and develop the Manual on WIS (WMO-No 1060), the Guide to WIS (WMO No 1061) and associated informal	Proposals on the amendments for the Manual on WIS (WMO-No 1060), the Guide to WIS (WMO No 1061) and associated informal guidance.	Ad hoc	ET-WISC

CBS-MG-17, Final report

OPAG-ISS Work Plan				
No.	Task	Deliverable/Activity	Due	Responsible
	guidance to better meet the needs of Members,			
<i>ET-WISC10</i>	Review WIS competencies related to WIS centre operations and associated training and learning guides,	Proposals on the amendments for WIS competencies.	Ad hoc	ET-WISC
<i>ET-CTS01</i>	WMO IPv6 Initiative	Questionnaire on IPv6 Analysis of the survey Recommendation on potential follow-up activities (eg training)	Q1-2018 and Q1-2020	ET-CTS (O.Gorwits, I.Glaser)
<i>ET-CTS02.1</i>	Cache in and through the cloud – Phase 1 in collaboration with TT-eWIS	Report on technical, management and financial options for establishing a cloud solution to facilitate the exchange between the GISCs	Q4-2017	ET-CTS (R.Giraud)
<i>ET-CTS02.2</i>	Cache in and through the cloud – Phase 2 implementation in collaboration with TT-eWIS	Implement the cloud solution to facilitate the exchange between the GISCs	Q2-2020	ET-CTS
<i>ET-CTS03</i>	Review of the guide on IT security (Publication WMO 1115)	Updated version of the WMO 1115 document	Q1-2018 and Q1-2020	ET-CTS
<i>ET-CTS04</i>	Review of the guide on VPN via the Internet (Publication WMO 1116)	Updated version of the WMO 1116 document	Q1-2018 and Q1-2020	ET-CTS
<i>ET-CTS05</i>	WIS emergency security response strategy	Implementation of the proposed security strategy	Q4-2017	ET-CTS
<i>ET-CTS06</i>	Monitor technological evolution in the area of responsibility such as - Internet of Things and slow speed network (LORA, SIGFOX...) - BigData and Cloud technologies	Reports related experience within members and if required initiate experiments	Q1-2018 and Q1-2020	ET-CTS
<i>ET-CTS07</i>	Contribute to the WIS Monitoring activity	Propose or assess proposal regarding monitoring solutions for the WIS	Ongoing	ET-CTS

CBS-MG-17, Final report

OPAG-ISS Work Plan				
No.	Task	Deliverable/Activity	Due	Responsible
<i>ET-CTS08</i>	Contribute to task GD-11 (Activities for GEOSS)	Technical evaluation of solution such as eduGAIN	Ongoing	Chair of ET-CTS
<i>ET-CTS09</i>	Contribute to SATCOM Forum	Support the organisation of the SATCOM forum and reports to CBS	Ongoing	Chair of ET-CTS
<i>IPET-CM01</i>	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	Proposed updates to the Manual on Codes for adoption via Fast-track and adoption between CBS sessions	Semi-annually	IPET-CM
<i>IPET-CM02</i>	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		Ad-hoc	IPET-CM
<i>IPET-CM03</i>	Review and maintain the Manual on Codes (WMO-No. 306) and associated reference and guidance material as required within the range of responsibilities, and publish these in suitable electronic formats for human and automated use, including codes.wmo.int.	Support to WMO's publishing of the Manual on Codes Mature version of GRIB Edition 3 based upon the experimental version to be adopted at CBS in 2016 Experimental version of BUFR Edition 5	Annual CBS 2020 CBS 2020	IPET-CM
<i>IPET-CM04</i>	Review and develop procedures and guidance to enable the interoperability of metadata and data between WMO standards and formats used within other		Ad-hoc	IPET-CM

CBS-MG-17, Final report

OPAG-ISS Work Plan				
No.	Task	Deliverable/Activity	Due	Responsible
	communities, such as NetCDF, using the WMO Logical Data Model as a tool to achieve this			
<i>IPET-CM05</i>	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		Continuous	IPET-CM
<i>IPET-CM06</i>	Monitor progress towards and coordinate actions to implement migration to Table Driven Codes Forms	Annual review of migration status per regional association and of consolidate monitoring status Consolidated review of global migration status based on routine WWW monitoring Advice to Members in support of migration activities Training (to trainers) on table driven code forms	Annually Annually Ad-hoc Ad-hoc	IPET-CM
<i>IPET-CM07</i>	Review and maintain the data designators in abbreviated headings in Manual on the GTS (WMO-No. 386)	Proposed updates to the Manual on the GTS for adoption via Fast-track	Annually	IPET-CM
<i>IPET-CM08</i>	Contribute to the maintenance of WIS competencies related to use of codes and associated training and learning guides and facilitate training	Training material	Annual training attached to IPET meeting	IPET-CM
<i>IPET-CM09</i>	Assist WIGOS Data Quality Monitoring System (WDQMS) in understanding and dealing with erroneous BUFR messages as they are identified by WDQMS	Response to issues as identified	Ad-hoc	IPET-CM
<i>IPET-DD01</i>	Improve relevance of WIS Discovery metadata	WIS users are able to find information on data and services: - User-centred analysis of effectiveness of GISC catalogue search interface - Guidance for GISC/DCPC providers on search interface design	Q2 2018	IPET-DD

CBS-MG-17, Final report

OPAG-ISS Work Plan				
No.	Task	Deliverable/Activity	Due	Responsible
		<ul style="list-style-type: none"> - Guidance for metadata authors including assessment of 'metadata granularity' - Guidance for metadata tool developers - Guidance on making WIS metadata records discoverable via industry search engines <p>Periodical monitoring of metadata quality in WIS DAR catalogue</p> <ul style="list-style-type: none"> - Procedures for metadata quality monitoring- including tracking 'missing' metadata - Metadata catalogue monitoring tool(s) 	monthly	
<i>IPET-DD02</i>	WMO Core Metadata Profile (WCMP) compatible with community best practice	Releases of WCMP amended to accommodate needs of Members and Programmes (fast-track) Assessment of value to be realised from migration of WCMP to ISO 19115-1:2014 & ISO/TS 19115-3:2016	Biannual	IPET-DD
<i>IPET-DD03</i>	Extend WMO data model(s) to address additional WMO information exchange requirements	Updates to WIGOS MD Application Schema in support of OSCAR implementation Updates to IWXXM in support of ICAO Annex 3 Amendments 78 and 79 and ICAO SWIM Application Schema (and associated code form) to encode climate station metadata and climate data streams Updated Guidelines on data modelling (reflecting changes to METCE etc.) Guidance regarding use of model-driven code forms available to Members		IPET-DD
<i>IPET-DD04</i>	Publish standard vocabularies in support of WMO information exchange requirements	Consistent terminology Definitions and language translations added to WMO Codes Registry WMO data models (e.g. METCE, OPM, IWXXM, WIGOS MD) published as ontology resources within WMO Codes Registry		IPET-DD
<i>ET-CAC01</i>	Establish an overall adapted audit process	Prepare new audit cycle and applicable principles....but in view of being generic enough to allow an extrapolation to other areas Define distinct criteria (maturity levels) and metrics that allow a proper assignment to a level	Q4 2017	ET-CAC

CBS-MG-17, Final report

OPAG-ISS Work Plan				
No.	Task	Deliverable/Activity	Due	Responsible
<i>ET-CAC02</i>	Run GISCs certification process	Second round of GISCs audit	Q2 2019	ET-CAC
<i>ET-CAC03</i>	Coordinate DCPCs and NCs certification	Co-ordinate the certification of NCs and DCPCs	Ad-hoc	ET-CAC
<i>TT-IM01</i>	review available information management practices and develop appropriate standards and practices in information management	Workshop on best practices in information management Guidelines on standards and best practices in information management	Q4 2017	TT-IM
<i>TT-IM02</i>	incorporate standards and practices for information management under WIS Part C	updated Manual on WIS and Guide to the WIS tacking into account standard in information management	Q4 2018	TT-IM
<i>TT-IM03</i>	Update to WIS competencies in the area of information management	Proposals on the amendments for WIS competencies related to information management Proposal for training and learning guides	Q4 2018	TT-IM
<i>TT-eWIS01</i>	Consolidate WIS 2.0 stakeholder requirements	Consolidated stakeholder requirements	Q4 2017	TT-eWIS
<i>TT-eWIS02</i>	Develop the implementation plan for WIS 2.0	implementation plan schedule and key deliverables Organisation proposal and associated costs Risk analysis	Q4 2018	TT-eWIS

3. OPAG-DPFS

OPAG-DPFS KEY OBJECTIVES, MILESTONES AND RECOMMENDATIONS TO CBS-16

OPAG – DPFS Key Objectives			
1. Implementation of the revised <i>Manual of the GDPFS (WMO-No. 485)</i> 2. Working with the Steering Group on Seamless GDPFS to develop a Strategy for the future GDPFS 3. Evolution of the GDPFS to facilitate implementation of impact-based forecasting and risk-based warnings			
Expert Teams	Activities	Milestones	
ICT-DPFS and all ETs	<ol style="list-style-type: none"> 1. Implementation of new Manual of GDPFS 2. Rolling review of user requirements 3. Cascading forecast process and seamless approach 4. Review of guidelines on meteorological site assessment of NPP (used to be TN-170) 	<ol style="list-style-type: none"> 1. 2018 2. (S/GDPFS) 3. (S/GDPFS) 4. 2018 	
ET-OWFPS	<ol style="list-style-type: none"> 1. Develop the guidelines for nowcasting technique 2. Use of additional observation types for verification 3. Develop strategy to exchange of EPS products and guidelines on post-processing (incl. calibration of model output) 4. Implications throughout forecast chain for high-resolution NWP including data assimilation 5. Building on existing GDPFS to respond to user requirements (SG-S/GDPFS, ET-IMPACT) for impact-based forecasting and risk-based warnings (in staged approach) 	<ol style="list-style-type: none"> 1. 2017 2. 2019 3. 2020 4. 2018 5. Wait for requirements 	
ET-OPSLS	<ol style="list-style-type: none"> 1. Workshops on Operational Climate Prediction 2. Guidelines on procedures for generating regional seasonal forecasts 3. Implementation of sub-seasonal forecasts, including establishment of sub-seasonal GPCs and possibly of an associated lead center. 4. Designation of LC-NTCP 5. Develop revised strategies for verification exchange, including for LC-LRFMME 	<ol style="list-style-type: none"> 1. 2018 2. 2018 3. 2019 	

CBS-MG-17, Final report

	<p>multi-model products, real-time verification and support to GSCU</p> <ol style="list-style-type: none"> 6. To support emerging requirements of Polar RCCs, revisit the mandatory and highly recommended data requirements for GPCs able to provide forecast information relevant to Polar regions, and revise GPDFS as necessary 7. Develop mechanisms for WGSIP and S2S project communities to provide feedback on LC-LRFMME products, and access GPC data to advance research efforts. (2018) 8. Review applications for new GPC candidates for WMO designation and update LC-LRFMME products by incorporating newly designated GPCs in the the multi-model forecast product. 	<ol style="list-style-type: none"> 4. 2017 5. 2018 6. 2018 7. 2018 8. (2017-2018...we are expecting a formal application from DWD to seek formal GPC designation) 	
ET-ERA	<ol style="list-style-type: none"> 1. Migration from fax to e-mail distribution of RSMC products 2. Develop and test new products as well as Ensemble and Transfer Coefficient Matrix (TCM) methods for atmospheric transport and dispersion modelling 3. Continue to develop non-nuclear ERA 4. Guidelines on usage of non-nuclear ERA products 	<ol style="list-style-type: none"> 1. 2019 2. 2019 3. 2019 4. 2018 	
SG-SWFDP	<ol style="list-style-type: none"> 1. Develop a project summary book after 10-year activities 2. Expand SWFDP to cover more regions 3. Support to existing subprojects to Phase IV 4. Integration with other initiatives such as FFGS 	<ol style="list-style-type: none"> 1. 2018 2. 2019 3. 2019 4. 2019 	
TT-HUM	<ol style="list-style-type: none"> 1. Formalize the interaction and procedures for support to humanitarian agencies 2. Designation of Centres for operational support to Humanitarian Agencies 3. Advance WMO multi-hazard warning capabilities [<i>ref. GMAS, MHEWS, SWIC, WWIS, etc...</i>] 	<ol style="list-style-type: none"> 1. 2019 2. 2019 3. Q1 2018 	

CBS-MG-17, Final report

TT-CentreAudit	<ol style="list-style-type: none"> 1. Develop the efficient and effective procedure for regular audit of the GDPFS Centres' compliance 2. Review WMO Technical Report on GDPFS and NWP Research in consideration with the revision of the Manual and the proposed audit procedure, and propose a revised reporting mechanism using CPDB. 	<ol style="list-style-type: none"> 1. 2017 2. 2018 	
TT-Guide	<ol style="list-style-type: none"> 1. Renew the Guide on GDPFS (WMO-No.305) in line with the new revised Manual on GDPFS(WMO-No.485) 	<ol style="list-style-type: none"> 1. 2019 	

4. OPAG-PWSD

**PUBLIC WEATHER SERVICE DELIVERY (PWSD) IMPLEMENTATION AND COORDINATION TEAM DELIVERABLES AND ACTION SHEETS FOR THE INTERSESSIONAL PERIOD 2016/2018
(UPDATED MARCH 5TH 2017)**

<i>Deliverable 1 (TOR a):</i> Coordinate the implementation of the decisions of Congress, the Executive Council and the Commission for Basic Systems (CBS) with respect to Public Weather Service Delivery.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Review decisions of Congress, EC, and CBS which are relevant to Public Weather Service Delivery and, in conjunction with the Secretariat, work to implement those decisions for the benefit of Members	All ICT Members Secretariat	Ongoing
<i>Deliverable 2 (TOR b):</i> 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.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Keep abreast of activities planned by other CBS OPAGs, by EC Working Groups and by other WMO entities and ensure that the work of OPAG-PWSD is fully coordinated with these other activities in a manner which optimises collaboration and which avoids duplication of effort.	All ICT Members Secretariat	Ongoing
<i>Deliverable 3 (TOR c):</i> 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.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Working with the Chair of TT-Hum, and OPAG-DPFS, investigate the use of the delivery structure of WMO (RSMCs, RCCs, etc.) and the network of National PWS Focal Points as a resource in the context of improving operational support to Humanitarian Response agencies.	OPAG Chair and Co-Chair WMO Secretariat	Q3 2018
<i>Deliverable 4 (TOR d):</i> 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.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Establish a mechanism within CBS to address the development of a harmonized and joined-up approach to service delivery within the OPAGs of the Commission.	OPAG Chair and Co-Chair WMO Secretariat	Q3 2017

CBS-MG-17, Final report

2.	Initiate and conduct informal discussions with representatives of the other technical commissions to examine the possibilities for a concerted approach to this issue.	OPAG Chair and Co-Chair	Q4 2017
3.	Work with the presidents of technical commissions (PTC) to define and support a consistent value chain across the Technical Commissions, thereby developing and promoting WMO-wide expert guidance on Service Delivery practices.	OPAG Chair and Co-Chair	Jan 2018
4.	From consideration of these options, develop proposals to bring to Congress in 2019 with recommendations as to the best way forward.	OPAG Chair and Co-Chair WMO Secretariat	Q3 2018
5.	Proposals and recommendations on the corresponding re-alignment of the WMO Programme structure may also need to be developed and brought forward, through the PTC, to the Executive Council for its consideration.	OPAG Chair and Co-Chair	Q1 2019
Deliverable 5 (TOR e): Keep under review the work of the PWSD Expert Teams and coordinate and guide their work programmes.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Arrange for routine informal consultation between members of the ICT, OPAG-PWSD on the progress of the work programmes if the ICT, ETs and TTs.	All ICT Members Secretariat	Ongoing
2.	Arrange for and attend ICT meeting to review work of ETs and prepare a report for CBS on the work of the OPAG.	All ICT Members Secretariat	Q2 2018
Deliverable 6 (TOR 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.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Make use of the new "WMO Register of Alerting Authorities" to promote and embed the SOV concept.	All ICT Members Secretariat	Ongoing
2.	Promote the implementation of CAP at NMHSs and the registration of Members in the "WMO Register of Alerting Authorities".	All ICT Members Secretariat	Ongoing
3.	Ensure inclusion of this principle in all relevant PWS documents.	OPAG Chair and Co-Chair Secretariat	Ongoing
4.	Ensure that work to collate and harmonise national weather warnings fully supports and reflects the principle of the Single Official Voice.	All ICT Members Secretariat	Ongoing
Deliverable 7 (TOR 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.			
	Action(s):	Responsible Member(s):	Due Date:

CBS-MG-17, Final report

1.	Prepare guidance (as part of the WMO Guide on Competency, to be developed) and appropriate training materials for Members on the implementation of competency requirements based on the PWS Competency Framework to enable timely implementation of the Recommended Practices appropriate to PWS forecasters and advisors.	OPAG Chair and Co-Chair OPAG Coordinator – Competency Framework.	Q3 2018
2.	In the context of Capacity Building, facilitate training events for Members to assist them in the implementation of the PWS competencies in line with their implementation of the WMO Strategy for Service Delivery	All ICT Members Secretariat	Ongoing
3.	PWS provisions as approved by CBS-16, to be presented for approval by EC-69 for inclusion in the <i>WMO Technical Regulations, Volume I</i> (WMO-No. 49);	WMO Secretariat OPAG Chair and Co-Chair OPAG Coordinator – Competency Framework.	Q2 2017
Deliverable 8 (TOR h): Support and promote excellence in communication as a key enabler of quality service delivery.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Take advantage of all opportunities to provide guidance and advice on excellence in communication.	All ICT Members Secretariat	Ongoing
Deliverable 9 (TOR i): Collaborate with development partners and other WMO entities to assist NMHSs in the identification and assessment of societal, economic and environmental benefits of hydro-meteorological services.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Facilitate workshops and other initiatives to assist NMHSs in the identification and assessment of societal, economic and environmental benefits of hydrometeorological services.	All ICT Members Secretariat	Ongoing
Deliverable 10 (TOR j): 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.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Update the list of National PWS Focal Points periodically.	WMO Secretariat	Ongoing
2.	Request PRs to appoint National PWS Focal Points in Member countries where none are, as yet, identified.	WMO Secretariat	Ongoing

CBS-MG-17, Final report

3.	Carry out a regular survey of the work of the National PWS Focal Points in relation to PWS functions and publish the results.	WMO Secretariat	Q4 2017
4.	Keep National PWS Focal Points fully involved and informed in the activities of the PWS Programme and of the OPAG	WMO Secretariat	Ongoing
5.	Periodically review statistics on the hits and usage of PWS pages on the WMO Website.	WMO Secretariat	Q4 2017
Deliverable 11 (TOR 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.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Ensure that the work of the ICT, ETs and TTs remains focused on providing practical, actionable advice to Members on building their capacity and implementing developments in science and technology in the context of improving public weather services.	All ICT Members	Ongoing

PUBLIC WEATHER SERVICE DELIVERY (PWS) EXPERT TEAM ON IMPACT-BASED FORECASTING AND WARNING SERVICES (ET/IMPACT)

TEAM DELIVERABLES AND ACTION SHEETS FOR THE INTERSESSIONAL PERIOD 2016/2018

Deliverable 1 (TOR 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			
	Action(s):	Responsible Member(s):	Due Date:
1.	Organise a stakeholder workshop to plan and design the implementation plan	ET Chair and Co-Chair Secretariat	Q3 2017
2.	Publish the guidance material deriving from that workshop at 1. above.	ET Chair and Co-Chair Secretariat	Q4 2017
Deliverable 2 (TOR 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.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Compile a listing of available personnel with expertise in areas relevant to Impact-Based Forecasting, with particular emphasis on those with expertise in the collection and evaluation of impact data.	All ET Members Secretariat	Q2 2018
Deliverable 3 (TOR c): Actively promote Impact-Based Forecasting by identifying a network of champions within NMHSs, sharing best practices through symposia, journal papers and communication outlets.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Compile a listing of personnel within NMHSs who have expertise and/or interest in the promotion of Impact-Based Forecasting. in areas relevant to Impact-Based Forecasting, with particular emphasis on those with expertise in the collection and evaluation of impact data.	All ET Members	Ongoing
2.	Use all possible opportunities to contribute to relevant scientific meetings, gatherings of NMHS personnel, publications etc to promote and explain the concept of Impact-Based Forecasting	All ET Members	Ongoing
Deliverable 4 (TOR d): Provide NMHSs with guidance on how to standardize Impact-Based Forecasting messaging protocols and formats (e.g. colour-coding, language, icons etc.).			
	Action(s):	Responsible Member(s):	Due Date:

CBS-MG-17, Final report

1.	Draft to be developed for inclusion into the implementation plan	ET Chair	Q3 2017
Deliverable 5 (TOR e): Working with external users and stakeholders, technical commissions, regional associations, relevant OPAGs and Programmes of WMO, establish user requirements for service improvements through science and technological innovation and implementation.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Establish initial contacts with relevant TCs, NMHSs and WMO Programmes to make sure requirements are collected and taken into consideration (HiWeather, forecasting)	All ET Members Secretariat	Q4 2017
Deliverable 6 (TOR f): Evolve current methodologies for verification and evaluation to incorporate a focus on Socio-Economic Benefits.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Engage with expertise from the Social Science and Economic communities to develop appropriate metrics for the verification and evaluation of Impact-Based Forecast and Warning Services.	All ET Members Secretariat	Q3 2018
Deliverable 7 (TOR g): Identify skills and relevant training needs for NMHSs and external users associated with wider implementation of multi-hazard impact-based forecast and warning services.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Review of the PWS Competency Framework to identify gaps in the area of IBF	OPAG Coordinator on Competency Framework Secretariat	Q2 2017
2.	Identify existing training materials supporting the development of competencies	OPAG Coordinator on Competency Framework Secretariat	Q2 2017
3.	At the Stakeholder Workshop (see Deliverable 1) review all material on competency and training	OPAG Coordinator on Competency Framework Secretariat	Q3 2017

**PUBLIC WEATHER SERVICE DELIVERY (PWS) EXPERT TEAM ON SERVICES AND PRODUCTS IMPROVEMENT AND INNOVATION
(ET/SPII)**

TEAM DELIVERABLES AND ACTION SHEETS FOR THE INTERSESSIONAL PERIOD 2016/2018

Deliverable 1 (TOR a): Monitor, evaluate and advise on challenges and opportunities for Public Weather Service Delivery presented by emerging science and technology.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Keep abreast of developments in science and technology relevant to Public weater Service Delivery and ensure that relevant developments are communicated to other experts active in the OPAG and the wider Commission as appropriate.	All ET Members	Ongoing
Deliverable 2 (TOR b): Address the user requirements identified by ET/IMPACT for data provision, management and visualization, through collaboration with OPAG-DPFS and other partners as necessary.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Liaise with Chair, ET/IMPACT to gather and collate user requirements identified by that ET in the areas of data provision, management and visualisation.	ET Chair and Co-Chair	Q4 2017
2.	In collaboration with OPAG-DPFS, identify products and technical developments which would assist Members in providing Impact-Based Forecast and Warning Services, especially in the areas of data provision, management and visualisation.	ET Chair and Co-Chair	Q1 2018
Deliverable 3 (TOR c): Take responsibility for PWS guidance on scientific and technical aspects of Service Delivery improvement, including nowcasting, uncertainty, CAP and mobile/web services.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Assemble examples and best practice of applying uncertainty information for use in impact-based forecasting, for example translation of percentage probabilities into scenarios for use in decision making for emergency planning and response.	ET Chair	Q2 2017
2.	Contribute to ET-IMPACT enhanced guidelines on impact-based forecasting	ET Chair Chair ET/IMPACT	Q4 2017
Deliverable 4 (TOR d): Provide oversight and coordination of the continuing development of WWIS/SWIC.			

CBS-MG-17, Final report

	Action(s):	Responsible Member(s):	Due Date:
1.	Discuss with ECMWF in acquiring ENS data for use in WWIS forecast compilation;	Armstrong Chen	Q1 2017
2.	Develop and launch the revamped WWIS website with observational data with responsive design	Armstrong Chen	Q2 2017
3.	Develop and launch the revamped MyWorldWeather app for the WWIS	Armstrong Chen	Q2 2017
4.	Incorporate in WWIS CAP-based warnings currently available on the public domain	Armstrong Chen	Q4 2017
5.	Check availability of CAP/XML warnings from Philippines, Metealarm, JMA	ET Chair, Yoshiro Tanaka, Secretariat	Q1 2017
6.	Revamp the SWIC website to incorporate CAP-based warnings	Armstrong Chen	Q3 2018
Deliverable 5 (TOR e): Complement and enhance the delivery of user-oriented PWS, and devise strategies for NMHSs and partners to optimize use and analysis of non-traditional data in forecasting and warning services, using collected examples and use of such data, e.g., crowdsourced weather, impact and behavioral data or social media information.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Support the "Task Team on Innovative Exploitation of Emerging Data for improved Public Weather Service Delivery" (TT/IPWSD) in its work, and contribute to the deliberations of the "EC Working Group on Emerging Data Issues".	All ET Members	Ongoing
2.	TT/IPWSD to report on the results of its work to ET/SPII.	ET Chair and Co-Chair	Q1 2018
Deliverable 6 (TOR f): Assist the relevant bodies dealing with cooperation between the public and private sectors in matters relevant to public weather service delivery.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Support the "Task Team on Cooperation between the Public and Private sectors for Public Weather Service Delivery" (TT/PPP) in its work, and contribute to the development of the 'rules of engagement' for PPPs as proposed by EC 68.	All ET Members	Ongoing
2.	TT/PPP to report on the results of its work to ET/SPII.	ET Chair and Co-Chair	Q1 2018

Deliverable 7 (TOR g): Remain mindful of the PWS needs of LDCs and SIDS when innovating and developing new services, in the spirit of the principle that 'no country is left behind'.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Ensure that, where possible, all new products and services proposed and developed through ET/SPII are evaluated for their applicability and usability in the context of NMHSs in LDCs and SIDS.	All ET Members	Ongoing
Deliverable 8 (TOR h): Identify experts to advise on technical aspects of Service Delivery improvement as required by the mandate above, specifically in the areas of Big Data and Public Private Partnerships.			
1.	Compile a listing of available personnel with expertise in technical areas relevant to Service Delivery Improvement, with particular emphasis on those with expertise in emerging data issues and public-private partnerships.	All ET Members Secretariat	Q2 2018

**PUBLIC WEATHER SERVICE DELIVERY (PWS) ET/SPII
TASK TEAM ON INNOVATIVE EXPLOITATION OF EMERGING DATA FOR IMPROVED PWS DELIVERY
(TT/IPWS)**

TEAM DELIVERABLES AND ACTION SHEETS FOR THE INTERSESSIONAL PERIOD 2016/2018

Deliverable 1: The Team will produce a document that will include/address the following elements.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Definition of emerging data, sources and means of harvesting such data through the use of new technologies; the quality control and archiving of such data.	TT Chair Chair, ET/SPII	Q1 2018
2.	Strategic approaches to the use of emerging data in improving public weather services such as crowdsourcing, gathering impacts data, gathering observational data from non-traditional sources (volunteer observations, etc) for improved delivery of benefits to the public and other users.	TT Chair Chair, ET/SPII	Q1 2018
3.	Contribute to the deliberations of the "EC Working Group on Emerging Data Issues", in particular in through providing guidance on the use of Social Media and other platforms for the collection of impact-data related to high-impact weather events.	TT Chair Chair, ET/SPII	Q1 2018

**PUBLIC WEATHER SERVICE DELIVERY (PWS) ET/SPII
TASK TEAM ON COOPERATION BETWEEN THE PUBLIC AND PRIVATE SECTORS FOR
PUBLIC WEATHER SERVICE DELIVERY (TT/PPP)**

TEAM DELIVERABLES AND ACTION SHEETS FOR THE INTERSESSIONAL PERIOD 2016/2018

Deliverable 1: The Team will produce a document that outlines a strategy for PWS exploitation of Cooperation between the Public and Private Sectors. The strategy will include/address the following elements.			
	Action(s):	Responsible Member(s):	Due Date:
1.	Examine and report on issues related to the "Single Official Voice" in warning services.	TT Chair Chair, ET/SPII	Q1 2018
2.	Developing approaches to drive mutual benefits between public and private sectors through stimulating private support to PWS activities.	TT Chair Chair, ET/SPII	Q1 2018
3.	Endeavours to ensure that "No country is left behind" by considering the needs of Least Developed Countries (LDCs) and Small Island Developing States (SIDS).	TT Chair Chair, ET/SPII	Q1 2018
4.	Contribute to the development of the 'rules of engagement' for PPPs as proposed by EC 68.	TT Chair Chair, ET/SPII	Q1 2018

ELEMENTS TO BE INCLUDED IN THE CBS WORKPLAN CONCERNING DISASTER RISK REDUCTION

A meeting of the Disaster Risk Reduction Focal Points of Regional Associations, Technical Commissions and Programmes (DRR FP RA-TC-TP) was held 14-16 December 2016. These notes reflect outcomes from that meeting and subsequent coordination on issues since then with reflections on issues and activities moving forward.

A significant issue for DRR activities centers on governance. The EC-WG on DRR no longer exists as an effective body to provide guidance or to provide a channel for recommendations to EC. This is due to the situation with the non-availability of the chair and over half of the membership. The DRR FP RA-TC-TP and the DRR programme are continuing their work with the anticipation that there will be a mechanism devised to provide input to the upcoming EC and that EC will resolve this issue when it meets. Also the User Interface Working Groups previously were moved to report directly to the EC-WG

A letter was prepared to the President of WMO by the Secretariat and the two co-chairs of the DRR FP RA-TC-TP to clarify the reporting roles, procedures and governance of the DRR FP RA-TC-TP and of the User Interface Working Groups. Additionally even if the EC-WG DRR is recreated, there is uncertainty around whether EC WG/DRR will be able to meet during 2017.

When preparing draft procedures for assistance to Members who have been, or are about to be, impacted by significant events which may restrict their abilities to provide critical services, the Secretariat should examine and where possible, use the Emergency Response Activities (ERA) procedures and examine other agencies that have similarly successfully implemented procedures such as OCHA.

We should investigate extending the current Hydrology Helpdesk activity to broader DRR aspects.

Following the adoption of the Sendai Framework, there is a need to baseline and report out on the DRR capability of our Members. The last DRR Survey of Members was undertaken in 2006 and does not reflect the current situation. The SG has placed moratorium on WMO surveys at the present time. A letter was prepared to the Secretary General (SG) of WMO by the Secretariat and the two co-chairs of the DRR FP RA-TC-TP requesting to allow a new survey to be done to establish this baseline of following and facilitate the Sendai Framework reporting requirement.

The Key Performance Indicators and Work Plan of the DRR Programme need to be updated and passed to EC via the EC WG/DRR or through some other mechanism until this group is resurrected or replaced.

The DRR Roadmap is has a somewhat awkward construct at present and it's unclear if it is a vision document, a concept note or an implementation plan. To address this, the DRR roadmap will be reshaped to be either two documents or have to major sub components. The first section or document will be strategic. It will provide the aim and vision for WMO's DRR activities. The second section or document will be an implementation plan.

The various Congress and Executive Council decisions have been reviewed. At a minimum, the following issues are needed to be addressed by the Roadmap. It should be noted that much of this already exists and the major issue is restructuring the roadmap and enhancing sections where needed.

Aim:

- guide WMO activities to support all components and phases of disaster risk management (enhance service delivery to DRR stakeholders)
- guide their further enhancement and coordination

Vision of a "DRR-services ready NMHS":

- Co-produce and co-deliver user-driven services for DRM in multiple sectors and at various spatial and temporal scales

- Fully link vulnerability, exposure and impact data to hazard information

Objectives:

- i. Provide a *framework* for Members to enhance their NMHSs contribution to DRR/DRM
- ii. Provide a mechanism to enhance WMO programmatic *coordination and collaboration* in DRR/DRM
- iii. Provide *guidance* to WMO how to support DRR/DRM at all levels. Identify knowledge products
- iv. Reference and leverage *developments in capabilities such as in science and technology, research and development, pilot or demonstration projects, training, etc.*
- v. Enhance the *role and visibility* of WMO NMHSs in DRR governance
- vi. Describe *requirements and resources needed*, monetary and non-monetary

Several possibilities have been identified for sub-structuring of activities in the Roadmap:

- i. The **priorities** included in the **WMO SP/OP** and most **RAs' Ops** such as *DRR, GFCS, WIGOS, etc.*
- ii. **Levels** (*global / regional implementation, national guidance*)
- iii. DRR Programme **thematic areas** such as *components of DRM and Sendai Priorities for Action*
- iv. **Activity types** such as *stakeholder/user engagement, partnerships, knowledge products, pilot/demonstration projects, research and events*
- v. **Phases** such as *budgetary periods, assessment-development-testing-broad implementation and short term vs long term*
- vi. **Societal / Grand Challenges** (*WWRP/WCRP*)

All existing WMO plans such as the WMO Strategic and Operating Plans, the RAs', TCs' and TPs' plans need to be considered when implementing the Roadmap. The Implementation Plan should also contain a Resource Plan.

The DRR Programme activities need to be more tightly coupled and coordinated with SWFDP, CIFDP and other projects and that this should be incorporated into the DRR Implementation Plan. The activities should also complement the roles of the RAs and community groups as well as the overarching WMO Service Delivery Strategy.

Where possible consider and leverage the work being undertaken by other programmes and Divisions on Quality Management Systems (QMS) and competencies.

The Terms of Reference of the DRR FP RA-TC-TP should be examined and reassessed for their appropriateness.

Duplication in effort between the TCs and the RA's DRR activities should be addressed and eliminated where it is not needed. Stronger TC involvement with the RA's, could help avoid duplication and would be particularly useful for DRR.

There is no formal CBS presence within the RA construct which can be a barrier to advancing DRR initiatives. There may be a role for the DRR FP RA-TC-TP to play here. Ensure either a CBS Co-Chair of DRR FP RA-TC-TP or the appropriate FP invited to attend RA meetings, or is a member of the RA Management Group.

Improve Strategic relationships with external organizations such as UNESCO, IOC, GEO, World Bank and the insurance sector.

DRR FP RA-TC-TP should become more closely involved with these activities/Working Groups

A priority of TT-HUM should be to work to establish an RSMC with specialized activity for operational support to humanitarian agencies.

Examine the integration of existing regional disaster alert systems toward the concept of

global coverage.

MeteoAlarm, MeteoAlert and WWIS/SWIC could have a role for in a Global MeteoAlarm type system.



LIST OF DECISIONS TO BE MADE AT POSSIBLE CBS EXT. (2018)

1. OPAG-IOS

- 1. Finalization of the Vision for WIGOS in 2040. It is important to complete this as WMO needs to provide timely advice to satellite operators to inform their long term planning**
- 2. Updated and new Regulatory and Guidance Materials, and additional Technical Documentation produced. Examples include:**
 - integrating GOS Manual & Guide into WIGOS Manual & Guide;
 - new regulatory material for RBON;
- 3. Recommendations on contribution of Members to WIGOS Implementation pending integrated Implementation Plan for WIGOS Component Observing Systems**

i.e. addressing actions from the various implementation plans, i.e. GFCS-IP, GAW-IP, GCW-IP, EGOS-IP and GCOS-IP
- 4. Recommendations on development of Machine to Machine Interfaces with OSCAR at the national level**
- 5. Reviewing and updating of science questions for impact assessment for Observing System Design and Evolution**
- 6. Radio Frequency Coordination and the agreed WMO position going into WRC-19**
- 7. Recommendations on implementing and integrating emerging observing systems (e.g. new satellite technologies, aircraft, surface GPS) in the Regions**
- 8. Recommendations to Expert Teams on integration of observing systems**
- 9. Recommendations on assessing the uptake and utilization of observational products by members**

2. OPAG-ISS

1. Implementation plan for WIS 2.0

CBS will have to approve the implementation plan for the development of WIS 2.0 and in particular the proposed schedule, deliverables and the organisation to set up in order to coordinate the work with DPFS, CSIS, Chy, ICAO, ... and succeed with the implementation of the WIS 2.0 platform.

2. Regulatory material for WIS part C

CBS will have to approve the proposed update to the Manual on WIS (and Guide to the WIS, if time permit) tacking into account standard in information management.

3. Aviation : strategy for interoperability between WIS and SWIM

CBS will have to approve the proposed strategy to ensure that WIS can interoperate with the SWIM.

4. WMDR and IWXXM

CBS will have to approve the proposed updates to WIGOS MD Application Schema in support of OSCAR implementation, and the proposed updates to IWXXM in support of ICAO Annex 3 Amendments 78 and 79 and ICAO SWIM.

5. Security and Big data

CBS will have to approve the implementation plan for the WIS Security Incident Response Process as a part of the strategy for managing security incidents that affect the operation and integrity of WIS.

CBS will be informed on the outcome of Big data and cloud technologies related experience within members and will be requested to initiate experiments.

6. Standardised Audit and Certification process

CBS will have to approve the new audit process and its applicable principles that will be generics enough to allow an extrapolation to other Commissions and Programmes and will be requested to initiate the new audit cycle for WIS centres.

3. OPAG-DPFS

1. Completion of the transition period for the new Manual on GDPFS (WMO-No.485)

- Establishment of new Centre Audit Procedure
- Audit report of WMCs and RSMCs
- Recommendation on status of RSMC with geographical specialization

2. Establishment of new RSMCs (Manual on GDPFS)

- Establishment of new RSMCs – SWIC, meteorological support to humanitarian agencies and other possible activities
- Amendments on designation criteria and minimum list of mandatory products of existing RSMCs
- Designation of new Centres

3. Renewal of the Guide on GDPFS (WMO-No.305)

4. Development of new reporting mechanism to replace current WMO Technical Progress Report on GDPFS and NWP Research

5. Implementation of the Seamless GDPFS

- To endorse the Outline of the Implementation Plan for the Seamless Data-processing and Forecasting System¹
- To endorse the continuation of the joint CBS-CAS Steering Group on Seamless Data-processing and Forecasting System for the further development and implementation of this initiative (draft terms of reference as listed in Annex 1);
- Technical Commissions & Regional Associations remain involved in the future governance, development and implementation of a Seamless Data-processing and Forecasting System

¹ This could include the establishment of two new TT; to provide guidance on the development of a common operating platform (joint working with WIS) and the development of a framework that enables advancements of science pull through to operations (joint working with CAS). A further decision is required on the next steps; to ensure we chose our preferred implementation option, secure appropriate project management, skills and funding resources and associated governance structures

4. OPAG-PWSD

Ref:	Action(s):	Responsible Member(s):	Due Date:
PWSD05	Develop proposals to bring to Congress in 2019 with recommendations as to the best way forward in relation to developing and promoting WMO-wide expert guidance on Service Delivery practices.	OPAG Chair and Co-Chair WMO Secretariat	Q3 2018
PWSD06	Proposals and recommendations on the re-alignment of the WMO Programme structure, in the context of mainstreaming good Service Delivery practices throughout WMO, to be developed and brought forward, through the PTC and CBS-Ext, to the Executive Council for its consideration.	OPAG Chair and Co-Chair	Q1 2019
PWSD08	Prepare guidance (as part of the WMO Guide on Competency, to be developed) and appropriate training materials for Members on the implementation of competency requirements based on the PWS Competency Framework to enable timely implementation of the Recommended Practices appropriate to PWS forecasters and advisors.	OPAG Chair and Co-Chair OPAG Coordinator – Competency Framework.	Q3 2018
PWSD09	PWS provisions as approved by CBS-16, to be presented for approval by EC-69 for inclusion in the <i>WMO Technical Regulations, Volume I</i> (WMO-No. 49);	WMO Secretariat OPAG Chair and Co-Chair OPAG Coordinator – Competency Framework.	Q2 2017
IPWSD03	Contribute to the deliberations of the “EC Working Group on Emerging Data Issues”, in particular in through providing guidance on the use of Social Media and other platforms for the collection of impact-data related to high-impact weather events.	Chair, TT/IPWSD Chair, ET/SPII	Q1 2018
PPP04	Contribute to the development of the ‘rules of engagement’ for PPPs as proposed by EC 68.	Chair, TT/PPP Chair, ET/SPII	Q1 2018

DELIVERABLES AND KEY PERFORMANCE INDICATORS TO BE INCLUDED IN THE CBS OPERATING PLAN 2016-2019

1. OPAG-IOS

CBS contribution to the WIGOS Vision 2040 (Space and Surface)

- PKI = Both "Surface" and "Space" annexes available by end of 2017
- CBS work completed in 2017.

Updated Regulatory Materials and Best Practices, and additional Technical Documentation produced (e.g. integrating GOS Manual & Guide into WIGOS Manual & Guide, New RM e.g. RBON)

- KPI=Draft available in 2018, and number of additional documents.
- ET-SBO update of RM and Guidance materials – 20k
- Integration of GOS Manual & Guide into WIGOS Manual & Guide – 50k
- 2017: Regulation of RBON – Secretariat to propose update of concept to take into account mobile platforms and OWRs; Consultation of ET-SBO and ET-ABO by correspondence & teleconference; consult RAs and JCOMM, insert their feedback, update and submit to ICG-WIGOS.

Promotion of best practices

- PKI = Number of mechanisms used (e.g. WIGOS and other Newsletter, ...)
- Contribute to WIGOS [Project] Newsletters
- Consider establishing WIGOS [Operations] Newsletter
- CBS, ABO Newsletters
- Use other media
- Webinars – cost to be investigated

Review of Application Areas and user requirements, including outside of the traditional WMO Weather & Climate area

- PKI = GCOS and GAW AAs completed (user requirements, SoGs)
- IPET-OSDE-3 meeting – 50k

Monitoring of OSCAR, and assuring OSCAR is reflecting observing systems capabilities

- PKI = Number of component observing systems integrated in OSCAR
- 0.5 position

Update Statements of Guidance, taking into account results from impact studies

- PKI = Number of updated SoGs
- IPET-OSDE-3 meeting (see cost above)

ICT-IOS to review and monitor actions of various implementation plans (GFCS-IP, GAW-IP, GCW-IP, EGOS-IP and GCOS-IP), assess status and CBS common action needed, and distribute work to CBS Teams as needed.

- KPI = Feedback report to GCOS, GAW, GCW, GFCS ...
- IPET-OSDE, ICT-IOS, then ET-SBO, ET-ABO, IPET-SUP, ET-SAT – 50k for ICT-IOS meeting

Radio Frequency Coordination

- KPI = WMO position paper to WRC-19 (preliminary (2017), pre-CMP-2 (4Q 2018), and final to 3Q WRC-19 (2019); Seminar (2017); and Updated WMO/ITU Handbook on Spectrum Usage meteorology (2017)
- WMO ITU Workshop 2017, 2019 – Cost ?

- SG-RFC 2017, 2018, 2019 meetings: 33k CHF / meeting
- WMO/ITU seminar 35k CHF
- Support to WRC-19 will be about 10K.

Monitoring implementation of the observing systems

- PKI = Percentage of reporting stations vs. expected.
- IPET-OSDE, ET-SBO and WQMS

Redesign proposals to improve network performance and cost-effectiveness of implementation of the observing systems

- PKI = Number of project proposals or activities contributing to improved network performance (target=3).
- ET-SBO, recommendations of the "Obs. Impact on NWP" Workshop

Supporting Members for establishing emerging observing systems (e.g. AMDAR) and assisting the regions in incorporating new technologies for the evolution of the observing systems at the regional level

- PKI = Number of supported regions
- Regional AMDAR workshops – 20k
- Participation of CBS experts at Regional Association meetings – 10k

Promoting integration of observing systems

- PKI = Number of activities focusing on the integration of observing systems
- Distribution of the radio-sonde networks
- Promotion of more cross-pollination of observing systems
- ET-SBO, ET-ABO, ET-SAT, IPET-SUP, IPET-OSDE, ICT-IOS

Assessments on utilization of observational products

- KPI = Number of observing systems for which assessments were made
- IPET-SUP survey & meeting, ICT-IOS

Other topics to be considered:

- Number of Countries registering stations in OSCAR
- RBON Contributions refined
- AMDAR Plans defined at the regional level

- OPAG-IOS Coordinate activities that are under the responsibility of the ICG-WIGOS.
- Various IPs: Synthetic document to be prepared for the Members to understand what CBS is doing to address the various IPs.

Meetings to be organized:

- 2017: ET-SBO, ET-ABO, ET-SAT (April), IPET-SUP (May), Meeting of the *ad hoc* Team following up from the Workshop of the Space-based Weather and Climate Extremes Monitoring Workshop (Feb. 2017) (TBD)
- 2018: IPET-OSDE, ICT-IOS, IPET-SUP, SG-RFC, AMDAR Regional Workshop
- 2019: ET-SBO, ET-ABO, AMDAR Regional Workshop

2. OPAG-ISS

OPAG-ISS Operating Plan					
No.	Activities	Deliverable/Activity	Due	Responsible	OPAG-ISS Tasks
OPAG-ISS01	WIS monitoring	Implement WIS monitoring at GISCs Extend standardization to DCPC and NC data flow and availability, and report on traffic associated with programmes, eg emergency messages (Tsunami) through WIS.	Q2 2016, Q4 2017 Q2 2018	OPAG-ISS	ET-WISC01 ET-CTS07
OPAG-ISS02	WIS implementation at national level	Training and capacity development based on competencies coordinated by RA working groups and GISCs Improve regulatory materials and guidelines	Q2 2018 Q2 2016, Q2 2018	OPAG-ISS	ET-WISC09, 10 IPET-CM02, 03, 08
OPAG-ISS03	WIS operation	Procedure to ensure the consistency and completeness of Metadata catalogue. Mechanism to ensure that GISC cache contain all global data exchanged during the past 24h Recommendation for the implementation of data policies management Procedure to ensure the efficient exchange of information through the WIS network Procedures for intra-GISCs communication in case of events such as: scheduled updates, maintenance work Recommended GISC-GISC backup procedures Contribute to SATCOM	Q4 2018 Q4 2018 Q2 2018 Q4 2018 Q4 2017 Q4 2017 Ongoing	OPAG-ISS	ET-WISC03, 04, 05, 07, 08 ET-CTS09 IPET-CM07
OPAG-ISS04	WIS usability	Harmonisation of user interface to help user to find data from any GISCs Harmonization of user registration parameters Improve WIS discovery metadata	Q2 2018 Q4 2017 Q2 2016, Q2 2018	OPAG-ISS	IPET-DD01, 02 ET-WISC02, 06
OPAG-ISS05	Centres compliance	Finalise certification of candidate WIS centres Undertake re-certification of WIS centres Review and refine WIS certification requirement Generalise centres certification process to cover other Commissions and Programmes	Q4 2017 Q2 2019 Q4 2017 Q4 2017	OPAG-ISS	ET-WISC11, ET-CAC01, 02,03,04,05 IPET-CM05, 06, 09

CBS-MG-17, Final Report

OPAG-ISS Operating Plan					
No.	Activities	Deliverable/Activity	Due	Responsible	OPAG-ISS Tasks
		Provide guidance and training on audit certification Coordinate other centres certification Monitor compliance on information exchange	Q4 2018 Ongoing Ongoing		
OPAG-ISS06	WIS security	Implement WIS security incident response process Updated version of the guide on IT security and the guide on VPN via the Internet	Q2 2016, Q2 2018 Q2 2016, Q2 2018	OPAG-ISS	ET-CTS03, 04, 05
OPAG-ISS07	WIS strategy and evolution	Consolidate WIS 2.0 stakeholder requirements Develop the implementation plan for WIS 2.0 Partnership with TC, RAs and external organisation, eg GEO, ICAO, IOC Investigate technical, management and financial options for establishing WIS 2.0 Monitor and explore new technologies and emerging data issues and prototype and pilot where applicable	Q4 2017 Q4 2018 Ongoing		ET-CTS01, 02, 06, 08 ET-WISC09, 10 TT-eWIS01, 02
OPAG-ISS08	Effective information management	Review available information management practices and develop appropriate standards and practices in information management Incorporate standards and practices for information management under WIS Part C Update to WIS competencies in the area of information management Review, maintain and develop WMO data representations and supporting vocabularies, together with associated guidance Review, maintain and develop WIS Discovery metadata, together with associated guidance	Q4 2017 Q4 2018 Q4 2018 Fast track: Bi-annually; In session:, Q4 2016, Q4 2018 Fast track: Bi-annually; In session:, Q4 2016, Q4 2018		TT-IM01, 02, 03 IPET-CM01, 04, 05, 07, 08 IPET-DD03, 04

3. OPAG-DPFS

Objective	Deliverable(s)	Performance Indicator(s)
To raise awareness and coordinate the implementation of the revised Manual on the Global Data-processing and Forecasting System (GDPFS) (WMO-No. 485)	<ul style="list-style-type: none"> • Publication of the Revised <i>Manual on the GDPFS</i> (WMO-No. 485) • Mapping of existing WMCs and RMSCs onto the new designations, and designation of new GDPFS centres, following the procedures endorsed by CBS-16 • GDPFS centres' audit initiated after EC-69, to ensure compliance with the revised <i>Manual on the GDPFS</i> (WMO-No. 485) • Designation criteria/functions for RSMCs for Space Weather, sub-seasonal forecasts and Humanitarian Support developed 	<ul style="list-style-type: none"> • Approval of the revised Manual on the GDPFS (WMO-No. 485) by EC-69 • Number of GDPFS centres confirming their designation by EC-69 • Number of new designated GDPFS centres by EC-69 • Number (i.e. 85-90) of Members compliant with the revised <i>Manual on the GDPFS</i> (WMO-No. 485) • Demonstration phase of at least one RSMC for Space Weather and one RSMC for Humanitarian Support initiated
To identify and plan activities and developments required for the implementation of the seamless and integrated DPFS, in coordination with technical commissions and regional associations, and advanced GDPFS centres	<ul style="list-style-type: none"> • Implementation Plan for the Seamless DPFS developed • Pilot project for the seamless DPFS identified and initiated 	<ul style="list-style-type: none"> • Endorsement of the DPFS Imperative, including the white paper for the Seamless DPFS, by EC-69 • Endorsement of the Implementation Plan for the Seamless DPFS, by EC-69 • Number of activities identified and prioritized for the implementation of one pilot project for the seamless DPFS
To foster the use of advanced forecasting tools and techniques through capacity development and related activities, including new and improved guidance materials	<ul style="list-style-type: none"> • Publication of new Guidelines on Nowcasting Techniques • Guidelines on High-resolution NWP developed • Guidelines on post-processing (inc. calibration of model output) developed • Revised <i>Guide on Global Data-processing and Forecasting System</i> (WMO-No. 305) and an action plan for its development • Guidelines on procedures for generating regional seasonal forecasts developed • Revised strategies for LRF verification exchange developed • Developed strategy for EPS data exchange 	<ul style="list-style-type: none"> • Timely production of new and/or improved guidance and related materials developed on time, in full and in the requirement format • Feedback from Members and other stakeholders on the quality and utility of the new and/or improved guidance and related materials
To facilitate the transition of mature research results into operations, and the use of advanced NWP/EPS products (including the upcoming outputs from the Earth Modelling Systems), through capacity development,	<ul style="list-style-type: none"> • Conduct the annual sessions of the co-sponsored training events with ECMWF, DWD and NOAA/NCEP • Regional Sub-project Implementation Plans for the Caribbean and West Africa SWFDPs developed • Continued support of the existing 5 SWFDPs • Integration of the SWFDP and the Flash Flood Guidance System (FFGS) in Southern Africa • SWFDP summary book after 10 year activity developed 	<ul style="list-style-type: none"> • Number (85-120) of forecasters (supported by WMO) trained at the co-sponsored training events with ECMWF, DWD and NOAA/NCEP • Number (8-10) of actions identified and prioritized in the Regional Sub-project Implementation Plans for the Caribbean and West Africa SWFDPs • Number (7-10) of Members benefiting (getting access to outputs) from the SWFDP-FFGS integration in

CBS-MG-17, Final Report

<p>including the expansion of the Severe Weather Forecasting Demonstration Project (SWFDP) and the mechanism to strengthen operational centres for the sustainability of the cascading forecasting process</p>		<p>Southern Africa</p> <ul style="list-style-type: none"> • Publications
<p>To coordinate the WMO's response to environmental emergencies involving large-scale dispersion of air-borne hazardous substances through WMO's participation in the International Convention Exercise (ConvEx-3) and regular review of RSMCs' support</p>	<ul style="list-style-type: none"> • Participation of WMO in the International Convention Exercise (ConvEx-3) and report on the strengths and deficiencies of the WMO's response to a nuclear emergency response • Coordination with ICAO to improve the issuance of SIGMET information related to a nuclear incident that may affect the safety of aircraft operations 	<ul style="list-style-type: none"> • Participation of WMO (including its 10 RSMCs for nuclear ERA and NMHS of Hungary) in the International Convention Exercise (ConvEx-3) • Participation of WMO in the preparatory meetings for the ConvEx-3
<p>To raise awareness of the meteorological and hydrological aspects of siting and operation of nuclear power plants through capacity development and related activities, including new and improved guidance materials</p>	<ul style="list-style-type: none"> • Publication of the Guidelines on Meteorological and Hydrological Aspects of Siting and Operation of Nuclear Power Plants 	<ul style="list-style-type: none"> • Timely production of new and/or improved guidance and related materials developed on time, in full and in the requirement format • Feedback from Members and other stakeholders on the quality and utility of the new and/or improved guidance and related materials
<p>To foster the use of advanced forecasting products in nuclear and non-nuclear environmental response activities through capacity development and related activities, including new and improved guidance materials</p>	<ul style="list-style-type: none"> • Draft Guidelines on RSMC support for non-nuclear environmental emergency response developed • Develop and test new nuclear ERA products 	<ul style="list-style-type: none"> • Timely production of new and/or improved guidance and related materials developed on time, in full and in the requirement format • Feedback from Members and other stakeholders on the quality and utility of the new and/or improved guidance and related materials

4. OPAG-PWSD

PUBLIC WEATHER SERVICE DELIVERY (PWSD) IMPLEMENTATION AND COORDINATION TEAM DELIVERABLES AND ACTIONS TO BE INCLUDED IN THE CBS OPERATING PLAN 2016-2019

Ref:	Action(s):	Responsible Member(s):	Due Date:
PWSD01	Working with the Chair of TT-Hum, and OPAG-DPFS, investigate the use of the delivery structure of WMO (RSMCs, RCCs, etc.) and the network of National PWS Focal Points as a resource in the context of improving operational support to Humanitarian Response agencies.	OPAG Chair and Co-Chair WMO Secretariat	Q3 2018
PWSD02	Establish a mechanism within CBS to address the development of a harmonized and joined-up approach to service delivery within the OPAGs of the Commission.	OPAG Chair and Co-Chair WMO Secretariat	Q3 2017
PWSD03	Initiate and conduct informal discussions with representatives of the other technical commissions to examine the possibilities for a concerted approach to this issue.	OPAG Chair and Co-Chair	Q4 2017
PWSD04	Work with the presidents of technical commissions (PTC) to define and support a consistent value chain across the Technical Commissions, thereby developing and promoting WMO-wide expert guidance on Service Delivery practices.	OPAG Chair and Co-Chair	Q1 2018
PWSD05	From consideration of these options, develop proposals to bring to Congress in 2019 with recommendations as to the best way forward.	OPAG Chair and Co-Chair WMO Secretariat	Q3 2018
PWSD06	Proposals and recommendations on the corresponding re-alignment of the WMO Programme structure may also need to be developed and brought forward, through the PTC, to the Executive Council for its consideration.	OPAG Chair and Co-Chair	Q1 2019
PWSD07	Arrange for and attend ICT meeting to review work of ETs and prepare a report for CBS on the work of the OPAG.	All ICT Members Secretariat	Q2 2018

CBS-MG-17, Final Report

PWSD08	Prepare guidance (as part of the WMO Guide on Competency, to be developed) and appropriate training materials for Members on the implementation of competency requirements based on the PWS Competency Framework to enable timely implementation of the Recommended Practices appropriate to PWS forecasters and advisors.	OPAG Chair and Co-Chair OPAG Coordinator – Competency Framework.	Q3 2018
PWSD09	PWS provisions as approved by CBS-16, to be presented for approval by EC-69 for inclusion in the <i>WMO Technical Regulations, Volume I</i> (WMO-No. 49);	WMO Secretariat OPAG Chair and Co-Chair OPAG Coordinator – Competency Framework.	Q2 2017
PWSD10	Carry out a regular survey of the work of the National PWS Focal Points in relation to PWS functions and publish the results.	WMO Secretariat	Q4 2017
PWSD11	Periodically review statistics on the hits and usage of PWS pages on the WMO Website.	WMO Secretariat	Q4 2017
IMPACT01	Organise a stakeholder workshop to plan and design the implementation plan	ET/IMPACT Chair and Co-Chair Secretariat	Q3 2017
IMPACT02	Publish the guidance material deriving from that workshop at 1. above.	ET/IMPACT Chair and Co-Chair Secretariat	Q4 2017
IMPACT03	Compile a listing of available personnel with expertise in areas relevant to Impact-Based Forecasting, with particular emphasis on those with expertise in the collection and evaluation of impact data.	All ET/IMPACT Members Secretariat	Q2 2018
IMPACT04	Draft to be developed for inclusion into the implementation plan	ET/IMPACT Chair	Q3 2017
IMPACT05	Establish initial contacts with relevant TCs, NMHSs and WMO Programmes to make sure requirements are collected and taken into consideration (HiWeather, forecasting)	All ET/IMPACT Members Secretariat	Q4 2017
IMPACT06	Engage with expertise from the Social Science and Economic communities to develop appropriate metrics for the verification and evaluation of Impact-Based Forecast and Warning Services.	All ET/IMPACT Members Secretariat	Q3 2018

CBS-MG-17, Final Report

IMPACT07	Review of the PWS Competency Framework to identify gaps in the area of IBF	OPAG Coordinator on Competency Framework Secretariat	Q2 2017
IMPACT08	Identify existing training materials supporting the development of competencies	OPAG Coordinator on Competency Framework Secretariat	Q2 2017
IMPACT09	At the Stakeholder Workshop (see Deliverable 1) review all material on competency and training	OPAG Coordinator on Competency Framework Secretariat	Q3 2017
SPII01	Liaise with Chair, ET/IMPACT to gather and collate user requirements identified by that ET in the areas of data provision, management and visualisation.	ET/SPII Chair and Co-Chair	Q4 2017
SPII02.	In collaboration with OPAG-DPFS, identify products and technical developments which would assist Members in providing Impact-Based Forecast and Warning Services, especially in the areas of data provision, management and visualisation.	ET/SPII Chair and Co-Chair	Q1 2018
SPII03	Assemble examples and best practice of applying uncertainty information for use in impact-based forecasting, for example translation of percentage probabilities into scenarios for use in decision making for emergency planning and response.	ET/SPII Chair	Q2 2017
SPII04	Contribute to ET-IMPACT enhanced guidelines on impact-based forecasting	ET/SPII Chair ET/IMPACT Chair	Q4 2017
SPII05	Discuss with ECMWF in acquiring ENS data for use in WWIS forecast compilation;	Armstrong Chen	Q1 2017
SPII06	Develop and launch the revamped WWIS website with observational data with responsive design	Armstrong Chen	Q2 2017
SPII07	Develop and launch the revamped MyWorldWeather app for the WWIS	Armstrong Chen	Q2 2017
SPII08	Incorporate in WWIS CAP-based warnings currently available on the public domain	Armstrong Chen	Q4 2017
SPII09	Check availability of CAP/XML warnings from Philippines, Metealarm, JMA	ET/SPII Chair, Yoshiro Tanaka, Secretariat	Q1 2017
SPII10	Revamp the SWIC website to incorporate CAP-based warnings	Armstrong Chen	Q3 2018

CBS-MG-17, Final Report

SPII11	TT/IPWSD to report on the results of its work to ET/SPII.	ET/SPII Chair and Co-Chair	Q1 2018
SPII12	TT/PPP to report on the results of its work to ET/SPII.	ET/SPII Chair and Co-Chair	Q1 2018
SPII13	Compile a listing of available personnel with expertise in technical areas relevant to Service Delivery Improvement, with particular emphasis on those with expertise in emerging data issues and public-private partnerships.	All ET/SPII Members Secretariat	Q2 2018
IPWSD01	Definition of emerging data, sources and means of harvesting such data through the use of new technologies; the quality control and archiving of such data.	Chair, TT/IPWSD Chair, ET/SPII	Q1 2018
IPWSD02	Strategic approaches to the use of emerging data in improving public weather services such as crowdsourcing, gathering impacts data, gathering observational data from non-traditional sources (volunteer observations, etc.) for improved delivery of benefits to the public and other users.	Chair, TT/IPWSD Chair, ET/SPII	Q1 2018
IPWSD03	Contribute to the deliberations of the "EC Working Group on Emerging Data Issues", in particular in through providing guidance on the use of Social Media and other platforms for the collection of impact-data related to high-impact weather events.	Chair, TT/IPWSD Chair, ET/SPII	Q1 2018
PPP01	Examine and report on issues related to the "Single Official Voice" in warning services.	Chair, TT/PPP Chair, ET/SPII	Q1 2018
PPP02	Developing approaches to drive mutual benefits between public and private sectors through stimulating private support to PWS activities.	Chair, TT/PPP Chair, ET/SPII	Q1 2018
PPP03	Endeavours to ensure that "No country is left behind" by considering the needs of Least Developed Countries (LDCs) and Small Island Developing States (SIDS).	Chair, TT/PPP Chair, ET/SPII	Q1 2018
PPP04	Contribute to the development of the 'rules of engagement' for PPPs as proposed by EC 68.	Chair, TT/PPP Chair, ET/SPII	Q1 2018

DRAFT CBS STATEMENT TO EC-SOP

This statement is made in response to the request of the Secretary General (ref: SG/ASG/SPO/PTCs SP2020-2023, dated 27 September 2016) requesting the Presidents of Technical Commissions to submit proposals for improvements and potential areas for consideration as focus priorities for the WMO Strategic Plan for the next financial period. It takes into account the outcome of the 16th Session of the CBS (Guangzhou, China, November 2016) and of the 17th Session of the CBS Management Group (Geneva, Switzerland, 27 February – 1 March 2017).

First of all, the CBS Management Group welcomes the change of the WMO Structure, and believes it is needed. We also believe that the WMO Vision should be clarified, stated and communicated upfront.

The Group has reviewed the general social needs and the strategic priorities of 2016-2019, and we believe they will still be valid for the period 2020-2023. This said, and as the past 4 years have witnessed and as the CBS-16 considered and recommended¹, a major (must do) driver and hence strategic priority for WMO in the coming years must be advising and facilitating Members to extract highest value from the application of new information sources and new technologies, and through engagement with all relevant sectors, to enable improved observation, data processing, forecasting and services. This is fully aligned with the evolving social needs for more accurate, geo-based, on-demand and intelligent weather, climate and water services. The significance of this driver, i.e. adoption of new technologies and their innovative applications in weather, water and climate services, including engaging effectively with others where they bring value and assist in meeting the associated challenges, will require a significant transformation of our approaches to information and its use, and is sufficient to constitute an individual strategic priority by itself for 2020-2023. In fact, the CBS Management Group, recognizing its importance, has established an Associate Member to the Management Group to focus on emerging data issues, a decision that will be communicated to Members through a Circular Letter. As well, the Inter-Commission work of the Future Seamless GDPFS is also aligned to deliver on this priority.

We feel that the rapid development of technologies will lead to major changes in the way NMHSs operate, bring weather information to users and work with an ever expanding community of service providers. Under this new strategic priority, the WMO should help Members NMHSs to adjust their operational process, to develop innovative applications of emerging technologies for the purpose of improved service quality and delivery, to deal with the globalization trend of meteorological information service, and to guide their partnership with private sectors. The Group discussed the Public Private Partnership (PPP) at its 17th Session, noted the update on the development of a policy framework to guide WMO Members in public-private engagement and invited its members to provide their comments into the EC-WG-SOP discussion. In particular, the Group indicated that for all of the major initiatives along WIS 2.0, WIGOS 2040 and Future Seamless GDPFS, the early engagement of external partners, which must include the private sector, will be essential.

In this context, the CBS Management Group agreed that the CBS needs to meet before Cg-18, in order to prepare for the key decisions to be brought to Congress and allow the Organization to respond to and to factor in the rapid advancements in new technologies and the changes they are bringing about in weather, climate and water operations and services. Full rationale for such an Extraordinary Session is provided in Annex X of the final report of the CBS Management Group 17th Session.

This driver related to new technologies and their innovative applications will impact all of the existing priorities, and we would recommend that explicit reference to the following four be done: DRR, WIGOS-WIS, Capacity Development and Governance. In particular, we would like to reinforce the importance of WIGOS, combined with WIS, remaining as a strategic priority, given the fact that we will reach the end of the WIGOS pre-operational phase and that

¹ CBS-16/Doc. 4.2, Decision 4.2/1, Emerging Trends in Information and its Use and Commission's discussion regarding strategic drivers.

implementation of WIGOS, together with WIS, at national and regional levels will have to make serious progress while many Members will continue to face challenges in this regard. Constructive engagement within and across TCs and RAs will particularly be needed while the successful implementation of WIGOS and WIS, is an essential foundation for all other national and global WMO priorities, especially DRR, Polar and High Mountain Regions activities, Aviation services, GFCS, supported by Capacity Development and Governance. Finally, we are also asking for an explicit reference to the importance of the foundational 'end to end' work linked to the evolution of the seamless Global Data Processing and Forecasting System.

With regard to the foreseen reform of Constituent Bodies, the CBS Management Group believes that careful consideration of transition to the next step ought to be made. A rigorous analysis of the current situation and current problems to address the needs ought to be undertaken, while providing strategic directions, and proposing processes for the transition from the current systems to the new ones. We believe that there is a need to minimize disruption to the business of the Organization, and stepwise implementation should be considered to smooth transition. This could be done with elaboration of an implementation plan. We also ought to identify what intergovernmental processes are needed in order to push the business of the Organization, and how to improve the processes for decision making. The future WMO structure must have stability, long term viability and must be able to deal with evolving priorities. The Presidents of Technical Commissions (PTCs) can be seen as the guardians of the Technical Integrity of the Organization. Mechanisms for collaborations at the working level between Technical Commissions must be put in place. The CBS Management Group believes that it could be proposed that the Presidents of the Technical Commissions could become EC members. The right mechanisms must be implemented for change management. The structure of the Regional Associations also need to be simplified and made more effective, and efficient mechanisms for collaborations between them and the Technical Commissions must be put in place. Consideration should also be given to the fact that most of WMO business is based on work done by Member's experts, part of which constituting voluntary work, and in this context financial aspects are not the only angle to be considered. It is important to make sure that experts will continue to be interested in the business of the Organization and be willing to contribute on a voluntary basis. Last, but not least, one must pay attention to the workload of the Secretariat staff in the future new structure.

CBS APPROACH TO SERVICE DELIVERY

1. CBS-16 recognized that while there may be differences in the particular areas of focus of different types of services, a harmonized approach to the accepted principles of high-quality service delivery needed to be adopted, and that in order to provide the required assistance to Members, service delivery as a discipline should be mainstreamed into the activities of WMO. It further recognized that there was a need to deliberate on how best to address requirements related to service delivery identified by other work areas of CBS and WMO Programmes in order to provide guidance and support to Members on issues related to consistent delivery of operational services.

2. The Commission was in full agreement that in order to promote service delivery at the level of Members of WMO, the PWS capabilities of Members needed to be upgraded and strengthened on a continuous basis to cope with the optimum delivery of new services, ranging from day-to-day operations to providing guidance informing decision makers and policy makers on longer timescales.

3. In doing so, the Commission agreed that the WMO Strategy for Service Delivery was developed in consultation with the OPAG/PWSD, and that the mandate for CBS includes "technical guidance on basic infrastructure to support all services". It is thus evident that CBS, through the OPAG/PWSD, has a role in promoting high-quality service delivery across all areas of WMO responsibility, and not just in Public Weather Services. It is also evident that CBS should respect the mandate of other Technical Commissions in their own areas of competence. Thus the achievement of a holistic WMO-wide approach to Service Delivery at Technical Commission level must be via cooperation and collaboration and should start within CBS itself. The Commission therefore decided to endorse and to implement the work plan as provided in its Decision 5.7/1 as laid out below as likely steps to achieve such a harmonized approach to service delivery:

(a) As a first step, establish a mechanism within CBS to address the development of a harmonised and joined-up approach to service delivery within the OPAGs of the Commission;

(b) Initiate and conduct informal discussions with representatives of the other Technical Commissions to examine the possibilities for a concerted approach to this issue;

(c) Work with the Presidents of Technical Commissions (PTC) to develop options regarding possible mechanisms for developing and promoting WMO-wide expert guidance on Service Delivery practices;

(d) From consideration of these options, develop proposals to bring to Congress in 2019 with recommendations as to the best way forward.

4. CBS-16 further decided that, as a new initiative which supported quality service delivery, impact-based forecast and warning services need to be developed on a sustainable and long-term country assistance basis. This will require expertise, resources, patience and persistence, and above all a willingness to collaborate and share information and know-how by NMHSs. This initiative should be built on scoping activities and lessons learnt, and on accelerated assistance to Members on the implementation of this new way of service provision.

5. The Commission further agreed that enhanced efforts were needed to facilitate a more rapid realization of impact-based forecast and warning services through the development of a strategy for implementation of such services through the ET/IMPACT of OPAG/PWSD, as well as a review of the PWS Competency Framework to ensure that it adequately addresses those skills required for the delivery of this new service.

6. CBS-16 further decided that the OPAG/PWSD, working in collaboration with other efforts within CBS, including the CBS-led review of emerging data issues, and cognizant of related efforts within EC, consider and integrate the rapid and efficient application of

new and emerging science and technology to improvements in service delivery in order to meet emerging demands for new products and services.

7. The Commission endorsed the PWS Competency Framework for inclusion in the *WMO Technical Regulations, Volume I (WMO-No.49)*, and requested the OPAG/PWSD, in collaboration with the WMO Education and Training Programme, to prepare, as requested by EC-68, related guidance (as part of the WMO Guide on Competency, to be developed) and appropriate training materials for Members on the implementation of competency requirements based on the PWS Competency Framework to enable timely implementation of the Recommended Practices appropriate to PWS forecasters and advisors.
8. CBS-16 noted the preparations for an international conference on socioeconomic benefits of NMHSs and the endorsement by EC of the approach that this conference be a substantive, focused, time- and cost-efficient, and results-oriented event. The Commission invited its members to actively participate in, and contribute to, the conference through providing case studies and research that they have undertaken in determining the social and economic benefits of their services to users.
9. As a next step, preparation of a short analysis is planned to outline what progress has been made since the original Madrid Conference (2007)¹ Action Plan and to look broadly at work accomplished throughout the WMO community that has contributed to advancing and realizing the Action Plan. It is envisaged that the Conference will be scheduled in late 2018.

¹ International Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services, Madrid Spain, 2007.

RATIONALE FOR A CBS EXTRAORDINARY SESSION

The Seventeenth Session of the CBS Management Group (Geneva, Switzerland, 27 February – 1 March 2017) discussed whether there should in principle be the need to organize an Extraordinary Session of the Commission in 2018, taking into account the decisions of CBS-16 and the need to make recommendations to the Executive Council and Congress in 2019. There is the need to meet at the intergovernmental level to make Decisions to advance the work of Members. It was noted that there are an expectation from Members to deliver more rapidly, including with regard to changes to Technical Regulations.

After discussion, the Group agreed that the Commission needs to meet before Cg-18, in order to prepare for the key decisions to be brought to Congress and allow the Organization to respond to and to factor in the rapid advancements in new technologies and the changes they are bringing about in weather, climate and water operations and services.

Strategic issues, including emerging data issues and engagement with the private sector

An extraordinary session with a focus on a few strategic areas for consideration will give Members the most recent information on the implementation of WMO programs and demonstration projects so as to promote the effective implementation of the decisions made by the Commission.

Emerging issues such as emerging data, and the emerging role of the private sector in weather prediction, makes it critical to come up with appropriate decisions and recommendations to the Executive Council. It will also be required to discuss how to go forward with the Service Delivery Strategy and particularly how to adapt to the increasingly active private sectors in service delivery. An extraordinary session would be useful for enhancing communication, discussion and consensus within the Commission on such issues.

An extraordinary session would provide the authoritative voice of NMHSs. Public Private Partnership (PPP) will help exploring and considering pathways for coordinated development between NMHSs and private sectors.

Information Management

There is a need to follow closely and adapt to rapidly changing new technologies, and keeping Members informed about such changes. This is particularly critical concerning information management, including all information flowing through WIS. WIS Part C. It is important to rapidly look at the implementation of WIS 2.0 and how to monitor implementation of the WIS 2.0 Strategy. For example, CBS-16 identified the need for NMHSs to update and adjust their technological systems to adapt to emerging cloud technology and big data application. The role and involvement of the private sector needs to be factored in.

WMO Integrated Global Observing System (WIGOS)

Per Cg-17 Decision, WIGOS is meant to become operational by the end of this financial period. Much work remains to be made to address the full implementation of WIGOS in 2019 and the CBS has a strong role to play in this regard. In particular, in order to regulate RBON in the WIGOS framework, it will be necessary to use CBS decisions and recommendations to Cg-18.

Global Data Processing and Forecasting System (GDPFS)

Resolution 11 (Cg-17) decided to initiate a process for the gradual establishment of a future enhanced integrated and seamless WMO Data-processing and Forecasting System, in light of the conclusions of the first World Weather Open Science Conference (WWOSC-2014, Montreal, Canada, August 2014). Decision 55 (EC-68) established a Steering Group on Seamless Data-processing and Forecasting System (following the request by Cg-17), with representatives from technical commissions and regional associations, with the main task to develop and table the implementation plan for consideration by EC-69. In addition, CBS-16 endorsed the new Manual on the GDPFS, which provides a new framework, standard

procedures and network of centres operated by Members. The involvement of CBS experts is required in these developments as they will impact the way Members operate in terms of their data-processing and forecasting systems. Providing guidance to Members on how to implement the GDPFS according to the new Manual on the GDPFS is vital for the management of the WMC/RSMC Network, and assuring continuity of the service.

Capacity development

One remaining problem is that many developing countries could not effectively implement the Commission's technical decisions, action plans or demonstration projects due to insufficient exposure to and understanding of all the above matters. In order to mitigate this, consideration will be given to organize and record WebEx sessions for relevant topics. An extraordinary session will contribute to WMO Capacity Building by providing a mitigation to the widening gap between developed and developing countries.

The session is a platform that is useful for developing countries to get the knowledge and understanding of the new trends of technologies and their implications for NMHSs' operational development. It also helps the organization to understand the need for capacity building from Members and facilitates technology transfer from developed countries to the developing ones.

Should an Extraordinary Session be organized, efforts will be made to enhance participation of developing countries, in particular for them to understand technology changes, and threats, targeting RA-I, RA-II, and RA-III in particular.

ACRONYMS

asap	As soon as possible
AWG	CHy Advisory Working Group
AWS	Automatic Weather Station
BUFR	Binary Universal Form for the Representation of Meteorological Data
CAeM	Commission for Aeronautical Meteorology
CAS	Commission for Atmospheric Sciences
CBS	Commission for Basic Systems
CBS Ext.	CBS Extraordinary Session
CBS-16	Sixteenth Session of the CBS
CBSLR-EDI	CBS Led Review on Emerging Data Issues
CBS-MG	CBS Management Group
C-CF	OPAG-PWSD Coordinator on the Competency Framework
CCI	Commission for Climatology
CD	Capacity Development
Cg	Congress
CHy	Commission for Hydrology
CIMO	Commission for Instruments and Methods of Observation
C-MAR	OPAG-IOS Coordinator on Marine Observing Systems
C-RAL	OPAG-PWSD Coordinator on Regional Association Liaison
C-SEIS	OPAG-IOS Coordinator on Scientific Evaluation of Impact Studies undertaken by NWP centres
CSIS	Climate Services Information System
DCPC(s)	Data Collection and Production Centre(s)
DPFS	Data Processing and Forecasting System
DRR	Disaster Risk Reduction
EC	Executive Council
EC-69	Sixty-Ninth Session of the Executive Council
EC-PHORS	Executive Council Panel of Experts on Polar and High Mountain Observations, Research and Services
EC-SOP	EC working Group on WMO Strategic and Operational Planning
EGOS-IP	Implementation Plan for the Evolution of Global Observing Systems
EIG	Economical Interest Group
EPS	Ensemble Prediction System
ET-ABO	OPAG-IOS Expert Team on Aircraft Based Observing Systems
ET-CAC	OPAG-ISS Expert Team on Centre Audit/Certification
ET-CTS	OPAG-ISS Expert Team on Communication Techniques and Systems
ET-ERA	OPAG-DPFS Expert Team on Emergency Response Activities
ET-IMPACT	OPAG-PWSD Expert Team on Impact-Based Forecasting and Risk-Based Warning
ET-OPSLS	OPAG-DPFS Expert Team on Operational Predictions from Sub-Seasonal to Longer-time Scales
ET-OWFPS	OPAG-DPFS Expert Team on the Operational Weather Forecasting Process and Support
ET-SAT	OPAG-IOS Expert-Team on Satellite Systems
ET-SBO	OPAG-IOS Expert Team on Surface-Based Observing Systems
ET-SPII	OPAG-PWSD Expert Team on Service Provision Innovation and Improvement
ET-WISC	OPAG-ISS Expert Team on WIS Centres
EUMETNET	EIG Grouping of European Meteorological Services
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
GAW	Global Atmosphere Watch
GCOS	WMO-IOC-UNEP-ICSU Global Climate Observing System
GCOS-IP	GCOS Implementation Plan
GCW	Global Cryosphere Watch
GDPFS	Global Data Processing and Forecasting System
GEO	Group on Earth Observations
GEO	Operational geostationary satellites
GFCS	Global Framework for Climate Services

CBS-MG-17, Final Report

GISC(s)	Global Information System Centre(s) (of WIS)
GMAS	Global MeteoAlarm System
GML	Geography Markup Language
GOOS	IOC-WMO-UNEP-ICSU Global Ocean Observing System
GOS	Global Observing System
GTS	Global Telecommunications System
HMEI	Association of Hydro-Meteorological Equipment Industry
IABM	International Association of Broadcast Meteorology
ICAO	International Civil Aviation Organization
ICG-WIGOS	Inter-Commission Coordination Group on WIGOS
ICSU	International Council for Science
ICT	Implementation Coordination Team
ICT-DPFS	ICT on Data Processing and Forecasting System
ICT-IOS	ICT on Integrated Observing Systems
ICT-ISS	ICT on Information Systems and Services
ICT-PWSD	ICT on Public Weather Services Delivery
ICTT-WIS	Ad hoc Inter-Commission Task Team on WIS
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission (UNESCO)
IOS	Integrated Observing Systems
IPET	Inter-Programme Expert Team
IPET-CM	OPAG-ISS Inter-Programme Expert Team on Codes Maintenance
IPET-DD	OPAG-ISS Inter-Programme Expert Team on Data Representation Development
IPET-OSDE	OPAG-IOSS IPET on the Observing System Design and Evolution
IPET-OWR	CIMO Inter-Programme Expert Team on Operational Weather Radars
IPET-SUP	OPAG-IOSS IPET on Satellite Utilization and Products
IPT-SWeISS	OPAG-DPFS Inter-Programme Team on Space Weather Information, Systems and Services
ITU	International Telecommunication Union
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
NFP	National Focal Point
NMHSs	National Meteorological and Hydrological Services
NOAA	US National Oceanic and Atmospheric Administration
NWP	Numerical Weather Prediction
OPAG	Open Programme Area Group
OPAG-DPFS	CBS OPAG on Data-Processing and Forecasting System
OPAG-IOSS	CBS OPAG on Integrated Observing Systems
OPAG-ISS	CBS OPAG on Information Systems and Services
OPAG-PWSD	CBS OPAG on Public Weather Services Delivery
OSCAR	Observing System Capability Analysis and Review tool
OSCAR/Requirements	Observational user requirements component of OSCAR
OSCAR/Space	Space-based observing systems capabilities component of OSCAR
OSCAR/Surface	Surface-based observing systems capabilities component of OSCAR
OSE	Observing System Experiment
OSSE	Observing System Simulation Experiment
PoC	Point of Contact
PPP	Public Private Partnership
PRA	President of Regional Associations
PTC	President of Technical Commissions
RA	Regional Association
RBCN	Regional Basic Climatological Network
RBON	Regional Basic Observing Network
RBSN	Regional Basic Synoptic Network
RRR	Rolling Review of Requirements
RSMC	Regional Specialized Meteorological Centre
S/GDPFS	Seamless Global Data Processing and Forecasting System
SG-GDPFS	Steering Group on GDPFS

CBS-MG-17, Final Report

SG-RFC	OPAG-IOS Steering Group on Radio-Frequency Coordination
SG-SWFDP	OPAG-DPFS Steering Group on Severe Weather Forecasting Demonstration Project
SOLAS	International Convention for Safety of Life at Sea
SWFDP	Severe Weather Forecasting Demonstration Project
SWIC	Severe Weather Information Centre
SWIM	System-Wide Information Management
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAC	Traditional Alphanumeric Code
TBD	To be defined
TC	Technical Commission
TDC(s)	Table Driven Code Form(s)
ToR	Terms of Reference
TT(s)	Task Team(s)
TT-ATG	Management Group Task Team on Approaches to Technical Governance
TT-DGNT	Task Team on Development of Guidelines for Nowcasting Technique
TT-EPS-PP	Task Team on Development of a Strategy for EPS Data Exchange and Guidelines on post-processing/calibration
TT-eWIS	ICT-ISS Task Team on Evolution of the WIS
TT-HR-NWP	Task Team on Development of Guidelines for High-resolution NWP
TT-HUM	OPAG-DPFS Task Team on the provision of operational meteorological assistance to Humanitarian Agencies
TT-IM	ICT-ISS Task Team on Information Management
TT-SV	Task team on Development of Standard Verification
TT-UABUFR	Task Team on Migration of Upper Air Reports to Table Driven Code Forms
TT-WDQMS	Task Team on the WDQMS
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
VoIA	WMO No. 9, Weather Reporting, Volume A, Observing Stations and WMO Catalogue of Radio-sondes
WDQMS	WIGOS Data Quality Monitoring System
WHOS	WMO Hydrological Observing System
WIGOS	WMO Integrated Global Observing System
WIR	WIGOS Information Resource
WIS	WMO Information System
WMO	World Meteorological Organization
WWIS	World Weather Information System
WWW	World Weather Watch
XML	Extensible Markup Language

[page left intentionally blank]

[page left intentionally blank]