Executive Council
Sixty-fifth session
Geneva
15–23 May 2013
Abridged final report with resolutions
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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. ORGANIZATION OF THE SESSION (agenda item 1)

1.1 Opening of the session (agenda item 1.1)

1.1.1 The President opened the sixty-fifth session of the WMO Executive Council at 9:30 a.m. on Wednesday, 15 May 2013. He welcomed members of the Executive Council and in particular the newly elected members, Ms Che Gayah Ismail (Malaysia) who replaced Dr Yap Kok Seng (Malaysia), two new presidents of regional associations, Mr Ahmed Abdulla Mohammed, Permanent Representative of Qatar replacing Dr Victor E. Chub as president of RA II, and Mr Juan Carlos Fallas Sojo, Permanent Representative of Costa Rica replacing Mr Arthur Rolle as president of RA IV. He thanked the other outgoing members of the Council for their contributions, Mr Ajit Tyagi (India), Mr Cho Seok-Joon (Republic of Korea), Mr Jack Hayes (United States of America) and Dr Yap (Malaysia) and also welcomed Dr Harry Lins (United States) as the newly elected president of the Commission for Hydrology. The list of participants is given in the appendix to the present report.

1.1.2 The President provided an overview of the advances made by the Organization in 2012–2013, highlighting in particular the significant progress made toward the preparation of the Strategic Plan 2016–2019 and the accompanying Integrated Operating Plan that reflects regional needs and the contributions of the constituent bodies of the Organization. He reviewed progress in programme areas such as the WMO Integrated Global Observation System (WIGOS)/WMO Information System (WIS), polar activities, the implementation of the Capacity Development Strategy, disaster risk reduction and service delivery, and aviation meteorological services. He underlined the important progress made with the initial implementation of the Global Framework for Climate Services (GFCS), its cross-cutting nature within WMO and its linkages with programme priorities of the partners, as well as the need to review the current data policy to ensure that the necessary climate data and forecast products are accessible to all. In this context he emphasized the role of the Council in helping guide WMO contribution to the preparation of the first meeting of the Intergovernmental Board on Climate Services (Geneva, 1–5 July 2013). Finally, he underlined the introduction on “non-controversial” documents as a contribution to continuous improvement of WMO practices and procedures.

1.1.3 The Secretary-General welcomed the Council to Geneva and in particular the newly elected members, noting the progress being made towards better gender balance. He emphasized the important guidance and support provided by the thirty-second meeting of the Financial Advisory Committee to the work of the Council, especially in relation to budgetary matters. In this regard, he underlined the special character of the Council, where members act in their personal capacity. He remarked that since the last session, the role of WMO as a scientific and technical organization had been increasingly appreciated and respected by the partners of the UN family, not only as a leading scientific and technical organization in the increasingly important areas of weather, climate and water, particularly for service delivery and contribution to disaster risk reduction, but also as an example of effectiveness and efficiency, served by appropriate mechanisms and processes.

1.2 Approval of the agenda (agenda item 1.2)

The Council approved the provisional agenda on the understanding that amendments may be introduced in the course of the session in accordance with the provisions of Regulation 160 of the General Regulations.

1.3 Establishment of committees (agenda item 1.3)

Plenary meetings

1.3.1 The Council agreed to conduct the entire session in plenary meetings. Confidential issues would be discussed in camera. Therefore Council members, or their alternates, were required to attend every plenary and camera meeting. Decisions could therefore to be adopted at any time during the session.
1.3.2 The President decided to chair a number of general items and items on the GFCS, strategic and operational planning, budget-related items and in camera meetings. For other items, the President delegated chairmanship to the Vice-Presidents according to the issues they are leading in the Council’s work:

- The First Vice-President would chair items related to WIS/WIGOS and capacity development;
- The Second Vice-President would chair items on service delivery, DRR, partnerships and communications;
- The Third Vice-President would chair items related to climate and water, research, and resource management.

1.3.3 The Assistant Secretary-General and several Directors were designated to serve as secretaries to plenary.

In-session committees

1.3.4 The President established a Coordination Committee in accordance with Regulation 29 of the General Regulations. It was composed of the President and the three Vice-Presidents, the Secretary-General or his representative, secretaries of plenary meetings and other key staff, invited by the President as necessary.

1.3.5 The Council approved the proposals of the Bureau on the establishment of a number of in-session committees to assist with the work of the session:

Committee on Budget
Prof. Adrian (Chair)
This Committee was open to all EC members

Committee on the Theme for World Meteorological Day 2015
Prof. Ostojski (Chair)
This Committee was open to all EC members

Selection Committee for the IMO Prize
Dr Moura (Chair)
Dr Bah, Mr Fallas, and Dr Harijono

Selection Committee for the WMO Research Award for Young Scientists
Dr Mukabana (Chair)
Dr Mohalifi, Dr Cano and Prof. Taalas

WMO Staff Pension Committee
Prof. Ostojski, Dr Makuleni, and Mr Sutherland

Selection Committee for the Norbert Gerbier-MUMM International Award
Mr Jacq (Chair)
Dr Anuforom, Ms Ismail and Mr Lee (president of CAgM)

Rapporteur on Previous Resolutions
Mr Naranjo

1.4 Programme of work of the session (agenda item 1.4)

Working hours of the meetings were established as 9:30 to 12:30 and 14:30 to 17:30. The necessary arrangements concerning the allocation of agenda items to the plenary were made. The Council suspended Regulation 110 of the General Regulations for the duration of the session.
1.5 Approval of the minutes (agenda item 1.5)

The Council noted that in accordance with General Regulation 112 no minutes should be prepared unless otherwise decided for special items. Audio recordings of plenary meetings shall be made and retained for record purposes.

2. REPORTS

2.1 Report by the President of the Organization (agenda item 2.1)

2.1.1 The Council noted the decisions made by the President on its behalf since its last session under General Regulation 9(7) (b) and Staff Regulation 9.5.

2.1.2 The President highlighted some key decisions that were required based on his appreciation, illustrated by a few examples, of how collective efforts have guided research advances, improved observations and enhanced the provision of quality services to help citizens of the world make informed decisions.

Strategic and Operational Planning

2.1.3 Significant progress has been made toward the preparation of the next WMO Strategic Plan and a truly integrated Operating Plan that reflects the needs of the Regions as well as the contributions of the technical commissions, the Secretariat and other constituent bodies of the Organization. These documents, as well as the accompanying budget, will be ready for consideration at the upcoming World Meteorological Congress in 2015.

2.1.4 A total of 109 NMHSs (58%) had responded to the Survey on the "Impacts of Achieved Results on Members" as of October 2012. In general, significant achievements were noted against the Organization's 8 Expected Results and in particular, the most beneficial WMO programme activities cited are: training and capacity building, provision of technical support, data collection and exchange, and standardization and provision of guidelines, procedures and publications.

2.1.5 In addition to providing directions to guide preparations for the programme and budget for the next financial period, the Council should consider several approaches to streamline decision-making processes and to possibly adjust the WMO General Regulations to incorporate the roles and responsibilities of the RAs that formalize the engagement and commitment of their Members and the contribution of the technical expertise from Members facilitated through technical commissions.

Global Framework for Climate Services (GFCS)

2.1.6 The GFCS has now entered the implementation phase, with a governance structure and Implementation Plan having been endorsed by the extraordinary session of the World Meteorological Congress in October 2012. Although the leadership for this Framework rests with WMO, its success depends on the effective engagement of stakeholders at national, regional and global levels, including the participation of numerous United Nations organizations. The Council should consider both the WMO specific contributions to the GFCS, as well as how the GFCS will influence the directions of WMO's World Climate Programme and the work of WMO constituent bodies.

2.1.7 These deliberations will be important for consideration at the inaugural meeting of the Intergovernmental Board providing the governance for the GFCS which will be held 1–5 July 2013. The Board will consider processes and substructures that will enable early action and engage key contributors to meet the goals and priorities outlined in the Implementation Plan. In this regard, the Council should reflect upon WMO's own structures that can contribute to this success.

2.1.8 Regional associations, NMHSs and technical commissions have an opportunity to lead early actions to strengthen the production, availability, delivery and application of science-based
climate predictions and services. The GFCS adopts a strong user focus, committing to developing a user interface from national to global scales that will facilitate better application of climate information by users, and strongly encourages nations to enhance user-producer communication. RAs, as well as NMHSs, can also play effective roles in facilitating these relationships.

2.1.9 Open and unrestricted access to climate data and information was one of the key principles outlined in the High Level Task-force Report and is an important pillar for meeting many of the goals outlined in the GFCS. As 2013 commemorates the 50th Anniversary of the World Weather Watch, the value of the groundbreaking work conducted in the early 1990s on data policy that has enabled the effectiveness of weather forecasts and warnings worldwide should be recognized. Resolution 40 (Cg-XII) is often quoted in many circles as a best practice and to that end, the Council, at its sixty-fourth session, established a task team to consider the mechanism and approach to be followed to ensure that the necessary climate data, information, science and forecast products are widely accessible for all. The Council should review the work of this Task Team and should provide further directions to guide its work.

2.1.10 At the global level, voluntary contributions are increasing to support the GFCS. These funds will largely be applied to projects enabling progress against the 2, 6 and 10-year targets in the Implementation Plan. Many countries do not even have the very basic of climate services, and early action will be directed to address these critical gaps in global climate monitoring, and to ensure a basic level of climate resilience for all people. In February 2013, Norway announced a major initiative for Africa to improve climate services under the auspices of WMO adding to contributions made by Switzerland, India, Canada, China, Hong Kong (China), Ireland, Republic of Korea and the United Kingdom of Great Britain and Northern Ireland. Through the interagency cooperation facilitated by the Secretary-General, other UN partners are also initiating actions under the Framework that contribute to the four initial priorities; Agriculture and Food Security, Water, Disaster Risk Reduction and Health.

2.1.11 WMO and the GFCS featured prominently in the work of the UNFCCC/COP 18 (Doha, 26 November–7 December 2012) and the adopted decisions. In particular COP 18 underlined the relevance of the GFCS to address the adverse impacts of climate change through systematic observations, data and information sharing, and enhanced adaptation capacity.

2.1.12 The High-Level Meeting on National Drought Policy, organized with FAO and UNCCD, held in Geneva from 11–15 March 2013, highlighted the significant risks and policy implications of drought on society. The improvements promised under the GFCS will enable those like National Meteorological and Hydrological Services to make a strong contribution to enable better climate resilience to the risks and hardships of these climate hazards.

WMO Information System (WIS) and WMO Integrated Global Observing System (WIGOS)

2.1.13 The significant efforts by the Management Teams of the technical commissions and regional associations in advancing the WIS/WIGOS priority this year should be recognized. Regional associations have been active in developing their implementation plans, and in some cases, jointly. The RA III/IV Workshop on WIGOS Implementation held in San Jose, Costa Rica from 27–29 November 2012 allowed for effective sharing and development of regional plans. Significant progress has been seen on WIS, with approximately 360 centres increasing their capabilities. These two initiatives are foundational to the weather, climate and water enterprise.

2.1.14 It is also noteworthy to acknowledge the progress of WMO Polar priorities. The first Global Cryosphere Watch, “CryoNet” implementation workshop was held in Vienna, Austria from 20-22 November 2012 and the fourth meeting of the EC Panel of Experts on Polar Observations, Research and Services (EC-PORS) met in Lanzhou, China from 13-15 March 2013 putting emphasis on the advancing initiatives aimed at the Third Pole. These efforts show continued WMO commitment in follow-up to the International Polar Year (2007–2008). Formal application has been made to the Arctic Council to secure observer status for the WMO, recalling that WMO is an official observer of the Antarctic Treaty Consultative Meeting (ATCM). These political alliances will facilitate partnerships that will assist in sustaining observation networks, research and services in
these remote areas that are so important to our understanding of changes in the global climate system.

**Capacity Development**

2.1.15 The Council, at its sixty-fourth session, approved the Capacity Development Strategy; since then, attention was turned to the Implementation Plan. This plan should now be considered by the Council. Significant progress and success have been made in mobilizing resources for a number of initiatives. The outcomes of the Second Conference of Ministers Responsible for Meteorology in Africa (AMCOMET-2) held at Victoria Falls, Zimbabwe from 15–19 October 2012 demonstrated that there is growing awareness of the role of NMHSs in securing socio-economic progress and provides further opportunity for capacity development in Africa.

2.1.16 In his presentation to the Association of Hydro-Meteorological Equipment Industry (HMEI), the priorities for WMO and the role that the equipment and instrument manufacturing sector could play, were stressed by the President. In particular, the notions of how this industry association could support requirement and specification development for particular applications and thereby offer a more cost effective benefit to WMO Members, the refurbishment of equipment and support for developing countries, were highlighted. Their executive is considering proposals for consideration by WMO. HMEI has also introduced a revised web page, offering WMO Members better access and insight into the scope and scale of the capabilities of their industry members.

**Disaster Risk Reduction**

2.1.17 The EC Working Group on Service Delivery, the Bureau and the Secretariat have been working to develop a more integrated approach to DRR and prepare the implementation plan for the WMO Service Delivery Strategy for consideration by the Council. Achievements include: a revised framework guiding interactions between NMHSs and Emergency Management and other important sectors; systematic documentation of good practices; the coordination of regional/national capacity development projects; and the establishment of partnerships and user-driven platforms to develop requirements for DRR-related guidelines, standards and training.

**Aviation Meteorological Services**

2.1.18 The Council should note the progress made by many Members in the implementation of their Quality Management System in compliance with ICAO Annex 3 by late 2012. Although this deadline is now past, many of those that have not already done so are working to complete this in the near future. In this regard, the President and Management Group of CAeM, as well as the presidents of regional associations made significant efforts in realizing this milestone. Focus will also have to be on the need for NMHSs to ensure that they have integrated competency assessment of aeronautical meteorology personnel by late 2013. The Council should give guidance on how to move forward to address challenges that are currently faced by the programme including the current deficiencies of all types of SIGMET by Meteorological Watch Offices.

2.1.19 The Council took note of the report of the President. It dealt with related issues under the relevant agenda items.

**2.2 Report by the Secretary-General (agenda item 2.2)**

2.2.1 The Council took note of the report of the Secretary-General.

2.2.2 The Council noted with appreciation the Secretary-General’s continued actions to increase the profile and relevant contribution of WMO and NMHSs to international initiatives to respond to the global challenges directly connected or amplified by climate variability and change, especially by launching the implementation phase of the GFCS.
2.2.3 The Council underlined the key contribution of WMO to the strengthening of observations, forecasts and warning capabilities of Members in need, the development of climate information and services for climate adaptation, the promotion of uniform methods to reduce the risks from hydrometeorological hazards, as well as its leadership as an efficient and effective Organization.

2.2.4 The Council dealt with related issues under the relevant agenda items.

2.3 Report of the Financial Advisory Committee (agenda item 2.3)

2.3.1 The Council considered the report of the Financial Advisory Committee and noted with appreciation its recommendations contained in Annex I to the present report. The Council took account of those recommendations in making its decisions under the various related agenda items.

2.3.2 The Council approved the requests of the Governments of the Comoros and the Islamic Republic of Mauritania to enter new agreements for the payment of their arrears of contributions.

2.4 Report on the 2013 Meeting of Presidents of Regional Associations and reports by presidents of regional associations (agenda item 2.4)

Report on the 2013 Meeting of Presidents of Regional Associations

2.4.1 The Council noted that the first 2013 Meeting of the Presidents of Regional Associations (PRA-2013) held in Geneva, 14–15 January 2013 aimed at reviewing the progress in key priority areas of WMO and following up the requests from EC-64 (full report is available at: ftp://ftp.wmo.int//Documents/PublicWeb/dra/rap/PRA-2013/Final Report/2013-PRA-I-Final-RPT.pdf).

2.4.2 The Council noted that after reviewing key priority areas, the presidents of regional associations (PRAs) made the following suggestions and conclusions:

(a) Efforts to clarify the different ways contributions to the GFCS can be offered by Members and partners were welcomed, and several trust funds established within GFCS could be aggregated;

(b) Additional support for QMS and competency standards should be provided to Members not yet compliant. The Secretariat and Members experienced in these issues should encourage “twinning/mentoring” arrangements;

(c) DRR-related strategic planning in the Regions should be linked to socio-economic groupings/DRR groupings programmes and projects;

(d) Sustainability should be considered in the implementation of DRR-related projects;

(e) Meteorological, hydrological and climate services should be considered separately in any categorization of NMHSs. The assessments should be made by the NMHS itself using agreed but flexible criteria and against the level of services required nationally in each of the three areas. The categories should be capability-based, rather than an assessment of how well an NMHS provides the services. In this sense the categories would not be directly related with QMS;

(f) The Country Profile Database (CPDB) should provide Members with a secure mechanism to update information about their country;

(g) Capacity development should be linked to the capability of Members to comply with WMO Technical Regulations. In this connection, a “Culture of Compliance” with WMO standards and recommended practices should be embraced.

PRAs also agreed:

(a) To provide guidance to NMHSs in their Regions for their participation in the Intergovernmental Board for Climate Services including the designation of members of the Board;
(b) To support the development/implementation of Regional WIGOS Implementation Plans (R-WIPs) and to provide guidance to the regional representatives to ICG-WIGOS;
(c) To ensure WIS implementation is included in RA plans.

2.4.3 The Council was informed that at the request of EC-64, PRA-2013 reviewed roles and responsibilities of regional associations and felt that:
(a) More clarification/consideration is needed; and
(b) Proposals to the next Congress should be prepared.

2.4.4 The Council was informed that PRA-2013 discussed the proposal by the president of RA VI to improve and integrate RAs performance including the idea of phasing of RA sessions into a 2-year cycle aggregating regional priorities through the use of regional surveys. The meeting also suggested some other options including RA short sessions in conjunction with the shortened Congress and use of videoconferences. RA presidents supported the proposal on aggregation of Members’ priorities through regional surveys and recognized that this information could be supplemented by the CPDB. These views have been forwarded to ECWG-SOP.

2.4.5 The Council was also informed that the PRAs meeting agreed that: regional priorities for the next WMO Strategic Plan should be set at an early stage; priorities for the Regions should correspond to Expected Results (ERs); that GFCS should be treated as cross-cutting; and that Regional KPIs be formulated as part of the WMO strategic and operational planning process.

Reports of Presidents of Regional Associations

RA I – Africa

2.4.6 The Council noted the report of the president of RA I, Mr Mamadou L. Bah.

2.4.7 The Council noted that the Second Session of the African Ministerial Conference on Meteorology (AMCOMET) was successfully organized by WMO, the African Union Commission and the Government of Zimbabwe in Victoria Falls, Zimbabwe, from 15-19 October 2012. The Council further noted that a new AMCOMET Bureau was elected and the Report of this Second Session was endorsed by the African Union Summit of Heads of State and Government in January 2013, including:
(a) The Integrated African Strategy on Meteorology (Weather and Climate Services);
(b) The establishment of a Joint Task Force to investigate the feasibility of developing an African Regional Space Programme, ensuring close coordination with relevant African Union Commission Departments and stakeholders;
(c) Taking necessary steps to establish a Regional Climate Centre for Central Africa in collaboration with WMO and partners.

In this regard, the Council requested the Secretariat, in collaboration with the African Union Commission and other partners, to support and facilitate the implementation of AMCOMET activities as appropriate.

2.4.8 The Council noted that, the meeting of RA I Task Team on WIGOS was organized in Nairobi, Kenya from 17 to 21 September 2012. The objectives of this meeting were to:
(a) Develop the RA I Regional WIGOS Implementation Plan;
(b) Coordinate WIGOS implementation activities with the WMO Information System in their operating plan and work programme, and;
(c) Promote capacity-building and outreach activities to assist Members in the implementation of WIGOS.

As part of the efforts to support Members to implement the WIGOS at the national level, it was decided that a regional workshop on WIGOS would be organized in the five subregions in Africa.
2.4.9 The Council stressed the importance of Pilot projects initiated in Burkina Faso, Chad, Niger and Mali to support Members to implement the GFCS at national level. The Council noted that the 20th session of the RA I Tropical Cyclones Committee held in Maputo, Mozambique, from 3 to 7 September 2012 developed actions in the reduction of disaster risks for the people in the Region.

2.4.10 The Council recognized the progress in enhancing the ECOWAS Meteorology Programme, including the holding of the 10th Meeting of the Committee of Directors of NMSs of ECOWAS Member States held in Abidjan, Côte d’Ivoire, from 11 to 13 July 2012 which discussed topics related to the GFCS and the establishment of a National Framework for Climate Services.

2.4.11 The Council noted that the 5th Conference of Directors of West African NMHSs was successfully organized by WMO and the State Meteorological Agency of Spain (AEMET) in Boadilla del Monte, Spain from 22 to 24 October 2012. The Council noted also that this Conference plays a key role in the region and requested the Secretariat and AEMET to support and facilitate the implementation of Boadilla del Monte Action Plan.

2.4.12 The Council noted that WMO supported the organization of the Southern Africa Climate Outlook Forum (SARCOF), the Greater Horn of Africa Climate Outlook Forum (GHACOF), the Western Africa Climate Outlook Forum (PRESAO), the Central Africa Climate Outlook Forum (PRESAC) and the Northern Africa Climate Outlook Forum (PRESANORD) whose products were extensively utilized by the spectrum of user groups in the region. Efforts are ongoing to designate the ACMAD, ICPAC and SADC Climate Services Centre and AGRHYMET to be WMO Regional Climate Centres. In the East African Community, WMO is contributing to the preparation of the Five-Years Meteorological Development Plan and Investment Strategy (2013–2018).

2.4.13 The Council encouraged the Secretariat and the president of RA I to enhance the collaboration with African Union and the UN Economic Commission for Africa in the implementation of ClimDev, AMESD and MESA.

RA II – Asia

2.4.14 The Council noted the report of the president of RA II, Mr Ahmed Abdulla Mohamed, with a focus on the major outcomes from RA II-15 which was held in Doha, Qatar, from 13 to 19 December 2012. The most important achievements of RA II included, among others:

(a) Adoption of the RA II Strategic Operating Plan (SOP) 2012-2015 for the Enhancement of National Meteorological and Hydrological Services in Asia identifying eight priority areas;
(b) Approval of the Regional WIGOS Implementation Plan for RA II (R-WIP-II) with seven projects;
(c) Progress on WIS implementation through operational services at two GISCs and trial operations at four conditionally-designated GISCs, an agreement on the preliminary list of principal GISCs and development of a Regional WIS Implementation Plan for RA II;
(d) A new working mechanism for effective implementation of the Regional Strategic Operating Plan by establishing a Management Group, four Working Groups with sub-groups and themes, two Implementation and Coordination Teams to handle cross-cutting activities as well as five Pilot Projects.

The Council was pleased to note that the RA II SOP 2012–2015 constituted an integral part of the WMO-wide Operating Plan 2012–2015 and contributed to the WMO Strategic Planning process.

2.4.15 The Council also noted that RA II agreed on pursuing an increase in the number of EC seats for RA II in light of great diversity in geography, climate, ecosystems, religions, and political and economic systems, as well as a number of Members that can make significant contributions to EC activities within RA II. In that respect, the Association agreed to proceed with a proposal to increase the number of seats allocated to RA II from six to seven for consideration by EC.
The Council further noted that RA II endorsed the generic criteria for consideration of the location of the Regional Office for Asia and the South-West Pacific developed by the Secretariat and agreed by the Management Groups of RA II and RA V, in light of the efficiency, cost-effectiveness and sustainability. The Council was also pleased to note that the RA II Management Group further considered the criteria including the possible weight given to soliciting additional hosting offers from Members and organizations. It is also noted with appreciation that, with close collaboration with the president of RA V and its Management Group on this issue, the president of RA II, in consultation with the RA II Management Group, will proceed with seeking potential candidates for hosting the Regional Office from all Members of RA II and RA V, and make a recommendation to the Secretary-General on the appropriate location of the Office, including Geneva as an option, before Cg-17.

The Council also noted that specific challenges and priorities to RA II, relate to:

(a) Implementation of the RA II Regional WIGOS and WIS Implementation Plans;
(b) Sustainable capacity development including human resources development;
(c) Further development of an RA II RCC network encompassing the two designated RCCs and five candidate RCCs to support the work of the GFCS;
(d) Climate services to address the slow-onset impacts of climate variability and climate change;
(e) Establishment of a Region-wide multi-hazard early warning system for Disaster Risk Reduction;
(f) Implementation of aeronautical meteorological services enhancements in coordination with CAeM and upgrading of service delivery capability in other application areas including marine meteorological services;
(g) Implementation of the WMO Flood Forecasting Initiative, water resources assessment and regional exchange of hydrological data and information;
(h) Reduction of risks and impacts of Region-specific hazards caused by climate change, sand and dust storms, thunderstorms and associated extreme weather events;
(i) Inter-regional cooperation with Regional Associations I (Africa), V (South-West Pacific) and VI (Europe) through the partnership with inter-regional partner organizations, including the Association of Southeast Asian Nations (ASEAN), the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and the League of Arab States (LAS).

RA III – South America

The Council noted the report of the acting president of RA III, Mr Julian Baez Benitez.

The Council noted the most important activities undertaken in the Region, which included:

(a) Development of the RA III Strategic Plan (2010–2013) for the Enhancement of the National Meteorological and Hydrological Services (NMHSs) based on the previous RA III Strategic Plan for NMHSs (2006–2009) and taking into account the WMO Strategic Plan, the WMO Operating Plan 2012–2015 and suggestions from Members of the Region. Likely trends, developments and evolving needs were considered to identify a set of deliverables, action-oriented and categorized in accordance with WMO Expected Results;
(b) Continuation of the Joint Meeting of Directors of Ibero-American Countries of RA III and RA IV with annual Action Plans adopted and approved for the implementation of the Ibero-American Climate Project (CLIBER), funded by Spain benefiting the Plurinational State of Bolivia, Colombia, Ecuador, Paraguay, Uruguay and the Bolivarian Republic of Venezuela, including several training activities and the new Meteorological Data Management System for the Region;
(c) Regional Climate Centres (RCCs) in the Region: The RCC for Western South America, established in the International Research Centre on El Niño Phenomenon (CIIFEN), based in Guayaquil, Ecuador, is now in its demonstration phase. The RCC for Northern
South America, established in the NMHSs of Brazil and French Guyana continued its initial implementation phase. The RCC for Southern South America, established in the NMHSs of Argentina and Brazil, is concluding its implementation phase;

(d) During a joint RA III and RA IV meeting, held in Costa Rica in October 2012, WIGOS regional implementation was discussed. In this context, the Regional WIGOS Implementation Plan (R-WIP) was considered by the RA III Permanent Representatives. Also, national focal points were appointed to work with the RA III Working Group on Infrastructure and Technological Development;

(e) All NMHSs responsible for aeronautical meteorology matters started their Quality Management processes before the November 2012 deadline set by ICAO. Also, efforts are ongoing within the region to meet the Competency Standards requirements for aeronautical meteorology personnel by 1 December 2013.

2.4.20 The Council also noted specific challenges in RA III, including the traceability of meteorological instrument calibration and measurement; the implementation of the Quality Management System in compliance with ICAO requirements; the incorporation of WIGOS implementation activities into the strategic plan/work programme of RA III; the need for research to improve understanding of climate variability and change and their linkages to changing cycles and characteristics of El Niño/Southern Oscillation (ENSO) and its impacts on hydrometeorological hazards; and the need for a coordinated framework of the GFCS and RCCs which include the development of tools and climate products and services to address disaster risk reduction at different timescales.

RA IV – North America, Central America and the Caribbean

2.4.21 The Council commended the former president, Mr Arthur Rolle (Bahamas) for his contribution to the work of the Association and welcomed Mr Juan Carlos Fallas Sojo and Dr Albert Martis, who were elected president and vice president respectively during the sixteenth session of RA IV.

2.4.22 The Council noted the most important activities in the Region, which included:

(a) The holding of the sixteenth session of RA IV in Willemstad, Curacao, 12–19 April 2013, which resulted in the approval of the Region’s SOP for 2012–2015 and the RA IV WIGOS Implementation Plan. During the session the Region also highlighted the priorities for the Region for 2016–2019 which included meeting QMS and staff competency requirements, requirements for aviation; emerging needs for marine meteorology, establishment of an optimal RCC network, and completing implementation of WIGOS including WIS;

(b) During 2012 WMO has continued its Project Office in Mexico to support the National Water Commission in achieving integrated, sustainable management of water and the PREMIA project and the Modernization Project for the NMS of Mexico (USD 105 million) funded by the World Bank (2012–2018);

(c) The Meeting of NMS’s Directors of Ibero-American countries was held in Madrid, Spain, in October 2012 with the attendance of the Ibero-American members of RA III and RA IV. The action plan for the period 2011–2013 was ratified. The main lines of action of the three-year Plan include, institutional strengthening of NMHSs and resource mobilization; development of climate services through pilot projects; education and training; and development of subregional virtual centres for the prevention and monitoring of extreme events;

(d) WMO, through the trust fund from Spain, supported during 2012 several activities including courses on automatic weather stations maintenance, data processing, climate change, administration of meteorological and hydrological services, flood management, seasonal forecast, hydrology, statistic forecast tools, use of forecast products and satellites, and other topics;
The Central American Project on Multi-Hazard Early Warning System to develop an end-to-end early warning system for Central America, financed by the World Bank and executed by WMO, was successfully implemented in Costa Rica during 2012 and 2013.

The WMO Haiti Task Team continued to coordinate the different actions and efforts to help Haiti after the earthquake that impacted this country in January 2010, providing immediate assistance including a set of seven new GSM enabled Automatic Weather Stations through VCP funds, two EMWIN systems and a flash flood guidance system supplied by the United States, technical support and training of local staff as well as France-funded specialized training of five staff members for ten months in Toulouse, France. The active participation of Canada, the Caribbean Meteorological Organization, Dominican Republic, France and the United Kingdom was the determinant in this effort.

The Canadian Department of the Environment and the World Meteorological Organization (WMO) signed a CAD 6.5 million Financing Agreement to support the programme “Haiti Weather Systems Programme – Climate Services to Reduce Vulnerability in Haiti”. The five-year project starting in 2013 aims to develop the capacity of the National Meteorological and Hydrological Service (NMHS) of Haiti.

RA V – South-West Pacific

2.4.23 The Council noted the report of the president of RA V, Dr Sri Woro B. Harijono highlighting the major achievements including:

(a) Development of a Regional WIGOS Implementation Plan (R-WIP-V) and a Regional WIS Implementation Plan;
(b) Implementation of the Severe Weather Forecasting and Disaster Risk Reduction Demonstration Project (SWFDDP);
(c) Further enhancement of partnership with SPREP through the Pacific Meteorological Council (PMC) and the Pacific Meteorological Desk Partnership (PMDP).

2.4.24 The Council noted the activities of the working groups in RA V aimed at achieving establishment of Regional Climate Centres (RCCs) and implementation of Regional/Subregional Climate Outlook Forums (RCOFs) including a Southeast Asian Climate Outlook Forum (SEACOF) and supporting the regional component of WHYCOS through the development of new project such as the South-East Asia HYCOS (SEA-HYCOS) and a follow-up to the Pacific-HYCOS.

2.4.25 The Council was pleased to note that after severe floods in Fiji in January and March 2012, a WMO fact-finding mission to Fiji was carried out to address the issue of improvement of the provision of hydrological services in the country, including flood forecasting and warning services and that the Fiji Coastal Inundation Forecasting Demonstration Project (CIFDP-F) was initiated with the financial support from KOICA.

2.4.26 The Council also noted specific challenges and needs especially for the NMHSs in the Pacific region related to the continuous development of human resources and building institutional capacity including capability of timely warnings for severe weather and climate extremes. In this regard, the Council noted with appreciation that RA V carried out capacity development activities especially for the Pacific SIDS/LDCs including education and training, technical assistance and advice on national and regional development strategies, policies, projects and legislation related to weather and climate.

RA VI – Europe

2.4.27 The Council noted the report of the president of RA VI, Mr Ivan Čačić. RA VI activities have been organized in accordance with the Regional Operating Plan for the period 2012–2015, which was approved by the president and published on the WMO website: ftp://ftp.wmo.int/Documents/PublicWeb/dra/eur/RA6_StratPlan/Operating_Plan_2012_2015.pdf.

2.4.28 The Council noted the approval by the president of RA VI of the Regional WIS Implementation Plan: http://www.wmo.int/pages/prog/dra/eur/RA6_WIS_ImplPlan.php. The Council
noted further that GISCs Offenbach, Exeter and Toulouse were operational and GISC Moscow would become operational later in 2013. The regional plan established a mechanism for monitoring the implementation of national centres (NC) through a WIS focal point working in coordination with the Secretariat. More than 70% of RA VI Members completed the process of nomination of national WIS focal point and assignment of a primary GISC to their NCs. The implementation of the planned DCPCs also progressed well.

2.4.29 The Council appreciated that the transition to the TDCF in RA VI has further progressed with 62% of the required data already produced in TDCF and plans established for more than 90% of the category 1 data to be transmitted in TDCF by the end of 2014. To assist RA VI Members in the transition to TDCF, two training events were carried out in 2012; one hosted by the Turkish State Meteorological Service and the other by the Roshydromet.

2.4.30 The Council noted that the RMDCN migration to a new generation has started and will be completed in the first half of 2013. All RA VI Members have been invited to join the new RMDCN, which would provide improved service for a lesser price.

2.4.31 A regional WIGOS workshop was hosted by the AEMET from 6 to 8 May 2013. The workshop raised the awareness of RA VI Members with WIGOS concept and requirements for development of national and regional monitoring networks. The RA VI WIGOS Implementation Plan has been developed and will be presented to the sixteenth session of RA VI in September 2013 for approval. Among the planned regional WIS and WIGOS activities, a pilot project for subregional cooperation in the provision of marine services over the Adriatic Sea area has been initiated led by the Croatian Hydrometeorological Service.

2.4.32 The Council noted with satisfaction that the DRR-related activities in the south-east part of RA VI have successfully progressed through a partnership with UNISDR and the European Commission, DG for Enlargement. The project “Building Resilience to Disasters in Western Balkans and Turkey” financed by DG Enlargement (approx. 1.1 million Euros over a two-year period) was initiated in 2012 as “Phase 2” of the previous DRR project for the same subregion, implemented during the 2009–2011 period. The new project addresses the issues identified during “Phase 1” and aims at assisting the beneficiary countries to implement effective early warning systems through enhanced national and regional cooperation.

2.4.33 The Council noted with appreciation the approval by the fifteenth session of CBS in September 2012 of the RA VI RCC Network (www.rccra6.org). Thus, RA VI became the first Region with a fully operational network of RCCs. The RA VI Management Group at its seventh session in February 2013 agreed that raising the awareness and promotion of the RCC Network services to RA VI Members should be one of the main tasks of the Working Group on Climate and Hydrology. Another important development was the initiation in the summer of 2012 of the Climate Watch Service (CWS) for the Region, which should be further developed and operationalized during the next RA VI intersessional period.

2.4.34 The Council noted that two RCOFs have been organized in RA VI, the South-East European COF (SEECOF) and the North-Eurasian COF (NEACOF), both conducting regular sessions for production of consensus statements for the summer and winter seasons. SEECOF has successfully introduced a mechanism for on-line sessions that proved to be a cost-efficient way of conducting the COF activities. The RA VI Management Group agreed that the COF mechanism could be successfully expanded to other areas, in particular, the Mediterranean, where the organization of an inter-regional (RA I and RA VI) MEDCOF had been initiated with the support of several NMHSs.

2.4.35 The Council noted the preparations for the sixteenth session of RA VI which will be held in Helsinki, Finland from 11 to 17 September 2013, preceded by a Regional Conference on 10 and 11 September. To facilitate the establishment of a base line and identify the major challenges and
priorities for RA VI Members, a regional survey had been conducted through an on-line questionnaire with a very high rate of responses of more than 90%. The initial analysis of the survey results indicates some specific regional challenges related to the heavy economic situation in large parts of RA VI that affects the NMHSs by budget and staff cuts. These factors, combined with a growing demand for high quality information and services by different user groups, pose severe pressure on NMHSs for finding innovative solutions to sustain and expand their operations. The sixteenth session of RA VI will discuss the issues and make plans for addressing the challenges and priorities through regional cooperation mechanisms, including the further development and integration of the European Meteorological Infrastructure.

2.4.36 The Council noted the discussions of the RA VI Management Group for enhancing the effectiveness and efficiency of the regional subsidiary bodies. The experience gained during the current intersessional period (2009–2013) was very positive. A structure composed of a Management Group and three working groups, each one composed of several priority-focused Task Teams, worked effectively and efficiently. The small size of the groups allowed more frequent short meetings within the normal budget allocation that helped to progress the agreed tasks and produce a set of deliverables (e.g., regional plans, guidelines, organization of regional events) aimed at assisting RA VI Members in their implementation activities. Using Internet technology for working groups and task team meetings (e.g., Webex) has been successfully implemented. The Management Group expressed its intention to seek further innovative methods for raising the effectiveness, including new approach to the RA sessions (eventually, switching to two-year intersessional cycle) under the condition of no additional cost for WMO; improving significantly the session documents with focus on regional issues; better cooperation and leverage with the technical commissions and their subsidiary bodies; and better engagement of RA VI Members and regional partners.

2.4.37 The Council noted the request to the Secretary-General from the Inter-State Council on Hydrometeorology of the Commonwealth of Independent States (ICH/CIS) for the establishment of a WMO Office for the CIS countries endorsed by RA II. Considering that the establishment of such an office would help aligning the activities of the CIS Members with the WMO Strategic Plan and Programmes, the Council agreed that the Secretary-General should initiate consultations with CIS and report to EC-66 on progress made. It was noted that budget allocation for a new WMO Office in the field exists in the current financial period.

2.4.38 Information about regional events organized during the period 2011–2013 is available at: http://www.wmo.int/pages/prog/dra/regional_activities.php.

2.5 Report on the 2013 Meeting of Presidents of Technical Commissions and reports by presidents of technical commissions (agenda item 2.5)

2.5.1 The Council noted that the 2013 Meeting of Presidents of Technical Commissions (2013-PTC) was held at the WMO headquarters (Geneva, Switzerland, 14–15 January 2013). The meeting was chaired by the First Vice-President of WMO, Dr Antonio Divino Moura. The full report of the meeting may be accessed through the following web link: http://www.wmo.int/pages/meetings/documents/Final_2013PTC_Report.pdf.

2.5.2 The Council observed that, in consideration of Resolution 45 (Cg-XVI) “Technical Regulations of the World Meteorological Organization”, and Resolution 26 (EC-64) “Amendments to the Technical Regulations” (please see attached), 2013-PTC, had discussed the responsibilities of technical commissions in the revision of the Technical Regulations, Volume I “General Meteorological Standards and Recommended Practices” (Basic Documents No. 2, WMO-No. 49). As requested by the Council that the amendments and updates to the Technical Regulations, Volume I should be done on a regular basis, and following the procedure described in the introductory part of the Regulations, which has been renamed as “General Provisions”, a new edition of Volume I should be published after each session of Congress in order to consolidate all revisions adopted by Council during the intersessional period.
2.5.3 The Council noted that, following the request of EC-64, the PTCs had considered the review of the Technical Regulations that should be done in a new structure and agreed to address and review relevant parts of the Regulations. The PTCs further needed guidance on development of the structure and noted that the Secretariat had already started to develop such guidance.

2.5.4 The Council supported the decision of 2013-PTC that an in-depth analysis of all regulatory material be carried out in order to improve the overall consistency of WMO Technical Regulations, Volumes I-IV, as well as the eight supporting Annexes. It further agreed that a new comprehensive review and revision of the Regulations should be carried out in order to reflect properly the development and implementation of major new systems, such as the WMO Information System (WIS), the WMO Integrated Global Observing System (WIGOS) and the Global Framework for Climate Services (GFCS). The Council urged TCs and the Secretary-General to prepare the new revised edition of the Technical Regulations for approval by the Seventeenth session of Congress (Cg-17) in 2015.

2.5.5 The Council welcomed the decision of 2013-PTC to develop a set of guidelines on the preparation and promulgation of the WMO Technical Regulations and related material. It agreed that such guidelines should be developed as a priority task in order to ensure that all stakeholders involved in the preparation of technical regulatory material have a common understanding of this specific matter.

2.5.6 Regarding the Executive Council Panel on Polar Observations (EC-PORS), the Council considered the statement by PTCs, as it appears in paragraph 3.2.3 of the Final Report of the 2013 Meeting of PTCs. In view of the statement, the Council requested EC-PORS to work with the PTCs, in coordination with the Secretariat, to address the concerns raised, and to develop a proposal of a way forward for consideration by EC-66. The Council further welcomed the decision by PTCs to inform EC-PORS-4 of the adjustments that respective TCs had made aimed at advancing the WMO polar activities agenda.

2.5.7 The Council welcomed the actions planned by PTCs toward developing programme-specific additions to the “Guide to the Implementation of a Quality Management System for National Meteorological and Hydrological Services” in which each TC would nominate a person or small drafting group for each programmatic area (TC focal points) to create a brief summary of programme-specific Quality Management System requirements for documentation and guidance, in close consultation with the user community. The Council requested the relevant Executive Council working groups to encourage partner organizations and national bodies, with which a working relation with WMO already exists, to help the TC focal points to establish agreed user requirements for this purpose.

2.5.8 With regard to the development of the White Paper on international exchange of climate data and products to support the implementation of the GFCS, the Council noted the PTCs’ endorsement of the proposal for the adoption of a new resolution to support the free and unrestricted access to climate data and products. The new resolution would be a clarification of the application of the existing Resolution 40 (Cg-XII) “WMO Policy and Practice for the Exchange of Meteorological and Related Data and Products Including Guidelines on Relationships in Commercial Meteorological Activities” and Resolution 25 (Cg-XIII) “Exchange of Hydrological Data and Products”, as opposed to a stand-alone resolution. It noted that this recommendation was reached following a request to PTCs by the President of WMO and the Chair of the EC Task Team on WMO Policy for International Exchange of Climate Data and Products to support the implementation of the GFCS.

2.5.9 The Council noted that the PTCs had endorsed the recommendation of the fifteenth session of the Commission for Basic Systems (CBS-15) to the Council that the documentation of the WMO Core Metadata Profile should be included in the Manual on the WMO Information System (WIS). The Council agreed to this recommendation.

2.5.10 The Council agreed with the proposal of PTCs to address the inconsistency between the approach used for approving changes to the Manual on Codes and the procedures agreed to
by the Council for managing changes to the WMO Core Metadata Profile. The presidents had agreed to a procedure recommended by CBS-15 whereby the president of CBS shall consult other presidents of technical commissions about changes, in parallel with consultation with Members. In this procedure, the president of CBS should approve changes that do not require changes to software used to interpret WMO Discovery Metadata; however, more significant changes should be recommended by CBS to the Council.

2.5.11 The Council supported the endeavour by the PTCs to embark on a Programme to Strengthen Operational Centres, which would be built upon the experience of implementing the Severe Weather Forecasting Demonstration Project (SWFDP). It noted that the presidents had adopted this position as a next step towards sustenance of the gains made from implementing the SWFDP in five (5) regional projects, which involve several WMO global and regional operational centres, 41 National Meteorological and Hydrological Services and several WMO Programmes (i.e., GDPFS, PWS, TCP, DRR, MMO, AgM, Space Programme, ETR, LDC, Regional Programme and WWRP) and technical commissions (i.e., CBS, CAgM, CHy, JCOMM and CAS). It noted that a draft concept paper for consideration by the next meeting of the PTCs was under development.

2.5.12 The Council agreed with the recommendations of PTCs with regard to the development of WIGOS Regulatory Material, including the proposal that issues related to changing technology and user requirements that suggest a dynamic updating process should be a feature of the final structure. It also agreed that there was a need to have some of the regulatory material placed at the Manual level to allow for shorter update cycles by the relevant Commission only. It agreed that the idea of consolidating all WIGOS Regulatory Material into the Technical Regulation level without having the Manual level should be carefully re-visited.

2.5.13 The Council appreciated actions taken by TCs with regard to the decision of Resolution 10 (EC-64) - WMO Integrated Global Observing System Framework Implementation Plan, to adopt the Implementation Plan and other WIGOS-related decisions and recommendations of the Council, including the development of the Implementation Plan, contribution to the ICG-WIGOS session and the Task Team meetings, and incorporating of WIGOS activities into the respective programmes of TCs.

3. GLOBAL FRAMEWORK FOR CLIMATE SERVICES (agenda item 3)

3.1 Follow-up to the Extraordinary Session of the World Meteorological Congress (2012) (agenda item 3.1)

Outcomes of the Extraordinary Session of the World Meteorological Congress

3.1.1 The Council recalled Resolution 47 (Cg-XVI) – Response to the Report of the High-level Taskforce on the Global Framework for Climate Services) and Resolution 1 (EC-LXIII - Establishment of an Executive Council Task Team on the Global Framework for Climate Services) and expressed its appreciation to the Executive Council Task Team on the GFCS (ECTT) for the completion of the draft Implementation Plan of the GFCS, which was approved by the Extraordinary Session of the World Meteorological Congress, held in Geneva, from 29 to 31 October 2012.

3.1.2 The Council noted that the major outcomes of the Extraordinary Session were the adoption of three resolutions (see resolutions at ftp://ftp.wmo.int/Documents/PublicWeb/mainweb/meetings/cbodies/governance/congress_reports/english/pdf/1102_Part1_en.pdf) pertaining to:

(a) The adoption of the draft Implementation Plan of the GFCS for the subsequent consideration by the Intergovernmental Board on Climate Services;
(b) The establishment of the Intergovernmental Board on Climate Services as an additional body accountable to Congress under Article 8(h) of the Convention of the WMO;
(c) The approval of the terms of reference and rules of procedure of the Intergovernmental Board;
(d) The approval of the specific functions of the Secretariat support of the GFCS; and
(e) The request to the Secretary-General to consider GFCS needs when developing the budget proposal for the biennium 2014–2015, and to include reference to GFCS governance and implementation as part of his overall budget proposal for the seventeenth financial period to be considered for approval by the Seventeenth World Meteorological Congress.

3.1.3 The Council stressed the need for the full participation of Members in the implementation of the GFCS including through identification and initiation of regional activities, identification and documentation of existing regional climate services delivery mechanisms, identification of regional partnerships with all potential stakeholders, the sharing of experiences in implementation and identification of needs for climate services.

3.1.4 The Council noted that the Extraordinary Session of the World Meteorological Congress was preceded by a Dialogue for Climate Services Users and Providers from 26 to 27 October 2012. The Dialogue provided an opportunity to share experiences, lessons and good practices on the production and application of climate services worldwide. A publication, “Climate ExChange” containing case studies on experiences from around the world on the development and application of climate services in various socio-economic sectors was launched at the Dialogue (the publication is available at: http://library.wmo.int/pmb ged/tudor-rose/).

Preparations for the first meeting of the Intergovernmental Board on Climate Services (IBCS1)

3.1.5 The Council noted that the first meeting of the Intergovernmental Board on Climate Services is planned to be held in Geneva from 1–5 July 2013. The Board shall elect its chair and vice-chair; consider issues relevant to the implementation of the GFCS; and follow-up on decisions of the World Meteorological Congress on the Intergovernmental Board on Climate Services, including the Implementation Plan of the GFCS, establishment of bodies reporting to the Intergovernmental Board on Climate Services and financial matters.

3.1.6 The Council noted that with the adoption of the draft Implementation Plan and Governance Mechanism by the Extraordinary Session of the World Meteorological Congress (Cg-Ext.(2012)), the GFCS moves to the implementation phase. In this regard, the Council recalled that Cg-Ext.(2012) urged Governments:

(a) To continue to make their expertise and experts available during the implementation of the GFCS;
(b) To make maximum use of existing national institutions and capabilities including National Meteorological and Hydrological Services (NMHSs);
(c) To strengthen national, regional and global capabilities to collect, rescue and exchange data and products, to generate climate information and products, and to provide climate services to enhance decision-making through implementation of a framework for climate services at national level;
(d) To facilitate coordination and collaboration among various institutions, including intermediary institutions at the nexus between climate information providers and climate services users, within their countries, for the generation and use of climate services through appropriate legal and institutional arrangements;
(e) To facilitate the transfer and sharing of technology and know-how between developed and developing countries in relation to the production, availability, delivery and application of science-based climate prediction and services, as an integral and essential part of any activity or project under the GFCS and its Capacity Development component;
(f) To develop new data policies that address data gaps, data accessibility issues, ownership, and data protection, confidentiality, exchange, applications and usage for the implementation of the Framework, noting internationally agreed data exchange policies such as the WMO Resolution 40 (Cg-XII) – WMO policy and practice for the exchange of meteorological and related data and products including guidelines on
relationships in commercial meteorological activities, and Resolution 25 (Cg-XIII) – Exchange of hydrological data and products, and the relevant provisions of the Group on Earth Observations;

(g) To provide adequate resources for strengthening weather, climate, and water observation networks, their operation, maintenance, quality control and traceability, as well as to train requisite experts with the required technical skills;

(h) To provide resources to their NMHSs and national institutions, especially those in the designated four priority areas of the GFCS – namely water, health, disaster risk reduction, and agriculture and food security – for the production, availability, delivery and application of relevant science-based climate prediction and services and for recruiting and training experts with the technical skills required to understand and apply climate services in enhanced decision-making;

(i) To support research in climate science, climate application science and interdisciplinary Earth system and social science at national, regional and global levels to improve the understanding of climate systems and their ecological, social and economic impacts and to promote the delivery of better climate services including the provision of more reliable and accurate data for enhanced decision-making while bearing in mind user expectations;

(j) To assist the global efforts of assessing and promulgating the socio-economic benefits of climate services through targeted studies and detailed analyses of the added value of climate services at the national, regional and global level;

(k) To work closely with the GFCS Office in communicating the development and progress in the implementation of the Framework, and in promulgating its benefits;

(l) To support the implementation of priority projects and activities as proposed in the Implementation Plan of the GFCS and submit for recognition these actions in the compendium;

(m) To directly and indirectly support countries or regions through their bilateral or multilateral Framework implementation efforts;

(n) To make use of existing and functioning climate funds for the implementation of the GFCS and to support the NMHSs in their efforts to access these funding options for national or regional projects; and,

(o) Invited Members to designate members of the Board, as set out in its terms of reference, and to make their expertise available for effective discharge of the Board’s responsibilities.

3.1.7 The Council noted that a Project Oversight Board for the GFCS involving partner UN and international agencies was established to facilitate the planning and coordination for the completion of the documents for the consideration of the IBCS-1. The Project Oversight Board is comprised of the International Federation of Red Cross/Red Crescent Societies (IFRC), Food and Agriculture Organization of the United Nations (FAO), World Food Programme (WFP), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Development Programme (UNDP), United Nations International Strategy for Disaster Reduction (UNISDR), World Bank, World Health Organization (WHO) and WMO. In this regard, the Council requested the Secretary-General to prepare a proposal to formalize the cooperation between the IBCS and partner organizations.

3.1.8 The Council also noted that the Secretary General had established an Interagency Coordination Group (ICG) on the GFCS to contribute to the development of effective forms of cooperation between organizations of the United Nations system engaged in the planning and implementation of the GFCS across UN partner organizations. The ICG will broaden the base of the GFCS so that all UN partner organizations can better fulfil their functions according to their respective mandates within the UN system. The ICG is a high level coordination structure involving the heads of the following agencies: Food and Agriculture Organization of the United Nations (FAO), World Food Programme (WFP), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Development Programme (UNDP), United Nations International Strategy for Disaster Reduction (UNISDR), World Bank, World Health Organization (WHO) and WMO.
3.1.9 The Council noted with appreciation the additional contributions and pledges made by Members to the GFCS Trust Fund and encouraged Members to continue contributing to the Trust Fund to support IBCS-1 and GFCS related activities and projects and to second experts to the GFCS office. In addition, it welcomed the in-kind contribution from Italy that has seconded an expert to the GFCS Office. The Executive Council thus concluded the consideration of agenda item 3.1 and approved Resolution 1 (EC-65) – Follow-up to the Extraordinary Session of the World Meteorological Congress (2012).

3.2 Aspects of the implementation of the Global Framework for Climate Services (agenda item 3.2)

3.2.1 The Council noted that WMO contributions to the Global Framework for Climate Services (GFCS) span across all the five pillars of the GFCS, and that the relevant activities are covered under the respective Expected Results (ERs), namely ERs 1 and 2 on User Interface Platform, ER 3 on Climate Services Information System, ER 4 on Observations and Monitoring, ER 5 on Research, Modelling and Prediction and ER 6 on Capacity Development. The Council further noted that aspects of capacity development for GFCS are also covered under all of the ERs above.

3.2.2 The Council noted with appreciation the contributions and pledges made by Members to the GFCS Trust Fund since the Extraordinary Congress in late 2012, including those from Australia, Canada, China, Hong Kong (China), Ireland, Norway, Republic of Korea, United Kingdom and Switzerland.

WMO Statement on Role and Operation of NMHSs

3.2.3 The Council recalled that Cg-XVI had endorsed the WMO Statement on Role and Operation of NMHSs. The Council further recalled that, through Resolution 48 (Cg-XVI) on the Implementation of the GFCS, Congress had requested the Executive Council to review the WMO Statement on Roles and Operation of NMHSs with a view to more clearly reflecting their crucial role in the implementation of the GFCS, and that EC-64 had entrusted the responsibility to the EC Working Group on Climate and related Weather, Water and Environmental Matters (ECWG-CWE). The Council noted that this task was also taken up by the EC Working Group on WMO Strategic and Operational Planning (ECWG-SOP), which consulted with other EC Working Groups to provide an inclusive Statement. The Council noted that ECWG-CWE reviewed the WMO Statement on Role and Operation of NMHSs, considering the overarching needs of the GFCS. The Council deemed that the updated WMO Statement should duly reflect the ‘central’ role of NMHSs in the delivery of climate services under the GFCS, while acknowledging the importance of partnerships with relevant stakeholders both at national, regional and global levels.

3.2.4 The Council noted that the WMO Statement on Role and Operation of NMHSs is a reference document of value in relation to guiding the more general role and responsibilities of NMHSs and as such should be focused and balanced and considered a “living document”. The Council considered the revised version of the Statement with changes proposed by the ECWG-CWE and, after making some additional changes, adopted the text as provided in Annex II to the present report for use during the coming twelve months. The Council requested the ECWG-SOP to continue to work on the document to ensure that its content remained focused and balanced.

Roles of WMO Technical Commissions in the implementation of GFCS

3.2.5 The Council recalled that Cg-XVI recognized that, while the Commission for Climatology (CCI) would have a central role in the implementation of the GFCS, other technical commissions would also have important roles to play. For example, the expertise and experience of JCOMM in ocean observations, ocean modeling, and ocean forecasting services, CHy in water-related observations, assessment and forecasting services, CAgM in climate services applications for agrometeorology, CAS in climate, weather and atmospheric chemistry research, modeling and prediction, CIMO in the setting of standards for observations and CBS in observation networks, information processing and dissemination and services delivery, are fundamental components that will enable the GFCS to succeed. To this effect, the Council agreed that it is important to highlight
the long experience, technical strengths and potential contributions of the WMO Technical Commissions as an integral part of the WMO contribution to the GFCS, and requested the Secretary-General to facilitate this on the eve of the first session of the Intergovernmental Board for Climate Services (IBCS), including through appropriate side events. As part of this facilitation effort, the Council also requested that the Secretary-General encourage the IBCS to avoid creating sub-structures that duplicate the technical capabilities and contributions that would come from the WMO Technical Commissions and co-sponsored bodies, particularly as concerns research and observations, but rather focus on coordination of required new activities between WMO and partner organizations.

3.2.6 The Council noted that the IBCS is expected to constitute its management structures to assist in the implementation of the GFCS, and emphasized that WMO’s participation in the respective management structures needs to adequately reflect its contributions, largely through its technical commissions. The Council requested the ECWG-CWE to propose ways to ensure that the roles and responsibilities of the technical commissions and WMO co-sponsored bodies are appropriately represented in the structure that will be adopted for the GFCS. The Council also proposed that the Terms of Reference of the Technical Commissions be reviewed to explicitly identify their expected contributions to the GFCS and help avoid duplication and also to ensure that they both reflect WMO’s technical competencies and assist in identifying gaps that may exist in implementing the GFCS such as in health, where WMO does not have a technical commission.

WMO Policy for International Exchange of Climate Data and Products to Support the Implementation of the Global Framework for Climate Services

3.2.7 The Council noted that its Task Team on the WMO Policy for International Exchange of Climate Data and Products to Support the Implementation of the GFCS had undertaken its work through a survey and e-mail exchanges between the members and the Secretariat. On 29 November 2012, the Chair of the Task Team, wrote a survey letter to the members of the Task Team, which contained a series of questions based around their Terms of Reference. The Council further noted that, based on the responses to the survey and comments on draft material prepared for further review by the Task Team during February to March 2013, a draft white paper on the International Exchange of Climate Data and Products to Support the Implementation of the GFCS.

3.2.8 The Council reviewed the draft white paper and provided the following comments for further consideration for inclusion by its Task Team:

(a) The importance of both data quality and digitization of data and the potential value held in unprocessed records to the implementation of the GFCS;
(b) Taking account of national policies and legislation with respect to exchange of international data and products;
(c) The additional new resolution on climate data will need to be explained in the supporting documentation, including ensuring consistency of terminology, and consideration of resolutions on data exchange from other international organizations, in particular, the Resolution IOC-XXII-6 by the 22nd Session of the UNESCO-IOC Assembly “IOC Oceanographic Data Exchange Policy”;
(d) That the provision of commercial climate services should include experience with Annex 2 of Resolution 40 (Cg-XII) Guidelines for relations among National Meteorological or Hydrological Services (NMSs) and regarding commercial activities;
(e) Recognizing the importance of socio-economic data for climate services at the national and local levels in designing adaptation measures of economic sectors to current and predicted climate conditions, this data should be used to the extent possible;
(f) With respect to the scope of data to be considered, consideration should be given to the need for multi-decadal products and region-specific requirements for climate services delivered through the GFCS, for example, the delivery of hydrological related data, information and products, based on a river basin approach. The scope should be further expanded to meet the needs from a user perspective, as informed by the IBCS; and
(g) Consideration should be given to reporting on the progress in the development of the exchange of climate data resolution at the IBCS.

3.2.9 Through Resolution 2 (EC-65) – Policy of the World Meteorological Organization for the international exchange of climate data and products to support the implementation of the Global Framework for Climate Services, the Council requested the Task Team to review and update the white paper and prepare a policy statement, based on this white paper, in the form of a draft resolution with annexes and background material to be presented at its sixty-sixth session.

4. IMPLEMENTATION OF THE WMO STRATEGIC PLAN 2012–2015, WITH EMPHASIS ON PRIORITY AREAS (AGENDA ITEM 4)

4.1 Service Delivery (agenda item 4.1)

Aeronautical Meteorology – Emerging Challenges

Quality Management Systems for aeronautical meteorological services

4.1.1 The growth of global aviation currently varies markedly across different regions. In areas of traditionally high economic activity and a strong aviation sector such as North America and Europe, the density of traffic is beginning to impact further growth potential, and thus significant investments in aviation projects such as the US NextGen air traffic management system, the European SESAR Joint Undertaking, the Japanese CARATS and other emerging projects in Asia and the Middle East are being launched to better manage air traffic in these regions. Official ICAO Air Traffic Forecasts (of Revenue Passenger Kilometres) see a continued robust growth for South and Central America (around 7 percent/a), Southeast Asia and the Middle East (up to 9 percent/a) and also signs of accelerating growth over parts of Africa. The crucial issues to be addressed by the Aeronautical Meteorology Programme include the implementation and further development of Quality Management Systems (QMS), assessment and documentation for the competency of personnel, SIGMET deficiencies, new services to Air Traffic Management (ATM) and the predictions and warnings of volcanic ash, space weather and nuclear and chemical emergencies. The Council recalled the need to align the programme with the WMO strategic planning process and the new ICAO Global Air Navigation Plan with its stepwise Aviation System Block Upgrades (ASBU). The Council further requested CAeM, together with ICAO, to conduct workshops dealing with the development and implementation of suitable key performance indicators for aeronautical meteorological services beyond the accuracy criteria cited in ICAO Annex 3 to guide the direction of development.

4.1.2 The Council recalled that aeronautical meteorology was a priority for WMO because for many NMHSs the aviation sector is a crucial client on which the viability of many NMHSs depended. For a part of the developing world, tourism is a central part of the national economies, relying mostly on aviation as the carrier of tourists. A globalized economy with separation of locations for management, marketing and production sites relies entirely on rapid access by safe and efficient aviation. In the view of WMO’s partner organization, the International Civil Aviation Organization (ICAO), the future development of aviation will be building on the pillars of safety and quality management, use of advanced technologies for operations and Air Traffic Management, regionalization of services to aviation, and establishment of high standards of infrastructure, personnel competence and efficiency. For Members and their meteorological service providers to civil aviation, these challenges will require a significant increase in their efforts that will be made possible by a much increased regional and global level of cooperation.

4.1.3 In this respect, the Council recalled that EC-64 had requested Members to provide in-kind contributions at current, or wherever possible increased levels, to the Aeronautical Meteorology Programme particularly in support of developing country Members. The Council was
reminded that there are many challenges for NMHSs in providing services to aviation which are reflected in the five top level priorities of the Commission for Aeronautical Meteorology below:

(a) Implementing and sustaining QMS noting that a number of Members appear to have missed the ICAO implementation deadline of 15 November 2012;
(b) Undertaking assessment and documentation of the competency of Aeronautical Meteorological Personnel (AMP) noting the WMO deadline of 1 December 2013;
(c) Improving the efficiency and effectiveness of SIGMET issuance;
(d) Improving services to aviation, in particular for air traffic management in high-density airspace, but also for average density areas;
(e) Improving Members’ ability to respond to volcanic ash and other large-scale, high-impact events, e.g. space weather, tropical cyclones and nuclear incidents.

Support for the Twinning/Mentoring Framework in Quality Management Systems (QMS) Implementation

4.1.4 The Council recognized that, following the expiry of the deadline on 15 November 2012, ICAO provisions concerning the quality management of meteorological services for international air navigation were now upgraded from a Recommended Practice to a Standard. The recent survey undertaken by the Secretariat was missing replies from a large number of Members.

4.1.5 The Council was, however, informed of an agreement in principle between the relevant WMO and ICAO Secretariats that Members not complying with the Recommended Practice of obtaining certification in accordance with the ISO 9001 Standard, should, as a minimum, provide evidence for having achieved the following milestones:

(a) Evidence of a contractual arrangement between the Meteorological Authority and Service Provider with clearly established responsibilities;
(b) Availability of quality policy, quality manual and complete set of work instructions/process descriptions at all workplaces, and routine use of these documents by staff;
(c) Documented evidence of user consultation and feedback (publications, questionnaires, records of user meetings, actions stemming from these);
(d) Evidence of corrective and preventive action processes; and
(e) An internal audit plan, audit reports and documented follow-up decided by a Management Review meeting.

4.1.6 Noting that some Members lacked capacity for internal audits, the Council re-iterated that a ‘twinning’ or ‘mentoring’ framework was expected to help overcome this critical issue. The Council, noting Resolution 26 (Cg-XV), appreciated the commitment of the relevant Task Team on the QMF to actively support the establishment of twinning/mentoring arrangements that would include the training of internal auditors on a regional basis, as a part of the WMO QMS implementation activities. The Council also encouraged the regional associations and their relevant working structures, in particular those for a language community, to play an active role in this activity coordinating also with non-NMHS service providers.

4.1.7 Noting further the recommendations developed by the Meeting of Presidents of Technical Commissions and Regional Associations in January 2013, the Council requested the Commission for Aeronautical Meteorology and the Secretary-General to provide Members with updated information on the perceived risks to their NMHSs or other service providers of failing to comply with new and stringent ICAO and WMO regulations.

4.1.8 The Council noted with concern that several Members had apparently not been able to undertake even initial steps towards the implementation of the QMS and WMO Competence Standards, in some cases due to a serious underfunding of the NMHS or service provider. It was noted that in many of these cases, the costs for air navigation services, which should include those for aeronautical meteorological services, failed to reach the organization providing the service. As one of the fundamental tenements of QMS stipulated that such a system can only be considered functional if a firm commitment by the executive management and the parent organization
(government ministry, department or similar) is demonstrated by the provision of adequate resources for the operational activities and the application of the QMS. The Council thus requested the Secretary-General to undertake, in close coordination with ICAO, an evaluation of the cost recovery mechanism and/or government funding situation in Members experiencing such extreme difficulties, and to make the findings of these evaluations available to the Members concerned with a view to improving their resourcing in a sustainable way. The Council strongly requested further ICAO/WMO efforts, e.g. in the form of conjoint expert missions to Members or subregions, in order to resolve such funding issues where they severely affected compliance with ICAO and WMO regulations.

**Competency of Aeronautical Meteorological Personnel (AMP)**

4.1.9 The Council, noting the deadline for implementation of AMP Competency Standards of 1 December 2013 as given in the new edition of the WMO Technical Regulations (WMO-No. 49), Vol. 1, was informed of rapid progress in the implementation of the CAeM Competency Assessment Toolkit in most WMO Regions with the help of the relevant task and expert teams of the Commission for Aeronautical Meteorology. The Council warmly welcomed the holding of AMP competency assessment workshops hosted and facilitated by several Members, and supported the cost-effective mapping of required competencies to web-based and other training material, with a view to addressing any competency deficits detected by the assessments. The Council appreciated the highly productive cooperation with the US COMET programme, which has provided access to a range of learning modules including a newly developed module on QMS. These are available on the COMET website at https://www.meted.ucar.edu/.

4.1.10 Recognizing the important role that Regional Training Centres (RTCs) have in the successful implementation of the AMP Competency Standards, the Council urged the ETRP and CAeM to coordinate with the RTC network and other training and education institutes on the further development of mechanisms, documented in line with QMS principles, to support the training, education and ‘best practices’ in the assessment of AMP. In this context, the Council warmly thanked the significant contributions to the work of the Expert Team on Education, Training and Competencies (ET-ETC) by the staff and management of the CIMH, which played a pivotal role in the success of this expert team.

4.1.11 The Council, recognizing also the significant resources needed by Members to comply with this new regulation, considered mitigation options for Members that would have difficulties in assuring that all relevant personnel be assessed and found competent by 1 December 2013. It recalled the request by the Members present at the recently held Technical Conference in connection with the sixteenth session of RA IV in Curaçao to complete the cycle of competency assessment workshops by holding such an event for RA III and RA IV in 2013.

4.1.12 In a QMS sense, the first priority for Members would be to establish a clear plan for the assessment of competencies, including:

(a) To create teams of assessors building on the individuals that have participated in WMO assessment training workshops;
(b) To establish a prioritized list of personnel that requires assessment;
(c) To develop, as a first step, an initial assessment methodology based on desk-top evaluations of quizzes, portfolios and existing evaluations including verification of products;
(d) To develop a prioritized plan for individual, in-depth assessments of personnel based on the results of the desk-top evaluations;
(e) An estimate of the time and resources needed for the completion of these steps;
(f) To inform the Quality Management Team of the NMHS and the WMO Secretariat of this estimate through suitable focal points or rapporteurs;
(g) To seek cooperation arrangements with other Members of the region, in particular where numbers of staff and resources are very limited.
SIGMET Advisory Trial

4.1.13 The Council noted that ICAO, in close collaboration with WMO and with the assistance of France, South Africa and China, had conducted a SIGMET advisory trial in RA I and RA II in mid-2011, in order to address long-standing SIGMET issuance deficiencies. The Council noted with concern that, although RA IV was not part of this exercise, some Members in the Region struggled to comply with the relevant ICAO regulations due to a severe lack of personnel and financial resources made available to them. The Council noted with concern that some aviation stakeholders and authorities were exerting strong pressure on ICAO to transition to a more phenomena-based, regionalized provision of Meteorological Hazard Advisories, which would possibly affect the role and resourcing of some of the smaller Members in the Region.

4.1.14 In the case of severe resource deficiencies, the Council further encouraged those Members concerned to seek the temporary transfer of their SIGMET responsibilities through negotiations involving ICAO to a Member in a position to provide this service on their behalf until such time that the necessary capabilities have been re-established, and noted Resolution 6 (EC-64) – Alternate means of compliance with ICAO SIGMET Provisions.

4.1.15 The Council further noted the requirement by aviation users that SIGMET information be better harmonized across the boundaries of Flight Information Regions (FIR), and encouraged the establishment of regional coordination mechanisms, making best use of existing CAeM Aviation Task Team structures and ICAO regional planning and implementation groups to liaise between Meteorological Watch Offices to support this effort.

4.1.16 The Council having been informed of plans by ICAO to create a structure of SIGMET advisory centres as developed during the advisory trial in 2011, encouraged Members with adequate resources in competent personnel and advanced infrastructure to cooperate with this project by closely following the ICAO regulatory process and exploring the possibility to become a candidate advisory centre.

Information relating to the status of SIGMET implementation by Members

4.1.17 The Council, having been informed of significant information deficits concerning the implementation status of such priority items as QMS, Competency Assessments and SIGMET issuance, strongly requested Members to provide the necessary status information to the Secretariat by timely replies to relevant questionnaires. The Council reminded Members that only complete, up-to-date and accurate information on the implementation status can be used to prioritize Secretariat and other support to Members. The Council thus adopted Resolution 3 (EC-65) – Steps to be undertaken to achieve compliance with the regulations of the World Meteorological Organization and the International Civil Aviation Organization.

Meteorological services for air traffic management and data-centric information exchange models

4.1.18 The Council noted the work of the Expert and Task Teams jointly established by CAeM and CBS to drive and facilitate the migration of aeronautical meteorological information (such as METAR/SPECI, TAF and SIGMET) to a XML/GML digital form, formatted in accordance with a globally interoperable information exchange model. To this end, and recognizing regional air traffic management improvement programmes such as NextGen (United States), SESAR (European Union) and CARATS (Japan), the Council noted that ICAO, with the assistance of WMO, was addressing the future system-wide information management of aeronautical meteorological information that will support the future global air traffic management environment. The latest version of the ICAO Global Air Navigation Plan (GANP) encompassed a system of sequential Aviation System Block Upgrades (ASBU) that were designed to take full advantage of emerging new technologies in all areas of aviation to cope with the expected growth of traffic and the ensuing increased traffic density.

4.1.19 Aviation meteorology is seen as a fundamental enabling factor for the transition to new, trajectory-based air traffic management concepts, for which highly accurate, reliable and detailed
meteorological information will be a pre-requisite to maintain and improve safety and economy while reducing the environmental impact in an increasingly dense air space. The Council further supported the development of new, tailored meteorological services for Air Traffic Management with emphasis on high-density air space and aerodromes by a newly established Project Team of ICAO in close cooperation with WMO, whereby the CAeM Expert Team on Meteorological Service to ATM and Meteorological Information Exchange (ET-M&M) is providing the scientific and technical input.

4.1.20 The Council, however, expressed concern about the accuracy and performance requirements for data and information currently discussed at the relevant ICAO groups, and urged the Commission for Aeronautical Meteorology (CAeM), the Commission for the Atmospheric Sciences (CAS) and the Commission for Instruments and Methods of Observation (CIMO) to study and evaluate these emerging requirements in terms of scientific and operational feasibility, cost implications and realistic implementation time-lines. Considering the future development of net-centric technologies in aeronautical meteorological services, the Council noted the importance of addressing issues of quality, integrity and reliability of aeronautical meteorological data and information, and its protection from unauthorized access, when introducing SWIM principles in support of the future global air traffic management system.

Volcanic Ash

4.1.21 The Council strongly supported the work of the WMO/IUGG Volcanic Ash Scientific Advisory Group. It was informed that since its establishment in March 2010, this group had played a significant role in advancing the scientific understanding of volcanic ash detection and forecasting in support of continued safe and efficient civil aviation operations. The Council was also informed of the recent conclusion of the ICAO International Volcanic Ash Task Force (IVATF). IVATF had involved many Members and resulted in a large number of recommendations to go forward to the International Airways Volcano Watch Operations Group. The Council noted that the recommendations will have procedural, training, and resource implications for many Members and requested the president of CBS to cooperate with CAeM in providing all necessary support to the Volcanic Ash Advisory Centres, Meteorological Watch Offices and Volcano Observatories for this challenging task. The Council encouraged in particular those Members with a large number of active volcanoes to review their activities and involvement in this process.

4.1.22 The Council further noted with appreciation that a number of “Best Practice Seminars” on Volcanic Ash Operations, initiated by ICAO with strong WMO involvement, had taken place, twice at the ICAO HQ in Montreal in 2011 and 2012, and once in parallel with a very successful WMO Volcanic Ash Workshop in Citeko, Indonesia in 2013. Also a successful dispersion model ‘inputs and outputs’ workshop was held at the NOAA Center for Weather and Climate Prediction (NCWCP) Facilities in 2012.

4.1.23 The Council was informed of an emerging consensus within the Volcanic Ash User Community that a gradual transition from determining the location of “any ash” towards a more quantifiable prediction of ash loading would require an upgrade of the relevant observing capabilities. The Council thus noted with appreciation that a joint letter by the Secretaries-General of WMO and of ICAO to all Members and Contracting States has strongly requested the Members /Contracting States of the two organizations to enhance and support the observation programmes that will allow to objectively determine the location, height and intensity of volcanic ash clouds. Only an integrated observing system with both ground and space-based observing systems could be expected to deliver the necessary resolution, completeness and reliability of Volcanic Ash (as a specific form of litho-aerosols). Recognizing this, the Council requested that systems developed for volcanic ash observation is incorporated into WIGOS.

Other emerging issues

4.1.24 Aviation as a crucial sector of the transport industry is required to establish sound safety risk management procedures. In this respect, the establishment of a CAeM-CBS inter-commission task team on space weather is developing a concept of operations in close cooperation with ICAO on the potentially harmful effects of solar storms on communications and
navigation systems and the health of passengers and crews. The Council strongly supported this cooperation between ICAO, CAeM, CBS and space weather agencies with a view to develop and agree on procedures for, and content of, the data on space weather disturbances and their potential effects on the flight safety.

4.1.25 Similar efforts are underway to provide meteorological support to aviation in the event of the release of chemical and/or nuclear hazardous substances. This work is again undertaken as a multi-disciplinary effort with other UN partners such as WHO, IAEA, ICAO, UNWTO and other stakeholders. The importance of this work was highlighted by the recent nuclear incident in Fukushima (Japan). A draft Terms of Reference for a joint working group of these organizations, to coordinate and strengthen the capacity for emergency response activities in the global transport sector, has been drafted and should be agreed shortly.

Public Weather Services

Implementation Plan for the WMO Strategy for Service Delivery

4.1.26 The Council recalled that, as requested by the Sixteenth World Meteorological Congress, the Secretary-General had arranged for the preparation of a draft Implementation Plan (IP) for the WMO Strategy for Service Delivery for approval by the Executive Council. It noted that the Public Weather Service (PWS) Programme had provided support to the EC Working Group on Service Delivery (ECWG-SD) in the development of the IP through wide consultations with the presidents of regional associations, presidents of technical commissions, experts in a number of NMHSs, as well as WMO Programmes. The Council fully supported the mainstreaming of a Quality Management System (QMS) in NMHSs through the implementation of the Strategy. The Council strongly supported the IP and welcomed its publication in view of the desirability of NMHSs to improve their service delivery, and recognized that these improvements would promote increased credibility and visibility of NMHSs in the eyes of the governments and user communities. It therefore adopted Resolution 4 (EC-65) – Implementation Plan of the WMO Strategy for Service Delivery, approving the implementation plan as contained in the annex to the resolution.

4.1.27 The Council urged Members to adapt and apply the Strategy and its IP to their own service delivery strategies and plans, for the delivery of quality services to all social and economic sectors in support of security of life, livelihood, property and national economic activities. It requested the Public Weather Service (PWS) Programme to make every effort to assist NMHSs in the application of the Strategy in a realistic, pragmatic and concrete manner in the provision of services to the public and other users, and, to organize regional seminars/conferences for the senior management of NMHSs in order to familiarize them with the IP. The Council also drew attention to the importance of proper monitoring of the progress of the application of the IP. The Council highlighted instances where weather phenomena which had been well forecast nevertheless led to considerable loss of life and damage. It urged that best practices in service delivery, which had been developed by some Members, such as the Weather-Ready Nation initiative of the National Weather Service in the United States, and the RA dio InterNET (RANET) communication system, would be widely shared for the benefit of all Members.

4.1.28 The Council agreed that excellence in service production and delivery is vital for NMHSs to sustain their mission. High quality service delivery is also a key element in keeping NMHSs competitive with the private sector and helping secure their credibility as the service provider of choice. Consequently, the guidance provided by the PWS Programme to NMHSs in promoting delivery of high quality services to user communities and in improving their skills in communicating social and economic benefits to decision-makers is critical.

4.1.29 The Council recognized the considerable resources that would be required by NMHSs to realize the implementation of the WMO Strategy for Service Delivery. It noted the risk of reduced visibility to end-users and policy makers of the basic role performed by NMHSs in consequence of increased delivery of services by the private sector providers. In this regard, the Council encouraged initiatives that would demonstrate the essential and unique role of public sector meteorology and support public funding provision for NMHSs.
The Council reiterated the importance of the demonstration of the socio-economic benefits of the services provided by NMHSs, particularly in developing countries in relation to the safety of life, livelihood and property as enshrined in the WMO Convention. In this connection, it recalled its request to the Secretary-General, through Resolution 7 (EC-64) - Social, Economic and Policy Impacts of Weather, Climate and Water Services, to prepare, in collaboration with the World Bank, an authoritative publication on methodologies for assessment of the benefits of services provided by NMHSs. In addition, the Council strongly supported that NMHSs be assisted in communicating the social and economic benefits of their services to their governments and to other decision-makers and welcomed plans by the PWS Programme to prepare relevant guidance material for this purpose. The Council was highly appreciative that in response to the request of EC-64, the PWS Programme, partnering with the WMO Regional Office for Europe (ROE), organized an expert meeting with representatives from a number of NMHSs and user sectors, economists from the World Bank, and social scientists, in April 2013, under the auspices of the “WMO Forum: Social and Economic Applications and Benefits of Weather, Climate and Services”. The experts began work on preparation of this joint publication and agreed that the methodologies should be tested through demonstration projects in a few NMHSs. The Council underlined the importance of the development of an authoritative WMO-World Bank document on methodologies for the assessment of the socio-economic benefits of NMHSs activities. The Council requested that a report on the progress of the project be presented to EC-66.

The Council noted the strong support of the ECWG/SOP for the joint WMO-World Bank Project, while highlighting the close synergy between provision and delivery of quality services by NMHSs and the valuation of those services. The Council supported the need to stress the value of underlying infrastructure at NMHSs that make the delivery of authoritative quality services possible and emphasized that in a policy dimension, the authoritative nature of those services had itself a core value. The Council recognized the value in holding a follow-up conference to the Madrid Conference (Madrid plus X) as an opportunity to raise the profile of NMHSs as providers of high quality services to users. In this regard, the Council requested that the ECWG-SD undertake an analysis of conducting this follow-up Conference with the result of the analysis to be presented to EC-66. This analysis should consider whether the funds for such a conference might be better spent on implementation of socio-economic studies for NMHSs, especially in developing and least developed countries and Small Island Developing States (SIDS).

The Council stressed the need to further strengthen the PWS component of the Severe Weather Forecasting Demonstration Project (SWFDP) to enhance the delivery of high quality warning and forecast services to users and thus ensure the full realization of the benefits of all current and future SWFDP projects. It supported the work of the PWS Programme in developing the capabilities of the NMHSs participating in the SWFDP to work with disaster management and civil protection authorities, and the media as primary beneficiaries of their services; and, in developing multiple communication channels including the traditional and emerging media.

The Council also noted that the WMO Marine Meteorology and Oceanography Programme has successfully conducted user requirement oriented activities contributing to capacity development for NMHSs, such as CIFDP-related training. The Council advised that this line of activities should further closely coordinate with PWS to ensure that the outcome of such projects would contribute to the implementation of the WMO Strategy for Service Delivery.

The Council noted the outcomes of the Common Alerting Protocol (CAP) Implementation Workshop and the CAP Jump-Start Workshop organized by the PWS Programme (Geneva, Switzerland, April 2013), and strongly encouraged the engagement of Members in adopting the CAP standard for communicating alerts. It recognized that the concept of CAP was not yet widely understood and that NMHSs needed assistance, through initiatives such as the CAP Jump-Start workshops, in becoming familiar with this technology and its utility. The Council therefore supported the recent training events organized by PWS to train NMHSs staff in Regional
Association I (Africa) in the implementation of CAP. It welcomed the publication, by PWS, of the Guidelines for Implementation of Common Alerting Protocol (CAP)-Enabled Emergency Alerting (PWS-27, WMO-No. 1109) as a tool for NMHSs to implement the CAP standard (the publication is available at http://library.wmo.int/pmb_ged/wmo_1109_en.pdf). Furthermore, the Council encouraged Members to participate in the WMO Register of Alerting Authorities initiative, using the PWS guide Administrative Procedure for Registering WMO Alerting Identifiers (PWS-20, WMO/TD-No. 1556) which is available at http://www.wmo.int/pages/prog/amp/pwsp/publications-guidelines_en.htm. The Register is an important tool towards achieving a “single official voice” status for NMHSs in issuing weather warnings. Active maintenance of the Register implied the need for close coordination between NMHSs and other agencies with alerting responsibilities for non-meteorological phenomena within Members. 

4.1.35 In recognizing the trend of moving towards impact-based forecasting, the Council noted the advisability of establishing formal collaborative and coordination mechanisms between NMHSs and national agencies responsible for civil protection. The Council supported the preparation of guidance material for NMHSs on developing multi-hazard impact-based information and warning services, by PWS experts in collaboration with relevant Commission for Basic Systems Open Programme Area Groups (CBS OPAGs) as approved by the fifteenth session of CBS (CBS-15, Jakarta, Indonesia, September 2012). The guidance material will highlight the challenges of impact-based forecast services as well as national circumstances as regards the responsibilities of NMHSs and existing task sharing in national risk management and will be enriched with existing examples and best practices of impact-based forecast and warning services. The Council requested to be kept informed of progress in this area. In this connection, the Council was informed of the positive feedback received from stakeholders in the United Kingdom following the introduction by the Met Office of an impact-based national severe weather warning service in 2011. Building on this success, an impact-based model is now being developed for other natural hazards in the United Kingdom in collaboration with other responsible agencies, organizations, and end user communities under the umbrella of the United Kingdom Natural Hazards Partnership. The Council noted with appreciation that the United Kingdom Met Office is willing to work with WMO to share these experiences. Similarly, the Council underlined the importance of collection by WMO of statistical data on natural hazards including severe weather events, and recognized that this could be best achieved through cooperation with insurance and re-insurance industries.

4.1.36 With regard to the recommendation by Cg-XVI that all technical commissions define competency requirements for their core job-tasks, the Council reviewed progress in developing competency requirements for PWS forecasters and advisors since its sixty-fourth session. These competency frameworks would not have regulatory force as is the case for competency standards in aviation meteorology, but would be guidance for Members in establishing and demonstrating appropriate levels of competency among their forecast staff. Competency framework documents were being developed; one for PWS forecasters, which would be the fundamental document, together with additional competency framework documents for more specialized roles such as forecasters working in the media, with emergency management, and on the development of focused products for users. The Council was informed that following the review of the requirements by CBS-15, they were being further developed within CBS and the EC Panel of Experts on Education and Training before being presented to CBS-Ext.(14) for approval.

Improving Forecast and Warning Services

4.1.37 The Council was updated on the preparation of guidance material to assist NMHSs in governing their relationships with cooperating agencies. The PWS Guidelines for Creating a Memorandum of Understanding and a Standard Operating Procedure between a National Meteorological or Hydrometeorological Service and a Partner Agency was published as PWS-26, WMO-No. 1099. This publication is available at the following web link: http://www.wmo.int/pages/prog/amp/pwsp/publications-guidelines_en.htm. The Council urged Members to consult this publication as a resource to assist them when developing collaborative relationships with partner agencies.
4.1.38 The Council appreciated the continued operational success of the World Weather Information Service (WWIS) Website, now available in ten language versions, namely: Arabic; Chinese; English; French; German; Italian; Polish; Portuguese; Russian; and Spanish, providing forecasts for 1,699 cities and with cumulative page visits surpassing the 1 billion mark. The Council welcomed the recent launch of the “MyWorldWeather” Android application following the success of the iPhone Application, but reminded that it is important to develop mobile weather applications for all major software platforms. The Council encouraged Members to continue to increase the number of cities for which they provided forecasts, the lead time, as well as the frequency of updating the forecasts. The Council expressed appreciation for the excellent manner in which Hong Kong Observatory (HKO) of Hong Kong, China was coordinating WWIS and Severe Weather Information Centre (SWIC) on behalf of Members. The Council welcomed the recently produced Guidelines on Participation of National Meteorological and Hydrological Services in the WMO World Weather Information Service, published as PWS-25, WMO-No. 1096, to assist NMHSs enhance their participation in WWIS. The Guidelines are freely available in Arabic, English, French, Russian and Spanish on the Web at the following web link: http://www.wmo.int/pages/prog/amp/pwsp/publicationsguidelines_en.htm.

Tropical Cyclone Programme

Support to Operational Forecasters

4.1.39 The Council noted that the Tropical Cyclone Programme (TCP) launched the WMO Tropical Cyclone Forecaster Website (TCFW) in April 2013. TCFW is hosted and maintained by the Hong Kong Observatory of Hong Kong, China on behalf of WMO and is now accessible at http://severe.worldweather.wmo.int/TCFW. The website is aimed to assist forecasters of all the basins in their operational forecasting of tropical cyclones. It functions as a portal to navigate the forecasters to various websites offering data/products of tropical cyclone analyses and forecasts. TCFW will also provide research outcomes and training materials, and thus serve as a comprehensive source of information for the forecasters. The Council encouraged the Members to actively use the websites and give feedback to the TCP for further enhancement of the utility of the TCFW.

4.1.40 The Council also noted that the update of the WMO Global Guide to Tropical Cyclone Forecasting, which was recommended at the sixth International Workshop on Tropical Cyclones (IWTC-6) in 2006, was finally completed in April 2013 at the initiative of Mr Chip Guard of the United States who served as Chief Editor. It was proposed that the new Global Guide be web-based to allow for revision/update as necessary in an easier manner so that it is kept fresh and will meet the needs of the time. In this regard, the Council noted with appreciation that the Australian Bureau of Meteorology agreed to accommodate a website for the new Global Guide and had set to work to develop its web-based version.

4.1.41 Noting the particular significance of TCFW and the web-based Global Guide for developing countries, the Council recommended that those websites be utilized also as resource for capacity development activities. It was envisaged that the two websites would be effectively linked and coordinated with each other to maximize their synergized effects. In this context, the Council requested the Secretariat to make efforts towards early completion of the new web-based Global Guide.

Coordination of Forecasting Services

4.1.42 The Council supported the initiatives of the TC RSMCs/TCW Cs Technical Coordination Meeting (TCM) in promoting the uniformity and standardization of tropical cyclone forecasting services. The Council noted that the TCM conducted a thorough review of the application of Common Alerting Protocol (CAP) to tropical cyclone warnings and advisories at its 7th session (Indonesia, 11–15 November 2012). It paid particular attention to the tropical cyclone advisories in CAP format which RSMC Tokyo started to develop on a trial basis in 2012. The Council noted that the TCM, while reaffirming the benefits of CAP as a universal adaptor for alert messages, recommended pursuing the studies on several issues such as the profile of track forecasts and
determination of alert areas in the CAP messages, which were identified during the 7th session. The Council endorsed the recommendation of the TCM and requested the Secretary-General to facilitate such practical discussions on CAP also at a regional level.

4.1.43 Noting the growing attention of society to tropical cyclone disasters across the regions and the response of the international disaster agencies, the Council also welcomed the recommendation of the TCM to explore the feasibility of developing a globally-unified classification of tropical cyclones including a category system. It will require an in-depth review of the current warning practices in all the regions and a careful consideration for the acceptability to the users who are familiar with existing classifications over the years. To undertake the study, the TCM set up an ad-hoc team which is comprised tentatively of RSMCs La Reunion, Miami, New Delhi, Tokyo and TCWC Perth as members, and the National Climatic Data Center of NOAA as an observer. The first result of the study will be reported to the TCM at its next meeting to be held in 2015. The Council requested the Secretary-General to keep the Council informed of the progress and outcomes of the study.

4.1.44 The Council recalled that Amendment 75 to ICAO Annex 3/WMO Technical Regulations [C.3.1] concerning provision of the graphical format of tropical cyclone advisories became effective in November 2010. In this respect, the Council underlined the report from ICAO, which was presented to the TCM-7, showed that so far only two of the seven Tropical Cyclone Advisory Centers (TCACs) had implemented the TC advisories in graphical format as of March 2012. In view of the improved usability of the advisories in international air navigation, the Council urged the TCACs to complete the migration of the advisory format as early as possible.

Regional TC Committees

4.1.45 The Council noted that the five regional tropical cyclone (TC) committees continued to enhance their warning services based on the regularly updated operational plans/manual and technical plans. In this regard, the Council supported the strategic approach that the TC committees had increasingly taken for updating their technical plans and forming closer links with the WMO Strategic Plan (e.g. Coordinated Technical Plan of the WMO/ESCAP Panel on Tropical Cyclones and ESCAP/WMO Typhoon Committee Strategic Plan).

4.1.46 The Council further noted that the scope of activities of the regional TC committees had been expanded through involvement with the WMO cross-cutting projects such as the Severe Weather Forecasting Demonstration Project (SWFDP), Coastal Inundation Demonstration Project (CIFDP) and Disaster Risk Reduction projects for Early Warning Systems in Regions I, II, IV and V. The Committees’ annual/biennial sessions serve as venues for information sharing for the projects and their technical plans have incorporated collaborative actions with those projects. The Council also noted the need of wider cross-cutting project coverage to reach all the Members of the regional TC committees. A synergistic relationship has also been developed with other UN agencies and international/regional entities. In a related move, the Council emphasized the recent cooperation between the RA V Tropical Cyclone Committee and the ICG/PTWS Regional Working Group on Tsunami Warning and Mitigation in the South West Pacific. The two groups jointly organized their sessions in July 2012 and agreed on the reciprocal enhancement of their cooperative activities in the future.

4.1.47 Considering the efficiency and effectiveness in developing regional early warning systems, the Council reiterated the important functions of the TC committees as above to be discharged in their regions through a multi-hazard approach. It requested the Secretary-General to provide the necessary support to the regional TC committees for fulfilling their evolving roles to play as established regional warning mechanisms.

Capacity Development

4.1.48 The Council noted that the training opportunities and courses regularly organized by the TCP have been of significant assistance to NMHSs for enhancement of their operational forecasting of tropical cyclones. It accordingly expressed appreciation to the Australian Bureau of
Meteorology, Météo-France and NOAA/National Hurricane Centre for hosting the group trainings and to the Japan Meteorological Agency and the India Meteorological Department for the on-the-job training at RSMCs. Regarding the group training, the Council noted with satisfaction the special arrangements that have recently been made for the NMHSs in urgent need of capacity development, including the Southern Hemisphere Training Course on Tropical Cyclones and the Workshop on Public Weather Services (PWS) for Fiji and the RA IV Workshop on Hurricane Forecasting and Warning and PWS for Haiti. The Council supported the TCP’s approach taken to cover broader aspects of warning services in the trainings through developing synergies with its partner programmes such as in particular DPFS for SWFDP, DRR for EWS and MMOP for CIFDP, in addition to PWS which has already proven its notable achievements in service delivery for years.

4.1.49 The Council stressed that the tropical cyclone forecaster competencies need to be developed to ensure the quality of tropical cyclone forecasting services and to meet the users’ requirements. It noted with satisfaction that the RA I and RA V Tropical Cyclone Committees and RA IV Hurricane Committee set up expert teams to propose a set of competencies in their respective Regions. For a coordinated and structural approach for developing the competency standards, the Council requested the WMO Secretariat to facilitate the discussion also in other Regions.

4.1.50 The Council noted that a series of the joint JCOMM/TCP Workshop on Storm Surges and Wave Forecasting has been successfully conducted for developing countries to establish and improve forecasting capabilities for waves and storm surges. The Council therefore requested the Secretariat to continue organizing and facilitating these workshops, as collaboration between JCOMM and TCP, in those Regions in need.

Marine Meteorology and Oceanography

4.1.51 The Council recalled that the report of the fourth session of Joint WMO-Intergovernmental Oceanographic Commission (WMO-IOC) Technical Commission for Oceanography and Marine Meteorology (JCOMM-4), held in Yeosu, Republic of Korea, from 23 to 31 May 2012, including the resolutions and recommendations was approved by the WMO Executive Council at its sixty-fourth session through Resolution 2 (EC-64).

4.1.52 The Council agreed with the JCOMM management approach to make plans for a proper operating plan versus available resources considering the expected long intersessional period (2012–2017/18). Intermediate steps may be required taking into account the Seventeenth World Meteorological Congress (2015).

4.1.53 The Council noted that the 10th session of the JCOMM Management Committee was held at the UNESCO/IOC Headquarters (7–10 May 2013). It recognized with satisfaction that the JCOMM intersessional workplan (2012–2017) included contributing activities to all five WMO Strategic Thrusts. The Council advised that further efforts should be made to fill the regional and technological gaps in ocean observations and services, including support for the new establishment of a new marine Data Collection or Production Centres (DCPCs) in Qatar, and encouraged JCOMM to expand capacity building initiatives to support the workplan conducted by the Commission.

IMO/WMO World Wide MetOcean Information and Warning Services

4.1.54 The Council recalled its decision at the sixty-second session to establish a World-Wide Met-Ocean Information and Warning Service (WWMIWS), and consequently the IMO/WMO, World-Wide Met-Ocean Information and Warning Service, Guidance Document, formally adopted by the twenty-seventh session of the International Maritime Organization (IMO), Resolution 1051/A27, on 20 December 2011.

4.1.55 The Council noted that the WWMIWS introduced the role of METAREA Coordinators and identified their responsibilities to ensure that the provision of met-ocean information and
warnings is consistent in meeting the obligations of the International Convention for the Safety of Life at Sea (SOLAS). This also ensures consistency with other aspects of safety information provided under the Convention, in particular, Navigation Warnings, which are provided under the auspices of the International Hydrographic Organization, and are coordinated by NAVAREA Coordinators. The Council noted the need for collaboration by JCOMM (through its Expert Team on Maritime Safety Services) with IOC, IHO and IMO to better coordinate the provision of tsunami warnings on the SafetyNet system. The Council recognized the need of ensuring maritime weather and sea ice safety services, including the operational service in five new Arctic Ocean Metareas, and acknowledged the acceptance of the NMHSs to serve as coordinators in their different Metareas. It further requested the Secretary-General to coordinate with IMO and IHO to have the METAREA Coordinators formally approved as soon as possible.

4.1.56 The Council noted and endorsed the recommendation of the JCOMM Management Committee at its 10th session (7–10 May 2013, Paris, France) to review the overall structure of the Manual on Marine Meteorological Services (WMO-No. 558) and the Guide to Marine Meteorological Services (WMO-No. 471), in view of making a recommendation for a new structure of those mandatory publications without duplication and/or potential conflict in contents. The Council also noted that such a review should also develop clear guidelines for Members applying to be Preparation/Issuing Services for the Global Maritime Distress and Safety System (GMDSS) Marine Broadcasting System.

Marine Environmental Emergencies

4.1.57 The Council recalled Recommendation-4 (JCOMM-4), approved by EC-64, that JCOMM should take a proactive role in supporting Members/Member States to respond to marine environmental emergencies including the maritime radioactive material discharge. The Council noted the establishment of an ad hoc Task Team on JCOMM Coordination for Marine Environmental Emergency Responses, in pursuing this objective during the intersessional period. The Council requested the Secretary-General to facilitate the work of the ad hoc Task Team, and encouraged JCOMM to closely liaise with IAEA, IMO, IHO, IOC (of UNESCO) and other partners to develop a clear concept including the user perspectives and requirements for the delivery of information regarding marine environmental emergency responses. The Council further noted that the results of the Task Team activities would also contribute to the implementation of the International Convention for the Prevention of Pollution from Ships (MARPOL).

4.1.58 The Council noted the recent announcement from the Arctic Council of the signing of the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic. The Arctic Council encouraged the development of future national, bi-national and multinational contingency plans, training and exercises, to develop effective response measures. To this end, the Arctic Council established a Task Force to develop an Arctic Council action plan or other arrangement on oil pollution prevention, and directed the Task Force to present the outcomes of its work and any recommendations for further action at the next Ministerial meeting in 2015. The Council encouraged the Secretariat and the ad hoc Task Team on JCOMM Environmental Emergency Responses to participate in the work of this Task Force and to bring meteorological expertise to bear on the protection of this fragile environment from possible future oil pollution incidents.

Coastal Inundation Forecasting Demonstration Project

4.1.59 The Council recalled the joint efforts of JCOMM and CHy through the Coastal Inundation Forecasting Demonstration Project (CIFDP: http://www.jcomm.info/CIFDP), to demonstrate how integrated coastal inundation forecasting and warnings can be improved and effectively coordinated by the National Meteorological and Hydrological Services (NMHSs). The Council reaffirmed the importance of CIFDP to enhance capacity of NMHSs for coastal disaster risk reduction, and to improve interaction with users of the NMHSs’ information services.

4.1.60 The Council noted with satisfaction the progress in ongoing National Sub-Projects of CIFDP for Bangladesh, Dominican Republic and Fiji. It also welcomed the initiation of the
Shanghai Sub-Project (CIFDP-S) in China and a plan for an Indonesia National Sub-Project (CIFDP-I). The Council expressed its appreciation to those countries providing support for the implementation of Sub-Projects, including the Republic of Korea and the United States, and requested the Secretary-General to continue to explore and coordinate resource mobilization for further implementation of CIFDP projects. The Council further noted that other countries with similar coastal issues should benefit from the experience and developed procedure/technologies from the CIFDP National Projects.

4.1.61 The Council recognized the improved concept and general framework of CIFDP, as detailed in the CIFDP Implementation Plan (JCOMM Technical Report No.64), and agreed that the revised framework would provide sound guidelines for those countries which plan to develop an integrated coastal inundation forecasting and warning system embedded in the national disaster management. Noting that even the most efficient warning system could leave a large potential for fatalities, and that the institutional collaboration would be the key to efficient warnings, the Council encouraged all Members concerned to consider developing and improving an integrated forecasting/warning system for coastal inundation by using the established framework and guidelines through CIFDP.

4.1.62 The Council noted linkages with related programmes and projects with CIFDP, including the Storm Surge Watch Scheme (SSWS), Severe Weather Forecast Demonstration Project (SWFDP), eSurge project of the European Space Agency (ESA), the WMO Working Group on Societal and Economic Research Applications (WG-SEERA), IOC Working Group on Tsunamis and Other hazards related to sea level Warning and mitigation Systems (TOWS-WG) and many others. The Council requested JCOMM and CHy, with support from the Secretary-General, to ensure continuing and close coordination with these activities, for synergies in strengthening national capacities under the respective subprojects.

4.1.63 The Council noted with satisfaction the JCOMM contributions to the Global Framework for Climate Services (GFCS) that the JCOMM leadership articulated in the 10th session of the JCOMM Management Committee. JCOMM expertise in ocean observations, ocean modelling, and ocean forecasting services is one of the foundational components that enable the GFCS. The Council further recognized that the JCOMM-led CIFDP efforts have demonstrated service provisions to coastal communities under the GFCS.

4.1.64 The Council noted the establishment by the International Telecommunication Union (ITU), the UNESCO/IOC and the WMO, of a Joint Task Force to, inter alia, develop a roadmap that could lead to enabling the availability of submarine repeaters equipped with scientific sensors for disaster warning system (tsunamis), and the monitoring of some essential climate variables. The Council requested the Secretary-General to facilitate the work of the Joint Task Force and encouraged JCOMM to actively contribute by providing the corresponding technical advice and expertise.

Agricultural Meteorology

Weather and Climate Services for the Agricultural Community

4.1.65 The Council recognized the work of the various CAgM Expert Teams in assisting WMO Members in providing better weather and climate services to the agricultural community. The Council requested the sixteenth session of CAgM in 2014 to consider appropriate structures to support the GFCS and especially the User Interface Platform and Capacity Building pillars, including Global Initiatives in AgroMeteorology (GIAM) with support of ICT infrastructure and an improvement of the coordination mechanisms. The Council encouraged CAgM to ensure that the proposed Global AgroMet Outlook System (GAMOS) is coordinated and consistent with RCOF and RCC operations.

4.1.66 The Council noted the recommendations of the first Meeting of the Joint JCOMM/CAgM Task Team on Weather, Climate and Fisheries (February 2013, New Caledonia), inter alia, to investigate ways to facilitate meteorological and ocean observations from fishing fleets; to liaise
with FAO for interacting with climate services; and urged NMHSs, especially from Small Island Developing States, to more closely link to the coastal zone and fisheries management community. The Council urged the Secretariat to take steps to promote these activities across all of the WMO Regions, especially in RA IV.

4.1.67 The Council recognized the value of the Roving Seminars on Weather and Climate for Farmers as an example of Climate Services within the context of GFCS. The Council supported the current Roving Seminars activities funded by the METAGRI-OPS project and those held in Ecuador and India supported by the Secretariat. The Council requested the Secretary-General to facilitate efforts to find additional funding for Roving Seminars in other regions of the world.

4.1.68 The Council noted the main outcome of the Senegal Workshop on Scaling-up Climate Services for Farmers in Africa and South Asia in developing project proposals based on the interactions of the workshop participants. The Council encouraged the Secretary-General to work with workshop partners (USAID, CCAFS, and CSP) to further develop these project proposals at future regional workshops funded by USAID in order for the final proposals to be sent to international donors for possible funding.

4.1.69 The Council noted the discussions with WMO and the University of Reading on the use and further development of the Statistics in Applied Climatology (SIAC) training course which uses many examples related to agriculture. The Council urged the Secretary-General to closely work with the University of Reading to use these SIAC courses for capacity building activities in agrometeorology, climatology and GFCS.

METAGRI-OPS Project

4.1.70 The Council noted with satisfaction the activities of the project METAGRI OPERATIONAL in 16 Western African countries and urged that more activities be performed based on the availability of donor funds. The Council expressed its appreciation to the Norwegian Ministry of Foreign Affairs and the Government of Greece for their support to this activity.

4.1.71 The Council emphasized the urgent need of improvement in rainfall observation networks in rural areas of developing countries. The Council encouraged a special coordinated effort from CAgM, CHy, CIMO and possibly CCI to develop standards for simple plastic raingauges to be used by farmers to improve the network of rainfall observations in areas where there are gaps and to contribute to the objectives of the WMO Integrated Global Observing System (WIGOS), with special regard to the quality of observations and the standardization of instruments and methods in rural and agrometeorological networks.

African Soil Moisture Project

4.1.72 The Council noted that WMO and the George Mason University (United States) are working on a project in South Africa to integrate MODIS satellite information with in-situ soil moisture measurements, funded by Norway. The project aims to strengthen integrated and participatory early warning systems for weather and climate risks for sustainable agricultural production in Africa.

World Agrometeorological Information Service (WAMIS)

4.1.73 The Council supported the efforts of the Secretary-General and WMO partners in developing WAMIS to assist WMO Members in disseminating agrometeorological bulletins and information. The Council endorsed the expansion of WAMIS web nodes through extrabudgetary funds to update existing equipment and to provide platforms to test and demonstrate web-based agrometeorological applications which are being developed in existing donor projects.

Caribbean Agro-Meteorological Initiative (CAMI)

4.1.74 The Council noted the successful completion of the CAMI project which was a joint initiative between the WMO and the Caribbean Institute for Meteorology and Hydrology (CIMH),
funded by the ACP-EU. The project successfully developed the capacity of ten NMHSs in the English-speaking Caribbean to deliver climate services to agricultural extension officers and the general farming community in their respective countries. These services are delivered through a sustainable user interface mechanism that will be expanded and replicated in future projects. The Council also noted that the project developed and distributed to regional governments a Policy Brief that promoted the development of weather and climate services for food security in the Caribbean region.

4.2 Disaster Risk Reduction Programme (agenda item 4.2)

**Progress with the implementation of the WMO Disaster Risk Reduction Programme Work Plan (2012–2015) and related strategic issues**

Systematic engagement of WMO Technical Commissions and Regional Associations in the implementation of the Disaster Risk Reduction Work Plan 2012–2015

4.2.1 The Council recalled its decision to adopt the two-tier Disaster Risk Reduction Programme Work Plan (2012–2015) (hereafter referred to as the DRR Work Plan). The aim is to facilitate better alignment of the activities of WMO constituent bodies and global operational network as well as strategic partners to assist National Meteorological and Hydrological Services (NMHSs) to implement an integrated approach to develop and deliver weather, hydrological and climate services to the DRR users. The Council was informed that progress is underway to map the roles and relevant activities of technical commissions (TCs) and the regional associations (RAs) and to develop processes for systematic engagement of the TCs and RAs in the implementation of the DRR Work Plan.

4.2.2 In this regard, the Council urged the TCs, with support from the Secretariat to determine opportunities for leveraging the TCs work plans and resources and identify: (1) current activities of the TCs that are directly relevant; (2) those activities that may require stronger inter-commission coordination across the relevant TCs; and (3) new activities that may be considered to be developed over time, particularly in relation to concrete deliverables of the DRR Work Plan;

4.2.3 The Council was informed by the presidents of the RAs that the coordinated approach of the DRR Programme has facilitated institutional partnerships of NMHS with the DRR user community, leading to greater synergies of activities. It was noted that systematic engagement of weather and climate experts from the Regions in the international and regional conferences in risk assessment and risk transfer is shaping the Regions’ approach to disaster risk reduction. The Council requested the Secretary-General to: (i) continue work with the DRR user community through this coordinated approach; and (ii) to strengthen resource mobilization efforts taking into account regional priorities and existing projects in the Region, in order to avoid duplication. Furthermore, the Council urged the RAs, with support from the Secretariat, to document lessons learned from the integrated and coordinated approach of the DRR Programme and engagement of the RAs in the implementation of the DRR and adaptation capacity development projects in Southeast Europe, the Caribbean, Southeast Asia and the Early Warning System (EWS) Project in Costa Rica and prepare recommendations for role of RAs and promoting the approach to other WMO Regions.

**DRR User-Interface Expert Advisory Groups and linkages to WMO TCs and to GFCS User-Interface Platform (UIP)**

4.2.4 The Council recalled its endorsement of four DRR User-Interface Expert Advisory Groups (UI-EAGs) and mechanisms for the DRR priority thematic areas, including: (1) Hazard/Risk Analysis; (2) Multi-Hazard Early Warning Systems; (3) Disaster Risk Financing and Transfer; and (4) Humanitarian Planning and Preparedness. It recalled that these UI-EAGs were established to provide user input and guidance towards the implementation of the DRR Work Plan. It recalled that the membership of these thematic UI-EAGs included leading experts from the DRR user community (public and private sectors), United Nations and other international partner agencies from humanitarian and development communities, academia as well as the NMHSs and DRR focal
points of relevant WMO TCs. The Council stressed that these DRR UI-EAGs serve as coordinated user platforms to:

(a) Identify and prioritize user needs and requirements for weather, hydrological and climate products and services and as input to the TCs activities pertaining to the development of related guidelines, manuals, and standards;
(b) Facilitate engagement of the user community in the implementation of DRR and adaptation capacity development projects with WMO TCs, RAs and global operational network (e.g., GDPFS, GTS/WIS, WIGOS) to demonstrate utilization of such products and services in DRR decision-making.

4.2.5 The Council was encouraged to learn of the progress in development of user-interface platforms for operational implementation of the DRR Work Plan including:

(a) Engagement of CBS and CCl with the UI-EAG Task Team for Humanitarian Planning, Preparedness and Response Planning for development of operational weather and climate services for the international humanitarian user-community, with a design and implementation planning meeting scheduled for July 2013;
(b) Engagement of the TCs with the UI-EAG on Hazard/Risk Analysis for development of standards for hazard definitions, monitoring, historical databases and metadata and mapping techniques (statistical and forward looking climate analysis) driven by requirements for risk analysis, noting that the first technical workshop planned to be held on 10–14 June 2013, for scoping the activities, priorities and inter-commission cooperation to address this area.

In this regard, the Council requested the Secretary-General to ensure support to the technical commissions to develop these coordinated mechanisms to encourage and where appropriate support the implementation of relevant guidelines and standards.

4.2.6 With consideration for the decisions of the 2012 extraordinary session of the WMO Congress and the EC-64 for the implementation of the Global Framework for Climate Services (GFCS), the Council noted that a number of deliverables of the DRR Work Plan directly contributed to the development of the other four components of the GFCS, namely, Climate Services Information System (CSIS), Observations, Research and Capacity Building. In this regard, the Council requested the Executive Council Working Group on Service Delivery (EC-WGSD):

(a) To establish clear linkages between the WMO DRR Programme UI-EAGs and the GFCS UIPs for DRR, with consideration for DRR UI-EAGs activities for identification of needs and requirements for climate services for DRR (e.g., risk analysis, EWS, disaster risk financing and humanitarian planning) and feedback mechanisms from the user community;
(b) To formulate, in consultation with the TCs and RAs, concrete recommendations to leverage DRR Work Plan deliverables relevant to strengthening of the other four components of the GFCS (i.e., CSIS, Observations, research and capacity development) for implementation of GFCS for DRR applications.

It requested the Secretariat to provide all necessary support to the EC WG SD in accomplishing its tasks.


4.2.7 The Council recalled that HFA 2005–2015 served as the primary driving force for the development of the DRR capacities nationally, regionally and globally and it underpinned the WMO DRR Programme strategic priorities. The Council was informed that, as HFA was drawing to an end in 2015, global, regional and national consultations were underway to identify priorities of action for a post-2015 Framework. The Council stressed the opportunities for inclusion of critical and strategic issues related to development of weather, hydrological and climate services to support DRR, the building of disaster-resilient communities, and the implementation of GFCS, in
the post-2015 Framework. To achieve this, the Council appreciated the efforts of the Secretary-General in consultation with the Members to develop a document that would highlight such strategic issues from national, regional and global perspectives and ensuring that these are communicated through the upcoming global consultations, such as the fourth Global Platform on Disaster Risk Reduction (21–23 May 2013, Geneva, Switzerland).

4.3 Data-processing and forecasting: weather, climate and water (agenda item 4.3)

Weather

Evolution of the Global Data-processing and Forecasting System (GDPFS)

4.3.1 The Council recalled that Cg-XVI (2011) adopted the outline for a revised *Manual on the GDPFS* (WMO-No. 485) through Resolution 6 (Cg-XVI), wherein it decided that this Manual is the single source of technical regulations for all operational data-processing and forecasting systems of Members. The Council reinforced that, similarly to the WIGOS and WIS, the GDPFS is an all-encompassing system, including data-processing and forecasting systems coordinated by CBS, jointly with other technical commissions and/or WMO Programmes, as well as with other international organizations. It agreed that the GDPFS is the basis for the operational production of accurate, reliable and timely weather, climate, water and related environmental forecasts and products, and would therefore satisfy, in a cost-effective and sustainable manner, the evolving data-processing and forecasting requirements of WMO Members. Noting that the evolution of the GDPFS goes beyond the data-processing and forecasting systems of the WWW, the Council requested the Secretary-General to develop an amendment for consideration by EC-66 to reflect these aspects in the *WMO Technical Regulations* (WMO-No. 49). The Council approved the amendments to the *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485) through Resolution 5 (EC-65) – Report of the fifteenth session of the Commission for Basic Systems concerning the global data-processing and forecasting system and emergency response activities (for the proposed amendments to the Manual, see Annex 2 to Resolution 5).

Severe Weather Forecasting Demonstration Project (SWFDP)

4.3.2 The Council noted that the SWFDP continues to make steady modest progress through five regional projects, either underway or under development. Recalling the decision by Cg-XVI that SWFDP should be an end-to-end cross-programme collaborative activity that engages all WMO Programmes that concern the real-time prediction of hydrometeorological hazards, through their respective technical commissions, the Council was pleased to note that the five regional projects presently involve several WMO global and regional operational centres (e.g. RSMCs), 41 NMHSs of developing countries (29 of which are LDCs/SIDSs), and engage several WMO Programmes (i.e. GDPFS, PWS, TCP, DRR, MMO, AgM, SP, ETR, CD, LDC, RP, and WWRP) and technical commissions (i.e. CBS, CAgM, CHy, JCOMM, and CAS).

4.3.3 The Council noted the potential benefit of an expanded role for Global Centres in the SWFDP, as demonstrated by the United Kingdom Met Office Global Guidance Unit (GGU) in the East Africa SWFDP, in sharing best practices, mentoring, training on forecast guidance and facilitating the establishment of effective severe weather teleconferences between the regional centres and NMHS forecasters.

4.3.4 The Council noted that in preparations for the implementation of the GFCS, there had been close consultation with a wide spectrum of users of hydrometeorological services in support of disaster risk reduction, and adaptation to climate variability and change. These users had, *inter alia*, highlighted the success of services delivered under the umbrella of the SWFDP. In addition to global NWP centres and RSMCs, the Council acknowledged that GPCs for Long-range Forecasts (LRF), RCCs and RCOFs could also have a role in the SWFDP model in support of developing seamless regional early warning systems. It therefore agreed in principle that the SWFDP model could also be applied to prediction at longer-time scales. It also agreed that SWFDP should broaden its scope to targeted applications (e.g. agriculture, marine, aviation, flood forecasting, etc.) for extending the benefits of the SWFDP to other user sectors in society. In this context, the
Council recommended synergy between the frameworks of the SWFDP, the FFGS, and the HYCOS projects to optimize existing structures and enhance the capabilities of NMHSs in flood forecasting; and endorsed the request by RA II to the Secretary-General to further explore opportunities with the Mekong River Commission (MRC).

4.3.5 The Council noted the significant increase of resources (both budgetary and human) required to ensure effective implementation, coordination and management of multiple, simultaneous regional projects, and long-term sustainability of the benefits gained with the SWFDP. Noting the main results of the study on resource requirements (WMO-No. 1101, Annex V), which was carried out following the request by EC-64, the Council approved the establishment of a Severe Weather Forecasting Demonstration Project (SWFDP) Office within the Secretariat to support the effective and sustainable management and coordination of regional projects, which would be supported by voluntary contributions, through Annex 1 to Resolution 5 (EC-65). The Council also recognized that the resources required to provide a sustainable training programme across the expanding programme of the SWFDP projects already exceeds what can be supported by voluntary contributions from global and regional centres, both in terms of finance and trainer time. The Council therefore requested the Secretary-General to continue to explore and coordinate resource mobilization with external partners to support the further implementation of the SWFDP and its expansion into all WMO Regions.

4.3.6 The Council acknowledged the importance of engaging with regional associations, including groupings of directors of NMHSs within the regional economical bodies (i.e. comprising Heads of Meteorological Services and Ministries in charge of meteorology) from early stages, to ensure regional endorsement, ownership and sustainability (i.e. recognition of SWFDP as a contributing mechanism for the implementation of their regional meteorological development plans and investment strategies). In this regard, the Council urged that the details of results of the SWFDP be shared with the regions that were not yet involved for them to adequately plan for the expansion.

Operational Weather Forecasting Process and Support – Approach towards Sustaining/ Strengthening WMO Operational Centres that Supports NMHSs

4.3.7 The Council noted that the donor agencies also recognize that the primary approach to building climate resilience and mitigating extreme weather hazards is through capacity development and investment in NMHSs to provide more timely and useful early warnings. Specifically, this requires institutional strengthening of NMHSs, reinvestment in national observing networks, improved forecasting, and placing a greater focus on delivering information and prediction services that meet the needs of governments, industry and communities, particularly in developing and least developed countries. Sustaining this investment requires technical training, a favourable continuous learning environment, and access to technical expertise and reliable and quality assured products that can help NMHSs attain increasingly higher levels of forecasting and service delivery skills. The Council recognized that this would largely rely on effective partnerships, as those established through the SWFDP “Cascading Forecasting Process” that provides improved access to and effective use by forecasters of existing and newly developed products and tools made available by advanced operational global and regional centres.

4.3.8 The Council recognized that advances being made in numerical weather and climate prediction by advanced global centres would require downscaling and tailoring their products (e.g. by regional centres) for practical use by NMHSs. While acknowledging the importance of the continued support from advanced global centres that provide NWP/EPS and satellite-based products, the Council highlighted the backbone roles played by the regional centres in the implementation of the SWFDP. It therefore agreed that strengthening and sustaining WMO operational centres (particularly RSMCs and RCCs, and their linkages to national centres in their respective geographical regions) would sustain and increase the beneficial impacts of the development of much needed capabilities at NMHSs of developing and least developed countries (which typically lack the basic human and financial capacity) for delivering weather, climate and hydrological forecasting and warning services. In this context, the Council acknowledged the planned Workshop on “Sustaining National Meteorological Services – Strengthening WMO
Regional and Global Centres”, organized by NOAA/NWS, the World Bank and WMO, to be held in Washington DC, United States, from 18 to 20 June 2013.

4.3.9 The Council also agreed that strengthening the mechanisms established through the SWFDP, and transitioning the SWFDP to become a properly supported activity in the next two to six years would be an important strategic investment in WMO plans to more fully address its priorities, and benefit more Members. The Council therefore stressed the need to consolidate the SWFDP into sustainable operational services through an ongoing Programme to Strengthen Operational Centres, particularly RSMCs and RCCs, to provide guidance of hazardous meteorological conditions and meteorological-related hazards (cross-reference: general summary, item 2.5). It is expected that this Programme would assist in sustaining the linkages between RSMCs and RCCs and national centres in their geographical regions, and in doing so assist in building upon the lessons learnt through the SWFDP. While focusing on disaster risk reduction, service delivery and capacity development, this broader initiative should be aligned with the evolution of the GDPFS and the WMO Capacity Development Strategy (e.g. Objective 5) (cross-reference: general summary, item 4.6), so as to increase and sustain the capacity of NMHSs in developing and least developing countries to deliver relevant weather, climate and hydrological forecasting and warning services. This would also make a contribution towards attracting further external support, which, if successful, would increase the rate of its uptake and its overall effectiveness.

4.3.10 The Council noted that a draft concept paper for a Programme to Strengthen Operational Centres, built upon the lessons learnt through the SWFDP, was under development and would be considered by the 2014 Meeting of the Presidents of Technical Commissions and thereafter by EC-66.

Operational Predictions from Sub-seasonal to Longer-time Scales, including contributions to GFCS/CSIS

4.3.11 The Council stressed the need for strengthening cooperation and data exchange between Global Producing Centres of Long-Range Forecasts (GPC) and Regional Climate Centres (RCC), and developing a plan of action to realize improved operational practice in support of NMHSs, including through Regional Climate Outlook Forums (RCOF). It therefore endorsed the planned workshop on operational long-range forecasting: GPCs and RCCs, which was being organized by CBS in collaboration with CCI, to be held in Brasilia, Brazil, from 25 to 27 November 2013. The workshop would restrict its scope to improving operational procedures in extended and long-range forecasting as part of the mandatory functions of GPCs and RCCs, and will include issues of capacity building. The Council anticipated that this workshop should facilitate improved implementation and functioning of the GFCS/CSIS and improved long-range forecasting services of WMO Members.

4.3.12 The Council recalled the request by Cg-XVI (2011) to the LC-LRFMME to extend its role to include the operational exchange of extended-range predictions, as a major contribution to the GFCS/CSIS. In order to accelerate the availability of such products to WMO Members, GPCs running extended-range forecasts are encouraged to display their products on their individual websites, and supply data from their monthly forecast systems on a voluntary basis for generation and display of multi-model extended-range products by the LC-LRFMME, along the same lines as for seasonal range products. Noting that standard procedures for verification of extended-range forecasts would be required to support the operational exchange of forecasts, the Council recommended that this pilot exchange be made in coordination with the WWRP/THORPEX/WCRP research activities on sub-seasonal to seasonal prediction.

Emergency Response Activities (ERA)

4.3.13 The Council recalled that WMO had actively participated within the UN system (in particular with the IAEA, as well as through the Inter-Agency Committee on Radiological and Nuclear Emergencies), following the Fukushima Daiichi NPP accident, to review and assess emergency preparedness and response systems. The Council was pleased to note that the WMO
Task Team on Meteorological Analyses for Fukushima-Daiichi Nuclear Power Plant Accident had been completed and the report is available on the WMO website. It noted that this contributes to the post-accident study undertaken by the UN Scientific Committee on Effects of Atomic Radiation (UNSCEAR) on the levels and effects of radiation released from the accident. The Council expressed its appreciation to the experts from several WMO Members, who actively participated in this work.

4.3.14 The Council recalled the request by Cg-XV (2007) with regards to the outdated WMO Technical Note 170, entitled: "Meteorological and Hydrological Aspects of Siting and Operation of Nuclear Power Plants". It endorsed the plan for the completion of the revision of this publication by 2014, involving relevant WMO Technical Commissions and the IAEA. The Council agreed that the revised publication should provide scientific and technical guidance on the access to, and analysis, interpretation and use of, meteorological and hydrological information on hazards, including the relevant aspects of climate variability and change, to support the assessment of the associated impacts on the safety of nuclear installations as well as the planning and risk management efforts concerned, as described in the IAEA Specific Safety Guide: "Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Facilities" (SSG-18, 2011, jointly sponsored with WMO).

**Climate System Monitoring and Assessment**

4.3.15 The Council noted the sustained cooperation among Members in providing input and expert review to the WMO annual statement on the status of the global climate, which has been regularly published since its initiation in 1993. In this regard the Council welcomed the work being taken by the Commission for Climatology (CCI) Task Team on National Climate Monitoring Products (TT-NCMP) to provide guidance on the calculation and provision of new national climate monitoring products that would further improve the content and the timeliness of WMO climate system monitoring products and services.

4.3.16 The Council noted the progress made by the Joint CCI/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI). The achievement included the organization of several hands-on training workshops in the Regions. The outcome of this work has been a valued input to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). Furthermore the knowledge asset in the various Regions being developed using ETCCDI analysis of climate extremes enables NMHSs to contribute to the climate adaptation efforts at regional and national levels. The Council urged Members to further support this activity and increase collaboration on exchanging the indices and the related data and metadata for ensuring highly documented and traceable scientific assessments which are produced through the post workshop interactions between ETCCDI experts and country participants.

4.3.17 The Council noted that it is critically important for the Members to further increase the capacity of their NMHSs to operate high quality climate monitoring and watch systems which are essential for producing timely information on the onset, intensity, geographical extent, duration, evolution and cessation of climate anomalies including extreme climate events such as heavy rains, heat waves, cold waves, drought spells, etc. which can lead to disastrous impacts on health, agriculture, water and public services.

4.3.18 The Council emphasized the urgent need to guide Members on the harmonization of concepts, definitions and tools which underpin the provision of operational climate advisories on extreme weather and climate events in a seamless approach. Considering the significant overlap of these activities with weather operations, the Council emphasized the need for close liaison between CCI and CBS, in line with their separate but mutually supportive responsibilities.

**Climate Services Information System**

4.3.19 The Council noted that the CCI Expert Team on Climate Services Information System (ET-CSIS) is working on a wide range of issues relevant to CSIS operations, including minimum set of functions and products, technical standards, data needs, climate services toolkit, capacity development, etc., in support of the approved Implementation Plan for the Global Framework for
Climate Services (GFCS). The Council agreed that CCI should work closely with CBS and other technical commissions and co-sponsored bodies to lead the CSIS development as a key contribution of WMO to GFCS implementation, to facilitate sustained operational production of the CSIS product portfolio including data, monitoring, diagnostics, predictions/projections, etc.

4.3.20 The Council noted with appreciation the efforts of the CBS/CCI Expert Team on Operational Predictions from Sub-seasonal to Longer-time Scales (ET-OPSLS) to promote and facilitate wider use of the operational long-range forecast (LRF) products provided by the GPCs, both at the regional and national levels. The Council was pleased to note that CBS and CCI are jointly organizing a workshop on operational LRF to help improve the exchange of data and products as well as operational practices (also see paragraph 4.3.9, EC-65/Doc. 4.3(1)). The Council noted that a Memorandum of Understanding on the creation of an International Coordination Office (ICO) for the WWRP/WCRP Sub-seasonal to seasonal (S2S) forecast research project at Jeju, Republic of Korea, was signed between the Republic of Korea and the WMO and was informed of the establishment of a Steering Committee for this project. The Council advised close coordination between the ET-OPSLS and the S2S Steering Committee, to avoid any potential duplication, and to optimize the use of resources.

4.3.21 Recognizing the ongoing work of the CCI/CBS Expert Team on Regional Climate Centres (ET-RCC) in guiding the establishment and implementation of new RCCs, the Council noted that the coverage of Regional Climate Centres (RCCs) is gradually expanding, with a new RCC Network in RA VI and a new RCC (North Eurasian Climate Centre, Russian Federation) in RA II recommended by CBS-15 for WMO designation. The Council also noted that CIIFEN in RA III and CIMH in RA IV have commenced their demonstration phases, and was informed that India began a demonstration phase as candidate RCC in RA II in May 2013. The Council recalled that RCC implementation in RA I is advancing, with the IGAD Climate Prediction and Application Centre (ICPAC) and the African Centre of Meteorological Applications for Development (ACMAD) already in demonstration phase, and a number of subregional RCCs or RCC Networks preparing plans for demonstrations. It was reported to the Council that the countries of Mesoamerica (Mexico and Central America), along with Cuba and the Dominican Republic, are planning an RCC Network with distributed functions to serve this subregion of RA IV. The Council stressed the need for the presidents of regional associations, CCI and CBS to put in concerted efforts to ensure the establishment of RCCs in all Regions to meet the immediate needs of the GFCS implementation. In order to further the objectives of the GFCS implementation plan, the Council also highlighted the importance of the GFCS undertaking innovative and ongoing approaches that expand additional climate service projects and activities, such as the North American Climate Service Partnership between Canada, Mexico, and the United States, which provides information and services at a regional level.

4.3.22 The Council also noted the vital importance of collaboration and the joint contribution of the Regional Associations in developing capacities of CSIS in responding to the requirements of climatic areas that involve two or more RAs, such as the initiative of RA VI and RA I in jointly launching an RCOF for the Mediterranean Region, called MedCOF. The Council complimented the Spanish State Meteorological Agency (AEMET) in facilitating this process by hosting a scoping meeting on MedCOF from 12–14 June 2013 in Madrid, Spain.

4.3.23 The Council noted that the planned activities of the EC Panel of Experts on Polar Observations, Research and Services (EC-PORS) include supporting the implementation of Polar Regional Climate Centres (PRCCs) and Polar Climate Outlook Forums (PCOFs), and identification of the relevant service requirements in the Arctic, Antarctic and “Third Pole” regions. The Council agreed that EC-PORS, the Global Cryosphere Watch, CCI, CBS and the concerned regional associations need to work in close cooperation to develop PRCCs and PCOFs and to be engaged with the relevant priority projects of the GFCS Implementation Plan. The Council further urged RA II Members and relevant polar communities to collaborate in the development of products and services suitable for the Third Pole Region. The Council also recognized the importance of collaboration with partnering agencies and organizations active in these regions, such as the Arctic Council.
4.3.24 The Council noted that the CCI Task Team on Global Seasonal Climate Update (GSCU) is continuing with the trial phase of the GSCU, and that a number of changes were effected to improve its structure and streamline its presentation to ensure that the GSCU addressed the needs of NMHSs. The Council noted that a peer review of the current version of the GSCU is underway, and that the aspects of its operational dissemination, as and when it is finalized, will be considered by CCI based on the guidance provided by EC-64. The Council appreciated that CBS is actively collaborating with CCI in the development of this product, keeping in view its overarching responsibility of coordinating operational global scale LRF including the GPCs and their Lead Centres.

Climate Information for Adaptation and Risk Management

4.3.25 Noting the relevance of the work of CCI in guiding, promoting and implementing activities relevant to the User Interface Platform and CSIS of the GFCS, the Council stressed the need for Members (working with support and guidance of the respective regional associations, and including both climate and sectoral communities) to support, conduct or host and to take part in user engagement through regional and national climate outlook forums, through user or sector-driven climate forums (e.g., hydrological-, agricultural- or health-focused forums), through interdisciplinary workshops and training, and through field activities including roving seminars.

4.3.26 Further noting the needs of key socio-economic sectors globally for reliable, relevant, actionable climate information for Climate Risk Management (CRM) and for adaptation, the Council appreciated CCI efforts in interacting with relevant UN bodies such as the UN International Strategy for Disaster Reduction (UNISDR), the World Food Programme (WFP), the World Health Organization (WHO) and other stakeholders to highlight the real-life case studies and lessons learnt, and urged Members to apply the CRM concept for improving decisions in managing the opportunities and hazards of the climate. The Council requested Members to support the work of the CCI in development of additional case studies demonstrating good practices in CRM for all Regions and sectors. The Council noted that CCI would support Members efforts in CRM through development of a WMO guideline on CRM for NMHSs and maintenance of on-line resources to support practical applications. Report of the EC Working Group on Climate and related Weather, Water and Environmental Matters (ECWG-CWE).

4.3.27 The Council noted with appreciation that the EC Working Group on Climate and related Weather, Water and Environmental Matters (ECWG-CWE) conducted its business through an online e-forum from 28 January to 22 February 2013, moderated by Dr Agnes Kijazi (Tanzania).

4.3.28 The Council welcomed the interaction of the ECWG-CWE and the EC Working Group on Capacity Development (ECWG-CD) and emphasized the development of a strategic approach towards enhancing the support of international financial mechanisms available for climate adaptation to benefit weather, water and climate activities on regional and international scales.

4.3.29 As regards the proposal of the United Nations Environment Programme (UNEP) to include its Programme of Research On climate change Vulnerability, Impacts and Adaptation (PROVIA) as a fourth component of the World Climate Programme (WCP), the Council appreciated the efforts of ECWG-CWE in continuing its assessment of the proposal through its e-forum, in close consultation with UNEP representatives, and noted its recommendations.

4.3.30 The Council noted that UNEP has been the sole UN body providing financial support and setting resource mobilization strategy to PROVIA since its inception. It further took note that according to the PROVIA costed workplan, its implementation would not bring about financial commitments to WMO.

4.3.31 The Council was informed that PROVIA has been included in the Climate Change Sub-programme of UNEP since mid-2011. The Council appreciated the recent efforts of UNEP in pursuing a stand-alone Governing Council decision on PROVIA to: (a) address the issue raised at EC-64 regarding the need for formal endorsement by the UNEP Governing Council of PROVIA as
an official programme of UNEP for its inclusion in the WCP; (b) raise the profile of the Programme in general; and (c) catalyze further support/funding by UNEP Member States.

4.3.32 The Council was informed that the 27th session of UNEP Governing Council (18–22 February 2013, Nairobi, Kenya) considered the status report of PROVIA and supported this programme. The UNEP Governing Council reiterated close collaboration with relevant UN bodies on PROVIA from global to national levels. The Council welcomed the decisions of the UNEP Governing Council, endorsed the recommendation of ECWG-CWE to formally include PROVIA as a component of WCP, and adopted Resolution 6 (EC-65) – Restructuring of the World Climate Programme: inclusion of the research programme on climate change vulnerability, impact and adaptation as an additional component.

Joint Expert Group on Climate, Food and Water (JEG-CFW)

4.3.33 The Council recalled that it had designated Dr A. Kijazi (Tanzania) as Focal Point of the ECWG-CWE to JEG-CFW, at its sixty-fourth session. The Council noted that, during the e-forum of the ECWG-CWE in early 2013, the Group adopted the Terms of Reference for the Focal Point.

4.3.34 The Council noted that, during the ECWG-CWE e-forum, the Group emphasized major issues that would require increased synergy in the areas of food and water. It also recognized the importance of the need to further develop and consolidate lessons learnt through interfaces operating in these sectors, within the context of GFCS. The Council supported the JEG-CFW in making concerted efforts to address these issues.

WMO Drought Initiatives

4.3.35 The Council noted with appreciation the successful organization of the High-Level Meeting on National Drought Policies (HMNDP), and complimented the collaboration of WMO, FAO and UNCCD and other partnering organizations. The Council noted the HMNDP Declaration (see Annex III to the present report) adopted by the High-level Segment of the meeting, which urged WMO, UNCCD, FAO, other related UN agencies, and programmes, as well as other concerned parties, to assist governments, especially the developing countries, in the development of National Drought Management Policies and their implementation. The Council encouraged all NMHSs to extend their full support and to urge relevant ministries and agencies in their countries to actively support the application of the Declaration. The Council thanked all the donors for their valuable support to the organization of HMNDP. The Council requested the Secretary-General to coordinate and extend the implementation of the outcomes of the HMNDP at the regional level.

4.3.36 The Council recognized the need for global coordination of efforts to strengthen drought monitoring, risk identification, drought prediction and early warning services and development of drought management knowledge base. The Council, therefore, welcomed the recent development of an Integrated Drought Management Programme (IDMP) in association with the Global Water Partnership (GWP) based on and inspired by the development and success of the Associated Programme on Flood Management. The Council requested the Secretariat to work with the GWP to develop a suitable governance structure for the programme and to make the IDMP become operational and visible to Members, keeping in view the diverse management aspects of drought. The Council considered the IDMP to be an important contribution to the GFCS.

4.3.37 The Council noted that the UN-Water Decade Programme on Capacity Development (UNW-DPC), WMO, UNCCD and FAO are collaborating on the National Drought Management Policies Initiative which aims to provide capacity development on this issue through four regional workshops that will take place from March 2013 to December 2014. The Council endorsed this initiative and requested the Secretary-General to harmonize as much as possible the efforts of this initiative with the IDMP.

Guide to Climatological Practices

4.3.38 The Council noted with appreciation that CCI had finalized the third edition of the Guide to Climatological Practices (WMO-No. 100), and set up an updated schedule to keep it current.
The publication is available online at: https://www.wmo.int/pages/prog/wcp/ccl/documents/WMO_100_en.pdf. It further noted that the Secretariat has initiated the translation of this publication into all official languages of the Organization to ensure a broader outreach and assist the Members in their climatological operations. In view of progressive developments in climatology, the Council requested the Members to provide their feedback to the Commission, for further improvements and updates.

**Water**

*Fourteenth session of the Commission for Hydrology (CHy-14)*


4.3.40 The Council noted the approach taken by the Commission of aligning its activities with the priorities as established in the WMO Strategic Plan and, in particular, the importance placed on the Commission’s contributions to the Global Framework for Climate Services, the WMO Global Integrated Observations System (WIGOS), Quality Management and Capacity Development.

4.3.41 The Council noted that once again, the Commission had adopted the approach of pre-session electronic discussions for some of its important documents, thereby enabling participation of experts without physically joining the session. While this had enabled a wider participation, the Council requested that the Commission undertake an evaluation of the effectiveness of this approach before its next session and reports its findings to the Council.

4.3.42 The Council noted that CHy-14 had decided to commence a process, including testing, that could see the potential adoption of the WaterML 2.0 as a WMO standard for information exchange and to register this standard as a joint WMO/ISO standard. The Council requested that the Commission work closely with the Commission for Basic Systems in the development of such a process and that such a process should be formally approved by the Executive Council. The Council also noted that the Commission had decided to support the further development by the WMO/OGC Hydrology Domain Working Group, of the Hydrologic Feature Model (HY_Features), a conceptual model intended to describe hydrologic objects represented in various NHSs’ datasets.

4.3.43 The Council encouraged Members to nominate more experts to the Open Panels of CHy Experts (OPACHEs), which should include leading experts that participate actively in the CHy work in the five priority theme areas. It also noted the increasing use of electronic media, especially the e-Board and the e-Forum, being made by the Commission in carrying out its activities and supported the future development of such tools with a view on strengthening communication and feedback mechanisms of relevant projects and programmes. The Council encouraged Members to facilitate the participation of experts from their countries to contribute to the issues and topics being addressed in the e-Board and the e-Forum.

*Review of the WHYCOS programme*


4.3.44 The Council noted that, as requested by Congress (Resolution 14 (Cg-XVI)), an independent external evaluation of WHYCOS had been performed during September and October 2011. This review was a follow-up to the WHYCOS Review undertaken in 2005. The Council further noted that the reviewers found that the original concept of WHYCOS, i.e. to strengthen the capacities of National Hydrological Services (NHSs) and regional institutions in discharging their relevant national and regional responsibilities in water resources management,
remained valid. It also noted that the programme provided an effective mechanism for bringing donors and recipients together to work on water-related issues. The Council was informed of the agreement between the eight WMO Members who are Members of the Arctic Council to launch the Arctic HYCOS as an important contribution to WHYCOS and WMO Polar activities and the International Polar Initiative. The Council agreed that the increasing focus of HYCOS components on addressing water resources management issues, through the production of hydrological data, services and products, was the best approach to development of HYCOS components and would aid in their sustainable implementation.

4.3.45 The Council noted the recommendations formulated by the reviewers and reviewed the responses prepared by the Commission. In particular, the Council noted that the Commission saw merit in the establishment of a more clearly identifiable support structure to the WHYCOS programme within the WMO Secretariat and supported the CHy-14 request for the Secretariat to further study the costs and benefits of different approaches to ascertain the desirability of such a structure.

4.3.46 The Council adopted Resolution 8 – World Hydrological Cycle Observing System.

Commission for Hydrology involvement in and contribution to the GFCS

4.3.47 The Council noted that CHy had adopted Resolution 1 (CHy-14) on CHy contributions to the GFCS.

4.3.48 The Council noted that the Commission, through the Hydrology and Water Resources Programme (HWRP), had made significant contributions to the Implementation Plan of the GFCS, in particular in relation to the User Interface Platform, water sector exemplar, and the observations and monitoring and capacity development pillars. The Council noted that the activities being undertaken in CHy’s Water, Climate and Risk Management thematic area, including workshops on extended hydrological prediction and the publication of a technical report on “Climate and Meteorological Information Requirements for Water Management”, could be considered as initial contributions to the GFCS. The Council noted that the activities being undertaken in CHy’s Water, Climate and Risk Management thematic area, including workshops on extended hydrological prediction and the publication of a technical report on “Climate and Meteorological Information Requirements for Water Management”, could be considered as initial contributions to the GFCS. The Council was pleased to note that CHy had compiled a discussion paper on “How CHy Can Contribute to the Global Framework for Climate Services” to facilitate discussions at CHy-14. The Council strongly supported the role and responsibility of NHSs and the hydrological community as a whole in the GFCS as the authority for assessing and interpreting the impacts of climate change on water and hydrology.

4.3.49 The Council noted the Commission’s view that the User Interface Platform should address issues such as the variety of current needs and the uses to which the currently available data is applied. The Council further noted that operational hydrologists, as represented by CHy, should be considered full partners in defining the specific climate products to be delivered through the GFCS. The Council supported the concept that CHy, in close cooperation with CCI, could also practically contribute to the activities of the GFCS through the Regional Climate Centres.

4.3.50 The Council supported the view that CHy has a major role to play as part of the User Interface Platform for the GFCS, noting in particular the importance of climate data, services and products to sustainable water resources management, especially as related to droughts and floods in a changing environment.

4.4 WMO Integrated Global Observing System and WMO Information System (agenda item 4.4)

Implementation of the WMO Integrated Global Observing System (WIGOS)

4.4.1 The Council noted that in accordance with Resolution 10 (EC-64) – WIGOS Framework Implementation Plan (WIP), urgent steps have been taken to progress the implementation of the WIGOS Framework by the Inter-commission Coordination Group on WIGOS (ICG-WIGOS), technical commissions, regional associations and the Secretariat. CBS and CIMO, having the technical lead in the WIGOS Framework implementation, adapted their working structures/mandates/activities to support WIGOS. Other technical commissions also recognized the need to
build activities in support of the WIGOS Framework implementation into their workplans and structures. The Council appreciated that ICG-WIGOS had identified many opportunities for all technical commissions to collaborate more closely on WIGOS Framework implementation, including through shared experts, alignment of activities and reduced duplication of effort and especially through active participation in its task teams.

4.4.2 The Council appreciated that the Regional WIGOS Implementation Plans (R-WIP) are well advanced in all Regions and already adopted by RAs I, II and IV. It noted that R-WIPs are taking into account regional and subregional needs, requirements and priorities. In this regard, the Council emphasized that commitment by Members to WIGOS is essential and urged Members to support implementation of WIGOS in their Region, including providing sufficient resources. The Council noted with satisfaction that the RA VI WIGOS Implementation Plan had been finalized for approval at RA VI-16 in Helsinki, Finland, September 2013. The Council also noted that RA III would approve its Regional WIGOS Implementation Plan at the RA III session in 2014.

4.4.3 The Council requested technical commissions to inform regional associations of the experts selected to participate in WIGOS-related expert teams and related bodies, and to draw attention to areas where there were significant gaps in technical expertise. It encouraged regional associations to entrain the identified experts into regional WIGOS implementation and it requested that they encourage Members to nominate experts to address technical and geographic gaps in expertise.

4.4.4 The Council appreciated that the Secretary-General had taken steps to bolster the WIGOS Project Office through two new staff to be employed for the period of the WIGOS Framework implementation. Concern was still expressed regarding the availability of funds for the key WIGOS implementation activities that may eventually delay the implementation. The Council also noted that volunteered experts are needed, especially for the development of WIGOS regulatory material which will form essential guidance for Members in the implementation of WIGOS on the country level. It requested technical commissions and Members to identify suitable experts and make appropriate arrangements through the ICG-WIGOS or through secondments to the WIGOS Project Office. The Council agreed that WIGOS implementation activities should be appropriately resourced and requested the ICG-WIGOS and the Secretariat to continue to monitor progress and to keep the Council well informed about accomplishments achieved and resources used.

4.4.5 The Council acknowledged that ICG-WIGOS had updated the WIP, which now provides improved estimation of resource requirements, adjusted target dates for tasks’ completion and identification of risks as requested by EC-64. The Council adopted the updated version of WIP as given in Annex IV to the present report. The Council recalled that the four previously agreed WIGOS component observing systems: (a) the Global Observing System (GOS); (b) the observing component of the Global Atmosphere Watch (GAW); (c) the observing component of the Global Cryosphere Watch (GCW); and (d) the World Hydrological Cycle Observing System (WHYCOS), did not reflect fully the WMO contributions to hydrological observations. It therefore agreed with ICG-WIGOS to widen the scope of the component observing systems to replace WHYCOS by the WMO Hydrological Observing System (including WHYCOS), as now captured in the updated WIP.

4.4.6 The Council also acknowledged suggested changes to the WIP proposed by the president of JCOMM, in particular one in relation to the difficulty faced by external agencies in providing its observations via the WIS, and requested ICG-WIGOS to consider including these changes in its next iteration of the WIP.

4.4.7 The Council agreed that the effective implementation and operation of WIGOS would depend on sufficient resources and commitments. Available resources will be targeted at ensuring the priority elements of the global WIGOS Framework are implemented by Cg-17. The Council strongly encouraged Members to provide additional resources for WIGOS implementation. One member suggested that the Council should consider whether to hold the CBS-Ext session planned for 2014 and instead use those financial resources to support WIGOS implementation. The Council noted that CBS was working toward significant reduction in the length of its sessions and was
considering holding future sessions conjointly with other constituent bodies, as appropriate. The Council also noted that a key priority for the extraordinary session was the implementation of WIGOS. Therefore, the Council agreed with CBS plans to hold an extraordinary session in 2014. In doing so the Council requested CBS and the Secretary-General to carefully consider the resource implications for WIGOS and other CBS-related programmes to ensure the best value for Members.

4.4.8 The Council expressed the need to find a proper balance between technical meetings versus intergovernmental meetings in order to advance the goals of the Organization. The Council requested its WG on SOP to prepare recommendations on improvements to the decision-making process of WMO constituent bodies for consideration at its next session.

4.4.9 The Council recognized the importance of NMHSs in providing leadership for WIGOS implementation at national level and appreciated that ICG-WIGOS is developing a toolkit to facilitate national WIGOS implementation. The Council requested the Secretary-General to convey a strong message to Members about the importance of both regional and national WIPs and related issues such as WIS, and that critical to the overall success of WIGOS was the designation of national WIGOS Focal Points comprising active individuals who would take the lead in these activities. In this regard, the Council noted that ICG-WIGOS had developed the self-assessment checklist to assist Members in understanding and assessing their readiness for WIGOS implementation. It requested Members to perform this assessment and provide the WIGOS Project Office with the outcome to be used for the WIGOS Capacity Development planning. The Council also noted that the WIGOS Capacity Development Strategy would be complemented with a list of capacity development activities that would assist Members in implementing their WIGOS national plans.

4.4.10 The Council noted that ICG-WIGOS developed a draft of the WIGOS Communications and Outreach Strategy and requested Members to support WIGOS Communications and Outreach efforts by distribution of outreach material within their NMHSs and to partners, and by developing outreach material tuned to national needs. It also requested Members to communicate to the Secretariat the success stories and benefits achieved through their WIGOS implementation activities, so that such material could be shared with others.

4.4.11 The Council noted that the ICG-WIGOS reviewed the proposal of its Task Team on WIGOS Regulatory Material (TT-WRM) and agreed that the proposed eight chapter headings can frame a consistent structure in the Technical Regulations (WMO-No. 49), with greater detail on WIGOS practices to be provided in the Manual on WIGOS. Accordingly, the Council decided that the Structure of the Technical Regulations agreed by EC-64, Annex VIII, be adjusted as described in Annex V to the present report. The Council also noted that the two removed headings (Climatological data and GCOS and Meteorological Instruments and Methods of Observation) will be covered across the other WIGOS sections and thus will not be lost. The Council agreed that compliance with the WIGOS technical regulations, in particular the mandatory elements, was necessary to achieve its effective implementation.

4.4.12 The Council noted that the ICG-WIGOS Task Team on WIGOS Metadata (TT-WMD) was developing the Core WIGOS metadata standard that, when implemented, would require all Members to record, retain and exchange specific information about instruments, observing stations and platforms, measurement characteristics and processing methods. It confirmed the importance of this work and requested technical commissions to be prepared to review the draft list of Core WIGOS metadata elements prepared by the TT-WMD. The Council requested regional associations to include within their regional WIGOS Implementation Plans capacity building activities to support Members in delivering their responsibilities for WIGOS metadata.

4.4.13 The Council, recalling Recommendation 6 (CBS-15) - Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP), urged Members, in collaboration with partner organizations and identified agents in the EGOS-IP, to address the 115 actions listed in the Plan. The Council recognized the need to monitor the implementation of the EGOS-IP actions, and requested Members, who have not yet done so, to nominate National Focal Points tasked to monitor the implementation of the EGOS-IP nationally, report on implementation issues, and
provide feedback to the CBS Inter-Programme Expert Team the Observing Systems Design and Evolution through the Secretariat.

4.4.14 The Council recognized the difficulty that many Members were experiencing in assigning station identifiers to observing sites, limiting the number of observations available for international exchange. The Council requested CBS as a matter of urgency to instigate procedures for expanding the range of station identifiers for use with Table Driven Code Forms, so that Members could assign these numbers to stations operating in their territories, including stations operated by intergovernmental and international organizations. The Council noted that the use of WMO station identifiers for observing stations within a Member’s territory emphasizes the central role of the NMHS within its country as a focus for quality management and enabling the Member to realize the benefits arising from operational data exchange. WIGOS will depend for its success on increasing the range of observing systems beyond those operated by the NMHSs, and the Council requested Permanent Representatives to use the opportunity offered by the extended range of station identifiers to assign station identifiers to all observing stations operating to WMO standards within their territories. In this connection, the Council recognized that a rapid increase in number and diversity of Automatic Weather Stations (AWS), particularly by non-NMS/NMHS agencies, had been occurring in many regions, especially in developing countries, and urged Members involved to address the benefits of this proliferation through the WIGOS Regional and National Implementation Plans.

4.4.15 The Council recognized the critical role of the WIS in implementing WIGOS and requested Permanent Representatives of Members to promote and facilitate access to WIS by the widest possible range of national users.

4.4.16 The Council reaffirmed the important role of observing system partners and co-sponsors in WIGOS and welcomed the initiative of the ICG-WIGOS to engage the Group on Earth Observations (GEO) and GCOS co-sponsors in its implementation activities, with a special focus on their shared and complementary roles in delivering the Observations and Monitoring pillar of the GFCS.

4.4.17 The Council noted with appreciation that the development of the WIGOS Operational Information Resource (WIR) was now mature enough for it to be implemented operationally with limited functionality pending full implementation before Cg-17. The Council further requested Members to provide information on WIGOS relevant national best practices to the Secretariat so that such information can be shared through the WIR. The Council nevertheless recognized that the remaining parts of the WIR yet to be developed, i.e. the “Standardization of Observations” Reference Tool (SORT) and the Surface-based observing stations capabilities component of the Observing System Capabilities Analysis and Review Tool (OSCAR) were critical and required substantial resources for their development and subsequent operation. It therefore urged Members to consider providing assistance for their development and/or future operations.

4.4.18 The Council expressed its appreciation at the importance being placed within WIGOS on standardization and quality assurance of observations including those derived from weather radars, Automatic Weather Stations (AWS) and other evolving new technologies, such as Lidar for volcanic ash.

4.4.19 The Council acknowledged that the JCOMM contribution to WIGOS implementation is realized essentially through the JCOMM Observations Programme Area Implementation Goals (OPA-IG), and requested Members to support implementation of marine observing systems in line with the OPA-IG, and to provide voluntary contributions to support the JCOMM in situ Observations Programme Support Centre (JCOMMOPS). It further urged Members to assure dataflow to end-users, including real-time distribution of marine meteorological and ocean data using the required and appropriate standards and formats.

4.4.20 The Council encouraged CAgM to continue efforts to accomplish its vision through the Global Initiatives in Agricultural Meteorology (GIAM) in a timely manner through efficient resource allocation and mobilization, especially giving high priority to WIGOS implementation.
4.4.21 The Council agreed that the lines of action developed as the outcomes of the first WCRP Data Advisory Council (WDAC) session are of significant importance for the development of climate observations and for guiding contributions of WCRP and WIGOS to GFCS. It was agreed that WIGOS should make observational data systematically available for meteorological and emerging climate and Earth System reanalyses and, as well, for model evaluation, for example through the Earth System Grid Federation and its “Observations for Model Intercomparison Projects” (Obs4MIPs) component, a recent initiative facilitating accessibility of observational products for climate model intercomparisons.

4.4.22 The Council noted the support of ICG-WIGOS for centennial observations at specific sites and urged Members to sustain relevant observation programmes as an invaluable scientific heritage for future generations. While fully acknowledging Members’ sole responsibilities for national observations, the Council requested CCI, jointly with GCOS and CIMO, to investigate existing site certification mechanisms, network criteria and monitoring principles and to set up an appropriate WMO mechanism for the recognition of centennial observing stations, based on a minimum set of objective assessment criteria.

4.4.23 The Council noted that the sustainability of the regional basic networks in some regions, and the reduced availability of data from those networks, is an issue of concern. It agreed that WIGOS and WIS have the potential to further strengthen all basic networks, especially those in developing and the least developed countries, through optimized design and evolution of WIGOS component observing systems, improved operation and maintenance and interoperability arrangements. The Council also renewed its request to Members of developed countries to assist in mobilizing and providing resources to support the basic infrastructure of those countries in need. The Council requested all regional associations to address the issue of availability of observations from the regional basic networks in their Regional Implementation Plans.

4.4.24 The Council noted the proposal from the Association of Hydro-meteorological Equipment Industry (HMEI) to strengthen collaboration between WMO and HMEI to implement a Joint HMEI/WMO Project on Capacity Development. It noted that the proposed joint project comprises two phases: Development of Tender Documentation and Specialized Training in Support of WIGOS Implementation in WMO Regions. HMEI stressed that the implementation of the project would support capacity development efforts to assist NMSs/NMHSs from developing and least developed countries with modernization of their observational networks and improving national service quality and service delivery. The Council was encouraged by this initiative and recommended that HMEI collaborate with relevant existing WMO bodies.

**Radio-Frequency Coordination**

4.4.25 The Council recalled Recommendation 7 (CBS-15) on the importance of radio frequencies for meteorological and related environmental activities. It noted the continued work of the CBS Steering Group on Radio-Frequency Coordination, in particular the progress on the preparation for the next International Telecommunication Union (ITU) World Radiocommunication Conference to be held in 2015 (WRC-15), including the publication of a WMO Preliminary Position Paper on the WRC-15 Agenda. Recalling the successful outcome at the WRC-12 for meteorology and related environmental activities, it encouraged all Members to support this important process and adopted Resolution 9 – Preserving the radio-frequency spectrum for meteorological and related environmental activities at the World Radiocommunication Conference 2015.

4.4.26 The Council recalled Resolution 11 (EC-64) and had agreed that strategically, participation of CBS experts in ITU processes remains a key activity for successful radio-frequency coordination. It also agreed that the other strategic elements include the continued coordination and collaboration with other international, regional, non-government and commercial organizations involved in the Earth observations and environmental activities. It noted that for long-term effectiveness, CBS should continue building the capacity of NMHSs to be able to effectively participate in national radio-frequency coordination issues, including representing national meteorological and related needs in regional and global radio-frequency coordination processes supported by appropriate guidance material.
Report of the fifteenth session of the Commission for Basic Systems


EC Panel of Experts on Polar Observations, Research and Services

4.4.28 The Council acknowledged the continued strengthening of WMO working relationships in the Polar Regions through the efforts of the EC Panel of Experts on Polar Observations, Research and Services (EC-PORS), particularly with the Antarctic Treaty Consultative Meeting (ATCM), Arctic Council (AC) and its bodies, and organizations such as the International Association of Antarctic Tour Operators (IAATO) and the Association of Arctic Expedition Cruise Operators (AECO). The Council was pleased to learn that the Arctic Monitoring and Assessment Programme (AMAP) of the Arctic Council, the International Arctic Science Committee (IASC) and Scientific Committee for Antarctic Research (SCAR) are now active members in EC-PORS. The Council was informed that, following a decision of EC-64, steps had been taken to request an observer status for WMO in the Arctic Council as an Intergovernmental Organization. The Council was informed of the agreement among the eight WMO Members who are members of the Arctic Council to launch an Arctic HYCOS programme as an important contribution to WMO Polar Activities and the potential International Polar Initiative. The Council emphasized that these relationships strengthen WMO’s observation, research and services in the Polar Regions, which will be beneficial for all WMO programmes, and especially the GFCS.

4.4.29 The Council noted the importance of improved prediction in Polar Regions and the Third Pole and had urged WWRP and WCRP to continue their efforts in these regions to achieve a seamless prediction capability which can support the services required in those regions.

EC-PORS - Global Cryosphere Watch (GCW)

4.4.30 The Council endorsed the steps taken by the EC-PORS-4 regarding the development of the Global Cryosphere Watch (GCW) programme and its proposed governance and the inclusion of a coordinating committee to ensure coordination with all WMO Programmes, technical commissions, regional associations and external partners. The Council also expressed its strong support to enhance the two key elements of the WMO Polar Activities: the GCW and the Global Integrated Polar Prediction System (GIPPS). The Council also underlined the need for integration of GIPPS with various developments of the leading centres and NMSs of the leading modelling centres of the weather and climate systems in order to improve our understanding of the role of the Arctic in the regional and global weather and ocean systems. It recognized that, as a cross-cutting programme, engagement of partners would be critical to long-term success. The Council therefore underlined the importance of allocation of the appropriate resources for GCW. It urged Members to provide comments to the GCW Implementation Plan (GCW-IP) so that the final GCW-IP could be considered at EC-66 in 2014.

4.4.31 The Council acknowledged the need for Secretariat support to GCW. There was a short-term need for replacement of current GCW and EC-PORS support personnel and encouraged Members to consider a seconded expert or a JPO to assist in coordination of these activities. The Council requested the Secretary-General to consider establishment of a GCW “International Project Office” (IPO) in the Secretariat in coordination with interested partners in their institutions and to seek Members’ support and assistance in the establishment of a GCW IPO.

4.4.32 The Council agreed that for the CryoNet, the observing component of the GCW, it will take some time to become fully operational as a component of WIGOS. It recognized that GCW depended on the efforts and support of many individuals and agencies for the successful implementation of GCW.
**Global Climate Observing System (GCOS)**

4.4.33 The Council recalled that undertaking the actions identified in the 2010 updated Implementation Plan for the Global Observing System for Climate in Support of the United Nations Framework Convention on Climate Change (UNFCCC) would address many of the needs for climate observations in support of the Global Framework for Climate Services (GFCS). The Council was reminded of the importance of a strengthened Global Climate Observing System to the successful implementation of the Global Framework for Climate Services (GFCS), recognizing that observations and monitoring constitute one of the essential pillars of the GFCS. The Council reiterated its urgent call to Members to assist and advise international and national organizations in the implementation of the global observing systems for climate.

4.4.34 The Council was informed on the next steps of the GCOS improvement and assessment cycle. At the thirty-seventh session of the Subsidiary Body for Scientific and Technical Advice of the UNFCCC in November 2012, GCOS was invited to submit a Third Adequacy Report to SBSTA in 2015, and a new Implementation Plan in 2016, with a draft of the latter encouraged to be provided one year before. The GCOS programme has started on the process of producing reports on progress and adequacy of climate observation and the new plan, which should identify not only verifiable and costed actions as previously but also specific requirements for data products, to meet the needs for adaptation to variability and change and for provision of services, in addition to those for assessment and mitigation of climate change. The content will be based on input from a review of actions set out in the in 2010 updated Implementation Plan, from the recent Workshop on Observations for Adaptation to Climate Variability and Change (26–28 February 2013, Offenbach, Germany), from the fifth IPCC Assessment process through one or more workshops that include participation of lead authors from Working Group 1 and Working Group 2 and other experts, from the 2014 National Communications to UNFCCC, from panel chairs and panel members and calling on one or several writing-team meetings, consultations and a public review. The Council supported the recommended planning and requested the GCOS Secretariat to report back on the process at EC-66.

**GCOS Expert Panels for Land, Atmosphere and Oceans**

4.4.35 The Council noted that the GCOS/GTOS/WCRP Terrestrial Observation Panel for Climate (TOPC) had held its fifteenth session from 6 to 7 March 2013, at WMO, in Geneva. On that occasion, the current Chairman, Prof Han Dolman (Free University of Amsterdam, The Netherlands) handed over the chairmanship to Prof Konrad Steffen (Federal Institute for Forest, Snow and Landscape Research, Switzerland). TOPC reviews the climate-observing components of terrestrial global observing systems and is managed by the GCOS Secretariat. The Council was informed that Prof Riccardo Valentini (University of Tuscia, Italy) had handed in his resignation as the Chairman of the Global Terrestrial Observing System (GTOS) Steering Committee on 5 March 2013, and that the GTOS Secretariat, formally still hosted at FAO, has been without staff support for more than one year. The Council noted the steps taken by the Secretary-General to support the TOPC and the need for a GTOS-sponsor dialogue on the future of GTOS.

4.4.36 The Council noted the most recent outcomes of the GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC), chaired by Prof Adrian Simmons, which met for its 18th session from 2 to 5 April 2013, at WMO, Geneva. Members commended the Panel’s work as an efficient platform for discussions on the climate-components of existing research and operational atmospheric observing systems and the related programmes, including important cross-cutting links to the World Climate Research Programme (WCRP) as well as to the Global Atmosphere Watch (GAW) Programme. The Members appreciated in particular the Panel’s work on the GCOS Surface Network (GSN), the GCOS Upper-Air Network (GUAN) and the GCOS Reference Upper-Air Network (GRUAN). The Council requested the Panel in its future sessions to continue to advise explicitly on climate-observing elements of the WMO Integrated Global Observing System (WIGOS), and to ensure that there is full cooperation between GCOS, WIGOS and WIS as they develop.
4.4.37 The Council was informed that the Secretariat for the GCOS/GOOS/WCRP Ocean Observations Panel for Climate (OOPC), has moved from IOC of UNESCO, Paris to the GCOS Secretariat. Following the approval of the Framework for Ocean Observations, GOOS Panels have been reorganized. GOOS will now be overseen by a steering committee and three Panels for Ocean Physics (OOPC), Biogeochemistry (the International Ocean Carbon Coordination Project will expand to include Nutrients and Oxygen) and a new Biology Panel. The GOOS Steering Committee, Secretariat, and Panel chairs will meet in Qingdao at the end of March. Key tasks for the Panel are coordinating a review of the Tropical Pacific Observing System, reducing uncertainty in air-sea flux estimates and identifying requirements for observations of western boundary currents. The Panel is also expected to expand its focus to the coastal oceans and shelf seas. The Council was pleased to learn about the current activities related to ocean climate and requested the GCOS Secretariat to cooperate closely with its sponsors to ensure that the OOPC will be sustainably supported in future.

4.4.38 In the context of the GCOS Panels’ work, the Council noted the importance of liaising closely with space agencies on dedicated space-based observations for climate, in particular through the Committee on Earth Observation Satellites (CEOS), the Coordination Group for Meteorological Satellites (CGMS), the WMO Space Programme and their development of the architecture for climate monitoring from space. The Council recommended that progress and future needs in the development of the architecture for climate monitoring from space be addressed in the next GCOS Adequacy Report and requested the GCOS Secretariat to remain engaged in the next stages of development and implementation of the architecture.

GCOS Reference Upper-Air Network (GRUAN)

4.4.39 The Council noted that the implementation of GRUAN has progressed steadily over the past years and initial GRUAN-quality data can be accessed at NOAA’s National Climatic Data Center (NCDC). As the GRUAN currently consists of 16 initial reference sites, which are predominantly located in the Northern Hemisphere mid-latitudes, the Council encouraged its Members to support GRUAN operations, in particular in arctic and tropical regions. The Council also noted that criteria for site assessment and certification, and the process for implementation, had been developed. It encouraged those Members maintaining GRUAN sites to undergo the formal GRUAN certification and assessment process.

GCOS Programme Review

4.4.40 The Council noted the status of the sponsors’ review of the GCOS programme. The GCOS programme has had substantial success in the past 20 years, but several new developments and some emerging issues have given rise to the need to re-examine the mandate and terms of reference of GCOS. The GCOS Steering Committee at its 19th session in 2011 welcomed an independent review of GCOS and appreciated the willingness of WMO to take the lead in seeking to carry this out in 2013. The review board had held its first meeting from 26 to 27 March 2013. The Council requested to be informed on the outcome of the review at its next session in 2014.

GCOS Cooperation Mechanism

4.4.41 The Council recognized that the cooperation mechanism of the GCOS programme to improve climate observation networks is working particularly well in Region I. Good progress was made in obtaining CLIMAT reports from the Regional Basic Climatological Network (RBCN) stations. The Council noted that strengthening of such networks was an important requirement for an effective GFCS. The GCOS Steering Committee had noted in its last session that many Members of WMO were not preparing and sending CLIMAT reports from all of their listed RBCN stations. The Council recalled the recommendation of Congress that Members were encouraged to expand these networks and urged Members to take appropriate actions.

4.4.42 The Council urged Members, with support of the GCOS Secretariat, to liaise with the responsible government agencies to initiate or to secure funding for the GCOS Cooperation
Mechanism. The Council explicitly thanked Germany, Japan, Switzerland and the United Kingdom who have contributed to the GCOS Cooperation Mechanism in the past year. In particular, the Council thanked the Government of the United Kingdom (Department of Energy and Climate Change) and the United Kingdom Met Office who support the position of the GCOS Implementation Manager in the GCOS Secretariat since 1 March 2013.

WMO Space Programme

Continuity and optimization

4.4.43 The Council recalled that a sounding capability was necessary on three sun-synchronous orbits to maintain the accuracy of global NWP models, as confirmed by the latest impact studies. The Council appreciated the tandem operation of Metop-A and Metop-B on the mid-morning orbit by EUMETSAT. It welcomed the successful operation of the new-generation Suomi-National Polar-orbiting Partnership (S-NPP) and urged the United States of America to ensure a continuous operation of this spacecraft until the Joint Polar Satellite System (JPSS) series is available. Noting the increasing use of FY-3 sounding data in NWP, the Council invited China to consider deploying a series of FY-3 satellites on the early morning orbit, which would allow the contributions of China, Europe and the United States to optimally complement each other in the global three-orbit sun-synchronous constellation. In this context, the Council noted with high appreciation that CMA was exploring the procedures related to the adjustment of China’s Meteorological Satellite Development Plan for the period from 2011 to 2020 in order to include a series of FY-3 early-morning orbit satellites, which will contribute significantly to improvement of Earth observation and regional and global numerical weather predictions. The Council considered that such a decision by China would be a major accomplishment for the space-based global observing system. It encouraged the Coordination Group for Meteorological Satellites (CGMS), EUMETSAT, NOAA and other satellite operators and NWP centres to enhance their cooperation with CMA and requested the Secretary-General to facilitate this important initiative. The Council further noted that EUMETSAT had reaffirmed its commitment to ensuring access to and use of mid-morning satellite data and products.

4.4.44 The Council recalled the vital role of observation from the geostationary orbit for permanent weather monitoring and nowcasting. It welcomed the extension by EUMETSAT of geostationary Indian Ocean coverage until the end of 2016. Recalling the benefit of the operation by the United States of an additional GOES spacecraft at 60° W since December 2006, it expressed concern that, after termination of this mission in June 2013, only a limited coverage of the South American continent will be available until the GOES-R generation of spacecraft is deployed over the GOES-East operational location. The Council also noted the importance of the Russian Federation’s plans to implement a constellation of meteorological satellites in highly elliptical orbits for quasi-continuous coverage of the Arctic.

4.4.45 The Council therefore adopted Resolution 11 – Avoiding gaps in essential space-based observation.

Architecture for Climate Monitoring from Space

4.4.46 The Council welcomed the Strategy towards an Architecture for Climate Monitoring from Space (ACMS) jointly completed by the Committee on Earth Observation Satellites (CEOS), CGMS and WMO, in consultation with GCOS and WCRP, which defined a conceptual approach for developing the ACMS. Being aware that, when finalized, the ACMS will become part of the space-base component of WIGOS and will underpin the observation and monitoring pillar of the GFCS, the Council recommended to take into account the following points for the further development of the ACMS: (i) the partnership developed with user communities within GFCS, as an essential avenue to apprehend the requirements for climate-related services, products and observations driving the architecture; (ii) the synergy to be enhanced between in-situ and space-based observing systems for calibrating and validating the space-based observations and products; and (iii) engagement of the broader user (service and science) communities for seeking feedback, monitoring the deliverables and realizing the benefits of the ACMS. The Council
highlighted the important role that the WMO Space Programme should continue to play in facilitating the future development of the physical and operational structure and governance scheme of the ACMS. It invited the parties to document this architecture and report to the sixty-sixth session, in response to Resolution 19 (Cg-XVI).

Satellite instrument calibration and inter-calibration (GSICS)

4.4.47 The Council emphasized the importance of satellite instrument inter-calibration to ensure interoperability of space-based measurement, traceability and consistency of data series over long time periods. It invited the members of the Global Space-based Inter-calibration System (GSICS) to incorporate GSICS practices and procedures into their operational schemes.

Capacity building and user readiness for new satellite systems

4.4.48 In line with the CBS Guidelines for Ensuring User Readiness for New Generation Satellites, the Council urged satellite operators and users to launch user readiness projects preparing for the operational use of new data streams from the 2014–2018 generation of operational meteorological satellites, and minimizing the risk of disruption at the time of transitioning. The Council welcomed the series of regional training events organized by the Virtual Laboratory for Education and Training in Satellite Meteorology (VLab). It appreciated the VLab contribution to increase Members’ awareness of the new requirements for competency standards for aeronautical meteorological personnel. The Council recommended as regular practice to organize regional training events in conjunction with major satellite user conferences.

Satellite data and products

4.4.49 The Council adopted Resolution 12 (EC-65) – Regional requirements for satellite data access and exchange, as recommended by CBS-15, within the regional WIGOS and WIS implementation framework.

4.4.50 The Council recalled the essential value of Direct Readout services to provide real-time access to polar-orbiting satellite data. Furthermore, the Council encouraged Members to implement in every Region coordinated satellite-based, sustained, rebroadcast service for global satellite data and products in Digital Video Broadcast standard (DVB-S or DVB-S2), as recommended in the Guide on the WMO Information System. The Council expressed its appreciation to EUMETSAT, CMA and NOAA for operating the EUMETCast, EUMETCast-America, CMACast and GEONetCast-Americas services. As concerns EUMETCast-America, it noted the expectation from EUMETSAT that, in the future, this service be maintained in the context of international partnership with South American Members. The Council welcomed JMA’s plans to implement a DVB-S/DVB-S2 service to support the dissemination of Himawari-8 and 9 data, and the announcement of a DVB-S2 satellite broadcasting service operated by the Islamic Republic of Iran, called IRIMSAT, including satellite data.

4.4.51 The Council encouraged Members to support the pilot activities undertaken within the SCOPE-Nowcasting initiative.

Space Weather

4.4.52 The Council encouraged the Inter-Programme Coordination Team on Space Weather (ICTSW) to further collaborate with the ICAO International Airways Volcano Watch Operations Group (IAVWOPSG) on the definition of space weather operational products and services for international air navigation, with a view to providing the basis for an amendment to Annex 3 of the ICAO Convention for consideration by a planned conjoint ICAO Meteorology (MET) Divisional Meeting and CAeM-15 in July 2014. The Council underlined the importance of this activity to enable the early implementation of operational space weather observation and forecast services to enhance air traffic safety.
**WMO Information System (WIS)**

**Status of the implementation of WIS centres**

4.4.53 The Council noted that the identification and categorization of WIS centres as of March 2013 represented 359 centres consisting of 223 National Centres (NCs), 121 Data Collection or Production Centres (DCPCs) and 15 Global Information System Centres (GISCs). Distribution of the centres across the Regions includes 78 in RA I, 71 in RA II, 20 in RA III, 48 in RA IV, 39 in RA V and 103 in RA VI. A full list of centres is available online at [http://www.wmo.int/pages/prog/www/WIS/centres](http://www.wmo.int/pages/prog/www/WIS/centres).

4.4.54 The Council noted that as of March 2013, CBS had reviewed and endorsed 53 DCPCs and eight GISCs and that an intensive audit process was underway to endorse the remaining conditionally designated GISCs by the end of 2013, as well as reviewing the DCPCs. It noted that seven GISCs were fully operational serving four Regions. It further noted that GISC Brasilia, Moscow and Washington were installed and then successfully audited by CBS. The remaining GISCs are expected to be operational before 2014. The Council thanked China, Japan and the Republic of Korea for providing interim WMO metadata management services through GISCs Beijing, Tokyo and Seoul. The Council thanked CBS for providing the relevant sections on metadata for the Manual on the WIS and the Guide to WIS. It encouraged those centres that have yet to do so, to register with their principal GISC or an interim metadata service in order to start managing their metadata. The Council requested that centres should notify the Secretary-General in writing of any changes to their association with a GISC and indicate the consent of the GISC to support the centre.

4.4.55 The Council noted that although WIS centres had been identified across most programmes, the initial list of centres was dominated by centres supporting programmes under CBS, and in particular centres associated with the World Weather Watch. It further noted that the benefits of WIS will continue to grow as WIS metadata matures to support services, publications and reports as well as observations and data. It noted that as WMO partnerships increase through initiatives such as the GFCS, technical commissions and regional associations may be approached by an increasing number of centres wishing to access and publish through WIS, including national climate and hydrological centres. It noted that centres from partner organizations such as ICSU had been identified in WIS by individual Members but that inter-organization liaison could be developed further through the Secretariat, regional and technical commission activities.

4.4.56 The Council adopted Resolution 13 (EC-65) – Amendments to the Manual on the WMO Information System.

**WIS Quality Management and Infrastructure Development**

4.4.57 The Council recalled that the Integrated Global Data Distribution System (IGDDS) originally focussed on the definition and operational implementation of an efficient distribution method for space-based observation data and products in the context of WIS. The Council noted that the scope of IGDDS had evolved to include terrestrial and satellite communications for the collection and distribution of satellite data and other operationally critical information. Such integration was exemplified by the success of the Regional ATOVS Retransmission Service (RARS) and the progress on the development of an international forum of users of satellite data telecommunications systems. The Council highlighted the importance of satellite data and satellite-based communication systems to WMO Members, including data collection systems and the distribution of warnings, time and operationally critical information essential to other initiatives such as SWFDP and GFCS and requested the organizations providing the IGDDS to continue to deliver the service.

4.4.58 The Council recalled that the Sixteenth Congress requested CBS to provide recommended practices for user authentication and authorization to control access to information exchanged through the WIS. The Council was pleased to see this being addressed in the
implementation of GISCs and encouraged CBS to identify common standards that will allow the sharing of user roles between all GISCs. Noting that the quality of the content of products and data in WIS was the responsibility of the associated WMO Programme, the Council stressed the importance of maintaining WIS standards through the monitoring of WIS functions and services. It noted the success of the CBS centre certification process in ensuring that GISCs and other centres are compliant with the standards required by WIS. The Council encouraged CBS to extend audit procedures to assess quality of services offered by WIS Centres, especially GISCs, at appropriate times and to enable continuous improvement activities to be planned, implemented and monitored as a contribution to the WMO Quality Management Framework.

4.4.59 The Council recognized that WIS meets many of the information management requirements of WMO Programmes, but will need further development to meet the needs for the registration of standards and practices as well as emerging initiatives such as the CSIS component of GFCS. It noted that although WIS seeks to use standard methods of communication around the globe, telecommunication realities mean that some non-standard arrangements have to be made and that it was important for Members to inform the Secretariat of such arrangements, especially over remote areas and the poles.

4.4.60 The Council recalled that EC-64 had requested CBS to provide a capacity-building plan involving GISCs and other centres that have implemented WIS, as well as capacity-building initiatives such as the Regional Training Centres, remote learning systems and fellowship programmes. It was pleased to see the initiatives undertaken by operational GISCs since EC-64 including the telecommunications workshop in Antalya run by Turkey and Germany, and GISC Workshops in Melbourne, Moscow, Seoul and Tokyo, and the combined Exeter/Toulouse GISC workshop scheduled for June 2013. The Council emphasized that in addition to the capacity-building plan, it is now essential to develop a structured training package for WIS and to investigate the feasibility of a competence framework for those with responsibilities for operating and managing WIS centres.

4.4.61 The Council thanked all Members that have supported the implementation of WIS to date. It encouraged CBS to continue to explore ways of exploiting new technologies in telecommunications and information management to help Members constrain the costs associated with operating the information systems. It noted that although WIS will continue to be developed and refined, it is essential for those Members, Regions and technical commissions that have yet to do so, to establish WIS implementation plans in order to meet the timelines established by Congress which expected WIS to be fully implemented by 2016.

4.4.62 The Council noted that the presidents of technical commissions had approved version 1.3 of the WMO Core Metadata Profile, and agreed that it should be published in the Manual on WIS (see Resolution 13 (EC-65)).

4.4.63 The Council adopted Resolution 14 (EC-65) – Quality management and infrastructure development of the WMO Information System.

WIS Data Management

4.4.64 The Council noted the difficulty that many Members were experiencing because there were insufficient WMO station identifiers available to assign a unique number to each station in the Member’s territory and that this hindered the international exchange of information. The Council noted with thanks that CBS had addressed this issue by permitting more station identifiers to be defined within the Table Driven Code Forms (TDCFs), and endorsed the conclusion by CBS that the cost and time scales of addressing the problem using the Traditional Alphanumeric Codes were prohibitive. The Council encouraged CBS to propose a procedure for allocating the increased range of station identifiers that makes it clear which body is responsible for ensuring the quality of the observations from the station, that ensures that the relevant authorities are consulted when the station identifiers are allocated and that encourages international exchange of observations from national and international organizations in support of WMO Programmes.
4.4.65 The Council emphasized the importance of Members completing migration of their processes and systems to be compatible with the TDCFs to meet the CBS migration schedule. Members that do not make the change will not be able to access observations from observing stations that are allocated a station number from the extended range, and will experience a reduction in the number of observations available to them as changes to observing systems create information that cannot be represented in the Traditional Alphanumeric Codes (TACs). The Council urged Members that had entered into an agreement with a Regional Telecommunications Hub to translate between TDCFs and TACs to plan and implement full migration, and reminded Members that had not yet implemented a solution to working with TDCF of the critical need to migrate, that without migrating they would experience an unavoidable reduction in the availability of observations in the TACs.

4.4.66 The Council noted with appreciation the progress that had been made by CBS and CAeM in creating an XML standard for exchanging aviation information to support ICAO (known as AvXML). The Council also noted that the development included a "Logical Data Model" named "metce" (Modèle pour l’Échange des informations sur le Temps, le Climate et l’Eau). The Council requested CBS to use the Logical Data Model to facilitate consistency between the Table Driven Code Forms and other data representation, to propose a method of managing developments to both the Logical Data Model and XML representations derived from it and to propose documentation for inclusion in WMO-No. 306 - Manual on Codes. The Council noted the importance of ensuring consistency in developing XML standards and requested that WMO programmes developing XML standards do this under the coordination of the Inter-Programme Expert Team on Metadata and Data Representation Development.

4.4.67 Noting the work of the Commission for Hydrology in developing, together with the Open Geospatial Consortium, an XML representation of hydrological information (WaterML2), and also noting that formal recognition of WMO data exchange standards through the ISO system would enhance the visibility of the WMO standards, the Council requested CBS to assist CHy to formalize WaterML2 as a WMO standard and to obtain a formal ISO standards number for WaterML2.

4.4.68 While acknowledging that basing WMO standards on standards developed by other standards bodies delivered many benefits, the Council noted that it also carried the risk of changes to the external standards having unanticipated impacts on WMO activities. The Council, therefore, encouraged CBS to explore methods for ensuring that the infrastructure needed to support external standards adopted by CBS would remain available throughout the period that those standards were in use.


Climate Data Management and Applications

Climate Data Requirements for GFCS

4.4.70 The Council emphasized the critical and necessary collaboration of all Members to ensure high-quality, timely and accessible climate data and metadata to enable their interpretation (including historical data) from all possible sources as an indispensible pre-requisite for effective climate services under the GFCS. The Council noted the wide range of techniques for meteorological, hydrological and marine observations, data transmission as well as data management and acknowledged the need for system coherence in managing these data. The Council welcomed the steps being taken by CCI to work in consultation with other technical commissions towards setting-up the necessary global infrastructure for ensuring that data are consistently managed using a commonly agreed and well described minimum set of procedures, regulations and system specifications. The Council noted the ongoing discussions led by CCI on ways and mechanisms to modernize climate data management worldwide with inclusion of in situ
and remote sensing data as well as data generated by GCMs. The Council requested CCI to work closely with other Commissions and programmes, specifically with CBS on WIS, WIGOS and with the GFCS-relevant groups and teams, to move from a concept to the definition of a High Quality Global Data Management Framework, as was proposed by CCI-XV in 2010.

Data Rescue and Climate Data Management

4.4.71 The Council welcomed the CCI plan to develop an integrated Internet data rescue portal to more effectively coordinate data rescue activities worldwide.

4.4.72 The Council urged Members in the Greater Mediterranean Region (GMR) to further collaborate on the exchange of the required minimum set of climate data and metadata to develop a long-term high-quality climate data set in the region to support the climate adaptation efforts. This data set is one of the main elements of the long-term goal of the Mediterranean Data Rescue Initiative (MEDARE).

Climate Normals

4.4.73 The Council noted the broad consultations led by CCI with involvement of other technical commissions to improve the current WMO definitions and practices applied by WMO Members in computing and disseminating Climate Normals. The Council welcomed the proposal made by the CCI Management Group to increase the frequency of updates to the 30-year WMO Climatological Standard Normals from 30 years to every ten years. In a changing climate, these updates would better reflect climate averages for use in operational climatology and provision of climate services. It further noted the views expressed by CCI experts to maintain the 1961–1990 period as a stable WMO reference period, specifically for long-term global climate variability and change assessment. This reference period should be maintained for this purpose until such time as scientific reason dictates that a new reference period is required. The Council requested CCI to submit a proposal for amending WMO Technical Regulations with respect to the definition, computation and provision of WMO Climate Normals.

World Weather Records

4.4.74 The Council reiterated the importance of the collection of global WMO datasets such as the well-received World Weather Records (WWR). While highly appreciating the continuous support to the publication of WWRs over the past decades, the Council urged Members to collaborate with WMO and CBS lead centres for updating the WWRs pertaining to the previous ten year periods: 1991–2000 and 2001–2010. The Council also urged Members to submit annual WWRs pertaining to 2011 and 2012 and future years as requested by WMO in the new practice for annual submission of the WWRs.

Climate Data Management Systems (CDMS)

4.4.75 The Council took note of the WMO survey on Climate Database Management Systems (CDMS) and acknowledged with satisfaction the Members’ response rate of 72 per cent by mid-2012. The survey analysis provided a good source of information for targeted capacity building in climate data management. The Council encouraged Members to actively create sub-regional, regional or even global CDMS user communities, as a cost-effective means of improved CDMS maintenance, upgrading and information sharing.

4.4.76 The Council welcomed the ongoing efforts of the CCI Expert Team on Climate Database Management Systems (ET-CDMS) to develop a set of CDMS specifications in order to standardize functions as far as possible, and to assist Members in their efforts of choosing a suitable system for their climate data management needs. The Council requested CCI to finalize its guidance to the Members of the list of modern CDMS requirements as a matter of priority.
4.5 Research (agenda item 4.5)

**World Climate Research Programme (WCRP)**

4.5.1 The Council acknowledged with appreciation that the WCRP is organizing a series of regional projects, conferences, capacity development and training activities focussing on the role of science in climate services and risk management. It encouraged Members to participate in the WCRP/ACPC Conference on the African Climate System - Addressing Priority Research Gaps to Inform Adaptation Decision-Making in Africa that will take place from 15–18 October 2013 in Arusha, Tanzania. The overall goal of the African conference is the production of an actionable climate research agenda that will result in outputs to inform adaptation decisions in Africa by mid-to-end of the 21st century. The conference is organized jointly with the African Climate Policy Center (ACPC) and will engage both well-established and early career scientists across the continent. Likewise, a joint WCRP-IPCC-EU International Conference on Regional Climate will be held 4–7 November 2013 in Brussels, Belgium. This event aims to showcase the main outcomes of the IPCC AR5 WGI report and the key scientific results for the first phase of CORDEX and identify the future research priorities. The Council was also pleased to note that the WCRP was organizing a Conference on Climate and Society for Latin America and the Caribbean scheduled for February 2014 in Montevideo, Uruguay.

4.5.2 The Council recognized the key contribution of the WCRP to the Global Framework for Climate Services in addressing the needs for science-based climate information at global and regional levels. The Council requested the Secretary-General to ensure that support for climate research is maintained and encouraged, for instance, through continuing coordination of WCRP activities with other research programmes such as the Global Atmosphere Watch Programme (GAW) and WWRP, and relevant Commissions and EC bodies such as CHy, CCI, CBS, JCOMM, and EC-PORS.

4.5.3 The Council endorsed the recommendations of the WMO/ICSU/IOC appointed Joint Scientific Committee (JSC) for the World Climate Research Programme at its most recent session in July 2012 in Beijing, China, that identified six "grand science challenges" resulting from the community based scientific papers and subsequent deliberations at the WCRP Open Science Conference (24–28 October 2011). The grand science challenges include:

(a) Provision of skilful future climate information on regional scales;
(b) Regional sea-level rise;
(c) Cryosphere in a changing climate;
(d) Clouds and climate sensitivity;
(e) Changes in water availability; and
(f) Prediction and attribution of extreme events.

These grand science challenges are intended to integrate scientific activities across the four WCRP core projects and the various WCRP Working Groups and Panels to deliver "actionable" climate information for decision makers in support of the GFCS and Future Earth.

4.5.4 The Council welcomed the establishment of a new WCRP Working Group on Regional Climate Science and Information (WGRC) to provide strategic advice on regional aspects of climate science, relevant aspects of climate services and vulnerability, climate variability and change, and climate impact and adaptation applications. In particular WGRC would contribute to the four near-time priorities of the GFCS and serve as the WCRP interface with the GFCS User Interface Platform. The WGRC reviewed best practices in climate services at its first session, 6–7 April 2013, and prepared recommendations on how WCRP can best interact with the GFCS UIP.

**World Weather Research Programme (WWRP)**

4.5.5 The Council noted that the sixteenth session of the Commission for Atmospheric Sciences (CAS-16) would be held from 20 to 26 November 2013 in Antalya, Turkey. CAS-16 will review progress in the World Weather Research Programme (WWRP) including The Observing
System Research and Predictability Experiment (THORPEX), consider WMO priorities, especially the GFCS and WIGOS/WIS, identify emerging research priorities with the assistance of Members and provide holistic guidance to the future activities of WWRP, including the post THORPEX legacy projects and activities.

4.5.6 The Council encouraged Members to actively participate in the CAS-16 preparations and session.

Nowcasting Research

4.5.7 The Council noted the progress made with developing a Lake Victoria Research and Development Project (RDP), following a recommendation of the sixty-second session of the Executive Council which assigned WWRP the task of developing a plan for a project to better understand the dynamics of Lake Victoria thunderstorms. The project plan proposes an extensive field programme, participation of local weather services and broad international research communities, to develop capabilities that will lead to greater safety for people dependent on Lake Victoria for their livelihood. The Mesoscale Forecasting Research community is motivated to also contribute to the project by implementing an extensive high-resolution modelling programme. The Council encouraged Members to participate in the implementation of the RDP and mobilize the resources required.

Mesoscale and Nowcasting Research and Development Projects/Forecast Demonstration Projects

4.5.8 The Council noted that there are several ongoing or proposed RDPs/FDPs based on nowcasting and mesoscale research aimed at addressing specific weather-related research needs identified by Members. In addition, large field programmes of the international community, such as HYMEX, are regularly monitored by the WWRP/JSC and THORPEX ICSC. HYMEX conducted field campaigns in the fall of 2012 and spring of 2013 and documented the formation of intense rainfall events along the Mediterranean coast (fall) and the formation of oceanic deep convection caused by severe wind episodes (spring). Such data will be instrumental to progress mesoscale NWP systems in the Mediterranean region.

4.5.9 FDP INCA-CE is a mesoscale research project including the study of significant societal impacts, aimed at developing a transnational (Central Europe) strategy in road safety, civil protection and operational hydrology.

4.5.10 RDP La Plata Basin Project is the project demonstrating the feasibility of dynamical prediction of local extreme weather using dense observation data and numerical models over a shared catchment in South America.

4.5.11 RDP/FDP FROST 2014, for the next Winter Olympic Games in Sochi, currently in the phase of testing the real-time forecasting and nowcasting facilities to be implemented during the Games, is aiming to demonstrate the usefulness of high-resolution deterministic mesoscale forecasts (including regional ensemble prediction systems) and nowcast systems for high impact weather phenomena (snow levels, wind, visibility, precipitation type and intensity) in a complex terrain.

Social and Economical Research and Application (SERA)

4.5.12 The Council noted with appreciation the collaboration of the Working Group SERA with the Marine Meteorology Programme on its JCOMM/CHy Coastal Inundation FDP for Bangladesh, Fiji and the Dominican Republic. The Council also noted the progress made on the draft of the SERA Warning Demonstration Project concept paper that now includes a SWFDP component.

Weather Modification

4.5.13 The Council noted that the lack of contributions by Members to the Weather Modification trust fund, which was established at the request of Cg-XV to advance the practice of
sound science in weather modification, holds a considerable risk to future activities. This risk includes challenges in organizing the International Conference on Weather Modification Research and the support of activities by the Expert Team on Weather Modification Research aimed at reviewing the guidance material on weather modification and updating the WMO statement on weather modification. In order to sustain these activities, the Council requests interested Members to contribute to the trust fund for Weather Modification.

4.5.14 The Council noted that, based on the necessity of developing a scientifically-based WMO position on weather modification, CAS-16 will consider the relative priority and sustainability of this activity in relation to other emerging issues, for example that related to geoengineering, and make recommendations to the sixty-sixth session of the Executive Council.

**Forecast Verification Research**

4.5.15 The Council noted that the Joint Working Group on Forecast Verification Research (JWGFVR) has issued a Tropical Cyclone Forecast Verification guidance document, and will publish a special issue of Meteorological Applications on forecast verification in June 2013. The special issue will include a review paper on progress in, and challenges for, forecast verification, a series of papers describing verification methods for short/medium/seasional forecasts and climate projections as well as on scores for severe weather and weather warnings. The working group is organizing a one-day ensemble verification workshop to be held during the European Meteorological Society Annual Meeting (Reading, September 2013) which will focus on interpretation of verification results. The Council encouraged the JWGFVR to continue to work towards the development of uniform verification methodologies and to make these available to Members.

**FDPs/RDPs in Tropical Meteorology Research**

4.5.16 The Council noted with appreciation that there are several FDPs/RDPs in Tropical Meteorology Research, including the Northwest Pacific Tropical Cyclone Ensemble Forecast Project (RDP, NWP-TCEFP), the Southern China Monsoon Rainfall Experiment (SCMEX) RDP and Typhoon Landfall FDP (TLFDP).

4.5.17 NWP-TCEFP launched the Tropical Cyclone Ensemble Forecast in 2010 for the purpose of providing guidance of tropical cyclone forecasts in near real-time for Typhoon Committee Members, using the TIGGE (THORPEX Interactive Grand Global Ensemble) Cyclone XML (CXML) data. The Council noted with appreciation that improvement of the website will be made based on the feedback from Members collected through a survey in December 2012. The Council further noted that the project has started evaluation of tropical cyclogenesis predictability over the western North Pacific on medium-range timescales.

4.5.18 The SCMEX RDP aims at improving the observation of precipitation processes by the use of a new generation of in-situ and remote sensing systems operated from the ground, on aircraft, and aboard satellites in order to shed light on the internal structure of convective clouds and their environment, and also the use of advanced high resolution modelling facilities able to resolve and represent the monsoon thermodynamics. The pilot phase of the SCMREX is scheduled for May 2013 and the implementation phase in May 2014.

4.5.19 The TLFDP will be extended to 2015 to include tropical cyclogenesis forecasting and to eventually develop techniques for the verification of the genesis forecasts.

**5th International Workshop on Monsoon in October 2013**

4.5.20 The Council noted that the 5th International Workshop on Monsoon (IWM-V) and the Monsoon Training Workshop are now scheduled in October 2013 (Macau & Hong Kong, China), which aims to provide a forum for researchers and forecasters to discuss recent advances and current issues covering all time scales (meso, synoptic, extended range, intraseasonal, climate) that are relevant to the forecasts of high-impact weather in the monsoon regions around the world.
4.5.21 Research workshops and projects organized jointly by WWRP and the Tropical Cyclone Programme (TCP) provide excellent opportunities for active interaction between operational forecasters and researchers focused on facilitating the transfer of research and technology developments to operations. Noting this, the Council urged the Secretary-General to take necessary actions to promote the involvement of operational forecasters in those events, in particular, the Eighth International Workshop on Tropical Cyclones (IWTC-VIII) and the Third International Workshop on Tropical Cyclone Landfall Processes (Republic of Korea), both of which will be held in November 2014.

THORPEX Legacy Projects

4.5.22 The Council expressed its satisfaction with the establishment of three THORPEX legacy projects aligned to the requirements of Members and the GFCS namely, the sub-seasonal to seasonal prediction project (S2S), the polar prediction project (PPP) and the new high-impact weather prediction project currently being developed. The first two projects were approved at EC-64 and as per Resolutions 16 and 17, their trust funds have been established and the International Coordination Offices are in the process of being formalized. The Council encouraged Members to participate in the implementation of these projects and provide the resources required. The Council noted that THORPEX continues until 2014 and encouraged Members to continue contributing to the THORPEX Trust Fund to enable completion of the experiment.

High Impact Weather Prediction Project

4.5.23 The Council recognized that the third THORPEX legacy project on high-impact weather prediction, from minutes to weekly timescale, with a strong socio-economic application component, has been requested by a number of Members. The development of an implementation plan was initiated at the Workshop on Improving the Prediction of High Impact Weather, Karlsruhe, Germany, in March 2013. The Council welcomed the recent establishment of the Task Force on High-impact Weather Prediction to finalize the implementation plan for the project for consideration by EC-66.

WWRP Open Science Conference

4.5.24 The Council was pleased to note that preparation for the World Weather Open Science Conference (OSC), scheduled during August 2014 in Montreal, Canada is proceeding well and that an International Organizing Committee (IOC) and sub-structures have been established with broad international representation. The IOC had its inaugural meeting during the AMS conference in Austin, Texas, United States on 8 January 2013. The overarching theme of the OSC is Seamless Prediction of the Earth System: from nowcasting through medium-range to seasonal forecasts. A strong focus will be placed on applications in key sectors and the active involvement of early career scientists, especially those from developing countries.

Global Atmosphere Watch (GAW) Programme

GAW

4.5.25 The Council recognized the good progress made in the Global Atmosphere Watch (GAW) Programme, especially shown through the GAW 2013 Symposium held in March 2013 (website: http://www.wmo.int/pages/prog/arep/gaw/gaw2013symp.html). The Council noted that GAW has matured with the infrastructure largely in place and the Scientific Advisory Groups (SAGs) having produced numerous documents guiding the observations, such as on data quality objectives (DQOs) and standard operating procedures (SOPs). The Council noted that the backbone of GAW is the observations that are made in remote areas and that this network needs to be kept healthy. In this connection the Council recognized that GAW observations provide the
basis for knowledge on greenhouse gases and other climate forcers, a basic requirement for science based policy and GFCS.

4.5.26 The Council noted the important links of GAW with the health, agriculture, disaster risk reduction and water (in terms of quality) priority areas of the GFCS. The Council requested for GAW to continue the important collaboration on health issues, noting that GAW had made a major contribution to five of the eleven areas presented in the “Atlas of Health and Climate”, published by WMO and WHO in 2012.

4.5.27 Sustaining and optimizing the GAW observing systems is an important permanent requirement. The Council noted that gaps remain and encouraged Members to fill them. The Council appreciated the efforts of several Members in the development of the observational network for atmospheric chemistry and related physical parameters. New regional stations that joined the GAW Programme in Australia, the United Kingdom, France, Finland, Germany, Denmark and Belgium make a valuable contribution. The Council stressed the special value of the stations that run observations in the Arctic and Antarctica, as well as in the Tropics, including three stations in Indonesia and one in Malaysia. As the majority of GAW stations perform observations of greenhouse gases, aerosols and ozone, the Council noted that those observations are also contributing to the observational pillar of the GFCS.

4.5.28 The Council noted that it is essential for GAW to take into consideration the socio-economic needs to ensure support for the Programme. The Council further agreed that it is important for GAW to enhance the value chain of GAW, from research driven and operational observations, through model development and application, to services. In this, Member contributions to research, infrastructure, capacity and institutional development are essential. Current examples of use and analysis of observations include the authoritative WMO Bulletins on Greenhouse Gases and on Ozone, UV Index, air quality indexes and forecasting, observations for volcanic ash detection and inclusion of atmospheric chemical and related components in NWP.

4.5.29 The Council agreed that the quality of the observations is directly related to their value for users. In this respect the developments within the GAW Programme related to the quality assurance system and capacity building was appreciated by the Council. The Council welcomed the establishment of the World Calibration Centre for sulphur hexafluoride in the Korea Meteorological Administration, the World Calibration Centre for UV radiation in Physikalisch-Meteorologisches Observatorium Davos and the proposal from NIST (United States) to host the Central Calibration Laboratory for terpenes. The Council appreciated the efforts of the expert groups who prepared the guidelines documents on observations of tropospheric ozone and VOCs. The Council expressed particular satisfaction with the activities on the expansion of the GAW observation network and capacity-building by Switzerland within the CATCOS project and recommended for other Members to undertake similar activities.

4.5.30 The Council noted the fruitful collaboration with the International Global Atmospheric Chemistry (IGAC) project of IGBP on Megacities and biomass burning and requested for GAW to continue this, expanding to air pollution and climate interactions by collaborating on the development of a strategic plan for integrated programmes on air pollution and climate change. It also noted the good connections to the 2nd phase of the Monitoring Atmospheric Composition and Climate (MACC-II) project of the European Global Monitoring for Environment and Security (GMES), with for instance GAW stations providing data to this initiative and GURME using MACC-II for boundary conditions in air quality modelling activities.

4.5.31 The Council recommended for GAW to become active in the Climate and Clean Air Coalition (CCAC) in order to provide a scientific basis for this global initiative in addressing short-lived climate forcers (ozone, methane and soot).

4.5.32 The Council noted that in 2014 GAW would have its 25th anniversary and suggested that Members could take this into consideration and plan appropriate activities to commemorate the success achieved and to ensure the sustainable future of GAW.
4.5.33 The Council was pleased to note that the 4th International Workshop on Air Quality Forecasting Research (IWAQFR) was successfully hosted by WMO in Geneva, December 2012, with the first three workshops having taken place in North America. The Council welcomed the hosting of the 5th workshop in Santiago, Chile, in October 2013, making the important participation from Latin America in this activity more feasible.

4.5.34 The Council requested GURME to look into the possibility of addressing other urban environmental concerns, such as noise pollution, hydrological problems and water resources, as has been done previously for health-related services.

4.5.35 The Council appreciated the publication of the WMO/IGAC Impacts of Megacities on Air Pollution and Climate (available at: http://www.wmo.int/pages/prog/arep/gaw/documents/Final_GAW_205_web_31_January.pdf), which also received good media coverage. The report examined data from Africa, Asia, South America, North America and Europe, and is the first international assessment of available information on air pollution in megacities. Due to the varying amount of scientific knowledge available across megacities, a comprehensive, integrated assessment of the impact of megacities on air pollution and climate was not yet possible. Many scientific questions still remain and many urban areas are still in need of comprehensive air quality management strategies.

4.5.36 The impact of megacities on local air quality has long been recognized. In recent years, the impact of anthropogenic emissions from megacities on regional and global climate has also received increasing attention. Historically, air pollution and climate change have largely been kept separate in both the scientific and policy communities. However, it is now recognized that air pollutants can be important drivers of climate change and the regional impacts of climate change can affect atmospheric chemistry. Thus air pollution, weather patterns and climate change are issues with overlapping temporal and spatial scales and should be addressed in an integrated manner. The Council agreed with the report that because of these linkages, it can be argued that megacities are the best places to realise the co-benefits of simultaneously controlling air pollution and to mitigate against climate change.

4.5.37 There is an opportunity for urban areas that are just beginning to implement air-pollution control measures to learn from those with established strategies. Experience shows that newer cities can avoid the pronounced air quality degradation that accompanied the development of older ones. The Council requested Members to take appropriate actions for this type of collaboration, as applicable.

4.5.38 The Council recommended that this megacity assessment be revisited in about 4 years.

**WCRP, WWRP and GAW Joint Research Initiatives**

4.5.39 The Council recognized the importance of close cooperation between the World Climate Research Programme (WCRP), the World Weather Research Programme (WWRP) and the Global Atmosphere Watch (GAW) Programme to adequately address the complex feedbacks between atmospheric composition and weather and climate processes. The growing requirements for more accurate, relevant and user specific services can best be address through a research approach that is seamless over spatial and temporal scales as well as the various components of the Earth system contributing to and impacting on predictive skill.

**Working Group on Numerical Experimentation (WGNE)**

4.5.40 The Council acknowledged the outcome of the 28th session of the Working Group on Numerical Experimentation (WGNE) held in Toulouse, France, 5–9 November 2012, which addressed important topics such as the Sub-seasonal to Seasonal Project, the Polar Prediction Project (PPP) and the Polar Climate Prediction Initiative (PCPI), and the linkages between weather-climate models and aerosols. WGNE has the responsibility of fostering the development
of atmospheric circulation models for use in weather, climate, water and environmental prediction on all time and spatial scales and diagnosing and resolving shortcomings. The working group decided to: (a) increase liaison between WGNE and the THORPEX Data Assimilation and Observing Systems Working Group; (b) enhance coordination of regional Ensemble Prediction Systems with the THORPEX TIGGE-LAM effort; (c) conduct dedicated studies on model momentum budgets; (d) review the list of critical variables stored on the S2S data base; (e) publish results on verification of tropical cyclone forecast in global models; (f) recommend scores and bootstrapping methods for precipitation verification; (g) develop aerosol case studies and to determine the role of aerosols in current seasonal to interannual predictions; and (h) identify metrics tailored for boreal summer Intraseasonal Variability (ISV) from modelling centres.

4.5.41 Council noted that the WCRP/WWRP Madden-Julian Oscillation (MJO) Task Force will now report directly to the WGNE because it is widely recognized that improved understanding and prediction of the MJO and related tropical ISV is crucial for both the climate and weather communities, and the decisions they support. This Task Force is expected to make a major contribution to the Sub-seasonal to Seasonal project and will now be organized around four sub-projects: (a) process-oriented diagnostics and metrics for MJO simulations; (b) boreal summer monsoon ISV monitoring and forecast metrics; (c) simplified MJO metrics and Coupled Model Intercomparison Project phase 5 analysis; and (d) vertical structure and diabatic processes of the MJO.

Sub-seasonal to Seasonal Prediction Project

4.5.42 The Council noted the progress on the implementation of the joint project of the WCRP and the WWRP on Sub-seasonal to Seasonal Prediction (S2S), which aims to improve forecast skill and understanding on the sub-seasonal to seasonal timescale, and to promote its uptake by operational centres and exploitation by the applications community. Specific attention is paid to the risk of extreme weather, including tropical cyclones, droughts, floods, heat waves and the waxing and waning of monsoon precipitation. To achieve many of these goals the planning group advocates the establishment of an extensive database of sub-seasonal (up to 60 days) forecasts and reforecasts, building on the THORPEX Interactive Grand Global Ensemble (TIGGE) database standards for medium-range forecasts (up to 15 days) and the WCRP Climate-system Historical Forecast project for seasonal to interannual forecasts. The Council acknowledged the outcome of the second planning group meeting at the United Kingdom Met Office, 5–7 February 2013, where subprojects on monsoon, MJO, Africa, extreme weather, and verification were discussed, and the database archive variables were reviewed. A Memorandum of Understanding was signed during EC-65 between WMO and the Korea Meteorological Administration to formalize the establishment of the S2S International Coordination Office in the Republic of Korea. The Council welcomed this substantial contribution to S2S and urged Members to consider contributing to the S2S trust fund, to ensure that the Project has adequate resources for its planned activities.

Polar Prediction Project

4.5.43 The Council noted the activities of the newly established 10-year Polar Prediction Project (PPP), especially the finalization of the Implementation Plan and the progress on the Year of Polar Prediction under the leadership of the PPP Steering Group and in close collaboration with the WCRP Polar Climate Predictability Initiative. The aim of the PPP is to “Promote cooperative international research enabling the development of improved weather and environmental prediction services for the Polar Regions, on time scales from hours to seasons” which represents a fundamental component of the emerging WMO Global Integrated Polar Prediction System. The Council welcomed the offer made by one Member country to host the International Coordination Office for the project. The Council acknowledged that this offer does represent tangible and substantial contributions to the project but responses to the request for contributions to the trust fund have not yet met the expectation, and the Council urged the Members to consider contributing to the PPP trust fund, to ensure that the project has adequate resources for its planned activities.
Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)

4.5.44 The Council noted that a letter of agreement has been signed between WMO and UNEP aiming to utilize their respective comparative advantages towards the implementation of the project “Assessment of Sand and Dust Storms in West Asia Region”. The project, focusing on country members of the Gulf Cooperation Council, Islamic Republic of Iran and Turkey, should develop an objective guidance for possible establishment of regional institutional mechanisms and infrastructure dealing with SDS, thus improving capabilities in meteorological services in monitoring and predicting the atmospheric dust process. The Council also noted that the outcome of the project would be a report providing guidance for possible future establishment of a new regional SDS-WAS node in the region.

4.5.45 The Council noted the establishment of the Pan American Center, which is a third regional node in the SDS-WAS. The Pan American Center, sponsored by Chapman University, will cover North, Central, and South America as well as the Caribbean. The Council urged all Members in this region to reach out to this new Center in order to ensure a global perspective of wind-blown dust, which is a hazard to health, safety, and infrastructure.

4.5.46 The Council noted that CAS and CBS collaborated towards establishing the mandatory functions for a Regional Specialized Meteorological Centre with activity specialization in Atmospheric Sand and Dust storm Forecasts (RSMC-ASDF) as approved by CBS-15.

4.5.47 The Council noted that the SDS-WAS Implementation Plan would be updated during 2013. It will propose autonomy for research coordination at regional levels by the Members involved, specify more precisely the steps to translate research modelling activities to operational dust forecasting, propose a mechanism of international coordination of existing regional collaboration components and suggest establishing a trust fund to support the global coordination of SDS-WAS activities which the Council can consider at its next session.

Polar Observations, research and Services – the International Polar Initiative (IPI)

4.5.48 The Council noted with interest the proposal of an International Polar Initiative (IPI) prepared by the inter-agency Steering Group on Long-term Cooperative Polar Initiative. The Council acknowledged the efforts of the Steering Group aimed at impartially reviewing the needs for an International Polar Decade (IPD), which was proposed in 2011 as a means to secure valuable legacies of the International Polar Year 2007–2008 (IPY), and recognized that the idea of IPD has been fruitfully developed by the Steering Group and evolved into the concept of IPI.

4.5.49 The Council acknowledged that IPI represents a novel attempt to efficiently respond to the existing challenges of polar observations, research and environmental services that are related to fast and profound changes in the Polar Regions and their likely global implications, and in this regard IPI may have a potential to help WMO to achieve its objectives in the Polar Regions in terms of developing more sustained observing systems and environmental information services. The Council noted with interest that the draft Concept of IPI includes a proposal to comprise observations, research, and services in the “Third Pole Region” in the scope of IPI activities. The Council considered inclusion of these issues as a positive development and thanked the Steering Group on Long-term Cooperative Polar Initiative for elaborating the draft Concept of IPI.

4.5.50 The Council noted that the draft Concept of IPI had been presented to several international organizations and science forums, which expressed their initial informal support to the initiative.

4.5.51 The Council further noted that the EC Panel on Polar Observations, Research and Services (EC-PORS) had also reviewed the draft Concept of IPI at its fourth session in Lanzhou, China, in March 2013.

4.5.52 The Council agreed that in order to determine the merit for WMO of participating in an IPI, it would be necessary for the Steering Group to finalize the Concept of IPI. The Council
requested EC-PORS to continue representing WMO in the inter-agency Steering Group. The WMO polar and cryosphere initiatives such as GIPPS, GCW, and AntON could be considered as WMO contributions to IPI, and potential linkages of IPI and the Future Earth could be also considered.

4.5.53 The Council further requested EC-PORS to consult widely with relevant international organizations and bring forward recommendations on the optimal level and modalities of the WMO participation in IPI for the Council's consideration at EC-66.

4.6 Capacity Development (agenda item 4.6)


4.6.1 The Council recalled Resolution 49 (Cg-XVI) calling for a WMO Capacity Development Strategy (CDS) and the discussion at Cg-XVI that the CDS should provide a coordinated and cohesive approach to capacity development activities by WMO aiming sustainable development of NMHSs in developing countries with a particular focus on Least Developed Countries (LDCs) and Small Island Developing States (SIDS) to meet their mandates. The CDS also provides the backbone to align the roles of regional associations, technical commissions, WMO co-sponsored Programmes, WMO Programmes as well as the Secretariat in capacity development, and to facilitate communication among them and with stakeholders, not limited to, but with a special focus on the other strategic priority areas (GFCS, Aeronautical Meteorology, WIS/WIGOS, DRR).

4.6.2 The Council noted the EC Working Group on Capacity Development (EC WG-CD) held in Geneva from 21 to 23 January 2013 reviewed the WMO Capacity Development Strategy (CDS) and further developed the CDS Implementation Plan (CDSIP) for presentation to EC-65. [The full report of the 2nd meeting of the ECWG-CD can be found at http://www.wmo.int/pages/prog/dra/documents/ECWG-CD_2013_Final_Report.doc.]

4.6.3 The Council was presented with and discussed the draft Capacity Development Implementation Plan for 2012–2015 (CDSIP). The Council agreed to the overall approach to implement the CDS and noted the work of the EC WG-CD on the document since the draft was presented to EC-65. The Council recognized in particular that the CDSIP included an executive summary, priority activities for the financial period, as well as a detailed table showing activities by programme, responsible bodies for each activity, and cost information regarding the allocation of the WMO regular budget contributing to each of the CDS Strategic Objectives. It also noted efforts to coordinate with the EC WG-SOP and regional association and technical commission presidents.

4.6.4 The Council recognized that the Strategic Objectives of the CDS are long-term in nature, dependant on multiple players and other factors, and that activities of CDSIP in this financial period included activities to be completed during the next three years as well as those initiatives to produce benefits in future time-frames. In this connection, the Council felt that the CDSIP captured in a more comprehensive and structured manner activities underway across the WMO, which as a whole contributed to strengthening NMHSs. It also identified key areas requiring addition action.

4.6.5 As such, the Council agreed that the CDSIP provided a good basis for action for the remainder of this financial period, and approved Resolution 16 (EC-65) – Implementation plan of the WMO Strategy for Capacity Development.

4.6.6 The Council recognized that strengthening WMO Knowledge Management to improve the availability and use of information for and about NMHSs is critical to the success of the CDSIP and therefore supported the creation of the EC WG-CD Task Teams for the Country Profile Database (CPDB) and the Categorization of NMHSs. In considering this aspect, the Council:

(a) Noted that the prototype WMO Country Profile Data Base (CPDB) [http://www.wmo.int/cpdb], once fully implemented, could transform the manner in which information fundamental to understanding the needs of NMHSs and to the
establishment of priorities for capacity development is collected and applied, and therefore requested that:

(i) Members provide updated information on their country for inclusion in the CPDB prototype as soon as a secure mechanism is available to receive it,
(ii) The EC WG-CD in consultation with the EC WG-SOP further develop how the CPDB can be refined to assess and monitor the development of NMHSs, and
(iii) The CPBD be made operational as soon as practical and within resources available; and
(iv) The Secretary-General allocate adequate resources to ensure its early completion.

(b) Recognized that the proposed categorization should serve to highlight the need to invest in NMHSs to facilitate provision of required services and comply with WMO standards and, as such, requested that:

(i) The categorization of NMHSs be based on objective criteria, with flexibility as to national requirements; and that
(ii) Based on these criteria, the categorization scheme should assist each NMHS to determine the service-levels necessary for it to fulfil its mandate and assess its ability to do so.

4.6.7 The Council appreciated that case studies illustrating the eight-step process had been prepared (see Annex 2 to the Implementation plan of the WMO Strategy for Capacity Development contained in the annex to Resolution 16) and encouraged countries to contribute additional studies;

4.6.8 The Council recognized that the newly released on-line Guide for the Role and Operations of Meteorological Services offers a useful resource for WMO Members and requested that it be maintained and be given visibility on the WMO web page;

Education and Training Programme

Human Capacity Development

4.6.9 The Council recalled Resolution 31 (Cg-XVI) outlining the major focus, strategies and activity areas for the WMO Education and Training Programme (ETRP) for this financial period. The Council noted that the Secretariat was successfully addressing every activity area requested of the Secretary-General. The Council also noted that whilst some of the regional associations had taken an active interest in reviewing their education and training needs and capabilities, and coordinating with the Regional Training Centres they had endorsed, more could and should be done. Similarly it appeared that Members could make better use of the available education and training opportunities by being selective in courses they apply for and only nominating suitable candidates for these courses.

4.6.10 The Council recognized the valuable contributions that Australia, China, Finland, France, Israel, Japan, Norway, the Republic of Korea, the Russian Federation, Turkey, the United Kingdom of Great Britain and Northern Ireland and the United States of America were making to assist all WMO Members to address the high priority areas for this financial period. The Council also recognized the significant contributions that Members made to education and training opportunities in programme areas such as public weather services, tropical cyclones, satellite, SWFDP, marine meteorology and oceanography. The contributions came via provision of direct extrabudgetary funding for fellowships and very short-term training events or in-kind contributions by partially or fully funding education and training events or reduction or waiving of fees and other assistance. In total these direct and in-direct contributions significantly increase the breadth and depth of education and training opportunities and resources available to all Members.
Fellows

4.6.11 The Council reiterated the importance of the WMO Fellowship Programme for the development of human resources in Member countries. The Council encouraged Members to actively seek multi-lateral funding opportunities for fellowships as the funds available under the WMO Regular Budget were insufficient to meet the demand in least developed and developing countries for basic university and vocational training plus new demands associated with the WMO high priority areas. In view of this situation the Council urged Members, especially those hosting RTCs, to assist in identifying further scholarship or cost sharing opportunities that could increase the number and types of opportunities available at the RTCs, and affiliate institutions at country and regional levels. Such opportunities could include partial fellowship support through waiver of tuition, provision of accommodation or coverage of living expenses and provision of long- and short-term on-the-job training experience.

4.6.12 The Council noted with appreciation the expansion of fellowship opportunities within the research area such as six-month placements at the University of Kyoto in Japan and PhD programmes through cooperation with the Academy of Sciences for the Developing World (TWAS) and the Nanjing University of Information Science and Technology. The Council urged Members to take full advantage of these opportunities to enhance their capacity to support the WMO high priority areas, in particular GFCS.

4.6.13 The Council recalled that the WMO Fellowship Programme included a provision for familiarization visits for recently appointed Permanent Representatives (PRs). The Council acknowledged the value of these visits to the new PRs to speed up their introduction in the work of the Organization and the Secretariat as well as some key WMO centres hosted by other Members. The Council also acknowledged the direct and indirect costs of these visits to WMO and its Members, particularly with static or decreasing funds and increasing demands on the limited fellowship funds. Within this context the Council appreciated the work of the WMO Fellowships Committee (FELCOM) in reviewing the processes and procedures for familiarization visits. The Council noted the delicate balance required between support for long-term fellowships and support for recently appointed PRs and the FELCOM’s efforts to keep the direct costs for the familiarization visits to less than 10% of the Fellowship Programme Regular Budget. The Council requested the Secretary-General to not exceed 10% of the Fellowship Programme Regular Budget for familiarization visits. The Council endorsed the Secretary-General’s decision to update the guidance (see Annex VI to the present report) for considering requests for familiarization visits and reducing the maximum number of centres that could be included in such a visit to two. The reduction in the duration of the visit and number of countries to be visited would help address the balance between limited funds and requests for visits. The Council encouraged Permanent Representatives to utilize alternative ways of achieving the goals of familiarization visits, such as teleconferencing, and twinning of visits with other travel opportunities. The Council encouraged Permanent Representatives to provide curricula vitae as part of their visit requests to assist the Secretariat and Members hosting such a visit to better prepare for the visit.

4.6.14 The Council thanked the EC Panel of Experts on Education and Training for their efforts to produce a new easy to use guide in English, French, Russian and Spanish for familiarization visits for recently appointed Permanent Representatives and potential candidates in applying for a WMO Fellowship. The Council noted that an update (in English only) to publication WMO/ETR-No. 18 “Manual on Policies and Procedures for WMO Fellowships” was underway and requested that it include the decisions made at this session regarding familiarization visits. The Council further noted that the revised publication would need to be renamed to conform to the WMO publishing guidelines.

4.6.15 The Council noted the improvement in the return of WMO Fellowship Reports from Members and endorsed the changes in the WMO Fellowship Nomination Forms that would provide additional information to the WMO Fellowship Committee when considering requests. The Council requested the Secretary-General to make copies of the new forms available to Members in English, French, Russian and Spanish as soon as possible.
4.6.16 The Caribbean Institute for Meteorology and Hydrology (CIMH) reported that in response to the limited funding available to meet the demand for fellowships by the least developed and developing countries, and the increasing cost of training in the Caribbean, CIMH had been successful in sourcing funds for training through projects and from various regional agencies. The CIMH further noted that in some cases these funds were used to co-fund training with WMO. Finally, the CIMH noted with appreciation WMO’s expressed desire to support the training of trainers that had benefited RTCs in RA IV and elsewhere.

Regional Training Centres

4.6.17 The Council recalled that Regional Training Centres were a key component of the WMO Education and Training Programme and their activities were expected to make a significant contribution to WMO addressing the high priority areas for this financial period. The Council noted the many positive contributions made by RTCs in Algeria, Barbados, China, Egypt, India, Kenya, Indonesia, Israel, Nigeria, the Philippines, Qatar, the Russian Federation, and Turkey in the last two years through the provision of long- and very short-term training opportunities for Members. The Council further recalled that its Panel of Experts on Education and Training had commenced a review of the “Future Roles and Operations of Regional Training Centres” due to concerns about how to support and fund the growing number of Regional Training Centres and reports indicating that about 50% of the Regional Training Centres were not used by Members or the use was very minimal. The Council recognized that whilst there may be some discrepancies in the activity figures due to communication problems or changeovers in personnel it was clear that Members were not taking, or able to take, advantage of the opportunities on offer at all RTCs and thus the situation needed to be reviewed. The CIMH reported that the online professional development course it offers to the staff of NMHSs in RA IV that supports competency assessment was being run for the second consecutive year and that there was a growing demand for the course. The CIMH further reported that it was prepared to offer a limited number of seats in the class to staff from NMHSs from outside of RA IV during the next offering of the course. The Council appreciated the offer of the CIMH to support the development of NMHSs in other Regions.

4.6.18 The Council noted that the RTC Directors had begun discussions on this issue in December 2012 in Langen, Germany. The meeting suggested additional areas that the review group should take into account in their considerations. These included: specialization (topic, level and language); delivery methods (face-to-face, distance learning); duration of activities (very short-term (less than a month), short-term (one month to less than six months) and long-term (greater than six months)); availability of different types of national and other funding to support RTC activities; training versus education (essentially short- and very short-term representing job focused training vs. long-term which is more academically based and related to building human capacity in an NMHS); and ability to react to changing WMO and regional priorities. The Council expressed concern with the slow progress given the importance of the topic. The Council requested the Panel to take immediate action to allow an informed debate on this issue at the forthcoming Education and Training Symposium. The Council was pleased to note that during the Langen meeting a number of the RTCs agreed on collaborative projects that could see exchanges of staff and expertise between Kenya and the Caribbean and collaborations between training centres in and around Europe and a possible consortium in East Asia. The Council welcomed this development and encouraged EC Members hosting these institutions to actively encourage and support these twinning activities.

4.6.19 The Council were informed that due to security issues in a number of countries it had not been possible for three of the agreed RTC reviews to proceed as Panel members were not able to obtain approvals from their national governments to support the missions. The Council noted that the ETR Office was identifying options to adjust the review schedules to keep the review programme on track pending the outcome of the review of the “Future Roles and Operations of RTCs”.

4.6.20 Council recalled its request from EC-64 for the presidents of Regional Associations I, III, IV and VI to advise EC-65 of the status of the inactive or dormant RTCs in their Region. The Council was pleased to note the advice from the presidents of RAs I, III, and VI that there was
promising ongoing discussion on how the RTCs could help Members address their education and training needs and from the president of RA IV that the RTC in Costa Rica was active and assisting Members through face-to-face and distance learning courses. The Council appreciated the advice from Brazil regarding their proposal to move to an RTC based on a virtual centre (network) composed of a number of Brazilian universities and institutions active in meteorological education and training. The Council recommended that this approach be considered in the RTC review the EC Panel on ETR are undertaking.

**Education and Training Activities**

4.6.21 The Council recalled that the Sixteenth World Meteorological Congress requested the WMO Technical Commissions to consider as a high priority the development of personnel competency requirements for this financial period. The Council noted with pleasure the activities within CBS on creating competency requirements for general forecasting and for public weather service advisors, and on the JCOMM decision to create a working group to develop competency requirements for the area of marine meteorology. Noting the importance of these activities and the potential benefits and impacts upon Members, the Council requested its Panel of Experts on Education and Training to continue the active liaison with these groups and assist in the wide spread dissemination of the draft competencies to ensure thorough and meaningful decision when the technical commissions consider them for possible adoption into the WMO Technical Regulations. The Council reconfirmed that the responsibility for creating and maintaining the competency requirements lies with the technical commissions but requested its Panel of Experts on Education and Training to maintain the liaison with the technical commissions to ensure a common approach to the formulation of the competence requirements.

4.6.22 The Council thanked its Panel of Experts on Education and Training for drafting and ensuring wide spread discussion relating to the proposed competency requirements for personnel involved in the provision of education and training. The Council reviewed the “Competency Requirements for Education and Training Providers for Meteorological, Hydrological, and Climate Services”, which includes the six top-level competencies and their application conditions, along with their associated descriptions, performance criteria and knowledge requirements [http://www.wmo.int/pages/prog/dra/etrp.php](http://www.wmo.int/pages/prog/dra/etrp.php).

4.6.23 The Council noted that adoption of these requirements would be consistent with the WMO approach to quality management and complemented and built upon the EC-64 guidance that training institutes that were not accredited as formal training providers in their host countries should follow ISO 29990:2010(E) – ‘Learning Services for non-formal Education and Training – Basic Requirements for Service Providers’. The Council noted that Members could nationally impose higher-level requirements. Resolution 17 (EC-65) – Competency requirements for providers of education and training to meteorological, hydrological and climate services, was approved by the Council.


4.6.25 The Twelfth WMO Education and Training Symposium is due to take place in 2013. The Council noted the kind offer of Météo-France to host the Symposium in its international conference facilities in Toulouse from 2 to 6 September 2013 thus allowing linkage with the CALMET workshop the previous week. The Council considered that holding the two meetings back-to-back would allow participants from the CALMET workshop to also contribute to the Symposium. The Council noted that the Symposium was a key opportunity for the WMO education and training community to coordinate and discuss how they could contribute towards Members and regional associations meeting their goals. The Council noted with interest that the Symposium would address issues such as the trainer and general forecaster competencies, distance learning, future roles and operations of Regional Training Centres and education and training support for high priority areas such as GFCS and aeronautical meteorology.
4.6.26 The Council noted that CHy-14 had revised and adopted the WMO Strategy on Education and Training in Hydrology and Water Resources for the period 2013–2016. In the implementation of this strategy, it was noted that comprehensive training material, including slides, lecture notes, videos and exercises, had been prepared to support the utilization of the WMO Manual on Stream Gauging (WMO-No. 1044) and courses had been held in Ghana, Mexico and the Dominican Republic. Similar, although less extensive, material was being prepared for the Manual on Flood Forecasting and Warning (WMO-No. 1072) and the Manual on Low-flow Estimation and Prediction (WMO-No. 1029). The delivery of Distance Learning Courses on basic Hydrological Science based on the WMO/COMET®/NWS model had continued with new courses held in India in November/December 2012 with 42 local participants and in Kenya in April/May 2013 for 46 African participants. The CIMH noted that its online course in hydrology would be completed in August 2013 and delivered to persons in RA IV during the 4th quarter of 2013. Finally, the Council was pleased to learn that CHy experts had supported the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) in the development of the syllabus of a 9-month Hydrologists Training Course planned to be offered starting in July 2013. PAGASA had kindly offered some places for students coming from RA V at very favourable conditions. The Council endorsed the WMO Strategy on Education and Training in Hydrology and Water Resources for the period 2013–2016.

4.6.27 The Council was pleased to note that CHy-14 had acted on the request and recommendation of Cg-XVI, by establishing a joint Task Team with UNESCO, IAHS and IAHR to develop an agreed global understanding of the definition of hydrologist and hydrological technicians and to develop competency requirements for hydrological personnel. It noted that the AWG to CHy, at its first meeting in February 2013, had observed that, in order to ensure a well formed proposal to CHy in 2016 (or even more desirably to the next WMO Congress in 2015), the Task Team should be established and working by the end of 2013, and had requested the Secretariat to accelerate the establishment of the Task Team.

WMO Resource Mobilization Strategy

6.6.28 The Council noted with appreciation that CHF 43.5 M had been received by WMO in voluntary contributions in 2012 equalling some 42% of total annual budget. In addition, some CHF 23,398 M in concrete pledges (Norway, Canada and others) were also in process.

4.6.29 The Council acknowledged that resourcing WMO activities to implement strategic priorities efforts to fulfill its mandate and commitments in line with the voluntary contribution target proposed for the financial period (initially CHF 142 M, revised to CHF 120 M) required significant continuous effort of both the Secretariat and Members, capitalizing on all potential sources of direct and indirect investment including direct financing, technology transfer, sharing of expertise, and leveraging on related initiatives.

Development Partnerships

4.6.30 The Council noted with appreciation the broad range of ongoing initiatives aimed at development of Weather, Water and Climate Services and modernization of NMHSs in all WMO Regions.

4.6.31 Additionally the Council noted that WMO had a major role to play in assisting NMHSs to access financing without the funds passing through the WMO Secretariat and also to leverage support through the programmes of the UN system and development partners such as the World Bank and bilateral Official Development Assistance (ODA) agencies who were increasingly focusing on enhancement of weather, water and climate services in their development activities.

Voluntary Cooperation Programme

4.6.32 The Executive Council recognized that Members continued to benefit from the activities carried out under the WMO Voluntary Cooperation Programme (VCP) and related technical cooperation activities. It welcomed the information that in 2012, in addition to the major regional
development projects mentioned above, support in the form of replacement, upgrading and extension of observing and communications infrastructure was provided through the VCP Programme. In 2012, six Members (Australia, China, Japan, Korea, Maldives and Mauritius) made cash contributions to the VCP Fund (VCP(F)), amounting to approximately USD 148,678 while USD 1,788,084 and equivalent support was provided through VCP Coordinated Projects through WMO with the support of Germany, Japan, Republic of Korea, Spain, United Kingdom and United States of America.

4.6.33 The Council was also informed of a broad range of development assistance being provided by WMO Members through bi-lateral means in the context of VCP to improve the delivery of climate, weather and water-related services in developing country Member States including the efforts of Australia, Canada, China, Finland, France, Germany, Japan, Mexico, New Zealand, Republic of Korea, Spain, Switzerland, United Kingdom and United States of America. A large number of countries were supported through these bi-lateral arrangements. The value of the total support provided through bilateral arrangements is estimated to be USD 24,951,779\(^1\) for a total VCP investment of USD 26,888,541.

4.6.34 Recalling Resolution 24 (Cg-XV) - the Voluntary Cooperation Programme, and considering the report of the Ad Hoc Informal Planning Meeting on the VCP and related Technical Cooperation Programmes 2013, the Council expressed its appreciation to VCP donors for the valuable efforts in supporting the VCP Programme. Recognizing that the VCP clearly remains an important mechanism, the Council encouraged Members to further contribute to and participate more actively in the Programme.

4.6.35 The Council considered the priority areas for VCP(F) in 2013 and supported the allocation shown in Annex VII to the present report.

**Fellowship Fund**

4.6.36 The Council recalled that the Fellowship Fund was established and launched on World Meteorological Day 2011 to accept private donations. While there has been modest success to date with respect to private donations, the inclusion of a Fellowship budget provision in all major projects will enable a new source of financing for the Fellowship Fund. Canada, Korea and Norway have already committed additional resources towards the fellowships in 2012. The Fellowship Fund is managed through the Fellowships Committee mechanism to ensure transparency in application of these funds and accountability to donors with special requirements. The total amount of funds received or pledged in the Fellowships Fund is currently CHF 305,000.

**Emergency Assistance Fund**

4.6.37 Noting that two countries requested support through the EAF in 2012 (Haiti and Fiji), the Council, recognizing that the occurrence of a disaster may severely impair the ability of a National Meteorological and/or Hydrological Service to provide basic observations, warnings and services, confirmed that the EAF remains an important mechanism for assisting developing countries, when affected by such a disaster. Noting that the fund balance sits at CHF 56,532, the Council urged Members to consider contributing to the fund as a matter of priority.

**Project Coordination**

4.6.38 With respect to the volume of voluntary contributions managed by the WMO Secretariat, and in light of the target in the Compendium 2012–2015, noting that Cg-XVI recognized that implementing this level of externally funded activities will pose a significant challenge for WMO in terms of meeting implementation deadlines, complying with Agreements and donor requirements for reporting and evaluation, the Council welcomed the progress in enhancing the project management processes within the Secretariat especially for the implementation of

\(^1\) Indicative figures reported through the IPM process.
complex projects, being done through the Project Management Board (PMB) and the Project Coordination Unit (PCU).

4.6.39 Noting that the RMO has a staff compliment of two core positions, (D.1, and P.5) and, as with other WMO Offices, the RMO is challenged to strategically deliver its contribution to the WMO Strategic and Operational Plans and the financing requirements of the WMO and Members, with this level of staffing, the Council welcomed the continued support of Members to the RMO through the UN JPO programme (Finland, Japan, Norway) and also through secondments (United Kingdom Met Office, Mexico) to partially address this human resource issue.

4.6.40 The Council expressed concern, that the Project Coordination Unit within the RMO is currently staffed by a seconded staff with a limited term, and urged the Secretary-General to move the PCU towards a more sustainable solution during this financial period, possibly using revenue from the programme support cost of projects.

Redesignation of the Resource Mobilization Office

4.6.41 The Council was advised of the redesignation of the Resource Mobilization Office (RMO) to Office for Resource Mobilization and Development Partnerships (RMDP) in line with the expanding focus of the Office and practices in sister UN Agencies.

Executive Council Working Group on Capacity Development

4.6.42 The Council considered changes to the terms of reference of EC WG-CD proposed by the EC WG on Capacity Development and adopted Resolution 18 (EC-65) – Amendments to the terms of reference of the Executive Council Working Group on Capacity Development.

4.7 Partnerships (agenda item 4.7)

Cooperation with the United Nations system

4.7.1 The Council noted the actions taken by the Secretary-General to strengthen the cooperation with the United Nations system. This has been facilitated by the WMO Liaison Office at the United Nations in New York and achieved through the active participation of WMO senior officials in sessions of the sixty-seventh session of the United Nations General Assembly and associated Committees; High-level ministerial events on Energy, Water and Disasters, Climate Change and Security; ECOSOC sessions and its commission meetings on sustainable development, status of women and on statistics, as well as the UNFCCC and UNCCD COPs and other events related to climate change, disaster risk reduction, water and food security. The Council acknowledged also the critical importance of the WMO engagement in consultations on the development of the Post-2015 agenda and the implementation of the Rio+20 outcomes. WMO senior officials participated in the discussions on the acceleration of progress of the existing Millennium Development Goals and also regarding the post-2015 Development Agenda and the formulation of Sustainable Development Goals.

4.7.2 The Council took note of the resolutions of the sixty-seventh session of the UN General Assembly addressed to the UN specialized agencies and relevant to WMO as referenced in the circular letter sent to the Permanent Representatives. Out of 36 resolutions of the 2nd Committee of the General Assembly 12 have some direct relevance to WMO activities and programme priorities in areas such as: Food Security, Biodiversity, Desertification, Global Climate Change, Water Cooperation and the implementation of Agenda 21 for the environmental pillar of sustainable development. WMO actively participated in the UN Inter-agency Task Team for the post-2015 Agenda including and the early discussions over the establishment of a High Level Political Forum to replace the Commission for Sustainable Development.

4.7.3 The Council requested Members and the Secretary-General to ensure appropriate follow-up to those resolutions. The Council invited Members to participate actively in relevant follow-up to the decisions of UN bodies in order to enhance the contribution of WMO, as well as
NMHSs, to the sustainable development of Members and to the implementation of the internationally agreed development goals.

4.7.4 The Council appreciated the actions taken to further strengthen the role of WMO in the UN system coordinated response to climate change, its contribution to the UNFCCC process, and its proactive engagement through the UN inter-agency mechanism HLCP Climate Working Group chaired by the WMO Assistant Secretary-General, and other international partnerships. It recognized with appreciation the enhanced cooperation on GFCS and the new initiative on sharing data for vulnerability mapping and climate knowledge, including in support of adaptation in climate sensitive sectors in the context of the GFCS implementation plan development and governance setting.

GFCS partnerships

4.7.5 In this regard, the Council welcomed the initiative taken by the Secretary-General to prepare the first session of the Intergovernmental Board on Climate Services (IBCS) and to establish an Inter-agency Coordination Group with key GFCS partners, a cooperation mechanism complemented at the working level by the Project Oversight Board (POB) which will help facilitate coordination and implementation of the GFCS Implementation Plan, in particular by sharing current and planned activities, developing new and synergistic activities or projects for possible funding through the GFCS Trust Fund or other financial mechanisms as appropriate.

4.7.6 Additional efforts to strengthen the engagement and support of partner agencies continued through concrete examples of collaboration. Collaboration between WMO and the World Health Organization (WHO) resulted in the development of an Atlas of Health and Climate. This joint publication launched at the extraordinary session of the World Meteorological Congress (Geneva, 29–31 October 2012) illustrates the geographical extent and impacts of climate-induced health epidemics and gives practical examples of how the use of weather and climate information can protect public health and improve health outcomes (http://www.wmo.int/ebooks/WHO/Atlas_EN_web.pdf). To further strengthen the collaboration with the WHO, a joint WHO-WMO project office to support implementation of the health component of the GFCS has been set up. It is expected that the office will be operational by mid-2013. Similar offices will be established to support implementation of the water and food security priority areas.

WMO participation in the work of the United Nations Conventions

UN Framework Convention on Climate Change

4.7.7 The Council was informed on the strong involvement of the WMO in the COP 18 of the UNFCCC held in Doha, 26 November–8 December 2012. The Council noted that at the thirty-seventh session, the Subsidiary Body for Scientific and Technological Advice (SBSTA), under the agenda item on research and systematic observation, invited the GCOS Secretariat to provide the third adequacy report to the SBSTA in 2015 and the final report on the implementation plan to SBSTA in 2016. At the same session, Parties to the UNFCCC were pleased to see that GCOS (on behalf of GTOS) submitted a report on the development of progress on methodologies, standards and protocols for terrestrial and climate-related matters. The Council requested the GCOS Secretariat to stay engaged in the UNFCCC process and to actively participate at SBSTA meetings.

4.7.8 The Council was informed that the SBSTA noted with appreciation the information from WMO on the outcome of the extraordinary session of the World Meteorological Congress, held from 29 to 31 October 2012, with respect to the implementation of the Global Framework for Climate Services, and invited WMO to provide, at SBSTA 39, information on the outcome of the first session of the Intergovernmental Board on Climate Services, to be held in July 2013.

4.7.9 The Council also noted that the Subsidiary Body for Implementation (SBI) of the UNFCCC considered approaches to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate
change to enhance adaptive capacity. In this respect, the Council was informed that the SBI recognized the GFCS as a relevant mechanism supporting climate risk management.

**UN Convention to Combat Desertification**

4.7.10 The Council welcomed the outcomes of the High-Level Meeting on National Drought Policy (HMNDP) held from 11 to 15 March 2013 in Geneva, co-sponsored by WMO, the United Nations Convention to Combat Desertification (UNCCD) and the Food and Agriculture Organization (FAO). The HMNDP was attended by a large number of UN Agencies, international and regional organizations and key national agencies. In particular, the Council acknowledged that the HMNDP Declaration was a solid instrument for WMO Members to develop national drought management policies and requested the Secretary-General to report at the next Council sessions on their development, in particular through the implementation and results from the Integrated Drought Management Project in partnership with the Global Water Partnership (GWP) and the National Drought Management Policies Initiative: Capacity Development to Support the Development of National Drought Management Policies.

**WMO participation in UN system-wide coordination mechanism**

4.7.11 The Council welcomed that WMO participation in the UN system-wide coordination mechanism is done in close cooperation with the Intergovernmental Oceanographic Committee (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), as appropriate.

**UN-Water**

4.7.12 The Council noted the enhanced role WMO was playing, through the chairmanship of its Secretary-General, in UN-Water’s definition of the post-2015 Development Agenda, in particular by facilitating the UN thematic consultations on water and contributing to the development of a possible Sustainable Development Goal on water, including ambitious but measurable and equitable targets and indicators. The Council also remarked the visibility that the International Year of Water Cooperation, celebrated in 2013, had brought to initiatives such as GFCS, which are emblematic of what a successful cooperation between countries, sectors, disciplines, and even generations, could look like.

**UN-Energy**

4.7.13 The Council noted that WMO actively participated in the first and second UN-Energy post-2015 thematic consultation meetings on energy and communicated its position on climate-energy related issues. It further noted that WMO has also contributed to a concept paper which integrates energy issues into the post-2015 development framework under the UN-Energy auspices. The Council agreed that it is important for the relevant WMO Programmes to address the weather and climate information needs of the energy sector, and contribute to initiatives such as enhancing the use of renewable energy sources, and improvement of urban energy efficiency in megacities and buildings.

**UN-Oceans**

4.7.14 The Council noted that WMO actively participated in the meetings of UN-Oceans, and was informed that following the consideration by the UN General Assembly of the JIU review of UN-Oceans (JIU/REP/2012/3), the 67th session considered the draft terms of reference (TORs) prepared by UN-Oceans and through resolution 67/78 requested UN-Oceans to draft revised terms of reference for consideration at the 68th session, based on comments from Member States. In this context, an interim coordination of UN-Oceans is in place, pending the final adoption of the TORs by the UNGA 68th session. The Council agreed on the relevance of WMO’s engagement on this coordination mechanism as part of the UN organizations with a mandate in oceans, and requested the Secretary-General to continue WMO participation, as appropriate.
Cooperation with UNESCO International Hydrology Programme

4.7.15 The Council noted that the establishment of new working arrangements between WMO and the International Hydrology Programme (IHP) of UNESCO in the field of hydrology and water resources was progressing and that the current draft of the arrangements was with UNESCO for submission through their relevant constituent bodies. The new working arrangements clarify the roles and responsibilities of each organization in the field of hydrology and water resources and identify key areas for future cooperation. It will be submitted to EC-66 (in 2014).

Partnership with the European Commission

4.7.16 The Council welcomed and encouraged initiatives by the Secretary-General to capitalize on and enhance the partnership with the European Commission. It agreed that, with the continuing involvement of the liaison office in Brussels, such efforts should be pursued pro-actively in order to strengthen collaboration or larger attention devoted to the potential role and added value of the meteorological community within different EU strategic and policy activities, including but not limited to the Global Monitoring for Environment and Security Programme (GMES, renamed Copernicus), aviation meteorology and GFCS.

4.7.17 The Council noted that WMO has direct financing arrangements with several Directorates General of the Commission including DG Development, DG Climate and DG Enlargement.

4.7.18 The Council welcomed the strong working relationship between WMO and the World Bank for implementation of development initiatives that benefit the weather and climate services community in many regions of the world.

Cooperation with GEO

4.7.19 The Council reviewed the decisions of Cg-Ext.(2012) with regard to the strengthening relationships with GEOSS as part of the implementation of the Global Framework for Climate Services (GFCS). Noting that the four priority areas of the Framework are already Societal Benefits Areas for GEOSS (i.e. agriculture and food security, water, health and disaster risk reduction), the Council encouraged collaboration with these ongoing efforts, in particular the use of Communities of Practice to contribute to the User Interface Platform, as well as with other applications and services that could advance the Framework’s goals (i.e. improved discovery of, and access to, climate information; promotion of Data Sharing Principles; involvement of end-users; and capacity building coordination).

Regional cooperation

4.7.20 The Council noted that WMO assisted the Permanent Committee of Meteorology of Gulf Cooperation Council for the design of and preparation of its project (Mitigating Impacts of Sand and Dust Storms in the Gulf Countries), and has continued to provide support to the League of Arab States (LAS) which comprises 22 States in RAs I, II and VI.

Cooperation with international organizations

Intergovernmental Panel on Climate Change

Report of the Chair of the Intergovernmental Panel on Climate Change

4.7.21 The Council thanked the Chair of the IPCC, Dr R.K. Pachauri, for his report on the current status of the work of the Panel, and expressed its continued appreciation of the key role of the IPCC in preparing and disseminating high quality assessments in support of international policy formulation on the climate change issue.
4.7.22 The Council reiterated WMO’s commitment to assist IPCC in delivering its work programme, including through financial, administrative and operational support. This support is particularly crucial during the final stages of preparation and approval of the AR5. WMO and its Members will take a proactive role and will participate in the execution of the outreach programme of the AR5 to ensure the widest dissemination of its findings among policy-makers at all levels.

4.7.23 The Council noted that the United Nations Framework Convention on Climate Change (UNFCCC) reiterated the crucial role of IPCC assessments for its future work in decisions taken at the 18th session of the Conference of the Parties (COP 18), and encouraged the IPCC to continue to respond to requests from the UNFCCC.

4.7.24 The Council welcomed the progress made in preparation of the AR5. The Council underlined the importance of having the material available for national media conferences at the same time as for the IPCC media release.

4.7.25 The Council noted the ongoing work of the IPCC Task Force on National Greenhouse Gas Inventories, and welcomed the progress made towards the release of the “2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands” and of the “2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol”, which will take place in October 2013.

4.7.26 The Council expressed appreciation and gratitude to: (i) the Secretariat, governments, institutions and organizations that continue to contribute to the functioning and work of the Panel and the WMO/UNEP IPCC Trust Fund; (ii) the experts who continue to contribute to the writing and review of IPCC reports; and (iii) UNEP for its continued co-sponsorship of the Panel.

4.7.27 The Council invited the IPCC Secretariat to continue its active commitment towards greater participation of NMHSs in the activities of the Panel, e.g. by considering the regular inclusion of NMHS representatives in national delegations to IPCC meetings, and involvement in nomination of authors, reviewers, and experts for IPCC assessment work and in the review of IPCC reports.

Future Earth for Global Sustainability – Executive Summary

4.7.28 The Council noted with appreciation the significant progress on development of the plan for the Future Earth research initiative by the International Council for Science (ICSU) and the Alliance of partners, including WMO as an observer.

4.7.29 The Council also expressed its appreciation to the ICSU Executive Director for his presence and contributions to the EC.

4.7.30 The Council recalled the decisions of Cg-XVI on the GFCS, in particular on the Research, predictions and modelling pillar of the GFCS and noted that linkages between GFCS and the Future Earth Initiative would be mutually beneficial to both ICSU and the WMO and would strengthen the existing partnerships as well as create opportunities for the advancement of research in Earth systems science, as well as climate services. The Council encouraged the continued involvement of WMO in Future Earth and in the Alliance and requested the Secretary-General to prepare a decision paper for discussion at its sixty-sixth session.

4.8 An Effective and Efficient Organization (agenda item 4.8)

4.8.1 WMO Strategic and Operational Planning for 2016–2019 (agenda item 4.8.1)

4.8.1.1 The Executive Council recalled the decisions of Cg-XVI (paragraphs 8.5.1–8.5.5) and EC-64 (paragraphs 4.8.13–4.8.15) with respect to the preparation of the next WMO Strategic Plan and the WMO Operating Plan for the period 2016–2019. The Council noted with appreciation the report and recommendations of its Working Group on WMO Strategic and Operational Planning (WG SOP) on these issues.
WMO Strategic Plan 2016–2019

4.8.1.2 The Council considered the draft WMO Strategic Plan 2016–2019 and requested the WG SOP to review the draft taking into account the recommendations of the Council, including the following:

(a) Review the current structure in view of the graphical representation given in Annex VIII to the present report, taking into account the linkages among the various elements of the Plan and planning process;
(b) Develop the vision statement and the core elements of the WMO in the Strategic Plan;
(c) Show how the strategic priorities are interlinked and benefit from each other;
(d) Enhance the emphasis on the provision of weather and water services as the current core functions of NMHSs;
(e) Enhance consistency of the introduction and provide reference to source data, preferably from WMO when available;
(f) Include the challenges facing NMHSs as relates to limited funding, rapidly evolving technology particularly as relates to communication and inadequate skilful human resources as affects service delivery; and
(g) Adequately present key WMO partners.

4.8.1.3 The Council requested the Secretary-General to communicate the revised draft to Members for their input not later than September 2013, and the WG SOP to use these inputs to prepare the next version of the Plan for consideration by the Council at its next session.

WMO Operating Plan 2016–2019

4.8.1.5 The Council considered and endorsed the following recommendations of its WG SOP regarding the preparation of the next WMO Operating Plan 2016–2019:

(a) The move to a single Integrated Operating Plan should take into account priority areas and be flexible. The Organization should avoid frequent changes in the strategic planning process noting that a single Strategic Plan for the Organization was adopted for the period 2012–2015;
(b) More clarity should be provided as part of the process to achieve a single Operating Plan given that there are variations in the planning cycles of RAs and TCs;
(c) RAs, TCs and Secretariat activities should be integrated into a single Integrated Operating Plan;
(d) The draft Operating Plan 2016–2019 should be presented to EC-66 for consideration.

Monitoring and Evaluation (agenda item 4.8.2)

4.8.2 The Executive Council recalled the decisions of Sixteenth Congress (paragraphs 8.4.1–8.4.4) and EC-64 (paragraphs 4.8.16–4.8.17) with respect to further development and implementation of the WMO Monitoring and Evaluation (M&E) System. The Council noted with appreciation the report of its Working Group on WMO Strategic and Operational Planning (WG-SOP) and agreed with its assessment that the M&E process was maturing and moving in the right direction. The Council noted that the Key Outcomes (KOs) and Key Performance Indicators (KPIs) were reviewed and the baselines and targets established for each KPI to facilitate the monitoring of progress to achieve results. It noted further the improvement in the level of response to the Survey on Impacts of Achieved Results on Members following its reopening as requested by EC-64. The Council observed that only a small fraction of NMHSs who responded to the questionnaire rated the level of utilization of WMO publications, and the quality of national and regional products as high to very high. The Council encouraged Members to continue with efforts to enhance the quality of products and make use of the various WMO publications to improve their
services. The Council also continued to encourage Members to respond to the surveys to provide information that may help the Organization to focus its priorities on actions to address the needs of Members.

4.8.2.2 The Council considered and agreed with the following recommendations of the Working Group on WMO Strategic and Operational Planning:

(a) The benefits from the ability of WMO to organize Members' NMHSs to bring their collective knowledge and resources to meet their respective mandates at national, regional and global levels should be taken into consideration in the implementation of the M&E system;

(b) The M&E System should be kept simple with a focus on programme outputs;

(c) The coordination with regional associations (RAs) should be enhanced to improve the level of response to questionnaires;

(d) The tool on Country Profile Database should be used to enable Members to provide information on progress and priorities;

(e) The information gathered through the survey should inform decisions on follow-up actions.

4.8.3 Continuous improvement of WMO processes and practices (agenda item 4.8.3)

The Council considered the report of the Working Group on Strategic and Operational Planning on the continuous improvement of WMO processes and practices, and decided to adopt the conditions and procedures under which session documents can be considered and processed as “non-controversial” (as given in Annex IX to the present report), with immediate effect, in order to begin implementation of this approach at EC-65, and at subsequent sessions of constituent bodies and other bodies of WMO.

4.8.4 Budget for the biennium 2014–2015 (agenda item 4.8)


4.8.4.2 The Council appreciated that the budget proposals for the biennium 2014–2015 were prepared in accordance with Resolution 37 (Cg-XVI) – Maximum Expenditure for the Sixteenth Financial Period and Resolution 9 (EC-LXIII) – Budget for the biennium 2012–2013.

4.8.4.3 The Council considered Recommendation 6 of the Financial Advisory Committee as contained in Annex I to the present report.

4.8.4.4 After discussion, the Council approved Resolution 19 (EC-65) – Budget for the biennium 2014–2015, and adopted the regular budget for the second biennium of the sixteenth financial period (2014–2015) amounting to CHF138,000,000; it also noted the requirements for the priority-funded voluntary resources for the biennium 2014–2015 amounting to CHF73,000,000 and estimates of voluntary resources for jointly-funded activities of CHF16,315,800. The Council furthermore took note of the Operating Plan for the Second Biennium (2014–2015) and the Revised Compendium of Project Initiatives proposed to be funded from Voluntary Contributions (2012–2015).

4.8.5 Preliminary discussion on the budget for the seventeenth financial period (2016–2019) (agenda item 4.8.5)

4.8.5.1 The Council reviewed the proposals of the Secretary-General for programme priorities and the preliminary budgetary resource level for the seventeenth financial period (2016–2019).

4.8.5.2 The Council considered Recommendation 7 of the Financial Advisory Committee as contained in Annex I to the present report. The recommendation of the Financial Advisory
Committee was to request the Secretary-General to develop the budget proposal for the seventeenth financial period (2016–2019) by addressing issues of:

(a) Affordability for Members;
(b) A needs assessment in the context of the Strategic Plan;
(c) Implication on “core” activities/WMO Programmes of anticipated voluntary funding in relation to the regular budget requirements;
(d) Additional efficiencies;
(e) Additional information on line budget items, including staff and travel costs;
(f) Presenting options to the budget including the ZNG option as well as the needs assessment for consideration; and
(g) Implications of non-implementation of proposed activities,

The Council also requested the Secretary-General to take into account, as appropriate, the document on the Preliminary Discussion on the Budget for the Seventeenth Financial Period (2016–2019).

4.8.5.3 After discussion, the Council adopted Resolution 20 (EC-65) – Outline priorities and budget resources for the seventeenth financial period (2016–2019).

4.8.6 Oversight (agenda item 4.8.6)


4.8.6.1 The Council took note of the report of the External Auditor on the financial statements for 2012. It noted with appreciation that the External Auditor had issued an unqualified opinion, and dealt with the recommendations therein under the relevant agenda items.

Report of the Audit Committee

4.8.6.2 The Executive Council noted with appreciation the report and recommendations of the Audit Committee on the annual Financial Statements, and reports of the external and internal auditors including liabilities for the Organization, procurement, the implementation of Risk Management, and Monitoring and Evaluation system. The Council welcomed the new member of the Committee, Mr. Suresh Raj Sharma, appointed by the President on behalf of the Executive Council in accordance with the terms of reference of the Audit Committee following the resignations of Mr. Murari Aryal.

4.8.6.3 The Council considered the recommendations of the Committee when dealing with respective issues on the agenda of the session.

Annual Accountability Report of the Internal Oversight Office

4.8.6.4 The Council considered the annual accountability report of the Director of the Internal Oversight Office (D/IOO) for 2012, as well as the comments of the Secretary-General thereupon. The Council also took into account the report of the Executive Council’s Audit Committee in considering the report of IOO.

4.8.6.5 The Council considered the summary of oversight findings, recommendations and actions taken in response, and D/IOO’s opinion on adequacy of governance, risk management and internal control processes. The Council noted the progress on implementation of audit recommendations, and the steps taken by the Secretariat to address the issues raised therein.

4.8.7 Joint Inspection Unit (JIU) (agenda item 4.8.7)

Status of Implementation of the Joint Inspection Unit (JIU) Recommendations

Recalling the WMO procedures of follow-up on JIU reports, (Resolution 11 (EC-LIV)), the Council noted with appreciation the report on implementation of JIU recommendations addressed to the
legislative bodies. It reviewed recent recommendations addressed to the legislative bodies since EC-64 and concurred with management proposal regarding acceptance of recommendations relevant to WMO. The Council also acknowledged with appreciation the work and reports of the JIU on matters concerning United Nations system-wide issues and WMO-specific matters.

4.8.8 Gender Mainstreaming (agenda item 4.8.8)

4.8.8.1 The Executive Council noted the report of its Panel of Experts on Gender Mainstreaming and endorsed the proposal to convene in 2014 a Third WMO Gender Conference on the theme: “Gender Dimension of Weather and Climate Services: The Benefits of Working Together”, eleven years after the Second Conference on Women in Meteorology and Hydrology took place. The Council strongly encouraged Members to support the event by offering voluntary contributions and nominating suitable participants.

4.8.8.2 The Council further noted ongoing work on the development of monitoring indicators aimed at measuring progress in implementation of the WMO Policy on Gender Mainstreaming. It called on Members to respond to the planned global survey on the participation of women and men in WMO activities as well as to provide any other relevant information that can be used to track progress in implementation of the Policy. The Council also urged technical commissions and regional associations to compile appropriate statistics on the participation of men and women in their work and also urged Members to nominate female candidates to working structures of the WMO constituent bodies.

5. RESOURCE MANAGEMENT (agenda item 5)

5.1 Financial statements for the year 2012 and report of the External Auditor (agenda item 5.1)

5.1.1 Taking into account the reports of FINAC and the Audit Committee, the Executive Council considered the audited financial statements of the World Meteorological Organization for the year 2012 and the report of the External Auditor to the Executive Council. The Executive Council noted with satisfaction that the External Auditor has issued an unqualified opinion on the financial statements for the year 2012.

5.1.2 The Council noted that for the year 2012, total revenue amounted to CHF 93.6 million (2011: 100.1 million) and total expenses to CHF 84.5 million (2011: 91.5 million), resulting in a surplus of CHF 9.1 million (2011: 8.6 million).

5.1.3 The Council noted that as at 31 December 2012, total assets amounted to CHF 219.8 million (2011: 208.1 million) and total liabilities to CHF 129.5 million (2011: 121.7 million), resulting in net assets/equity of CHF 90.4 million (2011: 86.4 million).

5.1.4 The Council noted that as at 31 December 2012, the total cash balance amounted to CHF 80.0 million (2011: 60.1 million) and that the increase was mainly because more payments of assessed contributions were received in 2012 (CHF 76.0 million) than in 2011 (CHF 57.0 million).

5.1.5 The Council noted with appreciation that as at 31 December 2012, arrears of contributions had decreased from CHF 22.2 million in 2011 to CHF 11.4 million, bringing the level of arrears to the lowest in over twenty years. The Council urged the Members to clear their dues at an early date.

5.1.6 The Council noted that for the year 2012, the total budget appropriation was CHF 69.0 million (2011: 72.9 million) and that total expenditure amounted to CHF 64.4 million (2011: 72.9 million).
5.1.7 The Council noted that for the year 2012, the revenue of the General Fund amounted to CHF 71.1 million (2011: 68.7 million) and expenses to CHF 71.0 million (2011: 79.2 million) resulting in a surplus of CHF 0.1 million (2011: deficit of 10.5 million).

5.1.8 The Council noted that as at 31 December 2012, the General Fund cash balance amounted to CHF 25.1 million (2011: 10.1 million).

5.1.9 The Council noted that for the year 2012, the revenue from voluntary resources amounted to CHF 22.5 million (2011: 33.4 million) and expenses to CHF 13.4 million (2011: 14.2 million), resulting in a surplus of CHF 9.1 million (2011: 19.2 million).

5.1.10 The Council noted that as at 31 December 2012, the cash balance for voluntary resources amounted to CHF 36.5 million (2011: 30.9 million), reflecting the policy to engage in expenditure only after the voluntary contributions have been received.

5.1.11 The Council considered that the financial position of the World Meteorological Organization remained sound at the end of 2012.


5.2 Scale of assessment of proportional contributions of Members for the years 2014 and 2015 (agenda item 5.2)

The Executive Council noted that in accordance with Resolution 39 (Cg-XVI) – Assessment of proportional contributions of members for the sixteenth financial period, the scale of assessment for the years 2014 and 2015 is based on that adopted by the United Nations at its sixty-seventh General Assembly in December 2012 and duly adjusted for difference in membership. The Council adopted Resolution 22 (EC-65) – Assessment of proportional contributions of Members for the years 2014 and 2015.

5.3 Amendments to Staff Regulations and Rules (agenda item 5.3)

5.3.1 The Council amends Article 9.5 of the Staff Regulations, subject to approval by Congress at its seventeenth session, which introduces an increase in the normal age of separation to 65 years for staff members appointed on or after 1 January 2014.

5.3.2 The Council noted the amendments to the Staff Rules applicable to Secretariat staff made by the Secretary-General since the sixty-fourth session of the Executive Council.

Review of the WMO travel policy

5.3.3 The Council notes that the 67th General Assembly of the United Nations adopted² a number of significant changes to the United Nations standards of accommodation for air travel (ref. proposals submitted by the United Nations Secretary-General³ and recommendations by the Advisory Committee on Administrative and Budgetary Questions⁴). The issues covered included standards of accommodation for air travel, travel time, system of daily subsistence allowance, lump sum arrangements, use of frequent flyer miles, advance purchase of tickets, online booking, and coordination across the United Nations system. The decisions are seen to improve the effective and efficient utilization of resources for air travel through improving the balance between cost and staff productivity.

² General Assembly Resolution A/RES/67/254, Section VI, 12 April 2013.
³ Report of the Secretary-General, A/66/876, Proposals for a more effective and efficient utilization of resources for air travel, 31 January 2012.
⁴ Reports of the Advisory Committee on Administrative and Budgetary Questions, A/66/739, Proposals for a more effective and efficient utilization of resources for air travel, 9 March 2012; A/67/636, Standards of accommodation for air travel, 12 December 2012.
5.3.4 In view of the significant amendments to the travel policy by the United Nations General Assembly, the Council requests the Secretary-General to examine the related decisions and propose appropriate amendments to the WMO travel policy, as appropriate and/or relevant, with the aim of improving the efficiency and effectiveness of travel resources and of maintaining to the extend possible close harmonization with the United Nations system.

5.3.5 The Council further requested the Secretary-General to review the implications of the proposed changes to the WMO travel policy on experts and participants in WMO constituent bodies, recognizing their contribution to the work of the Organization and noting that this is often voluntary.

5.3.6 The Council requested the President, on its behalf, in consultation with the Secretary-General, to approve the proposed changes to the WMO travel policy, following appropriate consultations with EC members, and to report to EC-66.

5.4 Pensionable remuneration of ungraded officials (agenda item 5.4)

5.4.1 The Council noted that, in accordance with the provisions of Article 54(b) of the Regulations of the United Nations Joint Staff Pension Fund, the scale of pensionable remuneration for the Professional and higher categories must be adjusted with the same effective date by the same percentage as the net remuneration increase. The Council further noted that the ICSC had promulgated the consequent revised scale of pensionable remuneration applicable to those categories of staff and that comparable United Nations agencies (ITU and UPU) had consequently adjusted the pensionable remuneration of their ungraded officials. The Council therefore decided also to apply with retroactive effect from 1 February 2013 the following levels of annual pensionable remuneration:

<table>
<thead>
<tr>
<th></th>
<th>Existing Provision</th>
<th>New Provision</th>
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<tbody>
<tr>
<td>Secretary-General</td>
<td>USD 330,550</td>
<td>USD 336,941</td>
</tr>
<tr>
<td>Deputy Secretary-General</td>
<td>USD 305,493</td>
<td>USD 311,400</td>
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<tr>
<td>Assistant Secretary-General</td>
<td>USD 282,714</td>
<td>USD 288,180</td>
</tr>
</tbody>
</table>

5.4.2 The Council requested the Secretary-General to take appropriate action as required by the decision thus taken. This amendment involves an increase of expenditures of CHF 2,800 for one year.

5.5 Human resources management (staff matters) (agenda item 5.5)

5.5.1 The Council noted that action was being taken to address the staffing issues identified by Sixteenth Congress and EC-64. It requested the Secretary-General to ensure that necessary funds be made available to support on-going training programmes, and to ensure that position descriptions specify the relevant supervisory and management skills. The Council encouraged the Secretary-General to make management and staff aware of available management and supervisory tools, and to encourage staff to participate in relevant courses to maintain and improve their management skills as appropriate. It encouraged all staff to contribute to the development and implementation of the induction programme, and in maintaining the relevance of the content.

5.5.2 The Council noted that a staff opinion survey was conducted during 2012, and requested the distribution of the Executive Summary of the Survey to EC members. The Council urged the Secretary-General and the Staff Association to make every effort to resolve any issues revealed, including the need for a wider range of training opportunities. It emphasized that a motivated and dedicated Secretariat is important for supporting the work of Members. The Council requested the Secretary-General to report to EC-66 on the follow-up actions to the Staff Survey.
5.6 Report on appointments, promotions, nominations, extensions and transfers of staff in the professional category and above (agenda item 5.6)

5.6.1 In accordance with Article 21 (b) of the Convention, the Council examined and approved the appointments made by the Secretary-General since its sixty-fourth session and listed in Table 1 of Annex X to the present report.

5.6.2 In accordance with Article 9.5 of the Staff Regulations the Council noted the approval by the President of WMO, acting on behalf of the Council, of the extension of appointment of one staff member beyond the statutory age of retirement initiated by the Secretary-General since its sixty-fourth session and listed in Table 2 of Annex X to the present report.

5.6.3 The Council noted the transfers, nominations and promotions made by the Secretary-General since its sixty-fourth session listed in Table 3 of Annex X to the present report.

5.6.4 The Council requested that WMO Members be made aware periodically of retiring staff at the professional and director categories.

6. COMMUNICATIONS AND PUBLIC AFFAIRS (agenda item 6)

Theme for World Meteorological Day 2015

6.1 The Council decided that the theme for the World Meteorological Day in 2015 would be “Climate knowledge for climate action”. It noted that, with the launch of the IPCC Fifth Assessment Report in 2013–2014 and the expected adoption of a new agreement under the UNFCCC in 2015, the issue of climate will have a particularly high profile in 2015. This theme will also support the GFCS and the benefits of climate services for addressing climate impacts. The Council requested the Secretary-General to develop a list of actions for supporting Members in marking this event (such as the WMO Bulletin, web content, etc.) and invited Members to adapt the theme into their national language(s) as appropriate.

6.2 The Council noted with appreciation WMO’s efforts to communicate clearly to decision-makers, the development community and the general public scientific and technical information about weather, climate and water as well as the societal benefits that WMO and its Members provide.

6.3 The Council recognized that, to be truly effective, the Organization’s communications must be fully integrated into all WMO substantive Programmes and activities and involve the entire WMO community.

6.4 The Council urged the Secretary-General and Members to further strengthen support to WMO communications activities as directed by Congress, and to enhance resources for communications activities, including extrabudgetary resources.

6.5 The Council welcomed the growing reach and impact of the press and media activities of the WMO Communications and Public Affairs Office, WMO’s growing presence on social media such as Facebook and Twitter, and its continuing work on the WMO Bulletin, other print products, exhibits, the Website and audiovisual products.

6.6 The Council further welcomed WMO’s continuing focus on promoting the WMO brand, upgrading the WMO Website, raising awareness of the scientific basis of climate change, and strengthening the Information and Public Affairs Focal Point network.
7. GENERAL AND LEGAL MATTERS (agenda item 7)

7.1 Fifty-eighth International Meteorological Organization Prize and other Awards (agenda item 7.1)

7.1.1 The Executive Council awarded the fifty-eighth IMO Prize to Dr Tillmann Mohr (Germany).

7.1.2 The Council established the IMO Prize Selection Committee for the fifty-ninth IMO Prize comprised of Messrs A.D. Moura (chair) G. Adrian, J.C. Fallas and Mrs A. Kijazi.

Other awards

Norbert Gerbier-MUMM International Award

7.1.3 The Council approved the proposal of the Selection Committee for the Norbert Gerbier-MUMM International Award and conferred the 2014 award on Drs Long Cao, Govindasamy Bala, and Ken Caldeira for their paper entitled “Climate response to changes to atmospheric carbon dioxide and solar irradiance on the time scale of days to weeks”. This paper was published 2012 in the Environmental Research Letters, Volume 7.

WMO Research Award for Young Scientists

7.1.4 Based on the recommendation of its Selection Committee, the Council conferred the 2013 WMO Research Award for Young Scientists upon Flavio Lehner (Switzerland) for the paper entitled “The freshwater balance of polar regions in transient simulations from 1500 to 2100 AD using a comprehensive coupled climate model”, published in 2012 in the journal Climate Dynamics.

7.2 Constitutional and regulatory matters (agenda item 7.2)

Terms of the Secretary-General

7.2.1 The Council considered the report and specifically the three proposals brought forward by its Working Group on WMO Strategic and Operational Planning (EC WG-SOP) regarding the terms for the Secretary-General.

7.2.2 The Council noted that any change of the duration of the mandate of the Secretary-General would require a change in the Convention and that the option that extends the duration of the term of the Secretary-General would have significant implications on the duration of other elected officers of its constituent bodies, length of financial periods, as well as changes to various regulations. The Council decided to therefore only focus on the two remaining options:

(a) Keeping the current Regulation 198 on the number of terms of Secretary-General unchanged, that is 3 terms (of 4 years); and

(b) Reducing the number of terms for the Secretary-General as currently provided for in Regulation 198, to 2 (of 4 years).

7.2.3 The Council welcomed the willingness of the president of Regional Association VI to include an agenda item on the number of terms of the Secretary-General in their coming session, and that of the presidents of the Regional Associations I, II, III, IV and V to collect information on the position of their Members about this issue.

7.2.4 The Council requested its WG on SOP to prepare a well structured proposal with pros and cons addressing the two options, including proposals on changes to General Regulations as appropriate, and to report to EC-66.
Number and distribution of seats of the Executive Council

7.2.5 The Council noted the report on its Working Group on WMO Strategic and Operational Planning (WG-SOP) regarding the number and distribution of seats of the Executive Council.

7.2.6 The Council considered that, as a change in the number of seats of the Executive Council would require a change in the Convention, it is a formal requirement that the presidents of the regional associations prepare appropriate proposals.

7.2.7 The Council requested the Secretary-General to assist the presidents of regional associations in the preparation of such submissions for the availability of the Working Group on Strategic and Operating Planning (WG on SOP) by the end of September 2013.

7.2.8 The Council instructed the WG on SOP to prepare the proposal which includes the necessary changes to the WMO Convention and General Regulations if required, for consideration at EC-66 reflecting in particular on the following aspects:

(a) The desirable balance between efficiency, effectiveness and cost implications for its operations, as well as that of its working groups and expert panels;
(b) The value of a wider representation to better reflect the diversity of its Members with respect to population dynamics, vulnerability to natural hazards and severe weather conditions;
(c) The willingness of Members to actively participate in the governance of the Organization through the involvement of their Permanent Representatives in their personal capacity.

Role and responsibilities of regional associations and any corresponding amendment to the General Regulations

7.2.9 The Council noted the follow-up of Resolution 1 (EC-64) - Review of the role and responsibilities of regional associations, by the WG-SOP which, at its meeting in January 2013 reviewed proposals for better definition of the role and responsibilities of regional associations in the WMO integrated planning and implementation process. Noting the current provisions of the WMO Convention and the General Regulations, as well as further tasks and responsibilities assigned to regional associations by Congress and EC decisions (including responsibilities outlined in the WMO Technical Regulations), a draft description of the roles and responsibilities of the Associations was proposed, structured into the following categories:

(a) Organizing and coordinating regional activities;
(b) Identifying and addressing needs of Members;
(c) Establishing requirements for regional networks and facilities;
(d) Regional planning and monitoring as part of the WMO integrated planning process;
(e) Establishing adequate regional subsidiary bodies structure; and
(f) Building and promoting regional partnerships.

7.2.10 The Council noted that WG-SOP considered these proposals as the basis for preparing an amendment to the General Regulations, Annex II, Regional Associations. WG-SOP considered further that the discussion should be extended to cover the broader issue of how the Organization could enhance the effectiveness and efficiency of its regional activities. It was pointed out that some roles of regional associations could be further emphasized, such as, the monitoring of the implementation of Council and Congress decisions by their Members, and working with Members towards reaching regional consensus on important issues for the Organization.

7.2.11 Noting that further refinement of the draft text for amendment of the General Regulations was needed, the Council requested the Secretariat to assist WG-SOP in its further work on developing a broad and flexible definition of the role and responsibilities of the regional associations with a view to taking a decision at its sixty-sixth session in 2014.
7.3 Designation of acting member(s) of the Executive Council (agenda item 7.3)

The Council designated as acting members of the Executive Council Mr Laxman Singh Rathore (India) to replace Mr Tyagi (India), Mr Ilsoo Lee (Republic of Korea) to replace Mr Cho (Republic of Korea), Ms Laura K. Furgione (United States) to replace Mr Hayes (United States) and Mr Juan Manuel Caballero González (Mexico) to replace Mr Fallas Sojo (Costa Rica) who became an ex-officio member following his election as president of Regional Association IV.

7.4 Review of panels and other bodies of the Executive Council (agenda item 7.4)

Following changes in the membership of the Executive Council, the Council decided on the following replacements and changes in the composition of its working groups, panels and committees:

**WG on WMO Strategic and Operational Planning**

Dr J.C. Fallas Sojo
Dr (Ms) L. Furgione to replace Mr J. Hayes
Mr A.A. Mohammed to replace Mr A. Tyagi
Ms Ismail to replace Mr K.S. Yap

**WG on Climate and Related Weather, Water and Environmental Matters**

Mr Mohammed to replace Mr Chub
Ms Ismail to replace Mr K.S. Yap
Mr Caballero to replace Mr Fallas (and Mr Rolle)

**WG on Capacity Development**

Dr L. S. Rathore to replace Mr Chub
Mr Fallas to replace Mr Rolle

**WG on Service Delivery**

Mr Lee to replace Mr Cho
Mr Caballero to replace Mr Fallas
Ms L. Furgione to replace Mr J. Hayes

**Task Team on Data Policy**

Dr G. Adrian – additional member

**Panel of Experts on Education and Training**

Dr Johannes Cullmann (Germany) to replace Dr Julius Wellens-Mensah

**Panel of Experts on Polar Observations, Research and Service**

Dr (Ms) Katrine Krogh Andersen (Denmark) – additional member

**Advisory Panel of Experts on Gender Mainstreaming**

Dr (Ms) Laura Furgione (United States) to replace Ms Vicky Nadolsky

**WMO Audit Committee**

Mr S.R. Sharma replaced Mr M. Aryal.
7.5 Amendments to the Technical Regulations (agenda item 7.5)

7.5.1 The Executive Council welcomed the follow up of Resolution 26 (EC-64), Amendments to the Technical Regulations, as follows:

(a) A new edition of the Technical Regulations, Volume 1, General Meteorological Standards and Recommended Practices (WMO-No. 49, edition 2011), incorporating all amendments until Cg-XVI (2011) has been published;

(b) As requested by EC-64, arrangements have been made for all WMO regulatory documents (Technical Regulations with their Annexes (Manuals)), and corresponding Guides, to be published on the website under “Policy Documents and Standards” title, which made them easily accessible by Members and other interested parties. (http://www.wmo.int/pages/governance/policy/tech_regu_en.html)

7.5.2 The Council further noted that the introductory part of the Technical Regulations, Volume I, had been renamed to “General Provisions” and included a new set of procedures for keeping the regulatory documents up-to-date in a systematic manner, and would ensure timely publication of a new edition of Volume I after each Congress and updates as necessary during the intersessional period.

7.5.3 Noting the considerable on-going work on the updating of the existing regulatory material and the need for developing further standard and recommended practices and procedures related to the implementation of new WMO systems and frameworks, the Council commended the initiative for publishing a new document containing Guidelines on the preparation and promulgation of WMO Technical Regulations. The objective of these Guidelines is to ensure consistency and alignment of all WMO regulatory material, improvement of the overall structure and style of documents and to introduce a logical framework for the WMO standard-making process. The guidelines encompass all previous recommendations of Congress and the Executive Council related to the procedures and processes of creating technical regulations; in addition, they utilize the ISO/IEC directives on rules for the structure and drafting of international standards, thus, aligning the WMO practices with those of other organizations promulgating such standards. In this regard, the Council requested the Secretary-General to publish the Guidelines and encouraged all bodies participating in the preparation of regulatory material to make use of them.

7.5.4 The Council noted that the on-going work on the improvement of the WMO Technical Regulations was part of a broader action aimed at an enhanced culture of compliance with the international regulatory framework created by WMO as part of its main functions defined by the Convention. In this regard, the Council agreed that the monitoring of the compliance with the technical regulations should be further developed and systematically performed by the Members, relevant constituent bodies and the Secretariat in order to identify critical cases of non-compliance (deficiencies) and undertake measures for their timely resolution.

8. SCIENTIFIC LECTURES AND DISCUSSIONS (AGENDA ITEM 8)

8.1 The At its sixty-fourth session, the Council conferred the 57th IMO prize on Dr Zaviša Janjić (Serbia/United States of America). Dr Janjić was invited to present a lecture at EC-65.

8.2 The Council thanked Dr Janjić for his lecture, and requested the Secretary-General to arrange for the appropriate publication of the lecture.

9. REVIEW OF PREVIOUS RESOLUTIONS OF THE EXECUTIVE COUNCIL (agenda item 9)

The Executive Council reviewed those of its previous resolutions that were still in force at the time of the sixty-fifth session and adopted Resolution 23 (EC-65) – Review of previous resolutions of the Executive Council.
10. **DATE AND PLACE OF THE SIXTY-SIXTH AND SIXTY-SEVENTH SESSIONS OF THE EXECUTIVE COUNCIL (agenda item 10)**

10.1 The Council agreed that its sixty-sixth session would be held at the WMO headquarters from 18 to 27 June 2014, following the 33rd FINAC session from 16 to 17 June 2014.

10.2 The Council further tentatively scheduled its sixty-seventh session of the Council, to be held at the WMO headquarters, from 15 to 17 June 2015, immediately following the Seventeenth Congress in 2015.

11. **CLOSURE OF THE SESSION (AGENDA ITEM 11)**

The sixty-fifth session of the Executive Council closed at 11:07 on 23 May 2013.
RESOLUTIONS ADOPTED BY THE SESSION

Resolution 1 (EC-65)

FOLLOW-UP TO THE EXTRAORDINARY SESSION OF THE WORLD METEOROLOGICAL CONGRESS (2012)

THE EXECUTIVE COUNCIL,

Noting:

(1) The decision of the World Climate Conference-3 to establish a Global Framework for Climate Services (GFCS),

(2) The report of the Intergovernmental Meeting for the High-level Taskforce for the Global Framework for Climate Services, Geneva 11–12 January 2010 (WMO-No. 1052),

(3) The report of the High-level Taskforce on the Global Framework for Climate Services, *Climate Knowledge for Action: A Global Framework for Climate Services – Empowering the Most Vulnerable* (WMO-No. 1065), presented to the Sixteenth World Meteorological Congress,

(4) Resolution 47 (Cg-XVI) – Response to the report of the High-level Taskforce on the Global Framework for Climate Services,

(5) Resolution 48 (Cg-XVI) – Implementation of the Global Framework for Climate Services,

(6) Resolution 1 (Cg-Ext.(2012)) – Implementation Plan of the Global Framework for Climate Services,

(7) Resolution 2 (Cg-Ext.(2012)) – Establishment of the Intergovernmental Board on Climate Services,

Considering:

(1) The preparations for the first meeting of the Intergovernmental Board on Climate Services (IBCS) to be held from 1 to 5 July 2013,

(2) The need to carry out projects and activities related to the Implementation Plan of the Global Framework for Climate Services,

Requests Members:

(1) To provide resources to the GFCS Trust Fund as well as in-kind contributions through the secondment of experts to the GFCS Office to enable the implementation of concrete activities at national and regional level;

(2) To nominate members to the Intergovernmental Board on Climate Services and experts who could serve on its subsidiary bodies;

(3) To initiate frameworks for climate services at national level as a coordination mechanism to ensure effective implementation of the GFCS;

(4) To be actively involved in the implementation of the projects and activities identified through the Implementation Plan of the GFCS;

(5) To continue to support or expand additional climate service projects and activities that advance the overall goals and objectives outlined in the GFCS Implementation Plan;
Requests the Secretary-General:

(1) To prepare a proposal to formalize the cooperation between the IBCS and partner organizations for the consideration of the first meeting of the Intergovernmental Board;

(2) To continue his efforts in communicating with Members to nominate members to the IBCS in order to ensure the widest participation in its first meeting.

Resolution 2 (EC-65)

POLICY OF THE WORLD METEOROLOGICAL ORGANIZATION FOR THE INTERNATIONAL EXCHANGE OF CLIMATE DATA AND PRODUCTS TO SUPPORT THE IMPLEMENTATION OF THE GLOBAL FRAMEWORK FOR CLIMATE SERVICES

THE EXECUTIVE COUNCIL,

Noting:

(1) Resolution 40 (Cg-XII) – WMO policy and practice for the exchange of meteorological and related data and products including guidelines on the relationships in commercial meteorological activities,

(2) Resolution 25 (Cg-XIII) – Exchange of hydrological data and products,

(3) Resolution 48 (Cg-XVI) – Implementation of the Global Framework for Climate Services,

(4) Resolution 4 (EC-64) – Executive Council Task Team on the WMO Policy for International Exchange of Climate Data and Products to Support the Implementation of the Global Framework for Climate Services,

Requests the Task Team to prepare, in accordance with its terms of reference, as provided in Resolution 4 (EC-64), a draft resolution with annexes and background material on the WMO Policy for the International Exchange of Climate Data and Products to Support the Implementation of the Global Framework for Climate Services for consideration by the Executive Council at its sixty-sixth session and possible tabling at the Seventeenth World Meteorological Congress. The draft resolution should be informed by the review, carried out during the Executive Council session, of the white paper developed by the Task Team, taking into consideration the further advice and guidance provided;

Requests the Secretary-General to continue to provide assistance to the Task Team in addressing its terms of reference.
Resolution 3 (EC-65)

STEPS TO BE UNDERTAKEN TO ACHIEVE COMPLIANCE WITH THE REGULATIONS OF THE WORLD METEOROLOGICAL ORGANIZATION AND THE INTERNATIONAL CIVIL AVIATION ORGANIZATION

THE EXECUTIVE COUNCIL,

Noting the potentially serious legal and safety consequences of non-compliance with essential standards and technical regulations of the World Meteorological Organization (WMO) and the International Civil Aviation Organization (ICAO),

Noting further:

(1) The importance of aviation as a key to sustainable development,

(2) The binding agreements between WMO Members and ICAO Contracting States as signatories to the WMO Convention and the ICAO Convention including their relevant Annexes,

Considering the role of cost recovery for services to aviation which depends on demonstrated compliance with the regulations cited above,

Considering further the potentially negative effects on the standing and reputation of National Meteorological and Hydrological Services and other providers of meteorological services to civil aviation of a public notification by ICAO of identified deficiencies in their services,

Urges WMO Members:

(1) To review the status of implementation of the requirements for aeronautical meteorology promulgated by ICAO;

(2) To consider making experts’ time and skills available for twinning and mentoring arrangements so as to support Members experiencing problems in the development, implementation and maintenance of mandated systems such as quality management systems, competency assessment and documentation, and SIGMET issuance;

Urges that the Commission for Aeronautical Meteorology, aided by the Task Team on Quality Management Systems, be charged with helping to arrange and support such twinning and mentoring agreements between Members;

Urges Members who, despite their best efforts, are unable to meet the ICAO and WMO requirements, in conformity with the relevant WMO Technical Regulations and ICAO Annex 3, to inform both the WMO Secretariat and the appropriate ICAO Regional Office of the current state of compliance, providing a detailed plan for remedial action (stating which milestones are to be completed, by when) and a realistic estimate for reaching compliance with the ICAO and WMO Regulations. Such a notification of the international organizations, while not replacing compliance, would at least help reduce a serious legal and organizational risk (in terms of liability) for the designated meteorological authorities and service providers of Members;

Urges WMO to review current cost recovery guidelines in conjunction with ICAO and establish additional guidelines for Members that provide a global or regional advisory service for aviation.
Resolution 4 (EC-65)

IMPLEMENTATION PLAN OF THE WMO STRATEGY FOR SERVICE DELIVERY

THE EXECUTIVE COUNCIL,

Noting:

(1) That the Sixteenth World Meteorological Congress adopted the WMO Strategy for Service Delivery,

(2) That, as requested by the Sixteenth Congress, the Secretary-General had arranged to develop an Implementation Plan of the Strategy for approval by the Executive Council,

(3) That the Implementation Plan was developed through wide consultations with presidents of regional associations, presidents of technical commissions, the Executive Council Working Group on Service Delivery, experts from National Meteorological and Hydrological Services and WMO Programmes, to cover all programmes of WMO having a service delivery function,

(4) That the Implementation Plan is designed to put the approved WMO Strategy for Service Delivery into effect,

Considering that the Implementation Plan adopts a holistic approach and describes:

(1) The procedures for implementation of the continuous cycle of the framework for service delivery at the global, regional and national levels,

(2) The respective roles of the Executive Council, regional associations, technical commissions and the Secretariat in the implementation of the Plan,

(3) The key deliverables and milestones for measuring short-term (2-year), medium-term (6-year) and long-term (10-year) progress,

Adopts the Implementation Plan of the WMO Strategy for Service Delivery as it appears in the annex to the present resolution;

Urges Members to adapt and apply the Implementation Plan as a means of guiding them in introducing or improving sound principles of service delivery;

Requests the regional associations and technical commissions to develop governance methods that are fit for purpose in their areas of responsibility for mainstreaming service delivery into their programmes and activities;

Requests the Secretary-General to support the implementation of the Plan in the Programmes of WMO and to facilitate the collection of examples to be distilled and disseminated as best practices.
Annex to Resolution 4 (EC-65)

IMPLEMENTATION PLAN OF THE WMO STRATEGY FOR SERVICE DELIVERY

PREFACE

The WMO Strategy for Service Delivery¹, which is aligned to the WMO Strategic Plan, was approved by the Sixteenth World Meteorological Congress. The Strategy explains why service delivery is important, and describes practices that can strengthen service delivery across the entire WMO. The Strategy is considered essential reading to fully appreciate the content and direction of the Service Delivery Implementation Plan.

This Implementation Plan has been developed to guide National Meteorological and Hydrological Services (NMHSs) in the assessment of their current service delivery performance and to assist in the development of plans to improve service delivery in line with their strategic objectives. Improving levels of service delivery will provide direct benefits to service users, and, as a consequence, stronger community support for the institutions of the NMHSs.

The core business of NMHSs is built around their public good responsibility to provide essential weather, climate and related information to the community at large. In all forms of business, it is vital to put the user² first and the provision of weather, climate, water and environmental services is no different. Only by fully understanding why users need our services and how they use them in their decision-making can we provide services that are fit for purpose. By striving to provide services that fully meet the needs of users, NMHSs ensure that they discharge their statutory obligations, and, as a consequence, are held in high regard by the public, their owners and users.

Within WMO we will develop mechanisms to provide assistance to NMHSs in order that they may implement “The WMO Strategy for Service Delivery”.

All Members are encouraged to use this Implementation Plan for “The WMO Strategy for Service Delivery” to assess where they currently stand in regard to levels of service delivery and to continue the work towards achieving ever higher standards.

² For definition see Appendix 3 – Glossary.
## EXECUTIVE SUMMARY

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   1.2 Purpose of the Implementation Plan
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3. FROM STRATEGY TO IMPLEMENTATION NATIONALLY
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6. CLOSING COMMENTS
APPENDIX 1: Service Delivery Progress Model (SDPM) ..........................................................
APPENDIX 2: Acting on the Strategy Elements ........................................................................
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APPENDIX 4: Toolkit of Documents and Templates³ .................................................................
APPENDIX 5: Service Delivery Examples⁴ ................................................................................
APPENDIX 6: An Example of Sharing Best Practice between NMHSS⁵ .....................................
APPENDIX 7: Action Plan Outline⁶ ............................................................................................
APPENDIX 8: Further Reading and Links to other Documents⁷ ...................................................

³ Appendix 4: http://www.wmo.int/pages/prog/amp/pwsp/documents/Appendix-4.doc
⁴ Appendix 5: http://www.wmo.int/pages/prog/amp/pwsp/documents/Appendix-5.doc
⁵ Appendix 6: http://www.wmo.int/pages/prog/amp/pwsp/documents/Appendix-6.doc
⁶ Appendix 7: http://www.wmo.int/pages/prog/amp/pwsp/documents/Appendix-7.doc
⁷ Appendix 8: http://www.wmo.int/pages/prog/amp/pwsp/documents/Appendix-8.doc
EXECUTIVE SUMMARY

WMO Members recognize the importance of high quality in service delivery by the providers of weather, climate, water and environmental services. WMO provides international coordination and sets standards for meteorological and hydrological products and provides guidance for service delivery, and indeed some great success has been achieved in delivering services. However, Members have agreed that a more uniform and structured approach for WMO on service development and delivery is required and hence approved “The WMO Strategy for Service Delivery” at the sixteenth session of the World Meteorological Congress in 2011 (Cg-XVI, May-June 2011), and requested the Secretary-General to arrange for the preparation of an Implementation Plan for the Strategy.

The goal of “The WMO Strategy for Service Delivery” (the Strategy) is to help National Meteorological and Hydrological Services (NMHSs) raise standards of service delivery in the provision of products and services to their users. The Implementation Plan provides a flexible methodology to assist Members in evaluating their current service delivery practices and to serve as high-level guidance for developing more detailed methods and tools for improving their service delivery process.

The Strategy itself is adaptable to the unique needs of Members both developed and developing regardless of who the users are and whether providers deliver public or commercial products and services. The role of the WMO Secretariat and WMO constituent bodies in the implementation of the Strategy is to serve both as a facilitator and coordinator.

Meeting the needs of users with fit for purpose products and services is vital to the success of Members as service providers. As the needs of users evolve, the capabilities of service providers should also adapt over time. Methods of distributing products and services are subject to change, especially in the modern information technology era. It is important that Members are agile and able to respond to these changes.

WMO Members that have already implemented a formal Quality Management Strategy are likely to be focused on meeting user needs as a key aspect of service delivery. For Members that have not introduced a Quality Management System (QMS), implementing a service delivery strategy along the lines described here will be an excellent step towards improved organization-wide quality management.

Those Members that provide services on a commercial basis, where there are contractual obligations, are no doubt acutely aware of the need for high service delivery standards. But equally, the practices of quality service delivery should be applied to weather, climate, water and environmental services provided to the public and to government agencies and departments.

Benefits that can be derived by users sensitive to the impacts of weather and climate, from high quality services that fully meet their needs are wide ranging. Members with high levels of service delivery through their Public Weather Services (PWS) are likely to be viewed by their users and by the organizations that provide their funding as returning value for investment of public funds. This can help to ensure sustainability for the PWS.

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8 For definition see Appendix 3 – Glossary.
9 Same as above
10 Same as above
11 Same as above
The Strategy describes a continuous cycle of four stages, which define the framework for service delivery, and identifies six elements which detail the activities required for high quality service delivery.

The **four stages** of a continuous, cyclic process for developing and delivering services are:

1. User engagement;
2. Service design and development;
3. Delivery; and
4. Evaluation and improvement.

The **six elements** necessary for moving towards a more service-oriented culture are:

1. Evaluate user needs and decisions;
2. Link service development and delivery to user needs;
3. Evaluate and monitor service performance and outcomes;
4. Sustain improved service delivery;
5. Develop skills needed to sustain service delivery; and

In order to achieve quality performance in service delivery, the focus and commitment of the leaders of service providers are vital to ensure that it is achieved throughout their organizations.

This Implementation Plan has been developed to help all Members assess and improve their service delivery irrespective of their current level and capacity.

Assessment of the current level of service delivery can be undertaken either by self-assessment, or with external assistance. The assessment should be made against a progress model which shows the type of activities and behaviours that are appropriate for service providers with a certain level of service delivery development. A Service Delivery Progress Model (SDPM) is included in this Implementation Plan to guide Members to the actions and activities that are required over short-, medium- and long-term in order to progress to higher levels of service delivery.

**Milestones** for the implementation of the Strategy are being set for short-term (two (2) years), medium-term (six (6) years) and long-term (ten (10) years).

The **Key Deliverables** resulting from the implementation of the Strategy over the short-term will be: (1) the assessment of the current level of service delivery; (2) putting in place the necessary Action Plan which should include strengthening user interaction through for example surveys, focus groups, and workshops for each user group to start improving the service delivery level; and (3) the assessment of required resources to implement the Action Plan. Over the medium-term, the Implementation Plan aims to facilitate access by a certain percentage of Members to at least one level higher in their service delivery development than their current level and, the documentation of processes and sharing of lessons learnt with other Members. After ten years the implementation of the Strategy aims to develop or strengthen a service culture and facilitate the mainstreaming of service delivery in the programmes and activities of Members’ service providers, resulting in tangible improvement of user perception of their services.

The WMO Executive Council Working Group on Service Delivery (ECWG-SD) will have the overall responsibility for monitoring progress and facilitating the implementation of the Strategy by NMHSs.
1. INTRODUCTION

1.1 Background

WMO Members have recognized the importance of quality service delivery for all products and services provided to users and that guidance on how to improve levels of service delivery is required. WMO provides international coordination and sets standards for meteorological and hydrological products and provides guidance for service delivery and indeed some great success has been achieved in delivering services. However, Members have agreed that a more uniform and structured approach for WMO on service development and delivery is required and hence approved “The WMO Strategy for Service Delivery” (the Strategy) at the sixteenth session of the World Meteorological Congress (Cg-XVI, May-June 2011). Following the approval of the Strategy, Congress requested the Secretary-General to arrange for the preparation of an Implementation Plan to assist Members in adapting and applying the Strategy in their own service delivery strategies and plans.\(^{12}\)

The Strategy serves as a foundation to improve service delivery by sharing best practices and supporting mutually agreed upon guidelines and by increasing user engagement throughout the delivery process, recognizing the many differences in cultures, structures, operational practices and resource and development levels across WMO Members as service providers.

The objective of this Implementation Plan is to lay out a path forward that will guide WMO constituent bodies and Members in realizing the goals of the Strategy, thereby improving service delivery to users. There is an expectation that this will result in increased uptake and use of their products and services, thus leading to greater user satisfaction and growth in the products and services provided and the ensuing socio-economic benefits.

The Executive Council Working Group on Service Delivery (ECWG-SD) has the oversight responsibility for the Strategy and has been tasked with monitoring its implementation\(^ {13}\).

The Strategy describes four stages which define the continuous cyclic process for service delivery and identifies six elements which detail the activities required for high quality service delivery.


The four stages of service delivery are shown in Figure 1 below.

![Diagram of service delivery stages]

**Figure 1. The four stages of service delivery**

The four stages of a continuous, cyclic process for developing and delivering services are:

1. User engagement;
2. Service design and development;
3. Delivery; and
4. Evaluation and improvement.

The six elements necessary for moving towards a more service-oriented culture are:

1. Evaluate user needs and decisions;
2. Link service development and delivery to user needs;
3. Evaluate and monitor service performance and outcomes;
4. Sustain improved service delivery;
5. Develop skills needed to sustain service delivery; and

Each of the stages and the elements is described in detail in the Strategy document, which is essential reading to understand this Implementation Plan.

Definitions of key terms used in this Implementation Plan are provided in the glossary in Appendix 3.
The distinction between a “User” and a “Customer”

In the context of this Implementation Plan, for clarity a distinction is made between user and customer. As noted in the glossary (see Appendix 3), a user is the person or the organization that receives the product or service and accepts it as an input to a defined process. For example, a member of the public may receive a tropical cyclone warning and proceed to prepare his/her house to withstand high winds and heavy rain. This user of the warning would not have paid the service provider for the service. A customer is the person or organization that pays for the warning service and specifies how it will be provided. In this tropical cyclone warning example the customer is the government that specifies the type of warning services it will fund the service provider to provide.

It is possible for both the user and customer to be the same person or organization. One example could be a farmer who requires a specific weather forecast service for crop spraying or harvesting that is not part of the public weather services of the service provider, and so purchases the service from a commercial provider. This farmer then becomes both the user and the customer for the service rendered.

1.2 Purpose of the Implementation Plan

It is widely recognized that great advances have been made in the sciences of meteorology, climatology and hydrology through the quality and volume of observational data and improvements in numerical prediction. However, it is less apparent that the benefits from these advances have been fully realized in terms of improvements by service providers to the users of products and services.

A main purpose of the Strategy is to ensure that the services provided by Members are fully utilized by the users in various sectors. This Implementation Plan has therefore been developed to assist the service providers of Members to enhance the quality and usefulness of meteorological and hydrological services so that the full benefit of these advances can be realized by users.

To achieve its purpose, the Implementation Plan outlines an approach that can be followed by National Meteorological and Hydrological Services (NMHSs) to convert the growing awareness of the importance of high quality service delivery into actions. A key component of the Implementation Plan is therefore a progress model (see Appendix 1). This provides a means to assess the current level of service delivery and how to improve it where it is considered cost effective to do so. By comparing its current service delivery situation against the levels articulated in the model, NMHSs will be able to identify the actions and activities required to move from the current level to a higher one.

The Implementation Plan also describes a role for the WMO constituent bodies to initiate, support and monitor the progress of Members in improving the quality of their service delivery.

1.3 Benefits derived from improved service delivery

As noted in 1.2. above, there is significant room for improvement to translate the full benefit of the advances in meteorology, hydrology and related technologies into services that meet user needs. However, the link between improved levels of service delivery and benefits to users of meteorological and hydrological services is being recognized. For example, an obvious benefit of improved warnings of severe weather will be a reduction in the risk to lives and adverse impacts upon economies. Usable, understandable and relevant services will benefit many weather-sensitive social and economic sectors such as health, agriculture, water resource management, transport, tourism and
energy, through enabling informed decision-making. Surveys of users of services can be conducted to determine the benefits they derive from the service provided and how that benefit can be increased by improved service delivery.\textsuperscript{14, 15}

As a result of improved service delivery, the users will have more confidence in the capability of NMHSs, leading to improved relations and increased demands for services. In addition, better services to government agencies and departments will lead to greater recognition of NMHSs as providers of vital services supporting the economy and society. This would enable NMHSs to make more convincing cases for investment to sustain and further improve the range and quality of services.

As the Strategy is implemented by Members with the assistance of WMO constituent bodies, more examples of successful user experience and derived benefits will become available and these should be included in the reporting process.

2. IMPLEMENTATION APPROACH

The approach to the implementation of the Strategy should be regarded on three different levels: Global, Regional and National.

2.1 Implementing the strategy at the global level

At the global level, the responsibilities for the Strategy fall within the mandates of:

1. Congress (Cg), which approved the Strategy, and which will have the ultimate responsibility to help develop the capacity for Members to implement it;

2. Executive Council (EC), which through its Working Group on Service Delivery, will exercise the oversight role;

3. The technical commissions (TCs), which are expected to provide technical advice and guidance for mainstreaming service delivery into their programmes and activities; and

4. The WMO Secretariat, which has the coordination responsibility and can facilitate the collection, aggregation and dissemination of best practices.

More specifically, the ECWG-SD will set out the means by which WMO will guide Members and WMO constituent bodies in the implementation of the Strategy, monitor and track progress and report to the Executive Council and ultimately to Congress.

2.2 Implementing the strategy at the regional level

At the regional level, the responsibility for the Strategy is focused on regional associations (RAs) to recognize and acknowledge service delivery among their main priorities. The RAs are expected to facilitate the implementation of the Strategy by their respective Members through the establishment of subsidiary bodies such as regional Working Groups or Expert Teams to address specific aspects of service delivery improvement. Such groups or teams could address activities such as conducting socio-economic studies and evaluations, improving media relations, designing and

\textsuperscript{14} \url{http://www.wmo.int/pages/prog/amp/pwsp/documents/PWS_23_ROE-1_en.pdf}
\textsuperscript{15} \url{http://www.wmo.int/pages/prog/amp/pwsp/SocioEconomicMainPage.htm}
implementing pilot and demonstration projects and establishing twinning mechanisms either intra- or inter-regionally to assist less developed Regions or sub-regions with emphasis on the Least Developed Countries (LDCs).

2.3 Implementing the strategy at the national level

There are many differences in the structures and operating models of Members’ NMHSs both in the types of meteorological and hydrological services they provide and the users they support. The implementation approach has been developed so that it can be adapted and applied by Members and their NMHSs, regardless of their operating model, to guide them in meeting the attributes of effective service delivery identified in the Strategy. A three-step process is proposed in the Service Delivery Progress Model; (i) determine a Member’s current levels of service delivery; (ii) target where they wish to be in the future; and (iii) develop tactics to get there.

To help illustrate how service delivery could be improved, examples of different levels of service delivery and lessons learnt are provided in Appendix 516.

2.4 The Service Delivery Progress Model (SDPM)

A key component of this Implementation Plan is the Service Delivery Progress Model (SDPM), presented in Appendix 1. The SDPM addresses the implementation of the Strategy at the National Level. It describes the activities, actions and behaviours expected in NMHSs at a particular level of service delivery development with respect to each of the six elements of the Strategy. The SDPM defines five possible levels of service delivery capabilities: (1) Undeveloped; (2) Development Started; (3) Development in Progress; (4) Developed; and (5) Advanced.

The SDPM also includes a number of questions and answers associated with each element of the Strategy that will assist NMHSs to determine their current level of service delivery capability and to show the types of activities, actions and behaviours that will enable them to move to higher levels of service delivery.

Assessment of performance against the SDPM could be undertaken by NMHSs themselves, by other NMHSs in a twinning role, or by some other external body. It is also likely that NMHSs will discuss with key users and customers their level of satisfaction with services to help them decide what level of service delivery development is appropriate for the future.

2.5 Advancing to higher levels of service delivery

For each of the six elements of the Strategy outlined on page 11, there will be actions that can be taken to improve levels of service delivery and thereby progress through the levels of the SDPM. In addition to the service level descriptions and the self-assessment questions posed, the SDPM provides detailed explanations of actions that can be undertaken by NMHSs to advance their service delivery performance (see Appendix 2).

3. FROM STRATEGY TO IMPLEMENTATION NATIONALLY

This part of the Implementation Plan lays out an approach to be applied by “service providers” at the national level with particular focus on NMHSs. All NMHSs are different to some

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extent and it is not straightforward to recommend a simple model that will be fully applicable and clear
to all of them. The Strategy recognizes that there is no prescriptive way to provide services to users;
however, the following steps are intended to help NMHSs to review their current service delivery
practices and to take actions to implement the Strategy.

Service providers

In the context of this Implementation Plan, the term NMHSs is used as a generic term applied to the
national authority that is the provider of meteorological and/or hydrological services. It is recognized
that in particular areas of meteorology and hydrology, other entities could, under commercial
contract, or through mandate provided by their government, provide public good services.

3.1 Steps to implement improved service delivery

Step 1 – Identify a Service Delivery Champion\(^{17}\)

Taking a decision to improve levels of service delivery may require a culture change
amongst the personnel in a National Meteorological or Hydrometeorological Service (NMS). All staff in
the NMS should recognize that they are making a contribution to a service that is provided to a user
and the needs of the user must be understood and considered at all times. Linked to this culture
change is a fundamental need to move from a focus on internal processes to one where meeting the
needs of users is the key objective. The culture change will only succeed if it is led and driven through
the NMS by its leaders, thus the need to appoint a Service Delivery Champion as the change agent.
The Service Delivery Champion, who should be a respected senior manager, will need to articulate
the benefits of improved service delivery across the NMS and to key stakeholders such as those in
government whose commitment will be essential to secure the necessary investment to improve
service delivery. Staff of the NMS are likely to become more motivated when they see and benefit
from the value users gain from their use of high quality meteorological and hydrological services.

Step 2 – Assess the current level of service delivery using the SDPM

Assessment of the current level of service delivery is best achieved by a systematic review
of all current practices against the definitions within the SDPM. Evidence should be sought to justify
the level chosen. Twinning with other NMHSs could be an effective approach to secure an objective
analysis. The assessment should be documented in a report that describes the NMHS’s state of
development for each element including an answer to each question posed in the SDPM with specific
evidence wherever possible.

Step 3 – Create an Action Plan with short-, medium- and long-term goals

Changes to improve service delivery within an NMS require a structured approach, laid out
in a clearly articulated Action Plan\(^{18}\) that includes milestones and identifies the appropriate level of
resources. By managing these changes as projects or programmes, the impact of the change on the
efficiency of internal processes and on users can be fully analyzed, understood and managed. The
changes can then be linked to achieving the desired outcomes. As more significant changes are made
with greater impact, staff with specialist skills in project or programme management may be required
to deliver the changes.

\(^{17}\) For definition see Appendix 3 – Glossary.
Some of these changes may be implemented quickly with only limited effort. Examples include change of formats of products, use of simpler language and avoidance of use of jargon, change of the time of broadcasts based on user surveys. Other changes may require a series of actions over medium or longer timescales, so it is important that they are documented and tracked through to completion. **Milestones** for the implementation of the Strategy can be set for short-term (two (2) years), medium-term (six (6) years) and long-term (ten (10) years).

**Key Deliverables** resulting from the implementation of the Strategy over the short-term will be the assessment of the current level of service delivery, putting in place the necessary Action Plan which should include strengthening user interaction through for example surveys, focus groups, workshops for each user group, to start improving the service delivery level and; assessment of required resources to implement the Action Plan. Over the medium-term, the Implementation Plan aims to facilitate access by a certain percentage of Members to at least one level higher in their service delivery development than their current level, the documentation of processes and sharing of lessons learnt with other Members. After ten years the implementation of the Strategy aims to develop or strengthen a service culture and facilitate the mainstreaming of service delivery in the programmes and activities of Members’ service providers, resulting in tangible improvement of user perception of their services.

**Step 4 – Allocate resources to implement the agreed actions**

It is clear that effort and resources will be required for improving levels of service delivery. While it is recognized that this may be difficult for some NMHSs where there is great pressure on existing resources, it may be that with recognition of the benefits that can result from improved service delivery, prioritization within NMHSs could be made to reallocate resources for this purpose.

The specific resources required for achieving a defined level of services (in terms of quality, range, accuracy, timeliness, detail, delivery method) need to be assessed very carefully and compared objectively to the expected benefits for the customer and user. Many examples exist of cost-benefit analysis for different user sectors where estimates of achievable user benefit have been demonstrated to clearly exceed the required resources for planning, implementing and providing the services for a foreseeable time. This is another area where twinning between developed and less developed NMHSs can provide guidance and assistance on the application of such analysis. However, if this proves difficult to do, suitable adjustments will need to be made to the service level, in consultation with users.

NMHSs that have a high level of service delivery will have dedicated staff responsible for ensuring that all the stages and elements of the Strategy are addressed for the services provided. For NMHSs in the early stages of service delivery development, this may not be possible, but the SDPM can be adapted to allow NMHSs to focus on stages or elements where development of effective service delivery is required and where benefits can be delivered quickly. This may help to minimize the impact on resources required in the early stages of development.

Finally, in those situations where the relationship with the customer involves a formal service agreement, it is advisable that before entering into such an agreement to ensure the availability of resources in accordance with Step 4. Strict budgetary control and evaluation of the development of user benefits in line with development costs need to be maintained throughout the process. Customer commitment must also be assured to avoid wasted investment for services that may be discontinued by the customer.

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Step 5 – Review progress of actions against the Action Plan in conjunction with regular reviews of level of service delivery

Continuous monitoring of progress against the Action Plan, clear internal financial accounting and regular meetings with the user/customer will ensure that the services developed are fit for purpose and, in the case of formal service arrangement, compliant with the service agreement, which could be a Memorandum of Understanding (MOU), Customer Supplier Agreement (CSA) or Service Level Agreement (SLA). This will also give the user confidence that their needs are being met and that they will get the service they expect. As part of the monitoring and evaluation process, appropriate Key Performance Indicators (KPIs) need to be developed based on the SDPM and the detailed questions contained therein. Examples of such indicators could be the number of service agreements with user groups and the number of user satisfaction surveys carried out.

Step 6 – Share best practice and knowledge between NMHSs

The sharing of experience, knowledge and best practice between NMHSs with the assistance of WMO constituent bodies and the Secretariat can help to ensure that NMHSs are able to focus limited resources on areas which deliver maximum benefit. An example of sharing best practice and subsequent Action Plan is provided in Appendix 7 to help illustrate the steps described above.

Step 7 – Report progress as recommended by ECWG-SD

In order to demonstrate the effectiveness of the resources being utilized to improve service delivery, monitoring and reporting of progress are essential. The ECWG-SD will establish a reporting process to track the cumulative progress of WMO Members.

4. FROM STRATEGY TO IMPLEMENTATION IN WMO CONSTITUENT BODIES

Although it is intended that this Implementation Plan be simple to use, many Members may need assistance to achieve the best results. It is certain that within their coordinating and facilitating functions, RAs and TCs, with the assistance of the Secretariat will have key roles in helping and encouraging Members to implement the Strategy and improve their levels of service delivery.

4.1 Role of the Executive Council Working Group on Service Delivery (ECWG-SD)

The ECWG-SD has been assigned the overall responsibility for the implementation of the Strategy. In addition to developing and providing guidance to NMHSs, the ECWG-SD will monitor the progress of Members, provide annual reports to EC and provide a final report to Seventeenth Congress in 2015.

4.2 Role of regional associations (RAS) and technical commissions (TCS)

WMO constituent bodies recognize already the importance of high-quality service delivery as a means to sustain or even develop an NMS’s potential. Experts and Management Groups of these bodies should participate in the development of recommendations on how Members can improve the value of the services provided to users. EC has requested TCs to ensure that the Strategy is infused into all the Programmes of the WMO whose mandate includes service delivery.20

While there is no prescriptive way to do this, RAs and TCs will be expected to develop governance methods that are fit for purpose in their areas of responsibility including the identification of a Service Delivery Champion to aid in communicating examples of best practice. TCs can each help to contextualize service delivery improvement in their area of technical expertise. For example, the Commission for Basic Systems (CBS) could establish an Expert Team to document and share best service delivery practices for public weather services; the Commission for Hydrology (CHy) could develop guidelines specific to excellence in the delivery of hydrologic services; the Commission for Climatology (CCI) could ensure that service delivery practices are well enunciated in the implementation plans for the Global Framework for Climate Services (GFCS) and the Commission for Aeronautical Meteorology (CAeM), Commission for Agricultural Meteorology (CAgM) and Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) could each incorporate service delivery improvement initiatives in their work plans focused on service delivery to aviation, agriculture and mariners, respectively.

In the case of reporting procedures, it is important to avoid the situation where the task of providing a report can be more time consuming than the activity being reported on. However, some level of monitoring, evaluation and reporting will be required to demonstrate that the Strategy is being implemented, that improvement is being achieved and that benefits are being delivered and measured. The timetable for these activities will depend upon the differing requirements of Members, RAs and TCs, but it is recommended that reports should be provided on at least an annual basis.

4.3 Role of the Secretariat

A number of the WMO Programmes have a service delivery dimension. The departments of the Secretariat that manage these programmes have a responsibility to promote the Strategy and advocate its implementation as described in this plan through the activities (including training and capacity development activities) of their respective programmes. Encouraging and supporting Members, through these programmes (including the Regional Programme and the Education and Training Programme), will be essential to achieving the first expected result of the WMO Strategic Plan which states as its goal, “Enhanced capabilities of Members to deliver and improve access to high-quality weather, climate, water and related environmental predictions, information, warnings and services in response to users’ needs, and to enable their use in decision-making by relevant societal sectors”.

4.4 Assessment reports

As part of the short-term (two (2) years) milestone of this Implementation Plan, the recommended first step for Members is to conduct an assessment of service delivery development to determine their current level and provide a report to the ECWG-SD advising the WG on the analyzed level and if plans and targets are in place for further improvement. The ECWG-SD will provide guidance on how to approach such assessment reports as the implementation of the Strategy is tested in a number of NMHSs.

The information contained in the assessment reports will be used by ECWG-SD to track the implementation of the Strategy. Examples are provided below of those elements that ECWG-SD will monitor:

(a) The number of NMHSs that have conducted an initial review of service delivery status;
(b) The number of NMHSs that have an Action Plan in place to improve their level of service delivery;
(c) The number of NMHSs that have achieved improvements in their level of service delivery; and
(d) Examples of good practice that can be communicated more widely.

To ensure that as many reports as possible are provided by Members, it is expected that RAs and TCs will have a key role in encouraging and assisting Members in the preparation of reports. This could be achieved by including this responsibility within the terms of reference of one of the regional Working Groups or Expert Teams.

For the implementation of the Strategy to be a success, exchange of knowledge and information amongst NMHSs and WMO constituent bodies will be crucial. Timely and accurate reports to ECWG-SD will help to ensure that relevant knowledge and information can be sent to other NMHSs and constituent bodies. RAs and TCs can also assist the flow of information and the exchange of knowledge and best practice. Twinning and mentoring will be important activities in achieving progress and RAs in particular will have an important role in facilitating these activities.

4.5 Milestones to measure progress of the SDIP

The high level objective of this Implementation Plan is to improve the levels of service delivery within NMHSs through their implementation of “The WMO Strategy for Service Delivery”. So that progress against this high level objective can be quantified, a number of targets and milestones are proposed.

4.5.1 The short-term (2-year) time frame

Within three months of approval of this Implementation Plan, the ECWG-SD will develop and distribute to Members a questionnaire that will facilitate the assessment of their current level of service delivery. The results of this questionnaire will be analyzed and form a baseline against which progress will be assessed. A second questionnaire will be administered two years after Implementation Plan approval and Members will be asked to submit an assessment report.

Over those first two years it is expected that:

(a) 70% of Members, with a portion from each of the six Regions, will have undertaken and completed the assessment of their current level of service delivery against the SDPM;
(b) 50% of Members will have decided which level is appropriate for them as a future target;
(c) 40% of Members will have decided which are the most important priority target user groups and will have conducted consultations with these groups to gather information on their requirements and decision-making processes;
(d) 30% of Members will have developed an Action Plan based on user input and their own service level assessment, to achieve their selected target level for service delivery and will have carried out an assessment of required resources to implement the Action Plan;
(e) At least 25% of Members will provide a report to the ECWG-SD; and
(f) At least 50% of RAs will have included service delivery Expert Teams or Working Groups in their working structures and have started to develop activities e.g., pilot projects and twinning arrangements within their Regions (and with other Regions).
4.5.2 The medium-term (6-year) time frame

Every two years after approval of this Implementation Plan, the ECWG-SD will administer a follow up survey and request updates of the Members’ assessment reports as a means to monitor the progress.

By the end of four years it is expected that:

(a) 80% of Members will have undertaken and completed the assessment of their current level of service delivery against the SDPM;
(b) 70% of Members will have decided which level is appropriate for them as a future target;
(c) 60% of Members will have decided which are the most important priority target user groups and will have conducted consultations with these groups to gather information on their requirements and decision-making processes;
(d) 50% of Members will have developed an Action Plan based on user input and their own service level assessment, to achieve their selected target level for service delivery and will have carried out an assessment of required resources to implement the Action Plan;
(e) At least 60% of Members will provide a report to the ECWG-SD; and
(f) 100% of RAs will have included service delivery Expert Teams or Working Groups in their working structures and have started to develop activities e.g., pilot projects and twinning arrangements within their Regions (and with other Regions).

After six years, it is expected that:

(a) 40% of Members will have established intra or inter-regional twinning or mentoring arrangements;
(b) 50% of Members have achieved advancement of at least one level in their service delivery; and
(c) All 50% have documented the processes and can share lessons learnt with other NMHSs.

4.5.3 The long-term (10-year) time frame

The ECWG-SD will monitor progress over the long term through periodic, progressive questionnaires and requests for updated assessment reports. After ten years, it is expected that the implementation of the Strategy will have resulted in the development or strengthening of a service culture and facilitation of the mainstreaming of service delivery in the programmes and activities of Members’ service providers, resulting in tangible improvement of user perception of their services.

Thus the aim of the long-term time frame would be that:

(a) All Members having developed or strengthened their service culture;
(b) At least 70% of Members having mainstreamed service delivery in the programmes and activities of their service providers; and
(c) At least 60% of Members being able to show improvement in user perception of their services.

5. LINKAGES WITH OTHER INITIATIVES AND ACTIVITIES

5.1 Linkages to WMO initiatives and activities

Service delivery is not a separate programme activity within an NMS; rather it should be seen as a critical component of everything that it does. A culture of continuous improvement in service
delivery benefits staff, the NMS and its customers. Improved capabilities thus have a positive impact on the perception of the NMS by the users of meteorological and hydrological services. The goal is to ensure that mutual benefits are accrued by both the NMS and the users. Examples of WMO initiatives and activities where there is strong synergy with the Strategy follow.

5.2 Linkages to the WMO Strategic Plan

“The WMO Strategy for Service Delivery” stems from the WMO Strategic Plan and in particular the Strategic Thrust, which focuses on improving service quality and service delivery. This Strategic Thrust recognizes the benefits that can flow to society from improvements in the quality and delivery of meteorological and related environmental services. Furthermore, the Strategic Thrust emphasizes that this will require collaborative efforts involving the providers and users of information to ensure that the needs of the users are integrated into the development of products and to enhance feedback between the providers and users of information to make continuous improvements. The expected result that deals with this Strategic Thrust addresses the rapidly changing paradigm for providing meteorological, hydrological and environmental services, which requires service providers to: (i) understand how the information is used so that it can be tailored to the users’ needs, for example through effective rolling reviews of user needs for products and services; and (ii) integrate meteorological, hydrological and environmental information and products into decision-making (see Reference 4, Appendix 8).

5.3 Linkages to Global Framework for Climate Services (GFCS)

The need for high levels of quality in service delivery is equally applicable to the development of climate services. The requirement for user engagement is recognized in the User Interface Platform (UIP), one of the five central pillars of the GFCS. Dialogue with users, obtaining feedback from them and developing monitoring and evaluation measures in order to meet user needs, are closely aligned with the Strategy Elements. The close synergy with the Strategy has been highlighted in the GFCS Implementation Plan which recognizes the opportunity to create efficiency by aligning the UIP, in particular, with the Strategy (see Reference 5, Appendix 8).

5.4 Linkages to quality management system (QMS)

A QMS is defined as the organizational structure, procedures, processes and resources needed to develop and successfully implement management for the delivery of the organization’s products and services. Effective service delivery and compliance with QMS standards are complementary and if an organization has high service delivery standards, it will be well positioned to meet the broader QMS standards. High levels of quality in service delivery and compliance with QMS standards are both essential if NMHSs wish to improve their outcomes.

During the last decade, a strong requirement for quality assurance, quality control and quality management practices in the provision of meteorological services for specific sectors has emerged. In particular, the provision of meteorological services for safe, economic and efficient air navigation is carried out under a global regulatory framework jointly developed by the International Civil Aviation Organization (ICAO) and WMO. There is now required, as a standard, a properly organized system for the quality management of the meteorological information by all service providers. It should be noted that this requirement applies not only to meteorological service providers but also to all providers of air navigation services (e.g., aeronautical information services (AIS), airport ground services, air traffic control (ATC), etc.). Thus, the needs are industry-driven and NMHSs and

other providers of meteorological services to aviation should implement a quality system that is in conformity with the ISO 9000 series of quality assurance standards.

Other sectors are following the aviation example and it is anticipated that QMS requirements for the provision of services in hydrology and marine transportation may be required. Noting that the ISO 9000 family of standards related to QMS is designed to help organizations ensure that they meet the needs of customers and other stakeholders while meeting statutory and regulatory requirements related to the product, “The WMO Strategy for Service Delivery” is closely related to the gradual introduction of the QMS principles in all areas of services provided by NMHSs. It is very encouraging to note that some NMHSs have already achieved ISO 9000 certification not only for their aviation services but also for the organization as a whole. Notwithstanding the necessary investment (financial and human resource) for obtaining and maintaining the ISO certificate, the experience of these NMHSs shows definitely a very positive impact on the quality of services and management practices, as well as on the user/customer attitude and perception.

A QMS should be supporting the stages and elements of the Strategy, complementing the SDPM as a guide to service delivery development. The WMO guidelines “A Guide for the Implementation of a Quality Management System for National Meteorological and Hydrological Services” (Reference 6, Appendix 8) provides advice and information to all NMHSs who wish to adopt a quality management approach to the delivery of services. Twinning and mentoring have been recognized by WMO as a method of assisting those Members requiring expertise, advice and assistance in the implementation of QMS22. A similar twinning and mentoring framework should be established to enable those NMHSs with well developed levels of service delivery to assist other NMHSs to improve levels of service delivery. The twinning and mentoring framework should also encourage interaction in an informal manner, or through bilateral visits and exchanges between NMHSs. It is expected that RAs will have a key role to play in establishing an effective framework for twinning and mentoring within and between the Regions.

5.5 Linkages to training

Training in all aspects of service delivery should be incorporated into relevant training events. For example, forecasting courses should include a module on service delivery where students are instructed on the competencies and behaviours required for quality service delivery. Such training should also include information concerning the users of the forecast information, their decision-making processes and how they apply meteorological or hydrological information in their decision-making. It is also highly desirable to train the users and customers of meteorological and hydrological services in how to use those products and services to achieve maximum benefits and to fully understand the capabilities of NMHSs.

5.6 Linkages to capacity development

Capacity development activities will often have the biggest impact when they focus on services and service delivery as the main objective and then consider the infrastructure, human and institutional capacities that are required to enable the delivery of the services. NMHSs will be able to make a more effective contribution to the development plans of their countries if the services they provide are developed with the needs of the user in mind. This will help to ensure that the services are valued by the users and that the meteorological and hydrological services are sustained and improved.

This approach is in line with the WMO Capacity Development Strategy (CDS)\textsuperscript{23} which aims to facilitate a holistic and integrated approach to sustainable capacity development of NMHSs especially in developing countries, through: advocacy, education and training, outreach, partnerships and resource mobilization, demonstration and pilot projects, service delivery and research. The WMO CDS focus on improved quality in service delivery rather than the more traditional approach of enhancing meteorological infrastructure has proved to be very successful in a number of countries. For example, several projects to install Media Weather Presentation Systems in African NMHSs resulted in an immediate increase in the profile of the NMS with ministers and the public. A second example concerns the implementation of a Severe Weather Forecasting Demonstration Project (SWFDP) where the benefits of investing in improved service delivery to the public, founded on investments in science and technology, have been shown through increased lead time and accuracy in warnings to mitigate the impacts of severe weather. The WMO \textit{Guide to Role, Operations and Management of NMSs}\textsuperscript{24} has a strong focus on service delivery and highlights many of the challenges that NMHSs face, including meeting national needs for meteorological and related data and services. It should be kept in mind that a pre-critical condition for delivering effective services is the capacity of the underpinning operational structure of NMHSs for the provision of accurate and timely products, based on sound scientific grounds.

5.7 \textbf{Linkages to the Madrid Action Plan (MAP)}

The International Conference on Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services, was organized by WMO in Madrid, Spain in 2007. The purpose of the Conference included, among others, fostering increased awareness in both the current and potential user communities of the availability and value of the full range of existing, new and improved services; and initiating and promoting new approaches to the evaluation of the social and economic benefits of meteorological and related services in the research, education and applications communities. The Conference reiterated that, among others, the role of NMHSs is to provide the information and services that enable governments and other stakeholders to minimize the costs of natural disasters, protect and strengthen the weather-, climate- and water-sensitive sectors of the economy and contribute to the health, welfare and quality of life of the public. The result of the Conference, known as the Madrid Action Plan\textsuperscript{25} clearly recognizes the need to be able to quantify the benefits within the various socio-economic sectors supported by NMHSs with the goal of strengthening their service delivery capacity.

6. \textbf{CLOSING COMMENTS}

The mainstreaming of “The WMO Strategy for Service Delivery” Implementation Plan represents an important milestone in strengthening the service orientation of NMHSs. The Plan describes practices that can strengthen service delivery across the entire WMO by providing a flexible methodology that is useful to NMHSs in both developed and developing countries. It provides NMHS’s decision-makers with the tools required to fully understand the use of our services in the decision-making processes in various socio-economic sectors and make them fit for purpose whether they be for public good or commercial gain. The first steps require a commitment from Members to evaluate their current level of service, to adapt the Plan to their needs and to interact closely with each other, their regional association and relevant WMO technical commissions as a part of an overall quality management system.

\textsuperscript{23} \url{http://www.wmo.int/pages/prog/dra/CDS.html}
\textsuperscript{24} \url{http://www.wmo.int/pages/prog/dra/linkedfiles/2011ECWG-CDd05.2.3GuideOutlinev16.docx}
\textsuperscript{25} \url{http://www.wmo.int/pages/themes/wmoprod/documents/madrid07_ActionPlan_web_E.pdf}
On behalf of the WMO Executive Council Working Group on Service Delivery, we trust you will find the Implementation Plan both informative and useful to furthering your national goals. The Working Group commits to help facilitate its implementation and monitor its progress to measure progress to higher levels of service over the next two to ten years. Raising the standards of service delivery to our users is a vital ingredient to the success of Members as service providers to enhance the visibility of NMHSs and attract new resources to strengthen our capacity.
APPENDIX 1: SERVICE DELIVERY PROGRESS MODEL (SDPM)

This model can serve both as a tool for assessing the level of development of NMHSs and also for developing an action plan for improving service delivery.

<table>
<thead>
<tr>
<th>Elements from the Strategy</th>
<th>Undeveloped</th>
<th>Development Initiated</th>
<th>Development in Progress</th>
<th>Developed</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Evaluate user needs and decisions.</td>
<td>No knowledge of the users or their requirements for products or services.</td>
<td>Users are known, but no process for user engagement exists. User requirements for service delivery are not well defined.</td>
<td>Users are able to contact NMHSs and their feedback is recorded. There are some formal processes for using the feedback received in development of services. User requirements are defined with limited documentation.</td>
<td>NMHSs seek input on an ad hoc basis from users to inform development of services. Requirements are defined in documents agreed with the customer, but are not routinely updated.</td>
<td>A consistent ongoing dialogue is maintained with users in respect of their needs and the services they receive. Requirements are defined in documents agreed with the customer and routinely updated using feedback from users.</td>
</tr>
</tbody>
</table>

The answers to the following questions will allow NMHSs to assess where their current service delivery processes lie on the SDPM.
<table>
<thead>
<tr>
<th>Q1a</th>
<th>Elements from the Strategy</th>
<th>Undeveloped</th>
<th>Development Initiated</th>
<th>Development in Progress</th>
<th>Developed</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Who are the users of the products and services you deliver?</td>
<td>There is no knowledge of the users of the service and products.</td>
<td>Some or all of the users are known, but this information is not captured in a formal document</td>
<td>A Memorandum of Understanding (MOU), Customer Supplier Agreement (CSA) or Service Level Agreement (SLA) is in place with some users, but is often incomplete or out of date, and, as a consequence, it is unlikely to be utilized.</td>
<td>An MOU, CSA or SLA is in place for each user but is not routinely assessed and updated.</td>
<td>An MOU, CSA or SLA is in place for each user and is routinely assessed and updated as necessary to ensure it contains current information. The information contained in the document is used to inform the development of products and services.</td>
</tr>
</tbody>
</table>

| Q1b | What processes do you have in place for engaging with your users? | There are no processes in place for engaging with users. | No proactive engagement with users. Users are able to contact NMHSs on an ad hoc basis, but no formal record of this contact is kept and action is rarely taken as a result. | Irregular proactive engagement is undertaken, which can be in the form of surveys or user workshops. | Regular workshops or other similar mechanisms are used to gain feedback from users on how services can be improved. A user feedback log is maintained and action to improve service delivery is taken. | A range of mechanisms is used that are appropriate to the user community. Outcomes are communicated back to the users. |

<p>| Q1c | How do your users contact you? | There is no mechanism for contact with users. | Mechanisms for user contact are in place, but are unreliable e.g., poor Internet access results in e-mails regularly going unanswered. | Users are able to contact NMHSs using a variety of means e.g., e-mail, telephone and post. Users are encouraged to contact the NMHSs through a variety of means. User contact is managed on an ad hoc basis. | User contact is managed by a designated individual or team. |</p>
<table>
<thead>
<tr>
<th>Elements from the Strategy</th>
<th>Undeveloped</th>
<th>Development Initiated</th>
<th>Development in Progress</th>
<th>Developed</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1d: How are user requirements gathered and documented to inform products and services?</td>
<td>User requirements have not been captured and documented.</td>
<td>There is an understanding of users needs, but these are not described in the form of user requirements and with little detail.</td>
<td>Outline user requirements have been captured but documentation is limited.</td>
<td>Requirements are defined in documents agreed with the customer, but are not routinely updated.</td>
<td>Requirements are defined in documents agreed with the customer and routinely updated using feedback from users.</td>
</tr>
<tr>
<td>2: Link service development and delivery to user needs.</td>
<td>No concept of service, just products issued.</td>
<td>Services do not respond to changing user needs and new technology. Products are documented with limited descriptive information.</td>
<td>Services are developed and changed as technology allows, but engagement of users is ad hoc. Products and services are documented and this information is used to inform management of changes.</td>
<td>User feedback is used to inform changes and developments to services. Products and services are consistently documented. SLAs are defined.</td>
<td>Users are consulted to inform development of products and services. The service defined in the SLA is agreed with the Customer based on User consultation.</td>
</tr>
</tbody>
</table>

The answers to the following questions will allow NMSs to assess where their current service delivery processes lie on the SDPM:

<p>| Q2a: What documentation do you maintain to define the products and services you deliver? | There is no documentation related to products or services. | Some information has been captured for a small number of services and products in a document such as Work Instruction or SLA, but this is not routinely updated. | Information has been captured for a small number of services and products in a document such as Work Instruction or SLA and these are routinely updated. | Information has been captured for most services and products in a document such as Work Instruction or SLA and these are routinely updated. | All products and services are described in documents such as Work Instructions and SLAs and these are routinely updated. |</p>
<table>
<thead>
<tr>
<th>Q2b</th>
<th>How are users kept informed when products and services are changed?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>There is no mechanism for informing users when products and services are changed.</td>
</tr>
<tr>
<td></td>
<td>Some users are informed ahead of time on an ad hoc basis when products and services are changed.</td>
</tr>
<tr>
<td></td>
<td>All users are informed when the products and services they receive are changed.</td>
</tr>
<tr>
<td></td>
<td>A formal process is followed to ensure that users are well prepared for any changes to services and products they receive.</td>
</tr>
<tr>
<td></td>
<td>Users are involved in identifying new requirements and making changes to products and services and new technologies are considered when changes are planned.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q3a</th>
<th>How do you verify the accuracy, quality and, effectiveness of the products and services you deliver to users?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>There are no measures of the accuracy, quality or effectiveness of the products and services delivered.</td>
</tr>
<tr>
<td></td>
<td>Some measures are used in an ad hoc manner to determine the accuracy and timeliness of products and services.</td>
</tr>
<tr>
<td></td>
<td>Some measures are used for verifying accuracy and quality of service delivery routinely.</td>
</tr>
<tr>
<td></td>
<td>Measures are used for accuracy, quality of service delivery and effectiveness based on user requirements.</td>
</tr>
<tr>
<td></td>
<td>Measures are routinely reviewed to reflect changes to user needs.</td>
</tr>
<tr>
<td></td>
<td>The SLA is updated in line with changes.</td>
</tr>
</tbody>
</table>

The answers to the following questions will allow NMSs to assess where their current service delivery processes lie on the SDPM.
<table>
<thead>
<tr>
<th>Elements from the Strategy</th>
<th>Undeveloped</th>
<th>Development Initiated</th>
<th>Development in Progress</th>
<th>Developed</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3b How are the outcomes of the verification of accuracy, quality and effectiveness and service delivery quality used to improve the products and services you deliver to your users?</td>
<td>There are no outcomes as there are no measures.</td>
<td>Some outcomes are recorded in an ad hoc manner or for internal purposes and may be used to improve some of the products and services delivered.</td>
<td>Outcomes are routinely recorded for some products and services and some analysis is undertaken.</td>
<td>Analysis of the outcomes is used to identify areas for improvement; actions are undertaken in an ad-hoc manner.</td>
<td>Areas for improvement are documented and actions undertaken routinely. Plans are produced and progress against targets is monitored routinely.</td>
</tr>
<tr>
<td>4 Sustain improved service delivery.</td>
<td>No concept of service delivery principles.</td>
<td>The concept of service delivery has been introduced and an assessment of current status has been undertaken.</td>
<td>An Action Plan has been created to improve the level of current service delivery and resources have been identified to implement it.</td>
<td>The Action Plan is being implemented to improve service delivery; the outcomes are being monitored.</td>
<td>The status of service delivery is reviewed on a regular basis. The Action Plan evolves in response to the outcome of the reviews.</td>
</tr>
</tbody>
</table>

The answers to the following questions will allow NMSs to assess where their current service delivery processes lie on the SDPM

<p>| Q4a Have you documented your service delivery processes? | No documentation to describe the service delivery process exists. | Some documentation to describe service delivery processes exists, but not in the format of a QMS. | A QMS exists for most service delivery processes. Monitoring of compliance is ad hoc. | A QMS exists to cover all service delivery processes and compliance is monitored. Some actions are undertaken to improve processes. | A QMS exists and a process for continual improvement is undertaken that includes input of feedback from staff, customers and users. |</p>
<table>
<thead>
<tr>
<th>Elements from the Strategy</th>
<th>Undeveloped</th>
<th>Development Initiated</th>
<th>Development in Progress</th>
<th>Developed</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q4b How do you use developments in science and technology to improve service delivery?</td>
<td>Developments in science and technology are not reviewed.</td>
<td>Some developments in science and technology are identified but no plans exist to utilize them.</td>
<td>Developments in science and technology are identified with some plans in place to utilize them.</td>
<td>Plans are routinely updated to benefit from developments in science and technology.</td>
<td>Developments in science and technology are embraced and plans are in place to maximize benefit from them.</td>
</tr>
<tr>
<td>Q4c How do you communicate changes in your service delivery process to your customers and users?</td>
<td>Changes are not communicated to customers or users.</td>
<td>Some changes are communicated but with some consideration of impacts on customers or users.</td>
<td>All changes in service delivery are communicated to customers or users as appropriate.</td>
<td>A formal communication process is followed to ensure that customers and users are well prepared for any changes in service delivery.</td>
<td>Customers and users routinely contribute to developing service delivery processes and the subsequent communication of changes.</td>
</tr>
<tr>
<td>5 Develop skills needed to sustain service delivery.</td>
<td>No concept or communication of service delivery principles.</td>
<td>No formal service delivery training in place, though informal communication of service delivery principles exists.</td>
<td>Most members of NMHSs are aware of the importance of service delivery. Some formal training is provided.</td>
<td>All members of staff are fully aware. Formal training is provided. There is an ad-hoc process for staff to provide ideas for improvements to service delivery.</td>
<td>There is a culture of providing best possible service delivery. Innovative ideas form a routine input to the Continual Service Improvement process.</td>
</tr>
</tbody>
</table>

The answers to the following questions will allow NMSs to assess where their current service delivery processes lie on the SDPM
<table>
<thead>
<tr>
<th>Q5a</th>
<th>Who is the Service Delivery Champion within your NMS?</th>
<th>Undeveloped</th>
<th>Development Initiated</th>
<th>Development in Progress</th>
<th>Developed</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>There is no Service Delivery Champion within the NMS.</td>
<td></td>
<td>The process of identifying a Service Delivery Champion has been started but is not yet complete.</td>
<td>A Service Delivery Champion has been identified but does not have appropriate support from all levels of the NMS to deliver improvements to Service Delivery.</td>
<td>A Service Delivery Champion has been identified but does not have all the appropriate resources to deliver improvements.</td>
<td>A Service Delivery Champion at an appropriately senior level has been given the training, resourcing and mandate to deliver improvements in service delivery.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q5b</th>
<th>What mechanisms are in place to enable your staff to be educated in the principles of service delivery?</th>
<th>Undeveloped</th>
<th>Development Initiated</th>
<th>Development in Progress</th>
<th>Developed</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>There are no mechanisms in place.</td>
<td></td>
<td>Informal communication of service delivery principles takes place between staff and management.</td>
<td>Mechanisms such as training workshops are regularly carried out for all staff and management. Available material on the subject is used.</td>
<td>Regular communication and training, which has been built on available material, occurs for all staff and management.</td>
<td>Ongoing training is carried out for all staff and there is regular communication between all levels of staff and management regarding service delivery.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q5c</th>
<th>What mechanisms are in place for documenting the roles of staff and their individual training requirements?</th>
<th>Undeveloped</th>
<th>Development Initiated</th>
<th>Development in Progress</th>
<th>Developed</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Staff have no documented Job Description or training plan.</td>
<td></td>
<td>Most staff have a Job Description but there is no correlation between them.</td>
<td>All staff have a Job Description that is coherent and consistent across the NMS.</td>
<td>Staff are reviewed against their Job Descriptions and areas for development are identified. Individual training plans are created based on development needs.</td>
<td>Training plans are reviewed to identify NMHSs' training requirements. Training is delivered using a variety of methods.</td>
</tr>
<tr>
<td>Elements from the Strategy</td>
<td>Undeveloped</td>
<td>Development Initiated</td>
<td>Development in Progress</td>
<td>Developed</td>
<td>Advanced</td>
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<td></td>
</tr>
<tr>
<td>Q5d How do you engage staff in improving service delivery?</td>
<td>There is no mechanism for staff to provide suggestions on how to improve service delivery.</td>
<td>An informal process for staff suggestions exists but is rarely used.</td>
<td>A process for staff suggestions exists; implementation of suggestions is ad-hoc.</td>
<td>Staff suggestions are encouraged and implemented as appropriate. Improvements to service delivery are communicated internally.</td>
<td>Staff suggestions are considered at a senior level and implemented as appropriate. Feedback is provided to staff on the impact of their suggestions.</td>
<td></td>
</tr>
<tr>
<td>6 Share best practices and knowledge</td>
<td>This activity is a key function of the WMO Secretariat Programmes that have a role in service delivery with assistance from the Education and Training Programme. NMHSs are encouraged to share best practice in service delivery, through formal training, twinning and mentoring etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 2: ACTING ON THE STRATEGY ELEMENTS

For each of the six elements of the Strategy, there will be actions that can be taken to improve levels of service delivery enabling the service provider to advance through the levels of the SDPM. Some of these actions are described in the following paragraphs, with greater detail provided in the SDPM.

**Strategy Element 1 – Evaluate User Needs and Decisions** recognizes that as the first step in the process of service delivery, it is vital to know the users of meteorological and hydrological products or services and their decision-making and planning processes in relation to those products and services. Getting to know the user will very much depend on the category of the user and different methods will need to be applied in the case of each category. The media and disaster management as well as humanitarian organizations can be defined as both users of the service and partners of NMHSs in the delivery of the service to other end users and decision-makers. Socio-economic sectors such as agriculture, health, energy, transport and tourism form a different group of users who may be using NMHSs’ service and products to provide services either as public good to the end users or as part of a commercial arrangement. The most diverse user group is the public. Surveys are most appropriate for gathering information on the requirements of the public as a major user group. While surveys may also initially be used in the case of other user categories, they may be followed by more in-depth workshops or interviews with individual users in those categories. Having established the different categories of users of NMHSs’ products and services, there must be an open and honest dialogue with them, so that there is a clear understanding of their requirements for meteorological and hydrological products and services, NMHSs’ capability to provide them, means of delivery, the way in which the services will be used, costs (if applicable), etc. This Implementation Plan will clearly define for each level of the SDPM, the service to be provided, as well as how it is provided and monitored. In the case of well-defined and well-structured user groups, the development of a Memorandum of Understanding (MOU), Customer Supplier Agreement (CSA) or Service Level Agreement (SLA) is a key activity in service delivery. Regular meetings with the users are essential to ensure that issues with service delivery are resolved and that changing requirements and capability are understood. In the case of the public where services clearly take the form of public good, undertaking such formal agreements with individual members of the public is not possible. However, in some countries, the requirements of the public may be represented through an organization or representative body. Where this is not the case, different channels such as regular surveys, web feedback and social media should be used for gathering information from the public on their requirements, level of satisfaction with the services of NMHSs and areas where action is needed to improve service delivery.

**Strategy Element 2 – Link Service Development and Delivery to User Needs** recognizes that users should be able to see that a service has been developed and delivered with their particular needs in mind, rather than being provided with a generic product, or one developed for another purpose. It is important that the user/customer is fully aware of the capabilities of the NMS, so that there are not unrealistic expectations over what products and service can be provided. A number of documents can be used to assist with the implementation of this element. For example, a Product Catalogue will define the range of data, products and services delivered by NMHSs and a Process Description Document can be used to ensure that an individual service fits into NMHSs’ process for supporting service delivery. A Work Instruction will ensure that all those involved in producing the product or service are aware of precisely what is required to

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27 Same as above
28 Same as above
29 Same as above
30 For definition see Appendix 3 – Glossary.
31 Same as above
ensure a consistent and branded output. In addition, risk assessment should be carried out to ensure that the risks preventing quality and reliable service development and delivery could be identified and properly managed.

**Strategy Element 3 – Evaluate and Monitor Service Performance and Outcomes** requires NMHSs to monitor a number of metrics related to the services they provide. These include: accuracy, timeliness, responses to issues raised by the user and user/customer satisfaction. However, it is important that the metrics are agreed with the user and customer and that regular reports are provided on the end-to-end performance of the services. These metrics play an important role in identifying areas where the product or service can be improved. A number of forms and documents will be required to effectively implement this strategy element. For example, a Feedback Log to track feedback from users, an Action Tracker to ensure that agreed actions are implemented and documents to define and report on verification statistics. Descriptions of these documents and links to templates to enable staff from NMHSs to create them are provided in Appendix 4.32

**Strategy Element 4 – Sustain Improved Service Delivery** recognizes that user needs evolve and NMHSs’ capability will change as scientific developments are implemented and technology changes. The constant dialogue with the user that is required as part of Strategy Element 1 will ensure that these changes are identified and that the benefits of the improvements are delivered to the user. The MOU, CSA or SLA is not a static document, but should be reviewed and updated as the user’s need evolves, in agreement with the user/customer. By sustaining improved service delivery NMHSs will also improve their standing and reputation which helps support their role as the authoritative body for the provision of meteorological and hydrological services with particular emphasis on services for public good. The Process Description Template can be used to show how Strategy Element 4 fits into NMHSs’ overall process for service delivery.

**Strategy Element 5 – Develop Skills Needed to Sustain Service Delivery** recognizes that new or improved skills to effectively communicate and interact with users and customers may be required to implement the Strategy. While technical knowledge and capabilities to develop products and services are needed, other skills such as communication, presentation, consultation with and analyzing user/customer needs will also be required, which may not have been the traditional areas of development for staff in NMHSs. These new skills required by staff working in service delivery should be clearly defined in required competencies as part of their Job Description. The WMO Public Weather Services Programme has developed competency requirements for NMHSs staff working in product and service development and delivery (see reference 4). A gap analysis of existing competencies should be used to identify training needs, leading to the development of standard training modules to ensure that all staff has the opportunity to learn and develop these skills.

**Strategy Element 6 – Share Best Practices and Knowledge**, recognizes the excellent work done by WMO in the past in ensuring that best practice and knowledge are transferred throughout NMHSs and it is essential that this continues. Twinning arrangements and mentoring between developed and less developed NMHSs to foster the exchange of experiences, technical know-how, best practice models and guidance, are highly encouraged to improve service delivery. Such arrangements can be facilitated by the Secretariat.

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## APPENDIX 3: GLOSSARY

These definitions are based on ITIL standards related to IT Service Management. Further information on these standards can be located at the following Website: [http://www.itil-officialsite.com/](http://www.itil-officialsite.com/)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>The degree to which a forecast parameter matches the observed value (e.g. on 9 days out of 10, the forecast maximum temperature issued at mid-day the previous day was within the agreed target compared to the observed maximum temperature on the following day. This gives a measure of accuracy of ( \frac{9}{10} \times 100 = 90% )).</td>
</tr>
<tr>
<td>Commercial service</td>
<td>A product or service provided to a customer on a fee-paying basis. Normally the price of the product or service will be determined by the cost of producing it plus an element of profit.</td>
</tr>
<tr>
<td>Compliance</td>
<td>Adherence to standards, regulations and other requirements.</td>
</tr>
<tr>
<td>Component</td>
<td>A part of a product, for example in the form of a graph, data or text.</td>
</tr>
<tr>
<td>Customer</td>
<td>The person or organization which pays for products and services and agrees the specification for delivery through the Customer Supplier Agreement (CSA) or Service Level Agreement (SLA). The Customer may or may not be the User.</td>
</tr>
<tr>
<td>Customer Supplier Agreement (CSA)</td>
<td>A legal document defining the services or products to be delivered by one party to another. Roughly analogous to a contract, but customarily made use of between different parts of government.</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>The degree to which the service or product benefits the user. This measure tries to capture the actions taken by users as a result of the service they have received and consequently the tangible benefit of that service or product.</td>
</tr>
<tr>
<td>Fit for Purpose</td>
<td>The product or service should be suitable for the intended purpose. This is one of two commonly recognized principles of quality assurance according to the journal “Quality Engineering”.</td>
</tr>
<tr>
<td>Memorandum of Understanding (MOU)</td>
<td>A document outlining the responsibilities of different parties in respect to a service or relationship where a formal contractual agreement cannot be entered in to.</td>
</tr>
<tr>
<td>On Time In Full (OTIF) Score</td>
<td>A measurement of delivery performance in a supply chain and looks at deliveries from the point of view of the customer. It measures how often the customer gets what they want at the time they want it.</td>
</tr>
<tr>
<td>Process Description Document</td>
<td>A document that forms part of the QMS documentation library. In the context of the Strategy it describes the process of service delivery within a National Meteorological or Hydrometeorological Service (NMS).</td>
</tr>
<tr>
<td>Product</td>
<td>Output, such as observations, datasets or information that is created by an analysis or forecast process, which the users will base their actions upon.</td>
</tr>
<tr>
<td>Production Unit</td>
<td>The group responsible for creation of the products delivered as part of the service.</td>
</tr>
<tr>
<td>Quality</td>
<td>A measure to indicate to what extent a set of intrinsic characteristics of a product or service meets customer requirements.</td>
</tr>
<tr>
<td><strong>Service</strong></td>
<td>A product that is delivered, including the activities associated with the people, process and Information Technology required to deliver it, or activity that is carried out (advice, interpretation, etc.) that meets the needs of the user or can be applied by a user.</td>
</tr>
<tr>
<td><strong>Service Delivery</strong></td>
<td>A continuous process for developing and delivering user-focused services, defined by user engagement, service design and development, delivery and evaluation and improvement.</td>
</tr>
<tr>
<td><strong>Service Delivery Champion</strong></td>
<td>An individual at an appropriately senior level who is responsible for improvements in service delivery. This individual will require the support of senior management, along with adequate training and resourcing, in order to deliver and sustain these improvements.</td>
</tr>
<tr>
<td><strong>Service Level Agreement (SLA)</strong></td>
<td>A non-technical document agreed between the provider of a product or service and the customer defining exactly what is required from both parties.</td>
</tr>
<tr>
<td><strong>Service Priority</strong></td>
<td>This can be described in different ways and with different definitions for the level of priority, with the normal being High, Medium or Low. An example of High priority would be those products that are used to minimize risk to life and limb.</td>
</tr>
<tr>
<td><strong>Technical Support Group</strong></td>
<td>The Technical Support Group is responsible for ensuring that the equipment such as the Information Technology and communication networks required to support service delivery is available to meet the SLA. Within a support group there may be different levels of support: 1st Line - initial support level responsible for developing user issues act as the users’ first point of contact. 2nd Line - more in depth technical support to assist in resolving issues that cannot be resolved by 1st Line. 3rd Line - expert support level, undertaking more in depth analysis to resolve problems that cannot be resolved by 1st or 2nd Line support.</td>
</tr>
<tr>
<td><strong>Timeliness</strong></td>
<td>A measure of the ability to have delivered the product by the time agreed with the Customer in the SLA, this should take account of the delivery time from provider to user. It is unreasonable to expect the provider to be accountable for any breakdowns of the infrastructure required to deliver the product that is outside of the NMHSs’ responsibility.</td>
</tr>
<tr>
<td><strong>User</strong></td>
<td>The individual, organization or intermediary who receives the product and service and takes action based on it. In the context of the PWS, members of the public will ideally have their needs considered by an organization or representative body, although in reality this is often done in an ad hoc manner based on different methods of information gathering such as surveys, or focus groups, with little direct contact with individual members of the public.</td>
</tr>
<tr>
<td><strong>Work Instruction</strong></td>
<td>A document provided to the individual producing the product or service, defining exactly what is required by the user (see template provided in Appendix 4)⁴³.</td>
</tr>
</tbody>
</table>

Resolution 5 (EC-65)

REPORT OF THE FIFTEENTH SESSION OF THE COMMISSION FOR BASIC SYSTEMS
CONCERNING THE GLOBAL DATA-PROCESSING AND FORECASTING SYSTEM AND
EMERGENCY RESPONSE ACTIVITIES

THE EXECUTIVE COUNCIL,

Having considered the Abridged Final Report with Resolutions and Recommendations of the
Fifteenth Session of the Commission for Basic Systems (WMO-No. 1101), concerning the Global
Data-processing and Forecasting System (GDPFS) and Emergency Response Activities (ERA),

Noting Recommendation 12 (CBS-15) – Establishment of the Severe Weather Forecasting
Development Project Office, and Recommendation 13 (CBS-15) – Amendments to the Manual on
the Global Data-processing and Forecasting System (WMO-No. 485),

Decides on each of the recommendations as follows:

(1) Endorses the establishment of the Severe Weather Forecasting Demonstration Project
(SWFDP) Office, with the terms of reference provided in Annex 1 to the present resolution;

(2) Approves the amendments to the Manual on the Global Data-processing and Forecasting
System (WMO-No. 485), as given in Annex 2 to the present resolution, and authorizes the
Secretary-General, in consultation with the president of the Commission for Basic Systems,
to make any necessary editorial amendments to the Manual;

Requests the Secretary-General:

(1) To make the appropriate arrangements for the establishment of the SWFDP Office within the
Secretariat, including the Trust Fund for the SWFDP;

(2) To incorporate the amendments in the Manual on the Global Data-processing and
Forecasting System (WMO-No. 485);

Requests its Working Group on Service Delivery to continue to guide the cross-programmatic
integration in SWFDP, including engagement of users and addressing regional needs and
sustainable transition of SWFDP outcomes to operations.

Annex 1 to Resolution 5 (EC-65)

TERMS OF REFERENCE OF THE SEVERE WEATHER FORECASTING DEMONSTRATION
PROJECT OFFICE

The Severe Weather Forecasting Demonstration Project (SWFDP) Office should be established
under the leadership of the Global Data-processing and Forecasting System (GDPFS), in
collaboration with the Public Weather Services Programme and with the cooperation of other
relevant WMO Programmes, such as the Tropical Cyclone Programme, the WMO Satellite
Programme and the Education and Training Programme, and of technical commissions. At least
1.5 professional and 0.5 administrative staff should be recruited for the SWFDP Office, to work with
the two full-time professional staff and one full-time administrative assistant provided from the
WMO regular budget (2012–2015). The SWFDP Office should have the following functions:
(a) Work with the WMO Resource Mobilization Office to secure long-term sustainable funding and to manage the effective use of funds so as to ensure the sustainability of regional projects;

(b) Assist where necessary in the establishment of funding mechanisms to enable the regional and global centres to transfer their contributions from short-term demonstration to long-term sustainable services;

(c) Organize training-of-trainer workshops to support the regions in providing up-to-date training;

(d) Plan and implement specific training and development activities in support of developing and least developed countries;

(e) Administer, manage and track the implementation of existing and the initiation of new regional projects, and provide such support as is required for regional projects to progress through to Phase 4 (Continuing Development Phase), including full transfer of the regional project management to the regional level;

(f) Provide technical support in the development of regional and national SWFDP implementation plans;

(g) Manage and coordinate the cross-programme links of the SWFDP with other WMO Programmes and technical commissions, and promote the broadening of the SWFDP model to other timescales in support of developing seamless regional early warning systems;

(h) Provide technical support to, and facilitate the activities of, the Steering Group for the Severe Weather Forecasting Demonstration Project and the Regional Project Management Teams of each SWFDP region.

Annex 2 to Resolution 5 (EC-65)

AMENDMENTS TO THE MANUAL ON THE GLOBAL DATA-PROCESSING AND FORECASTING SYSTEM (WMO- No. 485), VOLUME I

(Updates to the Manual are in shaded text and deleted parts are crossed out)

The proposed amendments to the Manual on the GDPFS, relate to:

(a) New procedures for the designation of Centres related to Atmospheric Sand and Dust storm Forecasts (ASDF): amendments to Volume I, Part I, paragraph 4.1.2.2; Part I, Appendix I-1; Part II, paragraph 1.4.1.2; and new Appendix II-12;

(b) The standard verification of deterministic NWP products: amendments to Volume I, Part II, Attachment II.7, Table F;

(c) The designation of RCCs and RCC Networks: amendments to Volume I, Part I, Appendix I-1; and Volume II, Region VI (Europe), Part I, new paragraph 4.6; and new Attachment IV.

Volume I, PART I
4.1.2.2  Centres with activity specialization

The functions of RSMCs with activity specialization shall include, inter alia:

[...]

(c) Providing tailored specialized products to service users in a particular area, including atmospheric sand and dust storm forecasts:
(d) Providing trajectories and atmospheric transport modelling products, including backtracking, in case of environmental emergencies or other incidents;

Volume I, PART I, APPENDIX I-1
3. The RSMCs with activity specialization are the following:

RSMC European Centre for Medium-Range Weather Forecasts (RSMC ECMWF)

Provision of Atmospheric Sand and Dust storm Forecasts:
RSMC-ASDF Barcelona

Provision of atmospheric transport modelling (for environmental emergency response and/or backtracking):

Volume I, PART II
1.4.1.2 Regional Specialized Meteorological Centres (RSMCs) with activity specialization
A Regional Specialized Meteorological Centre (RSMC) with activity specialization shall be designated, subject to the formal commitment by a Member or group of cooperating Members, to fulfill the required functions of the centre and meet the requirements for the provision of WWW products and services initiated and endorsed by the relevant WMO constituent body or bodies concerned. The centre should be capable of preparing independently or with the support of WMCs, and where appropriate, other GDPFS centres and disseminating to Members concerned:

(e) Atmospheric sand and dust storm forecasts in a particular geographical region;
NOTE: Centres producing regional atmospheric sand and dust storm forecasts and services, which are recognized as such by CBS following the guidance by CAS and at the request of the regional association(s) concerned, are called RSMC for Atmospheric Sand and Dust storm Forecasts (RSMC-ASDF). The definition and the list of designated RSMC-ASDF, mandatory functions of and criteria to be recognized as an RSMC-ASDF are given in Appendix II-12.

(e) Regional LRF products, climate monitoring products, climate watches, drought monitoring products, climate data services, and tailored climate products.

Volume I, PART II, New Attachment II-12

Volume I, APPENDIX II-12

DESIGNATION AND MANDATORY FUNCTIONS OF REGIONAL SPECIALIZED METEOROLOGICAL CENTRES WITH ACTIVITY SPECIALIZATION IN ATMOSPHERIC SAND AND DUST STORM FORECASTS

The mandatory function of the Regional Specialized Meteorological Centre(s) with activity specialization in Atmospheric Sand and Dust storm Forecasts (RSMC-ASDF) include creating, developing and maintaining a web portal to display forecast products as well as additional information, including a system to collect users' feedback. The goal is to provide guidance on the risk of sand and dust storm occurrence within an identified geographical domain of responsibility, and help the NMHSs concerned improve their warning services to the national authorities.
RSMC-ASDF are recognized as such by CBS following the guidance by CAS and at the request of the regional association(s) concerned, including for sensitive areas whose boundaries extend beyond or are outside those of a single regional association.

Designated RSMCs for the provision of Sand and Dust storm Forecasts, including their geographical region of responsibility, are:
RSMC-ASDF ‘CITYNAME’ (geographical area)

The RSMC-ASDF shall:

Real-time functions
- Prepare regional forecast fields using a dust forecast model continuously throughout the year on a daily basis. The model shall consist of a numerical weather prediction model incorporating on-line parameterizations of all the major phases of the atmospheric dust cycle.
- Generate forecasts, with an appropriate uncertainty information statement, of the following minimum set of variables:
  o Dust load (kg•m⁻²)
  o Dust concentration at the surface (µg•m⁻³)
  o Dust optical depth at 550 nm (-)
  o 3-hour accumulated dry and wet deposition (kg•m⁻²)
Forecasts shall cover the period from the starting forecast time (00 and/or 12 UTC) up to a forecast time of at least 72 hours, with an output frequency of at least 3 hours. They shall cover the whole designated area. The horizontal resolution shall be finer than about 0.5x0.5 degrees.
- Disseminate through the GTS/WIS and provide on its web portal the forecast products in pictorial form not later than 12 hours after the starting forecast time.
- Issue an explanatory note on the web portal when operations are stopped due to technical problems.

Non-real-time functions
- Store the generated products in WMO GRIB format.
- Maintain the web portal built to display forecast products as well as additional information.
- Perform seasonal and annual forecast evaluation based on available observational data.
- Issue annual activity reports.
- Support user training courses.
- Provide information on methodologies and product specifications and the guidance on their use.

Volume I, Part II, Attachment II.7, Table F

I – STANDARDIZED VERIFICATION OF DETERMINISTIC NWP PRODUCTS

[...]

3. Parameters

Extra-tropics
Mandatory
- Mean sea-level pressure (verification against analysis only)

[...]

[...]
6.2 Areas

[...]

Australia/New Zealand 10°S–55°S 90°E–180°E
Northern polar region 90°N - 60°N, inclusive, all longitudes
Southern polar region 90°S - 60°S, inclusive, all longitudes

Verification against analyses for grid points within each area, including points on the boundary.

7. Verification against observations

7.1 Observations

All parameters listed defined in section 3, except mean sea-level pressure, shall be verified against a common set of radiosondes. [...]

7.3 Areas

[...]

Australia/New Zealand 10°S–55°S 90°E–180°E
Northern polar region 90°N - 60°N, inclusive, all longitudes
Southern polar region 90°S - 60°S, inclusive, all longitudes

[...]

8. Scores

The following scores are to be calculated for all parameters against both analysis (except mean sea-level pressure) and observation.

Wind

Mandatory:
- rms vector wind error
- mean error of wind speed

Other parameters:

Mandatory
- [...]  
- S1 score (only for MSLP and only against analysis)

Additional recommended
- mean absolute error
- rms forecast and analysis anomalies (not required for observations)
- standard deviation of forecast and analysis fields (not required for observations)

[...]

Volume I, Part I, Appendix I-1

[...]

Regional Climate Centres providing regional long-range forecasts and other regional climate services:
1. A multifunctional centre that fulfils all the required functions of an RCC for the entire region, or for a sub-region to be defined by the regional association, may be designated by WMO as a WMO Regional Climate Centre (RCC). A group of centres performing climate-related activities that collectively fulfil all the required functions of an RCC may be designated by WMO as a WMO Regional Climate Centre Network (RCC Network). Each centre(s) in a designated RCC Network that is charged with a specific function will be referred to as a “node”. The functions of a node may be shared among several partners. Each node can be supported by contributing centres that provide regional and/or sub-regional products as agreed within their regional association.

3. Designated Regional Climate Centres and RCC Networks are as follows:

- RCC Beijing (RA II)
- RCC Tokyo (RA II)
- RCC Moscow (RA II)
- RCC Network (RA VI)
  - AE De Bilt Node on Climate Data Services
  - Offenbach Node on Climate Monitoring
  - Toulouse and Moscow Node on Long-range Forecasting

Volume II, Region VI, Part I, New Paragraph 4.6

[...] 4.6 Regional Long-range Forecasting, Climate Monitoring, and Climate Data Services

The regional structure of the RA VI RCC Network is given in Attachment IV.

NOTE: The list of mandatory functions of RCC Networks can be found in Volume I, Part II, Appendix II-10.

Volume II, Region VI, New Attachment IV

**STRUCTURE OF THE RA VI RCC NETWORK**

RA VI RCC Network consists of three nodes: (i) Climate Data Services led by KNMI, Netherlands; (ii) Climate Monitoring led by DWD, Germany; and (iii) Long-range Forecasting jointly led by Météo-France and ROSHYDROMET, Russian Federation. These lead centres have full responsibilities to satisfy the mandatory functions of RCC Network, with the support of the following contributing NMHSs:

- RA VI RCC node on Climate Data Services:
  - KNMI/ The Netherlands (lead), Météo-France/ France, OMSZ/ Hungary, met.no/ Norway, RHMS/ Serbia, SMHI/ Sweden, TSMS/ Turkey

1 North Eurasian Climate Centre (NEACC).
RA VI RCC node on Climate Monitoring:
DWD/Germany (lead), Armstatehydromet/ Armenia, Météo-France/ France, KNMI/ The Netherlands, RHMS/Serbia, TSMS/ Turkey

RA VI RCC node on Long-range Forecasting:
Météo-France/ France and ROSHYDROMET/ Russian Federation (joint lead), met.no/ Norway, RHMS/ Serbia, TSMS/ Turkey.

Overall coordination:
The DWD/ Germany is responsible for the overall coordination of the WMO RA VI RCC Network.

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Resolution 6 (EC-65)

RESTRUCTURING OF THE WORLD CLIMATE PROGRAMME: INCLUSION OF THE PROGRAMME OF RESEARCH ON CLIMATE CHANGE VULNERABILITY, IMPACTS AND ADAPTATION AS AN ADDITIONAL COMPONENT

THE EXECUTIVE COUNCIL,

Noting:

(1) That the Sixteenth World Meteorological Congress, through Resolution 18 (Cg-XVI) – World Climate Programme, decided to structure the World Climate Programme (WCP) in close alignment with the Global Framework for Climate Services (GFCS) and thereby to include in it the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP) and a new World Climate Services Programme (WCSP),

(2) Resolution 2 (EC-LXIII) – Coordination of climate activities, concerning the need for coordination of WMO activities in climate matters and the membership of the Executive Council Working Group on Climate and Related Weather, Water and Environmental Matters (ECWG-CWE),

Noting further:

(1) That the Sixteenth Congress agreed to the request of the United Nations Environment Programme (UNEP) to formally close the World Climate Impacts and Response Strategies Programme (WCIRP), which was part of the erstwhile structure of WCP, and recommended to UNEP that relevant WCIRP activities be taken up within the UNEP Programme of Research on Climate Change Vulnerability, Impacts and Adaptation (PROVIA),

(2) That the Sixteenth Congress requested the Executive Council to assess and take a decision on the UNEP request to include PROVIA as a component of the WCP,

(3) That PROVIA has been assessed by the Executive Council at its sixty-fourth session and recognized as an appropriate programme to establish a firm link with the respective governance mechanism of the User Interface Platform of GFCS, the GCOS Steering Committee and the WCRP Joint Scientific Committee,

(4) That PROVIA has been recognized and encouraged by the UNEP Governing Council at its twenty-seventh session,
(5) The assessment by the ECWG-CWE of the proposal to include PROVIA as a component of WCP and its recommendations thereon,

Decides:

(1) That PROVIA be included as a component of the WCP, in addition to the existing three components GCOS, WCRP and WCSP;

(2) To invite the Chair of the Steering Committee of PROVIA to represent the Programme in the work of the ECWG-CWE on the WCP components;

Requests the Secretary-General to inform the UNEP Secretariat of this decision and help the four components of the WCP to interact with each other effectively and contribute to the GFCS implementation;

Invites the Executive Director of UNEP to facilitate WMO representation in the PROVIA Scientific Steering Committee and support PROVIA participation in the work of the ECWG-CWE.

Resolution 7 (EC-65)

REPORT OF THE FOURTEENTH SESSION OF THE COMMISSION FOR HYDROLOGY

THE EXECUTIVE COUNCIL,

Having considered the Abridged Final Report with Resolutions and Recommendations of the Fourteenth Session of the Commission for Hydrology (WMO-No. 1105),

Decides:

(1) To note the report;

(2) To note Resolutions 1 to 7 (CHy-14);

Requests the Secretary-General to bring the above decisions to the attention of all concerned.

Note: This resolution replaces Resolution 5 (EC-LXI), which is no longer in force.

Resolution 8 (EC-65)

WORLD HYDROLOGICAL CYCLE OBSERVING SYSTEM

THE EXECUTIVE COUNCIL,

Noting:

(1) Resolution 14 (Cg-XVI) – World Hydrological Cycle Observing System, requesting the Secretary-General to carry out an independent external evaluation of the World
Hydrological Cycle Observing System (WHYCOS) programme, as a follow-up to the one carried out in 2005,

(2) The Comprehensive Review of the World Hydrological Cycle Observing System prepared by the independent external experts and the recommendations therein,

(3) Resolution 4 (CHy-14) – World Hydrological Cycle Observing System, containing the responses prepared by the Commission for Hydrology to the recommendations of the external evaluation,

Recognizing:

(1) That WHYCOS has proven in the past decade a useful means to mobilize resources to support the strengthening of National Meteorological and Hydrological Services (NMHSs) and their regional cooperation,

(2) The positive impacts of implemented HYCOS components on the strengthening of technical and institutional capacities of National Hydrological Services (NHSs) in a number of countries, including improved international cooperation in transboundary and international rivers basins,

(3) The visibility earned by WMO in the field of water-related issues also thanks to WHYCOS,

Aware and concerned that shortcomings still exist in the implementation of WHYCOS, in particular with respect to the sustainability of the systems installed, which may affect both ongoing components and the potential to implement new ones,

Reaffirms the importance of WHYCOS as a priority activity within the WMO Hydrology and Water Resources Programme;

Notes:

(1) The responses to the recommendations formulated in the Comprehensive Review of the World Hydrological Cycle Observing System, as included in Annex 1 to the present resolution;

(2) The revised terms of reference and composition of WHYCOS International Advisory Group (WIAG) as contained in Annex 2 to the present resolution;

Requests the president of the Commission for Hydrology, as Chair of the WIAG, to oversee the adoption of the recommendations of the external evaluation, taking into consideration the Commission’s responses, as endorsed by the Executive Council.

Annex 1 to Resolution 8 (EC-65)

RESPONSES TO RECOMMENDATIONS FORMULATED IN THE COMPREHENSIVE REVIEW OF THE WORLD HYDROLOGICAL CYCLE OBSERVING SYSTEM

Recommendation 1
The concept of WHYCOS needs to further evolve to make operational, within its HYCOS components, institutional, organizational, and human resources capacity development to allow the attainment of sustainable outcomes and societal impacts.
Response: Agreed.

Recommendation 2
The concept of WHYCOS and its HYCOS components be designed to give adequate attention to achieving outcomes, such as the provision of water resources assessments and flood forecasts and warnings, and not solely outputs such as the acquisition and distribution of hydrological data.

Response: Agreed.

Recommendation 3
Agreements with each country should be signed at the highest levels clearly defining the financial and human resource commitments of the country towards the project implementation and post-project stages of the component. Such an agreement should be made before commencement of the field implementation stage to ensure participation of the country and long-term sustainability of the investment. If such an agreement cannot be satisfactorily concluded, then the implementation stage should not go forward.

Response: Agreed.

Recommendation 4
All project stages, namely the Project initiation stages, the Project implementation stages and the Post-project stage, should maximize, to the practicable extent possible, the engagement of NHSs’ personnel in the development and implementation of all activities.

Response: Agreed.

Recommendation 5
WMO needs to redefine and reinvigorate its leadership role of the WHYCOS programme and its HYCOS components. WMO should be taking a much more proactive role in providing oversight and technical assistance by increasing its ability to provide advice and guidance on the operational implementation of on-the-ground projects such as HYCOS components.

Response: Agreed.

Recommendation 6
WMO needs to create a WHYCOS Office dedicated to the total management of the WHYCOS programme and its HYCOS components thereby focusing Secretariat leadership, having the delegated authority to respond to operational requirements in a timely fashion, and to take advantage of opportunities as they arise. The Office needs to promote awareness of the programme, facilitate donor involvement, and focus on the operational delivery of the programme. The Office may also include a Help Desk on the programme to assist in this process, particularly the provision of technical assistance to NHSs in implementing the components, particularly during the Post-project stage.

Response: Partially agreed. WMO’s role is that of ownership of the WHYCOS concept and supervision, from a technical and governance perspective, of the suite of HYCOS projects. The extent to which a dedicated WHYCOS Office will improve this coordination needs to be ascertained. It is proposed that a further study of the costs and benefits of different approaches could be undertaken including
identification of funding sources. In this regard, it will be important to define what is meant by “total management”.

**Recommendation 7**

WMO may need to invest in acquiring and developing its staff to be subject-content experts so they can more effectively provide advice and undertake analyses associated with operational aspects of HYCOS components and the WHYCOS programme in general.

**Response:**

Partially agreed, see response to Recommendation 6. Consideration could also be given to developing a support-based partners approach, incorporating, in particular, regional partners.

**Recommendation 8**

As owner of the WHYCOS programme, WMO should be playing a more significant role in mid-term and final evaluation reports that should also address the state of technical outcomes. WMO should also be undertaking a review of the post project stage approximately three years after completion of the project implementation stages. WMO should be paying more attention to understanding the causes of issues and in preventing their recurrence, particularly if they are common pitfalls.

**Response:**

Agreed.

**Recommendation 9**

WIAG needs to hold regular meetings comprising only essential participants to be an effective coordinating body and to provide recommendations to the Secretary-General on policy and programme development so that the programme can more rapidly respond to issues and be adjusted over time. WIAG, among its other duties, should focus on defining the persistently recurring issues associated with the Project implementation stages and Post-project stage and should assist the WMO Secretariat and its WHYCOS Office in developing strategies and approaches to resolve them. WIAG, through its coordination function, should monitor the development of issues and should assess the effectiveness of the strategies and approaches employed to overcome them.

**Response:**

Agreed in principle, noting that there are resource requirements associated with the implementation of this recommendation. Consideration could be given to other forms of “meetings” including teleconferences.

**Recommendation 10**

The WHYCOS Guidelines should be reviewed, revised, reissued and widely distributed. Compendiums of: lessons learned; WHYCOS and WIAG policies and procedures; WIAG recommendations; and minutes of WIAG and WCG meetings should be developed, regularly maintained and placed on the WHYCOS website for all to see.

**Response:**

Agreed, noting that the internal WHYCOS Coordination Group (WCG) is no longer in operation.

**Recommendation 11**

To fulfil the global concept of WHYCOS and to fully embrace the spirit of Resolution 25 (Cg-XIII), data collected through the HYCOS components must be exchanged in an unrestricted and free fashion by the participating countries in a timely fashion. If a country does not agree with the unrestricted and free exchange of data, it should not be part of the HYCOS component. WMO, through its WHYCOS Office, should be tracking the state of data exchange within the HYCOS components to ensure compliance with this recommendation and should provide its findings to WIAG.
Response:
Agreed. The Commission noted the opinion expressed by WIAG and AWG that application of WMO Resolution 25 should be encouraged within the WHYCOS programme, noting that within HYCOS Components data exchange among the countries for the purpose of the project was an essential requirement, and also noting that there may be in some instances protocols/agreements that have been signed at the local level that need to be taken into consideration. A set of data and/or products for exchange should be decided at the project level and guidance for this could be addressed in the revision of the WHYCOS Guidelines. Data exchange requirements could also be included in the Memoranda of Understanding signed by countries participating in HYCOS components.

Recommendation 12
WMO and its WMO Integrated Global Observing System (WIGOS), its WMO Information System (WIS) and WHYCOS programme should carefully analyse and clearly determine what specific efforts will be necessary and what costs and benefits will be incurred for HYCOS components to take advantage of the WIGOS and WIS initiatives and for the WHYCOS programme in general. Efforts should be undertaken to document these in as clear and concise a fashion as possible, as well as the costs and benefits that would likely accrue through the integration of the WHYCOS programme with WIGOS and WIS.

Response:
Partially agreed. Noting the importance of the WHYCOS programme as an end-to-end service delivery mechanism, the relationship between WIGOS and WIS and WHYCOS and its component HYCOSs from an information management perspective needs to be more clearly defined. This task should be addressed by the Chy AWG. Regional centres hosting HYCOS components data banks could register as WIS Data Collection or Production Centres (DCPC) to make WHYCOS-collected data widely discoverable.

Recommendation 13
WMO and the WHYCOS programme should ensure that all documentation such as the WHYCOS Guidelines reflect the requirements to comply with the WIGOS and WIS initiatives. WMO and the WHYCOS programme should also focus on increasing awareness of the WIGOS and WIS initiatives, and more importantly on the requirements they place upon the WHYCOS programme and its HYCOS components. Efforts at increasing awareness should be made as broadly as possible through the hydrology and water resources communities that may consider undertaking a HYCOS project. WMO and the WHYCOS programme should develop a strategy to assist existing HYCOS components in taking advantage of the WIGOS and WIS initiatives.

Response:
Agreed, subject to the response to Recommendation 12 being implemented and the results reported to the Commission.

Recommendation 14
Countries and donors should adopt the "Paris Declaration on Aid Effectiveness" (OECD, 2005) when working with the WMO on implementing the WHYCOS concept through its HYCOS components. This would include, inter alia, simplifying donor policies and procedures, increasing flexibility to better reflect the amount of time to implement components, and aligning components within national priorities.

Response:
Agreed.
Annex 2 to Resolution 8 (EC-65)

WHYCOS INTERNATIONAL ADVISORY GROUP

TERMS OF REFERENCE AND COMPOSITION

TERMS OF REFERENCE

The WHYCOS International Advisory Group (WIAG) shall:*  

1. Consider the concept, objectives, expected benefits/costs and future development of WHYCOS and advise the Secretary-General thereon;  

2. Review and assess the status of WHYCOS and of progress towards its objectives, and propose strategies for any necessary remedial action;  

3. Review the relationship of WHYCOS with other relevant international programmes, particularly from the point of view of coordination and avoidance of overlap and duplication, and propose any necessary actions;  

4. Identify and evaluate constraints on, and potential risks to, the future implementation and sustainability of WHYCOS, and propose strategies to minimize those risks. Risks include, inter alia, those of a financial, technical, operational and institutional/political nature;  

5. Consider and propose plans for effectively promoting and disseminating the achievements of WHYCOS;  

6. Consider and propose ways and means of engaging with donors in all project stages, especially for the future sustainability and appropriate expansion of WHYCOS;  

7. Review and advise on the Terms of Reference and Composition of WIAG.

COMPOSITION

The WHYCOS International Advisory Group shall be composed of:  

1. The president of the WMO Commission for Hydrology (Chair);  

2. One representative from each operational HYCOS;  

3. One representative from each active technical/financial partner;  

4. One representative of the Advisory Working Group of the WMO Commission for Hydrology or an expert appointed by the Commission.  

The Director, Hydrology and Water Resources Branch of WMO, shall act as secretary to the WIAG.  

Other persons may be invited from time to time to participate in the work of the WIAG as observers including:  

- Regional Hydrological Advisors;
• Representatives of prospective investors/donors;
• Representatives of prospective HYCOSs;
• Representatives of prospective technical/financial partners and other relevant international programmes and regional groupings;
• Representatives of other relevant WMO Programmes.

* Taking WHYCOS to mean the overall programme, its component parts and the mechanisms for coordination among them.

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Resolution 9 (EC-65)

PRESERVING THE RADIO-FREQUENCY SPECTRUM FOR METEOROLOGICAL AND RELATED ENVIRONMENTAL ACTIVITIES AT THE WORLD RADIOTELECOMMUNICATION CONFERENCE 2015

THE EXECUTIVE COUNCIL,

Recalling:

(1) Resolution 4 (Cg-XV) – Radio Frequencies for Meteorological and Related Environmental Activities,
(2) Resolution 11 (EC-64) – Radio Frequencies for Meteorological and Related Environmental Activities,

Noting:

(1) That the WMO observing systems comprise a wide number of different radio-based systems/applications operating in different radio services,
(2) That the World Radiocommunication Conference of the International Telecommunication Union (ITU) is the decision-making forum for the regular review and revision of the Radio Regulations – an international treaty related to radio-frequency allocations and regulatory provisions applied to all radio services,
(3) That the agenda of the World Radiocommunication Conference 2015 (WRC-15) and WMO activities concerning the Organization’s position on that agenda are being developed during the ITU preparations for WRC-15,

Considering:

(1) The increasing demand for meteorological and environmental data used by National Meteorological and Hydrological Services (NMHS) in weather forecasting, climate monitoring, protection of the environment, and detection and mitigation of negative effects of disasters,
(2) The important role of radio-based meteorological and environmental monitoring systems/applications in obtaining and disseminating meteorological data,
The crucial importance of the allocation of radio-frequency bands and of the protection from the harmful interference of radio-frequency bands employed by space-based and surface-based WMO observing systems,

Appreciating:
1. The long-standing excellent collaboration and partnership between WMO and ITU in ensuring the availability and protection of radio-frequency bands for observations,
2. The support of national and international meteorological agencies and organizations in radio-frequency spectrum activities,
3. The very active role of the Steering Group on Radio-Frequency Coordination (SG-RFC) of the WMO Commission for Basic Systems (CBS) and WMO Secretariat in safeguarding the interests of the meteorological community at WRCs,

Stressing:
1. The crucial importance of radio frequencies for obtaining environmental data used for weather forecasting, monitoring and prediction of climate change,
2. The need for absolute protection from the interference of radio-frequency bands that enable passive sensing of the atmosphere and the Earth,

Expresses its serious concern over the potential threats that some WRC-15 agenda items pose to radio-frequency bands allocated to meteorological aids, meteorological-satellite, Earth exploration-satellite and radiolocation radio services. These threats stem from the expansion of systems/applications of other radiocommunication services, in particular broadband applications of the mobile service;

Requests CBS to pursue an intensive preparation for WRC-15, in coordination with other technical commissions, especially the Commission for Instruments and Methods of Observation, and in collaboration with other relevant international bodies, in particular the Coordination Group for Meteorological Satellites and the Space Frequency Coordination Group;

Requests Members to provide experts to participate in SG-RFC, the ITU Radiocommunication Sector (ITU-R) and other activities related to the preparation of WRC-15;

Urges Members to take an active role in preparation for the WRC-15 and do their utmost to ensure the availability and protection of radio-frequency bands required for meteorological and related environmental operations and research, and in particular:
1. To participate actively in national, regional and international WRC-15 preparation activities and especially to involve experts from their Services in the work of regional telecommunication organizations and relevant ITU-R Study Groups and Working Parties;
2. To include consideration of radio-frequency spectrum issues into regional and national implementation plans of the WMO Integrated Global Observing System (WIGOS);
3. To ensure that their national radiocommunication/radio-frequency spectrum management administrations are fully aware of the WMO position on the WRC-15 agenda;

Invites ITU Member States to pay special attention to the WMO position on the WRC-15 agenda;

Requests the Secretary-General:
1. To give high priority to the WRC-15 preparation activities related to obtaining and preserving the radio-frequency bands essential for meteorology and related fields, in particular, through the CBS SG-RFC;
(2) To maintain the coordination role of the Secretariat in preparation for WRC-15, including participation in ITU-R meetings and WRC-15;

(3) To facilitate the coordination between NMHSs and their national radiocommunication administrations in preparing for WRC-15, by providing appropriate information and documentation.

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**Resolution 10 (EC-65)**

**REPORT OF THE FIFTEENTH SESSION OF THE COMMISSION FOR BASIC SYSTEMS RELEVANT TO INTEGRATED OBSERVING SYSTEMS**

THE EXECUTIVE COUNCIL,

Noting the Abridged Final Report with Resolutions and Recommendations of the Fifteenth Session of the Commission for Basic Systems (WMO-No. 1101),

Decides to take action on each of the recommendations as follows:

Recommendation 1 (CBS-15) – Implementation and sustainability of the database of observation requirements and observing capabilities

(a) Approves this recommendation;

(b) Assigns priority to the implementation of the database of observation requirements and observing capabilities within the overall WIGOS Framework Implementation Plan;

Recommendation 2 (CBS-15) – Revised functional specifications for automatic weather stations

(a) Approves this recommendation;

(b) Requests the Secretary-General to make arrangements for publishing the revised functional specifications in the Guide to the Global Observing System (WMO-No. 488);

Recommendation 3 (CBS-15) – Amendments to the Manual on the Global Observing System (WMO-No. 544), Volume I

(a) Approves this recommendation;

(b) Requests the Secretary-General to make arrangements for including these amendments in the Manual on the Global Observing System (WMO-No. 544), Volume I, or in the respective WIGOS Regulatory Material;


(a) Approves this recommendation;

(b) Requests the Secretary-General to bring the Implementation Plan for the Evolution of Global Observing Systems to the attention of Members and identified agents;

Recommendation 7 (CBS-15) – Radio frequencies for meteorological and related environmental activities

(a) Approves this recommendation;
(b) Requests the Secretary-General to continue to place a high priority on supporting radio-frequency coordination activities, including proactively increasing the awareness of Members and partner organizations regarding the important role of the Commission for Basic Systems in this area, and to encourage Members to support those activities.

Resolution 11 (EC-65)

AVOIDING GAPS IN ESSENTIAL SPACE-BASED OBSERVATION

THE EXECUTIVE COUNCIL,

Noting that space-based observations provide the major part of input data to Numerical Weather Prediction, are a vital support for severe weather monitoring and nowcasting, and play a unique role for global climate monitoring,

Noting further that the Commission for Basic Systems (CBS) adopted Recommendation 4 (CBS-15) – Actions towards avoiding gaps in essential space-based observation,

Considering:

(1) That under current plans, a gap is anticipated by 2020 for imagery and sounding missions on the early morning orbit,

(2) The risk of delay inherent in the forthcoming transition to a new generation of systems in the United States in the afternoon orbit,

(3) The anticipated termination of the additional mission of the geostationary operational environmental satellite providing frequent South America coverage,

Considering further:

(1) That according to current plans, the requirement for hyperspectral infrared sounding from geostationary orbit will not be accommodated on all geostationary positions in the coming decade, but that the possibility to implement such capability through alternative ways, including through free flyers, can be explored,

(2) That there is no path towards an operational follow-on of the planned Global Precipitation Measurement space-borne radar mission, which is expected to play an important role for global climate monitoring, operational hydrology and tropical cyclone monitoring, building on the Tropical Rainfall Measuring Mission successfully operated over 15 years,

(3) That the long-term continuity of upward radiation measurements at the top of the atmosphere is not planned in the afternoon orbit after the first mission of the Joint Polar Satellite System,

(4) That there is no long-term plan for limb sounders to monitor stratospheric ozone and greenhouse gases,

(5) That coordination is needed to maintain the continuity of satellite-based solar, solar wind and other space weather measurements,
Urges satellite-operating Members to take initiatives and develop plans to fill such gaps;

Invites the Coordination Group for Meteorological Satellites to monitor the plans with the support of the CBS Expert Team on Satellite Systems and to coordinate efforts towards a comprehensive, robust and optimized space-based observing system.

Resolution 12 (EC-65)

REGIONAL REQUIREMENTS FOR SATELLITE DATA ACCESS AND EXCHANGE

THE EXECUTIVE COUNCIL,

Noting that the Commission for Basic Systems (CBS) adopted Recommendation 5 (CBS-15) – Procedure for documenting regional requirements for satellite data access and exchange, recommending that such procedure be adopted as guidance in all Regions,

Considering:

(1) The challenges of accessing satellite data in light of the dramatic expected increase in the volume of satellite data and products available over the next 5–10 years, while user surveys show that actual access often remains well below expectations,

(2) The regional diversity of needs and capabilities of the various types of users, requiring different data access solutions,

(3) The need to document requirements for access to and exchange of data from existing satellites on the basis of WMO Regions,

(4) That a common approach to defining such requirements would facilitate their consideration as an input to the implementation and operation of the WMO Information System and WMO Integrated Global Observing System,

Invites all regional associations to establish standing mechanisms for documenting and maintaining their requirements for satellite data access and exchange, in line with the guidance provided by the Commission for Basic Systems at its fifteenth session;

Invites the Coordination Group for Meteorological Satellites and its Members to support these regional mechanisms.

Resolution 13 (EC-65)

AMENDMENTS TO THE MANUAL ON THE WMO INFORMATION SYSTEM (WMO-No. 1060)

THE EXECUTIVE COUNCIL,

Noting:

(1) Recommendation 8 (CBS-15) – Amendments to the Manual on the WMO Information System (WMO-No. 1060), and Recommendation 11 (CBS-15) – Quantitative monitoring of the WMO Information System,
(2) Resolution 12 (EC-64) – Designation of centres of the WMO Information System,
(3) The *Manual on the WMO Information System* (WMO-No. 1060),

**Noting further:**

(1) That the Commission for Basic Systems (CBS) has identified a schedule for reviewing the remaining conditionally designated centres in a timely manner,
(2) Resolution 5 (RA II-15) – WMO Information System,
(3) Those WMO Information System (WIS) centres that have been endorsed by CBS since the sixty-fourth session of the Executive Council,
(4) That the presidents of technical commissions had approved version 1.3 of the WMO Core Metadata Profile at their meeting in January 2013 (PTC-2013),

**Decides:**

(1) To approve the changes to the *Manual on the WMO Information System* as given in Recommendations 8 and 11 (CBS-15), reproduced in Annexes 1 and 2 to the present resolution;
(2) To update Appendix B, Table B.3 of the Manual, as shown in Annex 3 to the present resolution, to include the National Centres identified by Recommendation 8 (CBS-15), taking into consideration changes to principal Global Information System Centres (GISCs) as decided by RA II-15;
(3) To update Appendix B, Table B.1 of the Manual to change the status from “conditionally designated” to “designated” for GISCs in Brasilia, Moscow and Washington;
(4) To extend the period of conditional designation to the sixty-sixth session of the Executive Council in order to allow those centres in the process of implementing WIS to complete their installation and to demonstrate their compliance to the Commission for Basic Systems;

**Requests** technical commissions and regional associations to put in place WIS Implementation Plans, including processes for identifying and endorsing centres contributing to programmes and activities within their areas of responsibility;

**Requests** all operational GISCs to connect to the WIS core network and transmit information collected from their area to all other operational GISCs;

**Requests** the Secretary-General to make the amendments to the *Manual on the WMO Information System*, as decided above;

**Authorizes** the Secretary-General:

(1) To update Appendix B of the Manual to incorporate written notifications from CBS, regional associations, and GISCs;
(2) To make any consequent editorial amendments.
Annex 1 to Resolution 13 (EC-65)

AMENDMENTS TO THE MAIN TEXT OF THE MANUAL ON THE WMO INFORMATION SYSTEM (WMO-No. 1060)

(1) Insert new “note” following paragraph 2.3.4.1 as follows:

Note: An associated GISC is defined by a bilateral agreement between a centre and a GISC for the purposes of uploading or downloading data. A centre can have multiple associated GISCs but shall identify a principal GISC for uploading and management of metadata.

(2) Update paragraph 3.5.3.1 to clarify that information for global exchange shall be in all GISC caches.

3.5.3.1 Each GISC shall collect from its area information that is intended for global exchange and shall share such information with other GISCs so that all GISCs have a common holding of information available for global exchange. See also 3.5.5 (Maintain a 24-hour cache) and 3.5.8 (Coordinate telecommunications in a Global Information System Centre area)

(3) Insert text into paragraph 3.5.5.1 to clarify a purpose of the 24-hour cache is to support subscription services including the GTS.

3.5.5.1 Each GISC shall hold the information intended for global exchange for at least 24 hours to support subscription services, including but not limited to those for the GTS, and make the information available via WMO request/reply (“Pull”) mechanisms. Information limited to regional or AMDCN exchange need only be held in those GISCs supporting the region or AMDCN for which the information is to be available. This requirement intersects the WIS DAR requirement (see 3.5.6).

(4) Make the following insertion and editorial changes (in red) to paragraph 3.5.6.1

3.5.6.1 In support of the DAR function, each GISC shall maintain and provide access to a comprehensive catalogue of information across all WMO programmes encompassed by WIS. This includes, but is not limited to, information intended for global exchange. In order to satisfy the DAR functional requirement, GISCs are required to support, in interactive and in batch modes, upload, change and deletion of metadata, user discovery of metadata, user access to metadata, and synchronization of the WIS comprehensive metadata catalogue with other GISCs.

(5) Make the following insertion and editorial changes (in red) to paragraphs 3.5.7 and 3.5.8

3.5.7 Data network connectivity of a Global Information System Centre
Each GISC shall provide around-the-clock connectivity to the public and dedicated communication networks at a capacity that is sufficient to meet its global, regional and AMDCN responsibilities. Each GISC should ensure that every telecommunication facility it employs in support of WIS has the appropriate level of availability and capacity, including, as necessary, routing and backup arrangements. Each GISC should maintain service level agreements with the suppliers of its communication links and associated hardware.

3.5.8 Coordinate telecommunications in a Global Information System Centre area
Each GISC shall coordinate with the Centres in its area of responsibility to maintain a WIS telecommunications infrastructure that can meet the WIS requirements for information exchange within the area. In the case of particular global and/or regional agreements, a GISC could also support the exchange of agreed WIS time-critical and operation-critical information with other areas AMDCNs. The telecommunications infrastructure shall be implemented through various
technologies and services (for example, the Internet, satellite based data distribution, dedicated data networks) in accordance with capacity and reliability requirements.

(6) Split paragraph 3.5.9 as follows; move (in blue), delete or add text (in red) as follows.

3.5.9 Recovery arrangements of a Global Information System Centre
3.5.9.1 Each GISC shall implement and operate proper procedures and arrangements to provide swift recovery or backup of its essential services in the event of an outage. Each GISC shall maintain arrangements for its essential services to be taken up by another GISC in case of an incapacitating system failure. Each GISC should maintain arrangements for system back up in case of total site failure (for example, an offsite Disaster Recovery Centre) and for partial back up in situations otherwise affecting WIS functions within the GISC.

3.5.9.2 Each GISC shall maintain arrangements with one or more back up GISCs that include at a minimum the collection and dissemination of information to/from its AMDCN to be taken up by another GISC in case of an incapacitating system failure.

ADDITION OF PART V TO THE MANUAL ON THE WMO INFORMATION SYSTEM

Add the following Part V to the Manual on the WIS

PART V. WIS DISCOVERY METADATA

5.1 All information to be exchanged through the WIS shall have a WIS Discovery Metadata record associated with it.

5.2 WIS Discovery Metadata Records shall be provided by the data custodian to the principal GISC for the centre to which the data custodian is attached. No change should be made to a WIS Discovery Metadata record without the express approval of the data custodian other than in the case that the principal GISC for the data custodian may alter or withdraw the WIS Discovery Metadata record if it is found to interfere with the correct operation of the WIS, in which case an emergency change should be made and the data custodian shall be requested to provide an appropriate corrected Discovery Metadata record.

5.3 WIS Discovery Metadata records shall conform to the ISO 19115 standard and as a minimum contain the information specified as mandatory in the WMO Core Metadata Profile of that standard as defined in Appendix C to this Manual.

5.4 The Commission for Basic Systems shall maintain and develop the WMO Core Metadata Profile. Changes to the WMO Core Metadata Profile shall be governed using the procedures defined in Appendix C to this Manual.

Add the following Appendix C to the Manual on the WIS

APPENDIX C: THE WMO CORE METADATA PROFILE OF THE ISO 19115 METADATA STANDARD

C.1 Implementation of the WMO Core Metadata Profile

C.1.1 The WMO Core Metadata Profile of the ISO 19115 Metadata Standard places constraints on the contents of a discovery metadata record that are additional to those in the ISO standard. Authors of WIS Discovery metadata records shall apply these constraints.
C.1.2 Specifications in this Manual shall take precedence over the specifications in ISO 19115.

C.1.3 The Secretariat shall publish guidance materials to assist authors of WIS Discovery Metadata maintain consistency between metadata records.

C.1.4 WIS Discovery Metadata records shall be provided to GISCs conformant with ISO 19136 and ISO 19139 expressed in Geographic Markup Language (GML).

C.2 Procedures for amending the WMO Core Metadata Profile

C.2.1 General validation and implementation procedures

C.2.1.1 Proposal of amendments

Amendments to the WMO Core Metadata Profile must be proposed in writing to the WMO Secretariat. The proposal shall specify the needs, purposes and requirements and include information on a contact point for technical matters.

C.2.1.2 Drafting recommendation

The Inter-Programme Expert Team on Metadata and Data Representation Development (IPET-MDRD), supported by the Secretariat, shall validate the stated requirements (unless it is consequential to an amendment to the WMO Technical Regulations) and develop a draft recommendation to respond to the requirements, as appropriate.

C.2.1.3 Date of implementation

The IPET-MDRD should define a date of implementation in order to give sufficient time to the WMO Members to implement the amendments after the date of notification; the IPET-MDRD should document the reasons to propose a time span of less than six months except for the fast track procedure.

C.2.1.4 Procedures for approval

After a draft recommendation of the IPET-MDRD is validated in accordance with the procedure given in section C.6 below, depending on the type of amendments, the IPET-MDRD should select one of the following procedures for the approval of the amendments:

- Fast-track procedure (see C.2.2);
- Procedure for the adoption of amendments between CBS sessions (see C.2.3);
- Procedure for the adoption of amendments during CBS sessions (see C.2.4).

C.2.1.5 Urgent introduction

Regardless of the above procedures, as an exceptional measure, the following procedure accommodates urgent user needs to introduce new entries in the Code Lists and XML schema that support the WMO Core Metadata Profile or to correct errors in the metadata validation criteria.

---

1 The IPET-MDRD, the ICT-ISS and the OPAG-ISS are the current bodies dealing with the WMO Core Profile within the Commission for Basic Systems (CBS). If they were replaced by other bodies performing the same function, the same rules would apply, by replacing the names of the entities appropriately.
(a) A draft recommendation developed by IPET-MDRD shall be validated according to C.2.6.1, C.2.6.2 and C.2.6.3;

(b) The draft recommendation for pre-operational use, which can be used in operational data and products, shall be approved by the chairpersons of IPET-MDRD and OPAG-ISS, and the president of CBS. The list of pre-operational entries is kept on-line on the WMO web server;

(c) Pre-operational entries need to be approved by one of the procedures in C.2.1.4 for operational use;

(d) The lowest level of the version number of the metadata standard will be incremented (see C.2.1.6).

C.2.1.6 Issuing updated version

Once amendments to the WMO Core Metadata Profile are adopted, an updated version of the relevant part of the Manual on WIS shall be issued in the four languages: English, French, Russian and Spanish. The Secretariat shall inform all WMO Members of the availability of a new updated version of that part at the date of notification mentioned in C.2.1.3.

Version numbers of the WMO Core Metadata Profile have the form $a.b.c$ where:

$a$ shall be incremented if the change requires modifications to software (for example moving to a new version of the ISO 19115 standard). This is the top level of the version number. Such changes should follow the Changes during Sessions procedure in C.2.4.

$b$ shall be incremented if changes to conformance checking rules or changes to Code Lists are introduced and are mandatory for compliant metadata records. This is the middle level of the version number. Such changes should follow the Changes Between Sessions procedure in C.2.3.

$c$ shall be incremented if the changes have no impact on existing metadata records (for example adding a new entry to a Code List, or introducing a conformance checking rule that results in a warning rather than causing a metadata record to be declared invalid). This is the lowest level of the version number. Such changes should use the Fast Track procedure in C.2.2.

Note: development versions of the WMO Core Metadata Profile, not intended for operational use, are denoted by the digit 0 in second part of the version number. For example: 2.0.1. Development versions are intended to enable the development of a new version of the WMO Core Metadata Profile requiring changes to software systems.

C.2.2 Fast-track procedure

C.2.2.1 Scope

The fast-track procedure can be used for additions to Code Lists and validation rules that result only in warnings.

C.2.2.2 Endorsement

Draft recommendations developed by the IPET-MDRD, including a date of implementation of the amendments, must be endorsed by the chairperson of OPAG-ISS.
**C.2.2.3 Approval**

**C.2.2.3.1 Minor adjustments**

Correcting typographic errors in descriptive text in Code Lists is considered a minor adjustment, and will be done by the Secretariat in consultation with the president of CBS.

Note: a Code List is a list of valid entries that are permitted in a metadata field.

**C.2.2.3.2 Other types of amendments**

For other types of amendments, the English version of the draft recommendation, including a date of implementation, should be distributed to the focal points for Discovery Metadata matters for comments, with a deadline of two months for the reply. It should then be submitted to the president of CBS for consultation with the presidents of technical commissions and adoption on behalf of the Executive Council (EC).

**C.2.2.4 Frequency**

The implementation of amendments approved through the fast track procedure can be twice a year in May and November.

**Figure 1 - Adoption of amendments by fast track procedure**

![Diagram](image)

**C.2.3 Procedure for the adoption of amendments between CBS sessions**

**C.2.3.1 Approval of draft recommendation**

For the direct adoption of amendments between CBS sessions, the draft recommendation developed by the IPET-MDRD, including a date of implementation of the amendments, shall be submitted to the chairperson of OPAG-ISS and president and vice-president of CBS for approval. The president of CBS shall consult with the presidents of technical commissions.

**C.2.3.2 Circulation to Members**

Upon approval of the president of CBS, the Secretariat sends the recommendation in the four languages (English, French, Russian and Spanish), including a date of implementation of the amendments, to all WMO Members for comments to be submitted within two months following the dispatch of the amendments.
C.2.3.3 Agreement

Those WMO Members not having replied within the two months following the dispatch of the amendments are implicitly considered as having agreed with the amendments.

C.2.3.4 Coordination

WMO Members are invited to designate a focal point responsible to discuss any comments/disagreements with the IPET-MDRD. If the discussion between the IPET-MDRD and the focal point cannot result in an agreement on a specific amendment by a WMO Member, this amendment will be reconsidered by the IPET-MDRD.

C.2.3.5 Notification

Once amendments are agreed by WMO Members, and after consultation with the chairperson of the OPAG-ISS and the president and vice-president of CBS, the Secretariat notifies at the same time the WMO Members and the members of the Executive Council of the approved amendments and of the date of their implementation.

![Figure 2 - Adoption of amendments between CBS sessions](image)

C.2.4 Procedure for the adoption of amendments during CBS sessions

For the adoption of amendments during CBS sessions, the IPET-MDRD submits its recommendation, including a date of implementation of the amendments, to the Implementation/Coordination Team on Information Systems and Services (ICT-ISS) of the Open Programme Area Group on Information Systems and Services (OPAG-ISS). The recommendation is then passed to the presidents of technical commissions for consultation, and to a CBS session that shall be invited to consider comments submitted by presidents of technical commissions. The recommendation shall then be submitted to an EC session for decision.

![Figure 3 - Adoption of amendments during CBS sessions](image)
C.2.5 Procedure for the correction of existing entries in the Code Lists and validation rules

C.2.5.1 Correcting errors in the text describing a Code List entry

Where a minor error in the specification of a CodeList is found (e.g. typing error or incomplete definition) the CodeList entry shall be amended and re-published. The CodeList dictionary itself (the XML document) shall increment its version number. If, however, the error is in the meaning of the CodeList, then a new CodeList entry should be created and the existing (erroneous) entry marked as deprecated. Authors of metadata records should not use deprecated CodeList items. This situation is considered a minor adjustment according to C.2.3.1 above.

C.2.5.2 Correcting an error in a conformance checking rule

If an erroneous specification of a conformance checking rule is found, a new descriptor should preferably be added to the appropriate table through the fast-track procedure or the procedure for adoption of amendments between CBS sessions. The new conformance-checking rule should be used instead of the old. An appropriate explanation shall be added to the description of the conformance-checking rule to clarify the practice along with the date of the change.

C.2.5.3 Submission of changes to Code List Entries or conformance checking rules as a result of correcting an error

Such changes shall be submitted through the fast-track procedure.

C.2.6 Validation procedure

C.2.6.1 Documentation of need and purpose

The need for, and the purpose of, the proposal for changes should be documented.

C.2.6.2 Documentation of result

This documentation shall include the results of validation testing of the proposal as described below.

C.2.6.3 Testing with WIS metadata applications

For new or modified Code List entries and validation rules, proposed changes should be tested by the use of at least two independently developed metadata editors and two independently developed GISC catalogues which incorporated the proposed change. Results should be made available to the IPET-MDRD with a view to verifying the technical specifications.

C.3 Contents of the WMO Core Metadata Profile

C.3.1 Each supported version of the WMO Core Metadata Profile is listed in C.4. Versions that are no longer supported by WIS are denoted as “obsolete” and their definitions should be retained on the WMO website. Definitions of the versions of the WMO Core Metadata Profile are in sub-appendices of this Appendix.

C.4 WMO Core Profile Versions

Note: Versions of the WMO Core Profile before 1.2 did not provide all the functionality required by the WIS and are no longer supported.
WMO Core Profile version 1.2. This is defined at http://wis.wmo.int/2010/metadata/version_1-2
Note: metadata created using profile version 1.2 is compatible with that created under version 1.3
other than that the records may have been completed inconsistently and therefore may fail the
version 1.3 conformance checking rules.

WMO Core Profile Version 1.3. This is defined at http://wis.wmo.int/2012/metadata/version_1-3.
This is described in Appendix C.1.3 to this Manual.
WMO Core Metadata Profile version 1.3
Specification
Part 1 – Conformance Requirements
C.1.3-Part 1 to the Manual on the WMO Information System (WMO-No. 1060)

Document version: 1.0: Approved by PTC

Date: 4 February 2013
1 SCOPE

This specification defines the content, structure and encoding of discovery metadata published within the WMO Information System (WIS) Discovery-Access-Retrieval (DAR) Catalogue.

The metadata standard defined herein is an informal category-1 profile\(^2\) of the International Standard ISO 19115:2003 ‘Geographic information – Metadata’. This metadata standard shall be referred to as the **WMO Core Metadata Profile**.

WIS Discovery Metadata records shall be encoded in XML as defined by ISO/TS 19139:2007.

Part 1 of this specification defines the conformance requirements for the WMO Core Metadata Profile. Part 2 defines the Abstract Test Suite, Data Dictionary and Code Lists. Unless otherwise stated, references to “Part 1” and “Part 2” are to the relevant parts of this specification.

2 CONFORMANCE

Conformance requirements

The WMO Technical Regulations (WMO-No. 49) paragraph A.3.3 states:

\[
\text{A.3.3.4 WIS functions and operation shall be based on catalogues that contain metadata describing data and products available across WMO, plus metadata describing dissemination and access options. […]}
\]

In this document:

- 6 describes the XML encoding requirements for the discovery metadata records published to the WIS DAR (Discovery, Access and Retrieval) Catalogue (e.g. a WIS Discovery Metadata records).
- 7 describes how compliance with this version of the WMO Core Metadata Profile is declared within a WIS Discovery Metadata record.
- 8 and 9 describe additional constraints applying to WIS Discovery Metadata records. These are organized into two groups to support the following Formal Requirements for WIS Discovery Metadata:
  - Metadata uniqueness and discovery within WIS DAR Catalogue
  - Description of data for Global Exchange within WIS

UML is used to describe the additional constraints defined in this Annex applying to WIS Discovery Metadata records within the context of ISO 19115:2003/Cor. 1:2006.

Where there are inconsistencies between the text description of a requirement and the UML (Unified Modelling Language) description, the UML version shall be considered authoritative.

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\(^2\) A category-1 profile places additional restrictions on the use of an International Standard to meet the more specific requirements of a given community. Profiles of International Standards may be formally registered. The WMO profile of ISO 19115 has not been registered and thus remains an ‘informal’ profile.
Authors of discovery metadata records published within the WIS DAR Catalogue are required to comply with the WMO Core Metadata Profile. Thus WIS Discovery Metadata shall be compliant with:

- ISO 19115:2003 ‘Geographic information – Metadata’;
- ISO 19115:2003/Cor. 1:2006 ‘Geographic information – Metadata – Corrigendum 1’; and
- Additional constraints described in this Manual.


The Secretariat shall publish Guidance materials to assist authors of WIS Discovery Metadata maintain consistency between metadata records.

Note: see http://wis.wmo.int/MD_Index.

**Conformance classes for WIS Discovery Metadata**

Metadata records claiming conformance with the WMO Core Metadata Profile shall conform to the rules specified in Clauses 6 - 9 and pass all relevant test cases of the Abstract Test Suite in Part 2, 2.

Depending on the characteristics of a WIS Discovery Metadata record, 8 conformance classes are distinguished. Table 1 lists these classes and the corresponding Subclause of the Abstract Test Suite.

**Table 1 – Conformance classes related to WMO Core Metadata Profile**

<table>
<thead>
<tr>
<th>Conformance class</th>
<th>Reference in Part 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1 ISO/TS 19139:2007 compliance</td>
<td>2.1.1</td>
</tr>
<tr>
<td>6.2 Explicit identification of namespaces in XML</td>
<td>2.1.2</td>
</tr>
<tr>
<td>6.3 GML namespace</td>
<td>2.1.3</td>
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<tr>
<td>9.1 Identifying the scope of distribution</td>
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<tr>
<td>9.3 Defining WMO Data Policy and GTS Priority for data published for global exchange</td>
<td>2.3.2, 2.3.3</td>
</tr>
</tbody>
</table>

A WIS Discovery Metadata record may also be validated against Guidance published by the Secretariat.
Note: see http://wis.wmo.int/MD_Conform.

During such validation, a warning shall be issued for each occasion that a metadata record fails to comply with Guidance.

3 NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this specification. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 639-2, Code for the representation of names of languages – Part 2: Alpha-3 code
ISO 3166 (all parts), Codes for the representation of names of countries and their subdivisions
ISO 8601, Data elements and interchange formats – Information interchange – Representation of dates and times
ISO 19115:2003, Geographic information – Metadata
ISO 19115:2003/Cor. 1:2006, Geographic information – Metadata – Corrigendum 1
W3C XMLName, Namespaces in XML. W3C Recommendation (14 January 1999)
W3C XML, Extensible Markup Language (XML) 1.0 (Second Edition). W3C Recommendation (6 October 2000)

4 TERMS AND DEFINITIONS

namespace
Collection of names, identified by a URI reference, which are used in XML documents as element names and attribute names

WIS Discovery Metadata
Metadata consistent with this standard that is used within the WIS for discovery of information shared through the WIS.

5 SYMBOLS AND ABBREVIATED TERMS

Acronyms

DAR Discovery, Access and Retrieval; normally used to describe the WIS DAR Catalogue
DCPC Data Collection and Production Centre; part of the WIS
5.2 Namespace abbreviations

In the list below the item on the left describes the common namespace prefix used to describe the elements in the namespace. The second item is an English description of the namespace prefix and the item in parenthesis is the URN of the actual namespace. These URNs do not necessarily correspond to an effective location of the schemas, however, where available an authoritative location for the schema is provided.

The WMO Core Metadata Profile does not specify a namespace, as it contains no XML schema extensions.

This list corresponds to external namespaces used by the WMO Core Metadata Profile.

gco Geographic Common extensible markup language (http://www.isotc211.org/2005/gco)
gmd Geographic MetaData extensible markup language (http://www.isotc211.org/2005/gmd)
gmx Geographic Metadata Xml schema (http://www.isotc211.org/2005/gmx)
gss Geographic Spatial Schema extensible markup language (http://www.isotc211.org/2005/gss)
gsr Geographic Spatial Referencing extensible markup language (http://www.isotc211.org/2005/gsr)
gts Geographic Temporal Schema extensible markup language (http://www.isotc211.org/2005/gts)
svr geographic SeRVice metadata (http://www.isotc211.org/2005/srv)
gml Geography Markup Language (http://www.opengis.net/gml/3.2)
xlink Xml LINKing language (http://www.w3.org/1999/xlink)
xsi w3c Xml Schema Instance (http://www.w3.org/2001/XMLSchema-instance)
5.3 External classes

All of the model elements used within the WMO Core Metadata Profile are defined in ISO geographic information standards. By convention with ISO/TC 211, names of UML classes, with the exception of basic data type classes, include a two- or three-letter prefix that identifies the International Standard and the UML package in which the class is defined. Table 2 lists the standards and packages in which UML classes used in the WMO Core Metadata Profile.

Table 2 – Sources of UML classes

<table>
<thead>
<tr>
<th>Prefix</th>
<th>International Standard</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>ISO 19115:2003</td>
<td>Citation Information</td>
</tr>
<tr>
<td>EX</td>
<td>ISO 19115:2003</td>
<td>Extent Information</td>
</tr>
<tr>
<td>MD</td>
<td>ISO 19115:2003</td>
<td>Metadata Entity</td>
</tr>
</tbody>
</table>

6 XML ENCODING

WIS implementation is predicated on the publication of metadata records as XML documents.

6.1 ISO/TS 19139:2007 compliance

Compliance with this specification requires that WIS Discovery Metadata records shall validate without error against the XML schemas created from the UML model of ISO 19115:2003/Cor. 1:2006 using the encoding rules defined in ISO/TS 19139:2007 ‘Geographic information – Metadata – XML schema implementation’ Clause 9.

WMO Core Metadata Profile requires that:

6.1.1 Each WIS Discovery Metadata record shall validate without error against the XML schemas defined in ISO/TS 19139:2007.

Note: not all XML validation tools implement the full W3C XML Schema recommendation and not all XML validation tools interpret the W3C XML Schema recommendation in the same manner. It is recommended that a tool with strict interpretation of XML Schema and full support for the W3C XML Schema recommendation be used to ensure conformance.


XML 1.0 does not support the enforcement of certain types of constraints. For example, gmd:CI_ResponsibleParty shall include at least one of gmd:individualName, gmd:organisationName or gmd:positionName. As a result, it is imperative that implementers heed the constraints identified within the UML model defined in ISO 19115:2003 and the associated corrigendum. These are listed in ISO/TS 19139:2007 Annex A: ‘Table A.1 – Conformance Rules not enforceable with XML Schema’. 
WMO Core Metadata Profile requires that:

6.1.2 Each WIS Discovery Metadata record shall validate without error against the rule-based constraints listed in ISO/TS 19139:2007 Annex A (Table A.1).

Note: WMO provides an automated test suite including validation against the constraints listed in ISO/TS 19139:2007 Annex A. These are implemented as Schematron rules (ISO/IEC 19757-3:2006 ‘Information technology – Document Schema Definition Language (DSDL) – Part 3: Rule-based validation – Schematron’) and can be found at the following location: http://wis.wmo.int/2012/metadata/validationTestSuite/.

6.2 Explicit identification of namespaces in XML

To support the provision of reusable XML validation test suites, it shall be mandatory to explicitly define XML namespaces used within a WIS Discovery Metadata record. Use of a default (implied) namespace may lead to misinterpretation of the XML document and failure to validate.

WMO Core Metadata Profile places the following additional restriction on ISO 19139:2007:

6.2.1 Each WIS Discovery Metadata record shall name explicitly all namespaces used within the record; use of default namespaces is prohibited.

6.3 GML namespace


WMO Core Metadata Profile places the following additional restriction on ISO 19139:2007 –

6.3.1 Each WIS Discovery Metadata record shall declare the following XML namespace for GML: http://www.opengis.net/gml/3.2.

7 DECLARING COMPLIANCE WITH WMO CORE METADATA PROFILE

A WIS Discovery Metadata record may declare compliance with this version of the WMO Core Metadata Profile as follows:

- /gmd:MD_Metadata/gmd:metadataStandardName = “WMO Core Metadata Profile of ISO 19115 (WMO Core), 2003/Cor.1:2006 (ISO 19115), 2007 (ISO/TS 19139)”

- /gmd:MD_Metadata/gmd:metadataStandardVersion = “1.3”

8 METADATA UNIQUENESS AND DISCOVERY WITHIN WIS DAR CATALOGUE

8.1 Unique identification of WIS Discovery Metadata records

5.2 of the Manual on WIS (WMO-No. 1060; WIS-TechSpec-1: Uploading of Metadata for Data and Products) requires the use of the WMO Core Metadata Profile and the provision of a globally unique identifier for each WIS Discovery Metadata record:
5.2.1 This specification requires that each metadata record uploaded shall be represented in compliance with the WMO Core Metadata Profile of ISO 19115 with a unique identifier.

A WIS Discovery Metadata record shall be uniquely identified using the `gmd:MD_Metadata/gmd:fileIdentifier` attribute.

WMO Core Metadata Profile places the following additional restrictions on ISO 19115:2003/Cor. 1:2006 –

8.1.1 Each WIS Discovery Metadata record shall include one `gmd:MD_Metadata/gmd:fileIdentifier` attribute

8.1.2 The `gmd:MD_Metadata/gmd:fileIdentifier` attribute for each WIS Discovery Metadata record shall be unique within the WIS

(i.e. the attribute is mandatory in the WMO Core Metadata Profile and must be globally unique within the WIS).

Note that the `gmd:MD_Metadata/gmd:fileIdentifier` elements are treated as CASE-INSENSITIVE when assessing metadata records for duplication.

WMO Core Metadata Profile recommends the use of a URI structure for `gmd:fileIdentifier` attributes. The URI should be structured as follows:

- fixed string "urn:x-wmo:md:"
- citation authority based on the Internet domain name of the data-provider organisation, e.g. “int.wmo.wis”, “gov.noaa”, “edu.ucar.ncar”, “cn.gov.cma” or “uk.gov.metoffice"
- separator colon ":" 
- unique identifier –
  - for metadata records describing GTS products in bulletins or named according to the WMO file-naming convention P-flag = “T” or P-flag= “A”, the unique identifier is “«TTAAii»«CCCC»”
  - for metadata records describing products named according to the WMO file-naming convention P-flag = “W”, the unique identifier should be a truncated version of the WMO product identifier field of the associated data-files, excluding the date-stamp and any other varying elements as necessary
  - for metadata records describing other products, the unique identifier may be assigned by the citation authority so as to be unique among the identifiers assigned by the citation authority

The Secretariat shall maintain a list of «citation authority» and the associated organization.

Each «citation authority» organization shall implement procedures that ensure that its authorized metadata authors can create unique values for the «unique identifier». Note that inclusion of «citation authority» in `fileIdentifier` guarantees global uniqueness provided the organization has a procedure to ensure local uniqueness.

If the data custodian has their own methodology for assigning metadata identifiers and is able to guarantee the global uniqueness of the identifier, that identifier may be used.
Amendments to a WIS Discovery Metadata record shall not change the `gmd:MD_Metadata/gmd:fileIdentifier` attribute. Each amendment shall be published with an updated `gmd:MD_Metadata/gmd:dateStamp` attribute indicating the date of publication of the amended version of the metadata record.

`gmd:MD_Metadata/gmd:dateStamp` shall be specified using a single date as specified by ISO 8601 in the extended date format (YYYY-MM-DD), where YYYY is the year, MM is the month and DD is the day. Time (hh:mm:ss, where hh is the hour, mm the minutes and ss the seconds) may be added if required, separated from the day by “T”.

A set of WIS Discovery Metadata records with the same `gmd:MD_Metadata/gmd:fileIdentifier` shall be considered to be versions of the same WIS Discovery Metadata record. The sequence (time-order) of these records shall be determined from the `gmd:MD_Metadata/gmd:dateStamp`.

### 8.2 Provision of information to support discovery within WIS DAR Catalogue

Paragraph 5.9 of this Manual (WIS-TechSpec-8: DAR Catalogue Search and Retrieval) outlines the mechanisms by which WIS DAR Catalogue content may be searched according to indexed metadata attributes.

Search within the WIS DAR catalogue is based on terms from SRU (Search/Retrieval by URL, ISO 23950:1998).

At a minimum, for text-based searches, these shall include:

1. subject
2. abstract
3. title
4. author
5. keywords
6. format
7. identifier
8. type
9. crs (coordinate reference system)

For date-based searches, these shall include:

1. creationDate
2. modificationDate
3. publicationDate
4. beginningDate
5. endingDate

Finally, geographic search shall also be provided:

1. bounding box (specified in decimal degrees, north, west, south and east)
Table 3 provides a mapping from SRU terms to ISO 19115 attributes (defined via XPath):

**Table 3 - Mapping from SRU search terms to ISO 19115 attributes**

<table>
<thead>
<tr>
<th>SRU term</th>
<th>ISO 19115 attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>subject</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:keyword</td>
</tr>
<tr>
<td>abstract</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:abstract</td>
</tr>
<tr>
<td>title</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:title</td>
</tr>
<tr>
<td>author</td>
<td>/gmd:MD_Metadata/gmd:contact</td>
</tr>
<tr>
<td>keywords</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:keyword</td>
</tr>
<tr>
<td>format</td>
<td>/gmd:MD_Metadata/gmd:distributionInfo//gmd:distributionFormat//gmd:name</td>
</tr>
<tr>
<td>identifier</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:identifier</td>
</tr>
<tr>
<td>type</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//spatialRepresentationType</td>
</tr>
<tr>
<td>crs</td>
<td>/gmd:MD_Metadata/gmd:referenceSystemInfo/gmd:MD_ReferenceSystem/gmd:referenceSystemIdentifier/gmd:RS_Identifier/gmd:code</td>
</tr>
<tr>
<td>creationDate</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:date</td>
</tr>
<tr>
<td>modificationDate</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:dateType=&quot;creation&quot;</td>
</tr>
<tr>
<td>publicationDate</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:dateType=&quot;publication&quot;</td>
</tr>
<tr>
<td>beginningDate</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:temporalElement/gmd:extent</td>
</tr>
<tr>
<td>endingDate</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:temporalElement/gmd:extent</td>
</tr>
<tr>
<td>boundingBox</td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:geographicElement/gmd:EX_GeographicBoundingBoxBox/gmd:northBoundLatitude</td>
</tr>
<tr>
<td></td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:geographicElement/gmd:EX_GeographicBoundingBoxBox/gmd:westBoundLatitude</td>
</tr>
<tr>
<td></td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:geographicElement/gmd:EX_GeographicBoundingBoxBox/gmd:southBoundLatitude</td>
</tr>
<tr>
<td></td>
<td>/gmd:MD_Metadata/gmd:identificationInfo//gmd:extent//gmd:geographicElement/gmd:EX_GeographicBoundingBoxBox/gmd:eastBoundLatitude</td>
</tr>
</tbody>
</table>
The following elements from Table 3 are declared mandatory in ISO 19115:2003/Cor. 1:2006 –

- [abstract]
  /gmd:MD_Metadata/gmd:identificationInfo//gmd:abstract

- [title]
  /gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:title

- [creationDate, modificationDate]
  /gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date

- [author]
  /gmd:MD_Metadata/gmd:contact

CI_ResponsibleParty entity /gmd:MD_Metadata/gmd:contact element should use the CI.RoleCode "pointOfContact"; e.g.

- /gmd:MD_Metadata/gmd:contact//gmd:role = "pointOfContact"

Note that the abstract should provide a clear and concise statement that enables the reader to understand the content of the dataset. For guidance when completing the abstract, consider these points:

- State what the “things” are that are recorded.
- State the key aspects recorded about these things.
- State what form the data takes.
- State any other limiting information, such as time period of validity of the data.
- Add purpose of data resource where relevant (e.g. for survey data).
- Aim to be understood by non-experts.
- Do not include general background information.
- Avoid jargon and unexplained abbreviations.

It is recommended that /gmd:MD_Metadata/gmd:identificationInfo//gmd:pointOfContact should provide a minimum of a name and an e-mail address.

In order to improve the consistency of WIS Discovery Metadata records in regards to search and discovery within the WIS DAR Catalogue, the keyword and boundingBox attributes are mandatory within the WMO Core Metadata Profile.

WMO Core Metadata Profile places the following additional restrictions on ISO 19115:2003/Cor. 1:2006:

8.2.1 Each WIS Discovery Metadata record shall include at least one keyword from the WMO_CategoryCode code list.

8.2.2 Keywords from WMO_CategoryCode code list shall be defined as keyword type “theme”.

8.2.3 All keywords sourced from a particular keyword thesaurus shall be grouped into a single instance of the MD_Keywords class.
A new Code List Dictionary is published as part of this specification defining the set of permissible values for WMO_CategoryCode (see Part 2, Table 16). Keywords from WMO_CategoryCode shall be of type ‘theme’.

The GeographicBoundingBox is determined by four coordinates.

Bounding boxes that cross the 180 degree meridian can be differentiated from bounding boxes that do not by the following rule:

In a dataset that does not cross the 180 degree meridian the western-most longitude shall always be less than the eastern-most longitude, conversely, if a bounding box crosses the 180 degree meridian then the western-most longitude shall be greater than the eastern-most longitude.

Other constraints on geographic bounding boxes:

- The total longitudinal span shall be greater than zero, and less than or equal to 360 degrees.
- Geographic points shall be designated with the northern-most and southern-most longitudes equal, and the western-most and eastern-most longitudes equal.
- The northern-most latitude shall always be greater than or equal to than the southern-most latitude.
- Longitude and latitude shall be recorded in a coordinate reference system that has the same axes, units and prime meridian as WGS84.

Attribute /gmd:MD_Metadata/gmd:identificationInfo//gmd:citation//gmd:date//gmd:date shall be expressed as an ISO 8601 compliant date. The extended date format (YYYY-MM-DD) should be used, where YYYY is the year, MM is the month and DD is the day. Time (hh:mm:ss, where hh is the hour, mm the minutes and ss the seconds) may be added if required, separated from the day by "T".

The remaining elements from Table 3 are optional in this version of the WMO Core Metadata Profile:
- [format]
- [identifier]
- [type]
- [crs]
- [beginningDate]
- [endingDate]

Note: further guidance on the use of these elements is published by the Secretariat at http://wis.wmo.int/MD_OptElt

The primary language used in metadata conforming to the WMO Core Metadata Profile is English. Translations of English elements within the record may also be included.
8.2.5 All information contained within a metadata record shall, as a minimum, be provided in English within the metadata record.

Translations of all or part of the English content may also be included.

9 DESCRIPTION OF DATA FOR GLOBAL EXCHANGE WITHIN WIS

Within the WIS, it is important for GISCs to be able to identify which data are published for global exchange. This determines whether the data are incorporated into the GISC cache. The WIS Discovery Metadata record describing a given dataset may identify whether that dataset is published for global exchange within the WIS.

9.1 Identifying the scope of distribution

The scope of distribution for a dataset (e.g. whether it is published for global exchange within the WIS) may be specified using a keyword:

- /gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:keyword

The semantics of a keyword are inferred from a specified keyword thesaurus. The thesaurus relating to a particular keyword may be cited using the following element:

- /gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:thesaurusName

The scope of distribution for data within WIS shall be expressed using the following controlled vocabulary: "GlobalExchange", "RegionalExchange" and "OriginatingCentre".

A new Code List Dictionary is published as part of this specification defining the set of permissible values for specifying the scope of distribution within the WIS: WMO_DistributionScopeCode; Part 2, Table 17 refers.

The type of keyword may be specified using the following element:

- /gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords//gmd:type

The keyword type associated with WMO_DistributionScopeCode thesaurus shall be ‘dataCentre’. Keyword type ‘dataCentre’ is taken from the MD_KeywordTypeCode class described in ISO/DIS 19115-1:2013.

WMO Core Metadata Profile places the following additional restriction on ISO 19115:2003/Cor. 1:2006:

9.1.1 A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the scope of distribution using the keyword “GlobalExchange” of type “dataCentre” from thesaurus WMO_DistributionScopeCode.

9.2 Identifiers for metadata describing data published for global exchange

The identifier (gmd:MD_Metadata/gmd:fileIdentifier) for a WIS Discovery Metadata record that describes data published for global exchange via the WIS shall be formatted as follows:

- gmd:MD_Metadata/gmd:fileIdentifier = “urn:x-wmo:md:int.wmo.wis::{uid}”
where \{uid\} is a unique identifier derived from the GTS bulletin or file name.

Unique identifiers (\{uid\}) for globally exchanged data shall be defined as follows:

- If a GTS «TTAAii» and «CCCC» is allocated for the product (i.e. where the datasets described by the metadata record employ the WMO file-naming convention P-flag = “T” or P-flag = “A”) use «TTAAii»«CCCC» for the unique identifier; or
- Else if a WMO Product Identifier is allocated for the product (i.e. WMO file-naming convention P-flag = “W”) use a truncated WMO product identifier field of the associated data-files, excluding the date-stamp and any other varying elements as necessary.

WMO Core Metadata Profile places the following additional restriction on ISO 19115:2003/Cor. 1:2006:

9.2.1 A WIS Discovery Metadata record describing data for global exchange via the WIS shall have a gmd:MD_Metadata/gmd:fileIdentifier attribute formatted as follows (where \{uid\} is a unique identifier derived from the GTS bulletin or file name): urn:x-wmo:md:int.wmo.wis::\{uid\}.

Note: to assist readers, the following are examples of gmd:fileIdentifier attributes for data globally exchanged via the WIS –
- urn:x-wmo:md:int.wmo.wis::FCUK31EGRR
- urn:x-wmo:md:int.wmo.wis::FR-meteofrance-toulouse,GRIB,ARPEGE-75N10N-60W65E_C_LFPW

9.3 Defining WMO Data Policy and GTS Priority for data published for global exchange

The WMO Data Policy pertaining to Resolution 25 Cg-XIII, and Resolution 40 Cg-XII and other regulations (e.g. ICAO Annex 3 Meteorological Services for International Air Navigation) shall be expressed using the following controlled vocabulary: “WMOEssential”, and “WMOAdditional” and “WMOOther”.

A new Code List Dictionary is published as part of this specification defining the set of permissible values for specifying the WMO Data Policy: WMO_DataLicenseCode; Part 2, Table 14 refers.

WMO Data Policy is considered to be a Legal Constraint applying to both usage and access.

Note: more details on WMO Data Policy (WMO Resolution 40 Cg-XII and Resolution 25 Cg-XIII) are described at http://www.wmo.int/pages/about/exchangingdata_en.html

The WMO Data Policy shall be defined using the following element:

- /gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints//gmd:otherConstraints

The presence of more than one WMO Data Policy statement in a single metadata record yields an ambiguous state; a WIS Discovery Metadata record describing data for global exchange shall declare only a single WMO Data Policy.

WMO Core Metadata Profile places the following additional restriction on ISO 19115:2003/Cor. 1:2006:

9.3.1 A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the WMO Data License as Legal Constraint
(type: "otherConstraints") using one and only one term from the WMO_DataLicenseCode code list.

Note: only exact matches to the terms from the codelist are acceptable; "wmo-essential", "WMO Essential", or "WmOaDdiTiOnaL" will all fail to validate.

Note: Where WMO Data Policies “WMOAdditional” or “WMOOther” are cited, a more precise definition of the additional access or usage restrictions may be provided by the data publisher.

Note: guidance on the provision of alternative data policies and access or usage restrictions is provided at: http://wis.wmo.int/MD_DataPolicy.

The GTS Priority (also known as GTS Product Category Code) shall be expressed using the following controlled vocabulary: "GTSPriority1", "GTSPriority2", "GTSPriority3" and "GTSPriority4".

A new Code List Dictionary is published as part of this specification defining the set of permissible values for specifying the WMO Data Policy: WMO_GTSProductCategoryCode; Part 2, Table 15 refers.

GTS Priority is considered to be a Legal Constraint applying to both usage and access.

The GTS Priority shall be defined using the following element:

- /gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints//gmd:otherConstraints

The presence of more than one GTS Priority statement in a single metadata record yields an ambiguous state; a WIS Discovery Metadata record describing data for global exchange shall declare only a single GTS Priority.

WMO Core Metadata Profile places the following additional restriction on ISO 19115:2003/Cor. 1:2006:

**9.3.2 A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the GTS Priority as Legal Constraint (type: "otherConstraints") using one and only one term from the WMO_GTSProductCategoryCode code list.**

Note: only exact matches to the terms from the code list are acceptable; "gts.priority-4", "GTS Priority 4", or "GtsPriority4" will all fail to validate.

The absence of both gmd:accessConstraints and gmd:useConstraints shall be interpreted such that the terms expressed in gmd:otherConstraints (e.g. WMO Data Policy and GTS Priority) apply to both access and use.

However, this should be made explicit by expressing

- gmd:MD_LegalConstraints/gmd:accessConstraints
- gmd:MD_LegalConstraints/gmd:useConstraints
- gmd:MD_RestrictionCode "otherRestrictions".

Note: example

```xml
<gmd:resourceConstraints>
  <gmd:MD_LegalConstraints>
    <gmd:accessConstraints>
      <gmd:MD_RestrictionCode
        codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/..."/>
    </gmd:accessConstraints>
    <gmd:useConstraints>
      <gmd:MD_RestrictionCode
        codeList="http://standards.iso.org/ittf/PubliclyAvailableStandards/..."/>
    </gmd:useConstraints>
  </gmd:MD_LegalConstraints>
</gmd:resourceConstraints>
```
All statements regarding constraints originating from a single source should be grouped into a single gmd:resourceConstraints element.

Note: this practice aims to ensure forward compatibility with ISO 19115-1:2013 (currently in Draft International Standard status) where the amended gmd:MD_Constraints class is expected to include information about the source of a (set of) constraints.

10  SUMMARY OF ADDITIONAL RESTRICTIONS

The requirements defined in this specification are summarised below in Table 4, Table 5 and Table 6. They are grouped according to the encoding requirements expressed in 6 and the formal requirements expressed in 8 and 9.

<table>
<thead>
<tr>
<th>Encoding rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ISO/TS 19139:2007 compliance</td>
</tr>
<tr>
<td>2</td>
<td>Explicit identification of namespaces in XML</td>
</tr>
<tr>
<td>3</td>
<td>Specification of GML namespace</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Encoding rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1.2</td>
<td>[MANDATORY obligation] Each WIS Discovery Metadata record shall validate without error against the rule-based constraints listed in ISO/TS 19139:2007 Annex A (Table A.1).</td>
</tr>
<tr>
<td>6.2.1</td>
<td>[MANDATORY obligation] Each WIS Discovery Metadata record shall explicitly name all namespaces used within the record; use of default namespaces is prohibited.</td>
</tr>
</tbody>
</table>
| 6.3.1 | [MANDATORY obligation] Each WIS Discovery Metadata record shall declare the following XML namespace for GML: http://www.opengis.net/gml/3.2.
Table 5 – Metadata uniqueness and discovery within WIS DAR Catalogue (8)

<table>
<thead>
<tr>
<th>Target element(s)</th>
<th>Description</th>
</tr>
</thead>
</table>
| 4 gmd:MD_Metadata/gmd:fileIdentifier | 8.1.1 [MANDATORY obligation] Each WIS Discovery Metadata record shall include one gmd:MD_Metadata/gmd:fileIdentifier attribute.  
8.1.2 [MANDATORY obligation] The gmd:MD_Metadata/gmd:fileIdentifier attribute for each WIS Discovery Metadata record shall be unique within the WIS. |
| 5 gmd:MD_Metadata/gmd:identificationInfo/  
  ↄ gmd:MD_Identification/gmd:descriptiveKeywords | 8.2.1 [MANDATORY obligation] Each WIS Discovery Metadata record shall include at least one keyword from the WMO_CategoryCode code list.  
8.2.2 [MANDATORY obligation] Keywords from WMO_CategoryCode code list shall be defined as keyword type “theme”.  
8.2.3 [MANDATORY obligation] All keywords sourced from a particular keyword thesaurus shall be grouped into a single instance of the MD_Keywords class. |
| 6 gmd:MD_Metadata/gmd:identificationInfo/  
  ↄ gmd:MD_DataIdentification/gmd:extent/  
  ↄ gmd:EX_Extent/gmd:geographicExtent/ | 8.2.4 [CONDITIONAL obligation: geographic data only] Each WIS Discovery Metadata record describing geographic data shall include the description of at least one geographic bounding box defining the spatial extent of the data. |

Table 6 – Description of data for global exchange via WIS (9)

<table>
<thead>
<tr>
<th>Target element(s)</th>
<th>Description</th>
</tr>
</thead>
</table>
| 7 gmd:MD_Metadata/gmd:identificationInfo/  
  ↄ gmd:MD_Identification/gmd:descriptiveKeywords | 9.1.1 [MANDATORY obligation] A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the scope of distribution using the keyword “GlobalExchange” of type “dataCentre” from thesaurus WMO_DistributionScopeCode. |
| 8 gmd:MD_Metadata/gmd:fileIdentifier | 9.2.1 [CONDITIONAL obligation: data globally exchanged via WIS only] A WIS Discovery Metadata record describing data for global exchange via the WIS shall have a gmd:MD_Metadata/gmd:fileIdentifier attribute formatted as follows (where {uid} is a unique identifier derived from the GTS bulletin or file name): urn:x-wmo:md:int.wmo.wis::{uid}. |
| 9 gmd:MD_Metadata/gmd:identificationInfo/  
  ↄ gmd:MD_DataIdentification/  
  ↄ gmd:resourceConstraints/  
  ↄ gmd:MD_LegalConstraints/gmd:otherConstraints | 9.3.1 [CONDITIONAL obligation: data globally exchanged via WIS only] A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the WMO Data License as Legal Constraint (type: “otherConstraints”) using one and only one term from the WMO_DataLicenseCode code list.  
9.3.2 [CONDITIONAL obligation: data globally exchanged via WIS only] A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the GTS Priority as Legal Constraint (type: “otherConstraints”) using one and only one term from the WMO_GTSPriorityCode code list. |
11 AMENDMENTS TO CODE LISTS / NEW CODE LISTS

Table 7 lists the modifications and additions to the Code Lists defined in ISO 19115:2003. Please refer to Part 2, 4 for more information on Code List extensions.

Table 7 – Modifications and additions to the ISO 19115:2003 Code Lists

<table>
<thead>
<tr>
<th>Target Code List</th>
<th>Change</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI_DateTypeCode</td>
<td>Amendment</td>
<td>Additional term «reference» [004]</td>
</tr>
<tr>
<td>WMO_DataLicenseCode</td>
<td>New</td>
<td>WMO Data License applied to the data resource – derived from WMO Resolution 25 and Resolution 40 (<a href="http://www.wmo.int/pages/about/exchangingdata_en.html">http://www.wmo.int/pages/about/exchangingdata_en.html</a>)</td>
</tr>
<tr>
<td>WMO_GTSProductCategoryCode</td>
<td>New</td>
<td>Product category used for prioritising messages on the WMO Global Telecommunication System (GTS)</td>
</tr>
<tr>
<td>WMO_CategoryCode</td>
<td>New</td>
<td>Additional topic categories for WMO community</td>
</tr>
<tr>
<td>WMO_DistributionScopeCode</td>
<td>New</td>
<td>Scope of distribution of data within the WMO Information System.</td>
</tr>
</tbody>
</table>

12 WMO CORE METADATA PROFILE UML MODEL

Metadata records compliant with the WMO Core Metadata Profile shall contain at a minimum the information defined in Figure 1. These are the “mandatory” elements of the record.

Figure 1 – Mandatory contents of a WIS Discovery Metadata record

The WMO Core Metadata Profile specification defines a further set of elements that shall be included in a WIS Discovery Metadata record under certain conditions. These are illustrated in Figure 2. Details of the UML classes and attributes are provided in Part 2, 3.
Figure 2 - Full specification of the WMO Core Profile including both optional and mandatory items

WMO Core Metadata Profile version 1.3
Specification
Part 2 – Abstract Test Suite, Data Dictionary and Code Lists
Appendix C.1.3-Part 2 to the Manual on the WMO Information System
(WMO-No. 1060)

Document version: 1.0: Approved by PTC

Date: 15 January 2013
Approved on: 15 January 2013
1 SCOPE

This specification defines the content, structure and encoding of discovery metadata published within the WMO Information System (WIS) Discovery-Access-Retrieval (DAR) Catalogue.

The metadata standard defined herein is an informal category-1 profile\(^3\) of the International Standard ISO 19115:2003 ‘Geographic information – Metadata’. This metadata standard shall be referred to as the **WMO Core Metadata Profile**.

WIS Discovery Metadata records shall be encoded in XML as defined by ISO/TS 19139:2007.

Part 1 of this specification defines the conformance requirements for the WMO Core Metadata Profile. Part 2 defines the Abstract Test Suite, Data Dictionary and Code Lists. Unless otherwise stated, references to “Part 1” and “Part 2” are to the relevant parts of this specification.

2 ABSTRACT TEST SUITE (NORMATIVE)

Note: automated test suites for validating XML metadata records against both Formal Requirements and Guidance can be found from the WIS wiki: [http://wis.wmo.int/MD_Conform](http://wis.wmo.int/MD_Conform)

Note: An authoritative copy of the automated test suite for validating against the Formal Requirements described in this specification can be found at: [http://wis.wmo.int/2012/metadata/validationTestSuite/](http://wis.wmo.int/2012/metadata/validationTestSuite/).

2.1 Abstract tests for XML encoding

2.1.1 ISO/TS 19139:2007 compliance


Test purpose: **Requirement 6.1.2**: Each WIS Discovery Metadata record shall validate without error against the rule-based constraints listed in ISO/TS 19139:2007 Annex A (Table A.1).

---

\(^3\) A category-1 profile places additional restrictions on the use of an International Standard to meet the more specific requirements of a given community. Profiles of International Standards may be formally registered. The WMO profile of ISO 19115 has not been registered and thus remains an ‘informal’ profile.
2.1.2 Explicit identification of namespaces in XML

Test id: http://wis.wmo.int/2012/metadata/conf/explicit-xml-namespace-identification

Test purpose: **Requirement 6.2.1**: Each WIS Discovery Metadata record shall explicitly name all namespaces used within the record; use of default namespaces is prohibited.

Test method: In the instance document under test inspect all ‘xmlns’ declarations to ensure that an XML namespace is provided; e.g.

```xml
<gmd:MD_Metadata xmlns:gmd="http://www.isotc211.org/2005/gmd">
  …
</gmd:MD_Metadata>
```

The following ‘xmlns’ declaration is not permitted:

```xml
<MD_Metadata xmlns:="http://www.isotc211.org/2005/gmd">
  …
</MD_Metadata>
```

2.1.3 Specification of GML namespace

Test id: http://wis.wmo.int/2012/metadata/conf/gml-namespace-specification

Test purpose: **Requirement 6.3.1**: Each WIS Discovery Metadata record shall declare the following XML namespace for GML: http://www.opengis.net/gml/3.2.

Test method: In the instance document under test inspect all ‘xmlns’ declarations to ensure that the GML namespace is specified as http://www.opengis.net/gml/3.2; e.g.

```xml
xmlns:gml="http://www.opengis.net/gmd/3.2"
```

2.2 Abstract tests for metadata uniqueness and discovery within WIS DAR Catalogue

2.2.1 Unique gmd:fileIdentifier attribute

Test id: http://wis.wmo.int/2012/metadata/conf/fileIdentifier-cardinality

Test purpose: **Requirement 8.1.1**: Each WIS Discovery Metadata record shall include one gmd:MD_Metadata/gmd:fileIdentifier attribute.

Test method: In the instance document under test, validate that there is one and only one instance of the element identified by the following XPath:

```xml
/gmd:MD_Metadata/gmd:fileIdentifier
```

Note: there is no abstract test for **Requirement 8.1.2**: The gmd:MD_Metadata/gmd:fileIdentifier attribute for each WIS Discovery Metadata record shall be unique within the WIS.

2.2.2 Mandatory WMO_CategoryCode keyword

Test id: http://wis.wmo.int/2012/metadata/conf/WMO_CategoryCode-keyword-cardinality
Test purpose: **Requirement 8.2.1**: Each WIS Discovery Metadata record shall include at least one keyword from the WMO_CategoryCode code list.

Test method: (i) Inspect the instance document under test to assess whether the WMO_CategoryCode code list is specified as a keyword thesaurus within an instance of `gmd:MD_Keywords` using the following XPath:

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  ▷ gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title/ =
  "WMO_CategoryCode"
```

A `gmx:Anchor` element may be used to specify the location of the Code List; e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  ▷ gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title/
  ▷ gmx:Anchor/@xlink:href =
  "http://wis.wmo.int/2012/codelists/WMOCodelist.xml#WMO_CategoryCode"
```

(ii) Inspect the associated `gmd:MD_Keywords` element to ensure that at least one instance of a keyword from the WMO_CategoryCode code list is present. A normative version of the WMO_CategoryCode code list is published by WMO at: [http://wis.wmo.int/2012/codelists/WMOCodelist.xml](http://wis.wmo.int/2012/codelists/WMOCodelist.xml). Instances of keyword are identified by the following XPath:

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  ▷ gmd:MD_Keywords/gmd:keyword
```


Test purpose: **Requirement 8.2.2**: Keywords from WMO_CategoryCode code list shall be defined as keyword type “theme”.

Test method: (i) Inspect the instance document under test to assess whether the WMO_CategoryCode code list is specified as a keyword thesaurus within an instance of `gmd:MD_Keywords` using the following XPath:

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  ▷ gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title/ =
  "WMO_CategoryCode"
```

A `gmx:Anchor` element may be used to specify the location of the Code List; e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  ▷ gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title/
  ▷ gmx:Anchor/@xlink:href =
  "http://wis.wmo.int/2012/codelists/WMOCodelist.xml#WMO_CategoryCode"
```

(ii) Inspect the associated `gmd:MD_Keywords` element to ensure that the keyword type is specified as “theme” from the MD_KeywordTypeCode code list; e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  ▷ gmd:MD_Keywords/gmd:type/gmd:MD_KeywordTypeCode
```

Test id: [http://wis.wmo.int/2012/metadata/conf/keyword-grouping](http://wis.wmo.int/2012/metadata/conf/keyword-grouping)

Test purpose: **Requirement 8.2.3**: All keywords sourced from a particular keyword thesaurus shall be grouped into a single instance of the `MD_Keywords` class.
2.2.3 Geographic data extent specification with bounding box

Test id: http://wis.wmo.int/2012/metadata/conf/geographic-bounding-box

Test purpose: Requirement 8.2.4: Each WIS Discovery Metadata record describing geographic data shall include the description of at least one geographic bounding box defining the spatial extent of the data.

Test method: (i) Inspect the instance document under test to assess whether the metadata record is describing geographic data; e.g.

    /gmd:MD_Metadata/gmd:hierarchyLevel/gmd:MD_ScopeCode != "nonGeographicDataset"

(ii) Inspect the instance document under test to assess whether the geographic extent is specified using a bounding box. Abstract test http://wis.wmo.int/2012/metadata/conf/ISO-TS-19139-2007-rule-based-validation shall ensure that the bounding box is correctly specified. Geographic extent bounding box is specified using the following XPath:

    /gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/
      ↘gmd:extent/gmd:EX_Extent/gmd:geographicExtent/gmd:EX_GeographicBoundingBox

Note: there is no abstract test for Requirement 8.2.5: All information within a metadata record shall, as a minimum, be provided in English within the metadata record.

2.3 Description of data for global exchange via WIS

2.3.1 Identification of data for global exchange via WIS

Test id: http://wis.wmo.int/2012/metadata/conf/identification-of-globally-exchanged-data

Test purpose: Requirement 9.1.1: A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the scope of distribution using the keyword “GlobalExchange” of type “dataCenterdataCentre” from thesaurus WMO_DistributionScopeCode.

Test method: (i) Inspect the instance document under test to assess whether the WMO_DistributionScopeCode code list is specified as a keyword thesaurus within an instance of gmd:MD_Keywords using the following XPath:

    /gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
      ↘gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title//
      = "WMO_DistributionScopeCode"

A gmx:Anchor element may be used to specify the location of the Code List; e.g.

    /gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
      ↘gmd:MD_Keywords/gmd:thesaurusName/gmd:CI_Citation/gmd:title/
(ii) Inspect the associated gmd:MD_Keywords element to ensure that the keyword type is specified as “dataCentre” from the (amended) MD_KeywordTypeCode code list; e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  ↘gmd:MD_Keywords/gmd:type/gmd:MD_KeywordTypeCode = “dataCentre”
```

(iii) Inspect the associated gmd:MD_Keywords element to assess whether the keyword “GlobalExchange” from the WMO_DistributionScopeCode code list is present; e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:descriptiveKeywords/
  ↘gmd:MD_Keywords/gmd:keyword = “GlobalExchange”
```

Test id: http://wis.wmo.int/2012/metadata/conf/fileIdentifier-for-globally-exchanged-data

Test purpose: Requirement 9.2.1: A WIS Discovery Metadata record describing data for global exchange via the WIS shall have a gmd:MD_Metadata/gmd:fileIdentifier attribute formatted as follows (where {uid} is a unique identifier derived from the GTS bulletin or file name): urn:x-wmo:md:int.wmo.wis::{uid}.

Test method: In the instance document under test, validate that the gmd:fileIdentifier element conforms to the following regular expression:

```
/gmd:MD_Metadata/gmd:fileIdentifier// = “urn:x-wmo:md:int.wmo.wis::”
```

2.3.2 Specification of WMO Data Policy for globally exchanged data

Test id: http://wis.wmo.int/2012/metadata/conf/WMO-data-policy-for-globally-exchanged-data

Test purpose: Requirement 9.3.1: A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the WMO Data License as Legal Constraint (type: “otherConstraints”) using one and only one term from the WMO_DataLicenseCode code list.

Test method: Inspect the instance document under test to assess whether one and only one instance of a term from the WMO_DataLicenseCode code list is specified using the following XPath:

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints/
  ↘gmd:MD_LegalConstraints/gmd:otherConstraints/
```

A normative version of the WMO_DataLicenseCode code list is published by WMO at: http://wis.wmo.int/2012/codelists/WMOC odeLists.xml.

A gmx:Anchor element may be used to specify the location of the Code List; e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints/
```

2.3.3 Specification of GTS Product Category (GTS Priority) for globally exchanged data

Test id: http://wis.wmo.int/2012/metadata/conf/GTS-priority-for-globally-exchanged-data

Test purpose: Requirement 9.3.2: A WIS Discovery Metadata record describing data for global exchange via the WIS shall indicate the GTS Priority as Legal Constraint (type:
“otherConstraints”) using one and only one term from the WMO_GTSProductCategoryCode code list.

Test method: Inspect the instance document under test to assess whether one and only one instance of a term from the WMO_GTSProductCategoryCode code list is specified using the following XPath:

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints/
  ↘gmd:MD_LegalConstaints/gmd:otherConstraints/
```

A normative version of the WMO_GTSProductCategoryCode code list is published by WMO at: http://wis.wmo.int/2012/codelists/WMOCodLists.xml.

A gmx:Anchor element may be used to specify the location of the Code List; e.g.

```
/gmd:MD_Metadata/gmd:identificationInfo//gmd:resourceConstraints/
  ↘gmd:MD_LegalConstaints/gmd:otherConstraints/gmx:Anchor/@xlink:href =
```

3 WMO CORE METADATA PROFILE DATA DICTIONARY

This data dictionary includes only mandatory elements from ISO 19115:2003 and associated corrigendum, and elements explicitly mentioned within this specification. Other elements are omitted. Please refer to ISO 19115:2003 and ISO 19115:2003/Cor. 1:2006 for further information.

Note: note that additional guidance for metadata authors is provided at http://wis.wmo.int/MD_Index.

Table 1 to Table 7 are tabular representations of the UML diagrams for the section of the UML diagrams for the WMO Core Profile. Items marked with “M” in the “Obligation/Condition” column shall be present in a valid WMO Core Profile Metadata record. Those entries marked with “O” should be present if they are applicable. Entries marked “C” shall be present if the associated condition is met.

Line numbers match those defined in ISO 19115:2003 and the associated corrigendum.
<table>
<thead>
<tr>
<th>Name / Role name</th>
<th>Definition</th>
<th>Obligation / Condition</th>
<th>Maximum occurrence</th>
<th>Data type</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD_Metadata</td>
<td>root entity which defines metadata about a resource or resources</td>
<td>M</td>
<td>1</td>
<td>Class</td>
<td>Lines 2-22</td>
</tr>
<tr>
<td>fileIdentifier</td>
<td>unique identifier for this metadata file</td>
<td>M</td>
<td>1</td>
<td>CharacterString</td>
<td>See Part 1, 8.1 and Part 1, 9.2</td>
</tr>
<tr>
<td>hierarchyLevel</td>
<td>scope to which the metadata applies</td>
<td>O</td>
<td>1</td>
<td>Class</td>
<td>MD_ScopeCode «CodeList» See Table 12</td>
</tr>
<tr>
<td>contact</td>
<td>party responsible for the metadata</td>
<td>M</td>
<td>N</td>
<td>Class</td>
<td>CI_ResponsibleParty «DataType» See Table 6</td>
</tr>
<tr>
<td>dateStamp</td>
<td>date that the metadata was created or revised</td>
<td>M</td>
<td>1</td>
<td>Class</td>
<td>Date</td>
</tr>
<tr>
<td>metadataStandardName</td>
<td>name of the metadata standard (including profile name) used</td>
<td>O</td>
<td>1</td>
<td>CharacterString</td>
<td>Free text See Part 1, 7</td>
</tr>
<tr>
<td>metadataStandardVersion</td>
<td>version of the metadata standard (version of the profile) used</td>
<td>O</td>
<td>1</td>
<td>CharacterString</td>
<td>Free text See Part 1, 7</td>
</tr>
<tr>
<td>Role name: identificationInfo</td>
<td>basic information about the resource(s) to which the metadata applies</td>
<td>M</td>
<td>N</td>
<td>Association</td>
<td>MD_DataIdentification See Table 2</td>
</tr>
</tbody>
</table>
Table 2 – Identification information (includes data identification)

<table>
<thead>
<tr>
<th>Name / Role name</th>
<th>Definition</th>
<th>Obligation / Condition</th>
<th>Maximum occurrence</th>
<th>Data type</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 MD_Identification</td>
<td>basic information required to uniquely identify a resource or resources</td>
<td>Use obligation from referencing object</td>
<td>Use maximum occurrence from referencing object</td>
<td>Aggregated Class (MD_Metadata) «Abstract»</td>
<td>Lines 24-35.1</td>
</tr>
<tr>
<td>24 citation</td>
<td>information about citing the resource(s)</td>
<td>M</td>
<td>1</td>
<td>Class</td>
<td>CI_Citation«DataType» See Table 6</td>
</tr>
<tr>
<td>25 abstract</td>
<td>brief narrative summary of the content of the resource(s)</td>
<td>M</td>
<td>1</td>
<td>CharacterString</td>
<td>Free text</td>
</tr>
<tr>
<td>33 Role name: descriptiveKeywords</td>
<td>provides category keywords, their type, and reference source</td>
<td>M</td>
<td>N</td>
<td>Association</td>
<td>MD_Keywords See Table 3 See Part 1, 8.2 and Part 1, 9.1</td>
</tr>
<tr>
<td>35 Role name: resourceConstraints</td>
<td>provides information about constraints which apply to the resource(s)</td>
<td>O</td>
<td>N</td>
<td>Association</td>
<td>MD_Constraints See Table 4 Part 1, 9.3</td>
</tr>
<tr>
<td>36 MD_DataIdentification</td>
<td>basic information required to uniquely identify a dataset</td>
<td>Use obligation from referencing object</td>
<td>Use maximum occurrence from referencing object</td>
<td>Specified Class (MD_Identification)</td>
<td>Lines 37-46 and 24-35.1</td>
</tr>
<tr>
<td>39 language</td>
<td>language(s) used within the dataset</td>
<td>M</td>
<td>N</td>
<td>CharacterString</td>
<td>ISO 639-2 recommended</td>
</tr>
<tr>
<td>41 topicCategory</td>
<td>main theme(s) of the dataset</td>
<td>M</td>
<td>N</td>
<td>Class</td>
<td>MD_TopicCategoryCode«Enumeration» See Table 13</td>
</tr>
<tr>
<td>45 extent</td>
<td>extent information including the bounding box, bounding polygon, vertical, and temporal extent of the dataset</td>
<td>C</td>
<td>N</td>
<td>Association</td>
<td>EX_Extent«DataType» See Table 5 See Part 1, 8.2</td>
</tr>
</tbody>
</table>
### Table 3 – Keyword information

<table>
<thead>
<tr>
<th>Name / Role name</th>
<th>Definition</th>
<th>Obligation / Condition</th>
<th>Maximum occurrence</th>
<th>Data type</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>52 MD_Keywords</td>
<td>Keywords, their type and source</td>
<td>Use obligation from referencing object</td>
<td>Use maximum occurrence from referencing object</td>
<td>Aggregated Class (MD_Identification)</td>
<td>Lines 53-55</td>
</tr>
<tr>
<td>53 keyword</td>
<td>commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject</td>
<td>M</td>
<td>N</td>
<td>CharacterString</td>
<td>Free text See Part 1, 8.2 and Part 1, 9.1</td>
</tr>
<tr>
<td>54 type</td>
<td>subject matter used to group similar keywords</td>
<td>O</td>
<td>1</td>
<td>Class</td>
<td>MD_KeywordTypeCode «CodeList» See Table 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See Part 1, 8.2 and Part 1, 9.1</td>
</tr>
<tr>
<td>55 thesaurusName</td>
<td>name of a formally registered thesaurus or a similar authoritative source of keywords</td>
<td>O</td>
<td>1</td>
<td>Class</td>
<td>CI_Citation «DataType» See Table 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See Part 1, 8.2 and Part 1, 9.1</td>
</tr>
<tr>
<td>Name / Role name</td>
<td>Definition</td>
<td>Obligation / Condition</td>
<td>Maximum occurrence</td>
<td>Data type</td>
<td>Domain</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>--------------------------</td>
<td>-----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>67 MD_Constraints</td>
<td>restrictions on the access and use of a resource or metadata</td>
<td>Use obligation from referencing object</td>
<td>Use maximum occurrence from referencing object</td>
<td>Aggregated Class (MD_Metadata and MD_Identification)</td>
<td>Line 68</td>
</tr>
<tr>
<td>68 useLimitation</td>
<td>limitation affecting the fitness for use of the resource or metadata. Example, “not to be used for navigation”</td>
<td>O</td>
<td>N</td>
<td>CharacterString</td>
<td>Free text</td>
</tr>
<tr>
<td>69 MD_LegalConstraints</td>
<td>restrictions and legal prerequisites for accessing and using the resource or metadata</td>
<td>Use obligation from referencing object</td>
<td>N</td>
<td>Specialised Class (MD_Constraints)</td>
<td>Lines 70-72 and 68</td>
</tr>
<tr>
<td>70 accessConstraints</td>
<td>access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource or metadata</td>
<td>O</td>
<td>N</td>
<td>Class</td>
<td>MD_RestrictionCode «CodeList» See Table 11</td>
</tr>
<tr>
<td>71 useConstraints</td>
<td>constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource or metadata</td>
<td>O</td>
<td>N</td>
<td>Class</td>
<td>MD_RestrictionCode «CodeList» See Table 11</td>
</tr>
<tr>
<td>72 otherConstraints</td>
<td>other restrictions and legal prerequisites for accessing and using the resource or metadata</td>
<td>C / accessConstraints or useConstraints equal “otherRestrictions”</td>
<td>N</td>
<td>CharacterString</td>
<td>Free text or code table. See Part 1, 9.3</td>
</tr>
</tbody>
</table>
### Table 5 – Extent information

<table>
<thead>
<tr>
<th>Name / Role name</th>
<th>Definition</th>
<th>Obligation / Condition</th>
<th>Maximum occurrence</th>
<th>Data type</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>334 EX_Extent</td>
<td>information about horizontal, vertical, and temporal extent</td>
<td>Use obligation from referencing object</td>
<td>Use maximum occurrence from referencing object</td>
<td>Class «DataType»</td>
<td>Lines 335-338</td>
</tr>
<tr>
<td>336 Role name: geographicElement</td>
<td>provides geographic component of the extent of the referring object</td>
<td>C</td>
<td>N</td>
<td>Association</td>
<td>EX_GeographicExtent «Abstract» See Table 5 See Part 1, 8.2</td>
</tr>
<tr>
<td>339 EX_GeographicExtent</td>
<td>geographic area of the dataset</td>
<td>Use obligation from referencing object</td>
<td>Use maximum occurrence from referencing object</td>
<td>Aggregated Class (EX_Extent and EX_SpatialTemporalExtent) «Abstract»</td>
<td>Line 340</td>
</tr>
<tr>
<td>343 EX_GeographicBoundingBox</td>
<td>geographic position of the dataset NOTE This is only an approximate reference so specifying the coordinate reference system is unnecessary</td>
<td>See Subclause 8.2 (Part 1)</td>
<td>Use maximum occurrence from referencing object</td>
<td>Specialised Class (EX_GeographicExtent)</td>
<td>Lines 344-347 and 340</td>
</tr>
<tr>
<td>344 westBoundLongitude</td>
<td>western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)</td>
<td>M</td>
<td>1</td>
<td>Class</td>
<td>Angle -180,0 &lt;= West Bounding Longitude Value &lt;= 180,0 See Part 1, 8.2</td>
</tr>
<tr>
<td>345 eastBoundLongitude</td>
<td>eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)</td>
<td>M</td>
<td>1</td>
<td>Class</td>
<td>Angle -180,0 &lt;= East Bounding Longitude Value &lt;= 180,0 See Part 1, 8.2</td>
</tr>
<tr>
<td>Name / Role name</td>
<td>Definition</td>
<td>Obligation / Condition</td>
<td>Maximum occurrence</td>
<td>Data type</td>
<td>Domain</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>------------------------</td>
<td>-------------------</td>
<td>-----------</td>
<td>--------</td>
</tr>
<tr>
<td>346 southBoundLatitude</td>
<td>southern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)</td>
<td>M</td>
<td>1</td>
<td>Class</td>
<td>-90,0 &lt;= South Bounding Latitude Value &lt;= 90,0; South Bounding Latitude Value &lt;= North bounding Latitude Value</td>
</tr>
<tr>
<td>347 northBoundLatitude</td>
<td>northern-most coordinate of the limit of the dataset extent expressed in latitude in decimal degrees (positive north)</td>
<td>M</td>
<td>1</td>
<td>Class</td>
<td>-90,0 &lt;= North Bounding Latitude Value &lt;= 90,0; North Bounding Latitude Value &gt;= South Bounding Latitude Value</td>
</tr>
</tbody>
</table>

See Part 1, 8.2
<table>
<thead>
<tr>
<th>Name / Role name</th>
<th>Definition</th>
<th>Obligation / Condition</th>
<th>Maximum occurrence</th>
<th>Data type</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>359 CI_Citation</td>
<td>standardized resource reference</td>
<td>Use obligation/condition from referencing object</td>
<td>Use maximum occurrence from referencing object</td>
<td>Class «DataType»</td>
<td>Lines 360-373</td>
</tr>
<tr>
<td>360 title</td>
<td>name by which the cited resource is known</td>
<td>M</td>
<td>1</td>
<td>CharacterString</td>
<td>Free text</td>
</tr>
<tr>
<td>362 date</td>
<td>reference date for the cited resource</td>
<td>M</td>
<td>N</td>
<td>Class CI_Date «DataType»</td>
<td>See Table 7</td>
</tr>
<tr>
<td>374 CI_ResponsibleParty</td>
<td>identification of, and means of communication with, person(s) and organizations associated with the dataset</td>
<td>Use obligation/condition from referencing object</td>
<td>Use maximum occurrence from referencing object</td>
<td>Class «DataType»</td>
<td>Lines 375-379</td>
</tr>
<tr>
<td>375 individualName</td>
<td>name of the responsible person surname, given name, title separated by a delimiter</td>
<td>C / organisationName and positionName not documented?</td>
<td>1</td>
<td>CharacterString</td>
<td>Free text</td>
</tr>
<tr>
<td>376 organisationName</td>
<td>name of the responsible organization</td>
<td>C / individualName and positionName not documented?</td>
<td>1</td>
<td>CharacterString</td>
<td>Free text</td>
</tr>
<tr>
<td>377 positionName</td>
<td>role or position of the responsible person</td>
<td>C / individualName and organisationName not documented?</td>
<td>1</td>
<td>CharacterString</td>
<td>Free text</td>
</tr>
<tr>
<td>378 contactInfo</td>
<td>contact information for the responsible party</td>
<td>O</td>
<td>1</td>
<td>Class CI_Contact «DataType»</td>
<td></td>
</tr>
<tr>
<td>379 role</td>
<td>function performed by the responsible party</td>
<td>M</td>
<td>1</td>
<td>Class CI_RoleCode «CodeList»</td>
<td>See Table 9</td>
</tr>
<tr>
<td>Name / Role name</td>
<td>Definition</td>
<td>Obligation / Condition</td>
<td>Maximum occurrence</td>
<td>Data type</td>
<td>Domain</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>------------------------</td>
<td>-------------------</td>
<td>-----------</td>
<td>--------</td>
</tr>
<tr>
<td>393  CI_Date</td>
<td>reference date and event used to describe it</td>
<td>Use obligation/condition from referencing object</td>
<td>Use maximum occurrence from referencing object</td>
<td>Class «DataType»</td>
<td>Lines 119-120</td>
</tr>
<tr>
<td>394  date</td>
<td>reference date for the cited resource</td>
<td>M</td>
<td>1</td>
<td>Class</td>
<td>Date</td>
</tr>
<tr>
<td>395  dateType</td>
<td>event used for the reference date</td>
<td>M</td>
<td>1</td>
<td>Class</td>
<td>CI_DateTypeCode «CodeList»</td>
</tr>
</tbody>
</table>

See Table 8
### 4 CODELISTS AND ENUMERATIONS

Table 8 to Table 13 describe the Code Lists defined in ISO 19115:2003 and ISO 19115:2003/Cor. 1:2006 that are referenced in the WMO Core Metadata Specification – including amendments for WMO Core Metadata Profile in **bold**.

Table 14 to Table 17 describe the new Code Lists defined in WMO Core Metadata Profile. A GML CodeList Dictionary implementation of the new and amended Code Lists is published at: [http://wis.wmo.int/2012/codelists/WMOCodelists.xml](http://wis.wmo.int/2012/codelists/WMOCodelists.xml).

#### Table 8 – CI_DateTypeCode «CodeList» (including amendment)

<table>
<thead>
<tr>
<th>Name</th>
<th>Domain Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI_DateTypeCode</td>
<td>DateTypCd</td>
<td>identification of when a given event occurred</td>
</tr>
<tr>
<td>creation</td>
<td>001</td>
<td>date identifies when the resource was brought into existence</td>
</tr>
<tr>
<td>publication</td>
<td>002</td>
<td>date identifies when the resource was issued</td>
</tr>
<tr>
<td>revision</td>
<td>003</td>
<td>date identifies when the resource was examined and improved or amended</td>
</tr>
<tr>
<td>reference</td>
<td>004</td>
<td>date identifies when the resource was referenced or accessed</td>
</tr>
</tbody>
</table>

#### Table 9 – CI_RoleCode «CodeList»

<table>
<thead>
<tr>
<th>Name</th>
<th>Domain Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI_RoleCode</td>
<td>RoleCd</td>
<td>function performed by the responsible party</td>
</tr>
<tr>
<td>resourceProvider</td>
<td>001</td>
<td>party that supplies the resource</td>
</tr>
<tr>
<td>custodian</td>
<td>002</td>
<td>party that accepts accountability and responsibility for the data and ensures appropriate care and maintenance of the resource</td>
</tr>
<tr>
<td>owner</td>
<td>003</td>
<td>party that owns the resource</td>
</tr>
<tr>
<td>user</td>
<td>004</td>
<td>party who uses the resource</td>
</tr>
<tr>
<td>distributor</td>
<td>005</td>
<td>party who distributes the resource</td>
</tr>
<tr>
<td>originator</td>
<td>006</td>
<td>party who created the resource</td>
</tr>
<tr>
<td>pointOfContact</td>
<td>007</td>
<td>party who can be contacted for acquiring knowledge about or acquisition of the resource</td>
</tr>
<tr>
<td>principalInvestigator</td>
<td>008</td>
<td>key party responsible for gathering information and conducting research</td>
</tr>
<tr>
<td>processor</td>
<td>009</td>
<td>party who has processed the data in a manner such that the resource has been modified</td>
</tr>
<tr>
<td>publisher</td>
<td>010</td>
<td>party who published the resource</td>
</tr>
<tr>
<td>author</td>
<td>011</td>
<td>party who authored the resource</td>
</tr>
</tbody>
</table>

#### Table 10 – MD_KeywordTypeCode «CodeList» (including amendment)

<table>
<thead>
<tr>
<th>Name</th>
<th>Domain Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD_KeywordTypeCode</td>
<td>KeyTypCd</td>
<td>methods used to group similar keywords</td>
</tr>
<tr>
<td>discipline</td>
<td>001</td>
<td>keyword identifies a branch of instruction or specialised learning</td>
</tr>
<tr>
<td>place</td>
<td>002</td>
<td>keyword identifies a location</td>
</tr>
<tr>
<td>stratum</td>
<td>003</td>
<td>keyword identifies a the layer(s) of any deposited substance</td>
</tr>
<tr>
<td>temporal</td>
<td>004</td>
<td>keyword identifies a time period related to the dataset</td>
</tr>
<tr>
<td>theme</td>
<td>005</td>
<td>keyword identifies a particular subject or topic</td>
</tr>
<tr>
<td>dataCentre</td>
<td>006</td>
<td>keyword identifies a repository or archive that manages and distributes data (from ISO/DIS 19115-1:2013)</td>
</tr>
<tr>
<td>Name</td>
<td>Domain Code</td>
<td>Definition</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>MD_RestrictionCode</td>
<td>RestrictCd</td>
<td>limitation(s) placed upon access or use of the data</td>
</tr>
<tr>
<td>copyright</td>
<td>001</td>
<td>exclusive right to the publication, production, or sale of the rights to a literary, dramatic, musical or artistic work, or to the use of a commercial print or label, granted by law for a specified period of time to an author, composer, artist or distributor</td>
</tr>
<tr>
<td>patent</td>
<td>002</td>
<td>government has granted exclusive right to make, sell, use or license an invention or discovery</td>
</tr>
<tr>
<td>patentPending</td>
<td>003</td>
<td>produced or sold information awaiting a patent</td>
</tr>
<tr>
<td>trademark</td>
<td>004</td>
<td>a name, symbol, or other device identifying a product, officially registered and legally restricted to the use of the owner or manufacturer</td>
</tr>
<tr>
<td>license</td>
<td>005</td>
<td>formal permission to do something</td>
</tr>
<tr>
<td>intellectualPropertyRights</td>
<td>006</td>
<td>Rights to financially benefit from and control of distribution of non-tangible property that is the result of creativity</td>
</tr>
<tr>
<td>restricted</td>
<td>007</td>
<td>Withheld from general circulation or disclosure</td>
</tr>
<tr>
<td>otherRestrictions</td>
<td>008</td>
<td>limitation not listed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Domain Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD_ScopeCode</td>
<td>ScopeCd</td>
<td>class of information to which the referencing entity applies</td>
</tr>
<tr>
<td>attribute</td>
<td>001</td>
<td>information applies to the attribute class</td>
</tr>
<tr>
<td>attributeType</td>
<td>002</td>
<td>information applies to the characteristic of a feature</td>
</tr>
<tr>
<td>collectionHardware</td>
<td>003</td>
<td>information applies to the collection hardware class</td>
</tr>
<tr>
<td>collectionSession</td>
<td>004</td>
<td>information applies to the collection session</td>
</tr>
<tr>
<td>dataset</td>
<td>005</td>
<td>information applies to the dataset</td>
</tr>
<tr>
<td>series</td>
<td>006</td>
<td>information applies to the series</td>
</tr>
<tr>
<td>nonGeographicDataset</td>
<td>007</td>
<td>information applies to non-geographic data</td>
</tr>
<tr>
<td>dimensionGroup</td>
<td>008</td>
<td>information applies to a dimension group</td>
</tr>
<tr>
<td>feature</td>
<td>009</td>
<td>information applies to a feature</td>
</tr>
<tr>
<td>featureType</td>
<td>010</td>
<td>information applies to a feature type</td>
</tr>
<tr>
<td>propertyType</td>
<td>011</td>
<td>information applies to a property type</td>
</tr>
<tr>
<td>fieldSession</td>
<td>012</td>
<td>information applies to a field session</td>
</tr>
<tr>
<td>software</td>
<td>013</td>
<td>information applies to a computer programme or routine</td>
</tr>
<tr>
<td>service</td>
<td>014</td>
<td>information applies to a capability which a service provider entity makes available to a service user entity through a set of interfaces that defines a behaviour, such as a use case</td>
</tr>
<tr>
<td>model</td>
<td>015</td>
<td>information applies to a copy or imitation of an existing or hypothetical object</td>
</tr>
<tr>
<td>tile</td>
<td>016</td>
<td>information applies to a tile, a spatial subset of geographic data</td>
</tr>
<tr>
<td>Name</td>
<td>Domain code</td>
<td>Definition</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1. MD_TopicCategoryCode</td>
<td>TopicCatCd</td>
<td>high-level geographic data thematic classification to assist in the grouping and search of available geographic data sets, Can be used to group keywords as well. Listed examples are not exhaustive. NOTE It is understood there are overlaps between general categories and the user is encouraged to select the one most appropriate.</td>
</tr>
<tr>
<td>2. farming</td>
<td>001</td>
<td>rearing of animals and/or cultivation of plants Examples: agriculture, plantations, herding, pests and diseases affecting crops and livestock</td>
</tr>
<tr>
<td>3. biota</td>
<td>002</td>
<td>flora and/or fauna in natural environment Examples: wildlife, vegetation, biological sciences, ecology, sea-life, habitat</td>
</tr>
<tr>
<td>4. boundaries</td>
<td>003</td>
<td>legal land descriptions Examples: political and administrative boundaries</td>
</tr>
<tr>
<td>5. climatologyMeteorologyAtmosphere</td>
<td>004</td>
<td>processes and phenomena of the atmosphere Examples: weather, climate, atmospheric conditions, climate change, precipitation</td>
</tr>
<tr>
<td>6. economy</td>
<td>005</td>
<td>economic activities, conditions and employment Examples: production, labour, revenue, commerce, industry, tourism and ecotourism, forestry, fisheries, commercial or subsistence hunting, exploration and exploitation of resources such as minerals, oil and gas</td>
</tr>
<tr>
<td>7. elevation</td>
<td>006</td>
<td>height above or below sea level Examples: altitude, bathymetry, digital elevation models, slope, derived products</td>
</tr>
<tr>
<td>8. environment</td>
<td>007</td>
<td>environmental resources, protection and conservation Examples: environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape</td>
</tr>
<tr>
<td>9. geoscientificInformation</td>
<td>008</td>
<td>information pertaining to earth sciences Examples: geophysical features and processes, geology, minerals, sciences dealing with the composition, structure and origin of the earth’s rocks, risks of earthquakes, volcanic activity, landslides, gravity information, soils, permafrost, hydrogeology, erosion, health, health services, human ecology, and safety Examples: disease and illness, factors affecting health, hygiene, substance abuse, mental and physical health, health services</td>
</tr>
<tr>
<td>10. health</td>
<td>009</td>
<td></td>
</tr>
<tr>
<td>11. imageryBaseMapsEarthCover</td>
<td>010</td>
<td>base maps Examples: land cover, topographic maps, imagery, unclassified images, annotations</td>
</tr>
<tr>
<td>12. intelligenceMilitary</td>
<td>011</td>
<td>military bases, structures, activities Examples: barracks, training grounds, military transportation, information collection</td>
</tr>
<tr>
<td>13. inlandWaters</td>
<td>012</td>
<td>inland water features, drainage systems and their characteristics Examples: rivers and glaciers, salt lakes, water utilization plans, dams, currents, floods, water quality, hydrographic charts</td>
</tr>
<tr>
<td>14. location</td>
<td>013</td>
<td>positional information and services Examples: addresses, geodetic networks, control points, postal zones and services, place names</td>
</tr>
<tr>
<td>15. oceans</td>
<td>014</td>
<td>features and characteristics of salt water bodies (excluding inland waters) Examples: tides, tidal waves, coastal information, reefs</td>
</tr>
<tr>
<td>16. planningCadastre</td>
<td>015</td>
<td>information used for appropriate actions for future use of the land Examples: land use maps, zoning maps, cadastral surveys, land ownership</td>
</tr>
<tr>
<td>Name</td>
<td>Domain code</td>
<td>Definition</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>society</td>
<td>016</td>
<td>characteristics of society and cultures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Examples: settlements, anthropology, archaeology, education, traditional</td>
</tr>
<tr>
<td></td>
<td></td>
<td>beliefs, manners and customs, demographic data, recreational areas and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>activities, social impact assessments, crime and justice, census information</td>
</tr>
<tr>
<td>structure</td>
<td>017</td>
<td>man-made construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Examples: buildings, museums, churches, factories, housing, monuments, shops,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>towers</td>
</tr>
<tr>
<td>transportation</td>
<td>018</td>
<td>means and aids for conveying persons and/or goods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Examples: roads, airports/airstrips, shipping routes, tunnels, nautical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>charts, vehicle or vessel location, aeronautical charts, railways</td>
</tr>
<tr>
<td>utilitiesCommunication</td>
<td>019</td>
<td>energy, water and waste systems and communications infrastructure and services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Examples: hydroelectricity, geothermal, solar and nuclear sources of energy,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>water purification and distribution, sewage collection and disposal, electricity and gas distribution, data communication, telecommunication, radio, communication Networks</td>
</tr>
</tbody>
</table>

Table 14 – WMO_DataLicenseCode «CodeList»

<table>
<thead>
<tr>
<th>Name</th>
<th>Domain Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMO_DataLicenseCode</td>
<td>WMODatLicCd</td>
<td>WMO Data License applied to the data resource – derived from WMO Resolution 25 and Resolution 40 <a href="http://www.wmo.int/pages/about/exchangingdata_en.html">http://www.wmo.int/pages/about/exchangingdata_en.html</a></td>
</tr>
<tr>
<td>WMOEssential</td>
<td>001</td>
<td>WMO Essential Data: free and unrestricted international exchange of basic meteorological data and products.</td>
</tr>
<tr>
<td>WMOAdditional</td>
<td>002</td>
<td>WMO Additional Data: free and unrestricted access to data and products exchanged under the auspices of WMO to the research and education communities for non-commercial activities. A more precise definition of the data policy may be additionally supplied within the metadata. In all cases it shall be the responsibility of the data consumer to ensure that they understand the data policy specified by the data provider – which may necessitate dialogue with the data publisher for confirmation of terms and conditions.</td>
</tr>
<tr>
<td>WMOOther</td>
<td>003</td>
<td>Data identified for global distribution via WMO infrastructure (GTS / WIS) that is not covered by WMO Resolution 25 or WMO Resolution 40; e.g. aviation OPMET data. Data marked with “WMOOther” data policy shall be treated like “WMOAdditional” where a more precise definition of the data policy may be additionally supplied within the metadata. In all cases it shall be the responsibility of the data consumer to ensure that they understand the data policy specified by the data provider – which may necessitate dialogue with the data publisher for confirmation of terms and conditions.</td>
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Table 15 – WMO_GTSProductCategoryCode «CodeList»

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<td>Product category used for prioritising messages on the WMO Global Telecommunication System (GTS)</td>
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Table 17 – WMO_DistributionScopeCode «CodeList»

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Annex 2 to Resolution 13 (EC-65)

QUANTITATIVE MONITORING OF THE WIS – CHANGES TO THE MANUAL ON THE WMO INFORMATION SYSTEM (WMO-No. 1060)

Typographic conventions used in the text:

Text that has been deleted from that in an existing translated document.
Text that has been added to that in an existing translated document.

AMENDMENTS TO THE MANUAL ON THE WMO INFORMATION SYSTEM

Modified paragraph
3.5.10.2. Monitoring of the collection and dissemination of WIS information (data and products) should include, as appropriate, Integrated World Weather Watch Monitoring-WIS monitoring and monitoring related to WMO Programmes other programme-related monitoring.

Annex 3 to Resolution 13 (EC-65)

**TABLE B.3 OF THE MANUAL ON THE WMO INFORMATION SYSTEM (WMO-No. 1060)**

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**Resolution 14 (EC-65)**

**QUALITY MANAGEMENT AND INFRASTRUCTURE DEVELOPMENT OF THE WMO INFORMATION SYSTEM**

**THE EXECUTIVE COUNCIL,**

**Noting:**

(1) Resolution 51 (Cg-XVI) – Designation of centres of the WMO Information System,

(2) Resolution 12 (EC-64) – Designation of centres of the WMO Information System,

**Noting further:**

(1) The importance of satellite-based systems for communication as well as data and product transmission, in particular the importance of the satellite broadcast systems operated by Members as part of the Global Telecommunication System,

(2) The success of the Regional ATOVS Retransmission Service and the potential benefits from the Satellite Communications Users Forum (SATCOM),

(3) The effectiveness of suitable standards that facilitate interoperability between WMO Information System (WIS) centres in reducing the overall costs of WIS,

(4) The importance of monitoring and corrective processes to ensure the appropriate implementation and application in each centre of the standards agreed to in WIS,

(5) The need for further training and guidance material to facilitate the implementation and use of WIS by Members,

**Requests** the Commission for Basic Systems:

(1) To continue to develop the Integrated Global Data Dissemination Service within WIS, expanding its scope to include satellite-based data collection and distribution systems and further integration of space-based and terrestrial information exchange;
(2) To further advance the SATCOM user forum initiative as defined by the Sixteenth World Meteorological Congress;

(3) To continue the identification and adoption of suitable standards that facilitate the seamless interoperability of WIS centres, including user authentication and authorization;

(4) To review the WIS centre certification process defined in the manual on WIS to include routine or periodic assessment of the centres’ WIS functionality and compliance with agreed standards;

(5) To define and document the standard WIS monitoring practices and procedures for WIS centres to be included in the *Manual on the WMO Information System* (WMO-No. 1060) and the *Guide to the WMO Information System* (WMO-No. 1061) as appropriate;

(6) To develop a structured training package for WIS and to investigate the feasibility of a competence framework for staff operating and managing WIS centres;

**Requests** the Secretary-General to take the relevant actions in support of the activities of the Commission for Basic Systems to facilitate the timely implementation of WIS.

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**Resolution 15 (EC-65)**

**REPORT OF THE FIFTEENTH SESSION OF THE COMMISSION FOR BASIC SYSTEMS RELEVANT TO THE TECHNICAL REGULATIONS CONCERNING THE GLOBAL TELECOMMUNICATION SYSTEM AND DATA MANAGEMENT**

THE EXECUTIVE COUNCIL,

**Having considered** the *Abridged Final Report with Resolutions and Recommendations of the Fifteenth Session of the Commission for Basic Systems* (WMO-No. 1110),

**Noting** Recommendation 9 (CBS-15) – Amendments to the *Manual on Codes* (WMO-No. 306), and Recommendation 10 (CBS-15) – Amendments to the *Manual on the Global Telecommunication System* (WMO-No. 386),

**Noting further** that the president of the Commission for Basic Systems, in consultation with its Management Group, had recommended changes to the *Manual on the Global Telecommunication System* (WMO-No. 386),

**Decides:**

(1) To approve the amendments to the *Manual on Codes* (WMO-No. 306), Volumes 1.1 and 1.2, as given in Annex 1 to the present resolution, with effect from 1 July 2013;

(2) To approve the amendments to the *Manual on the Global Telecommunication System* (WMO-No. 386), Volume I, Part II, as given in Annex 2 to the present resolution, with effect from 1 July 2013;

(3) To approve the amendments to the *Manual on the Global Telecommunication System* (WMO-No. 386), Volume I, Part I, as given in Annex 3 to the present resolution, with effect from 1 July 2013;
Authorizes the Secretary-General to make any consequent editorial amendments;

Requests the Secretary-General to publish the revised documents.

Annex 1 to Resolution 15 (EC-65)

CHANGES TO THE PROCEDURES FOR AMENDING THE
MANUAL ON CODES (WMO-No. 306), VOLUMES I.1 AND I.2

[Editorial note: Meaning of marks used below:
Text --- No changes
Text --- Addition or modification
Text --- Deletion or modification]

Amend articles 1.1 and 6.3 of the procedures as follows:

1.1 Proposal of amendments

Amendments to the Manual on Codes must shall be proposed in writing to the WMO Secretariat. The proposal shall specify the need, purpose and requirement for the proposed amendment and include information on a contact point for technical matters. A contact point for technical matters shall be identified to facilitate collaboration for validation and drafting recommendations.

6.3 Testing with encoder/decoder

For new or modified WMO code and data representation forms, proposed changes should be tested by at least two centres, using the use of at least two independently developed encoders and two independently developed decoders which incorporated the proposed change. Where the data originated from a necessarily unique source (for example, the data stream from an experimental satellite), the successful testing of a single encoder with at least two independent decoders would be considered adequate. Results should be made available to the IPET-DRMM with a view to verifying the technical specifications.

Annex 2 to Resolution 15 (EC-65)

AMENDMENTS TO THE MANUAL ON THE GLOBAL
TELECOMMUNICATION SYSTEM (WMO-No. 386), VOLUME I, PART II

Following the first paragraph at the top of page II-4

“Once a bulletin has been originated or compiled, the CCCC must not be changed. If the contents of a bulletin is changed or recompiled for any reason, the CCCC should be changed to indicate the centre or station making the change.”

Insert the text:

When Traditional Alphanumeric Code (TAC) bulletins from one centre (NMHS1) are converted to Table Driven Code Form (TDCF) by another centre (NMHS2):
(a) The location indicator CCCC of NMHS1 (the producer of TAC bulletins) shall be used in the abbreviated headings of the converted bulletins;

(b) For each bulletin converted, the RTH responsible for NMHS1 shall ensure that the “remarks” column of Volume C1 of WMO Publication No. 9 - Catalogue of Meteorological Bulletins shows that the data are converted by NMHS2;

(c) In the case that NMHS1 and NMHS2 are in the zones of responsibility of two different RTHs, the RTH responsible for NMHS1 (the producer of TAC bulletins) shall send the required Advanced Notification form to the WMO Secretariat;

Annex 3 to Resolution 15 (EC-65)

AMENDMENTS TO THE MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM (WMO-No. 386), VOLUME I, PART I, RECOMMENDED BY THE PRESIDENT OF THE COMMISSION FOR BASIC SYSTEMS

The following text should be inserted into the Manual on GTS in section 1.3, at the end of principle 2:

Note that in this document, the word circuit is traditionally understood to represent a physical link between two Centres, but in today’s modern telecommunication systems, could also be understood to represent a logical stream of data between two Centres that are interconnected using a network. In this latter situation, several circuits could be implemented from a given Centre over a single physical connection to a network.

Note that a GTS circuit is a specialized form of a WMO Information System (WIS) circuit and that for convenience the status of any WIS link between WIS centres may be recorded as being in one of four states:

B1 - Negotiating,
B2 - Circuit Operational,
B3 - Pending GTS status and
B4 - GTS Circuit.

Resolution 16 (EC-65)

IMPLEMENTATION PLAN OF THE WMO STRATEGY FOR CAPACITY DEVELOPMENT

THE EXECUTIVE COUNCIL,

Noting:

(1) Resolution 49 (Cg-XVI) – WMO Strategy for Capacity Development,
(2) Resolution 18 (EC-64) – WMO Capacity Development Strategy,
(3) Resolution 21 (EC-64) – Terms of reference of the Executive Council Working Group on Capacity Development,
Considering:

(1) That capacity building is one of the priority areas for WMO in the sixteenth financial period (2012–2015) and has significant implications for the other four priority areas and for implementation of the WMO Strategic Plan,

(2) The need for a cohesive and coordinated approach to capacity development to maximize the outcome of WMO capacity-development activities,

Having considered the draft Implementation Plan of the Strategy for Capacity Development 2012–2015,

Decides:

(1) To adopt the draft Implementation Plan of the WMO Strategy for Capacity Development 2012–2015, as given in the annex to the present resolution;

(2) To assign to the Executive Council Working Group on Capacity Development the responsibility for reviewing the implementation of activities as set out in the draft Implementation Plan, with the involvement of relevant stakeholders, including other Executive Council bodies and WMO Programmes;

(3) To entrust the Executive Council Working Group on Capacity Development with the task of reviewing the Implementation Plan and informing the Executive Council at its sixty-sixth session of progress made and any proposed changes;

(4) To consider a report by the Working Group prior to the next regular session of the World Meteorological Congress;

Requests the Executive Council Working Group on Capacity Development to consider the Implementation Plan and its annexes as guides for the preparation of a subsequent plan with clearly articulated goals, targets and priorities, which is to be an integral part of the WMO Operating Plan for 2016–2019;

Urges technical commissions, regional associations, Executive Council Working Groups and Panels of Experts, and Members to collaborate in and give all possible support to the Implementation Plan of the Strategy for Capacity Development in the sixteenth financial period (2012–2015);

Requests the Secretary-General to communicate the Implementation Plan with supporting annexes to Members and constituent bodies in all official languages.
Annex to Resolution 16 (EC-65)

IMPLEMENTATION PLAN OF
THE WMO STRATEGY FOR CAPACITY DEVELOPMENT

CONTENTS

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EXECUTIVE SUMMARY

The Capacity Development Strategy (CDS), as approved by the Executive Council at its sixty-fourth session, manifests the holistic nature of capacity development. On the basis of the criteria given by the Sixteenth World Meteorological Congress and by the Executive Council at its sixty-third and sixty-fourth sessions, a strategic framework was developed to ensure that a range of relevant considerations were factored in CDS and, subsequently, in the Capacity Development Strategy Implementation Plan (CDSIP). An analysis of how the World Meteorological Organization (WMO) can best assist National Meteorological and Hydrological Services (NMHSs) in developing and sustaining their activities led to the preparation of the six Strategic Objectives of CDS:

- **Strategic Objective 1:** Define required capacities and identify deficiencies
- **Strategic Objective 2:** Increase visibility and national ownership
- **Strategic Objective 3:** Optimize knowledge management
- **Strategic Objective 4:** Reinforce resource mobilization and project management
- **Strategic Objective 5:** Strengthen global, regional and subregional mechanisms
- **Strategic Objective 6:** Increase education and research opportunities

The Capacity Development Strategy is expected to serve as a basis for action beyond this financial period, however CDSIP for 2012–2015 seeks to identify activities that during this period contribute to the accomplishment of the CDS Strategic Objectives.

As a standard-setting organization, WMO provides the framework for international cooperation in weather, water and climate. By promoting the establishment of standards for measurement of geophysical observations as well as processing and standardization of related data, it provides the point of reference needed by NMHSs to build their service, cooperate with their neighbours and contribute to global efforts.

The Capacity Development Strategy puts emphasis on communicating these WMO technical requirements and on assisting Members in translating them into national, regional and global priorities and actions. Over the last two decades this emphasis has been somewhat muted as new technologies and rapidly developing changes in methods of data collection and exchange rendered many WMO requirements obsolete or incomplete. During this financial period, these standards, requirements and manuals should be brought up to date and promulgated. A clear need for compliance must be put forward to create what has been called a “culture of compliance”. In parallel, reports by NMHSs on their conformance to these requirements should be collected and used to establish baseline information or identify gaps at national, regional and global levels. The collected information should be used in the formulation of WMO assistance to Members in the development of their NMHS.

This focus on compliance will further collaboration between NMHSs and advance the application of meteorology to public weather services, agriculture, aviation, shipping, the environment, water issues and the mitigation of the impacts of natural disasters.

Paramount for this financial period are foundational activities, which are vital for future action. For example, tools to communicate both what NMHSs need and what WMO has to assist them should be improved. Baseline information on national capabilities should be established and the roles of WMO bodies contributing to those capabilities should be clarified. Once mechanisms in these areas have been established, they should serve to further elucidate priorities for future plans and contribute to the development of future WMO Strategic and Operating Plans.

Section 3 of CDSIP identifies CDS key activities and priority areas for 2012–2015 relating to each of the six Strategic Objectives, with an estimate of regular budget allotment for each Objective.
Building on Section 3, the CDSIP Table in Annex 9 provides specific WMO Programme activities derived from the WMO Strategic and Operating Plans 2012–2015, with approximate regular budget allocations for each Strategic Objective. This is also a first effort to map WMO capacity development activities to the six Strategic Objectives, through the various programmes of the Organization and across the Expected Results of the Strategic and Operating Plans and the regular budget (2012–2015). While Section 3.2 of CDSIP describes the roles of WMO entities in general, the CDSIP Table identifies those with primary responsibility for a representative listing of specific activities by WMO Programme. Attention was paid to the institutional, infrastructural, human and procedural capacities at global, regional and national levels.

The Capacity Development Strategy lays emphasis on assisting NMHSs in engaging with national stakeholders. This engagement should foster mutual understanding and yield prioritized requirements that justify investment in capacity while building national ownership, strengthening the NMHS service orientation and emphasizing the socio-economic contributions of the NMHS.

1. INTRODUCTION

The purpose of this document is to provide Members of the World Meteorological Organization, through its Congress and Executive Council, with an Implementation Plan to support the Organization’s Capacity Development Strategy. This provides a coordinated and cohesive approach to capacity development activities carried out by WMO.

The roles of WMO constituent bodies as well as those of WMO Members in implementing CDS are discussed to further cultivate a collaborative approach to a common goal, unattainable without the efforts of all. Particular emphasis is laid on the role of national governments, especially in planning and sustaining the capabilities of NMHSs in partnership with regional and global communities, in recognition of the importance of NMHSs for public safety, security, national development and general social and economic benefits which flow from weather, water and climate services. The Capacity Development Strategy aims to ensure that WMO capacity-development activities are scalable, capacity-development investments are monitored and results evaluated for sustainability over time. This Implementation Plan is bound to the WMO Strategic and Operating Plans 2012–2015 and is thus developed for a four-year period, whereas the Capacity Development Strategy itself describes a longer-term strategy potentially over several planning periods.

A distinction is made between “capacity building” and “capacity development” (see Annex 1: Definitions). The former implies that no capacity currently exists, while the latter considers existing capacities with an emphasis on a more holistic approach and national ownership of the development process. WMO assistance to NMHSs must be informed by existing and planned capacities. In most cases, there are existing capacities, but in exceptional circumstances, such as in countries emerging from conflict or major natural disaster, capacity building is an appropriate approach. For concrete examples of how WMO assists in Capacity Development see Annex 2: Case Studies.

2. STRATEGIC FRAMEWORK

An analysis of WMO assistance to NMHSs resulted in the identification of a number of issues which led to the formulation of the Strategic Objectives and Strategic Approaches outlined in Annex 9, which, together with the activities and associated implementation plans, are expected to ensure that implemented capacities are sustainable and retained over time. Each of the Strategic Objectives corresponds to one or more of the eight steps of the Capacity-development Process and deals with the identified issues (see Annex 3: Capacity Development Process, Dimensions and Quality Management Approach).
The Strategic Approaches will address how the vision above can be achieved in terms of capacity development. The Strategic Framework (see Figure 1) builds upon the following key elements of capacity development:

- The Eight-step Capacity-development process, adapted from the five-step approach of UNDP and others, to better reflect the steps required for the development of NMHSs;
- The four dimensions of capacity development: human, institutional, infrastructural and procedural);
- The WMO Strategic and Operating Plans (2012–2015);
- The WMO Programmes;
- The complementary and mutually reinforcing roles of constituent bodies, the WMO Secretariat, Members and partners in capacity development;
- The Quality Management System: a set of interrelated or interacting elements that organizations use to direct and control how quality policies are implemented and quality objectives achieved;
- The WMO Strategy for Service Delivery, which seeks to build and institutionalize practices to strengthen service delivery by describing key strategy elements and activities.

Figure 1. The CDS strategic framework
2.1  **Relationship to the WMO Strategic and Operating Plans (2012–2015)**

Capacity building is one of the strategic thrusts of the WMO Strategic and Operating Plans for 2012–2015. It is recognized as a cross-cutting activity that relates in many ways to the other thrusts and is found in all of the Expected Results of the WMO Strategic Plan. In addition, Expected Result 6 (Enhanced capacities of NMHSs, in particular in developing and least developed countries, to fulfil their mandates) recognizes that special attention must be paid to improving the capabilities of NMHSs in developing and least developed countries.

The Strategic Plan includes capacity building for developing and least developed countries as one of the five strategic priority areas expected to make a significant contribution to the achievement of the Expected Results. For further information on this issue see Annex 4: CDS and WMO Priorities.

3.  **IMPLEMENTATION PLAN**

The implementation of the WMO Capacity Development Strategy is structured with key activities supporting the strategic approaches under the Strategic Objectives described above. Section 3.1 describes the general implementation framework with key activities, priorities and regular budget for each CDS Strategic Objective (see Figure 2 below), the roles of various stakeholders and approaches to resource mobilization. Annex 9 provides more detailed information on the activities under each Strategic Objective mapped to WMO Programmes, the key outcomes of the WMO Strategic and Operating Plans and estimated budget allocation (2012–2015).

3.1  **Key activities and priorities for 2012–2015**

<table>
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<tr>
<th>Strategic Objective 1 Define required capacities and identify deficiencies CHF</th>
<th>8,337,000</th>
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</table>

1A: Emphasize compliance with WMO technical requirements in addressing priorities

**Key activities of WMO:**
- Clarifying WMO standards, technical requirements, practices and priorities
- Compiling compliance reports
- Organizing training activities.

1B: Assist countries in identifying deficiencies of NMHSs

**Key activities of WMO:**
- Organizing stakeholder fora to define national and regional requirements and show global interdependence

---

1 The cost implication was calculated as follows:

1. Non-staff costs are captured. Staff costs are excluded.
2. Costs of activities are captured by objective as follows:
   - Objective 1: cost of activities relating to the sessions of technical commissions, the Training Programme, the Regional Programme (20 per cent only) and Expected Result 7;
   - Objective 2: cost of activities relating to the Public Weather Service Programme, the Aeronautical Meteorology Programme, the Tropical Cyclone Programme, the Disaster Risk Reduction Programme, the WMO Programme for the Least Developed Countries (50 per cent only), the Marine Meteorology Programme and the Regional Programme (10 per cent only);
   - Objective 3: cost of activities relating to the Regional Programme (10 per cent only), and the REM costs for information and communication technologies (10 per cent only);
   - Objective 4: cost of activities relating to the Resource Mobilization Programme and the Voluntary Cooperation Programme;
   - Objective 5: cost of activities relating to the Regional Programme (60 per cent only);
   - Objective 6: cost of activities relating to fellowships and the Research Programme.
• Organizing national and regional user events
• Developing guidance material on the role and operation of NMHSs
• Country assessments and independent analyses, conducting and reporting on country assessments to establish baselines
• Promoting transparency through information sharing leading to the development of requirement-driven strategies.

1C: Encourage development of services to address specific user needs

Key activities of WMO:
• Developing communication plans
• Defining new services and new products to be delivered by NMHSs in accordance with the WMO Strategy for Service Delivery.

1D: Establish modalities for partner and stakeholder engagement

Key activities of WMO:
• Working with national partners and government entities to build a common vision for use of environmental information to meet societal needs
• Organizing national development partner and stakeholder meetings
• Sharing of projects and requirements.

Priorities for Strategic Objective 1

- Cultivate culture of compliance
  - Update and clarify standards
  - Communicate updated standards and technical requirements, and NMHS responsibility to comply
  - Assist Members in reporting on their compliance (assessments, reporting tools, etc.)

- Focus assistance to address the deficiencies of NMHSs in priority areas such as aviation, the Global Framework for Climate Services, the WMO Integrated Global Observing System and Disaster Risk Reduction (especially for least developed countries and small island developing States)
  - Continue to assist NMHSs in completing their Quality Management System and becoming ISO certifiable, with a recommendation to become fully ISO certified
  - Support the implementation of competency assessments through provision of guidance, assessor training and, where necessary, targeted support based on twinning and Secretariat assistance

- Continue to assist NMHSs in building stakeholder confidence and service delivery vision.

| Strategic Objective 2: Increase visibility and national ownership | CHF 6,183,000 |

2A: When dealing with decision-makers, emphasize the socio-economic benefits of services provided by NMHSs
Key activities of WMO:
- Developing an advocacy, outreach and communication strategy to approach governments
- Advocating inclusion of NMHSs in national development planning and securing buy-in and national funds for the development of NMHSs.

2B: Assist NMHSs in incorporating requirements in national policy, legislative frameworks and national development plans

Key activities of WMO:
- Collecting and disseminating examples of clear legislative and policy frameworks, best practices and case studies
- Assisting developing countries in clarifying national laws and procedures through consultation and training
- Collecting information and carrying out research on the socio-economic benefits of the services provided by NMHSs
- Assisting NMHSs in the development of their strategic plans to include the four dimensions of capacity development.

2C: Enhance outreach to end-users and decision-makers

Key activity of WMO:
Assisting NMHSs, through workshops, training events and consultancies, in the development of services designed to meet user needs, with particular emphasis on public weather services for increased visibility of NMHSs.

2D: Develop leadership and management capacities

Key activities of WMO:
- Enhanced training to develop leadership at various organizational levels of NMHSs
- Developing a network of qualified experts to assist NMHSs with management skills and strategic planning
- Facilitating twinning arrangements.

2E: Reinforce national support to meet societal needs for weather, climate and hydrology services

Key activities of WMO:
- Categorizing NMHSs according to the level of services provided and using the categories to guide assistance
- Linking the categories to human, institutional, infrastructural and procedural capacities needed to provide the required levels of service (for information on NMHS categories, see Annex 5: Categorization of NMHSs)
- Tailoring fellowship and training activities as well as technical assistance to address identified deficiencies and WMO priority areas.

Priorities for Strategic Objective 2

- Emphasize that NMHSs have to comply with WMO standards and technical requirements and to use WMO guidance material to build national support
- Use information gathered from categories of NMHS service, the Country Profile Database and surveys to seek national support based on need
  - Fill gaps in observing systems, institutional, human and procedural capacities
– Continue and expand direct country assistance (advocacy, assessments, project formulation and strategic planning)
– Continue assistance in establishing appropriate national legal and policy frameworks
– Continue focus on service, risk mitigation and socio-economic benefits to build national and partner support.

Strategic Objective 3: Optimize Capacity Development Knowledge Management (CDKM) CHF 935,000

3A: Enhance mechanisms for collecting and sharing up-to-date information relating to the development of NMHSs

Key activities of WMO:
- Completing the development of a Country Profile Database
- Developing coordinated information collection mechanisms including surveys and online submissions from Members
- Relevant monitoring and evaluation data on capacity-development activities of NMHSs to be made available to stakeholders including partners and investors.

3B: Share best practices and success stories relating to the development of NMHSs

Key activities of WMO:
- Establishing web-based and other mechanisms for sharing information
- Encouraging Members to prepare specific examples of success and challenges in developing the capacity of their NMHSs
- Highlighting lessons learned and principles that could be applied in other countries.

3C: Enhance communities of practice dealing with the development of NMHSs

Key activity of WMO:
Coordinating the work of informal groupings in communities of practice to provide assistance, insight, experience and knowledge of global and regional initiatives relating to the development of NMHSs.

Priorities for Strategic Objective 3

– Establish mechanisms for gathering and monitoring NMHS development such as categories, the Country Profile Database, surveys and national assessment missions
– Improving web-based tools to facilitate Members’ access to WMO requirements and guidelines, and to report/monitor progress.

Strategic Objective 4: Reinforce Resource Mobilization and Project Management CHF 336,000

4A: Enhance coordination, actively explore new funding opportunities and develop proposals through dialogue with stakeholders and development partners
Key activity of WMO:

Developing mechanisms for sharing information about funding opportunities and to facilitate access to donors.

4B: Enhance capacity to develop, implement, monitor and evaluate projects

Key activities of WMO:
- Creating a project coordination system within the Secretariat to assist in the development and coordination of large scale projects
- Developing a monitoring and evaluation toolkit, and providing assistance and guidance in gathering data and information
- Workshops and courses on Project Management.

4C: Encourage innovative voluntary and bilateral cooperation

Key activities of WMO:
- Seminars and workshops to facilitate south-south cooperation
- Promoting cooperation between NMHSs and their official development assistance agencies
- Strengthening and expanding the Voluntary Cooperation Programme
- Encouraging communities of interest such as the Informal Planning Meeting.

Priorities for Strategic Objective 4

- Build a strong project oversight system within the Secretariat (create a Project Coordination Unit and a Project Oversight Board)
- Continue and increase resource mobilization and partnerships through a variety of activities (see Annex 8: Resource Mobilization Strategy)
- Use the need for NMHSs to comply with WMO requirements and technical standards to target assistance in advocacy, resource mobilization, technology transfer, training and research.

Strategic Objective 5: Strengthen global, regional and subregional mechanisms  
CHF 4,239,000

5A: Strengthen the work of global and regional centres

Key activities of WMO:
- Delivering regional and subregional pilot projects and demonstrations with emphasis on services that support regional issues and their link with WMO priorities and global systems
- Help NMHSs reduce the high cost of observing system expendables and maintenance.

5B: Strengthen global, regional and subregional mechanisms that provide support for meteorological, climatological and hydrological services

Key activities of WMO:
- Working with regional associations to build regional political support for NMHSs
- Building partnerships with subregional bodies and economic groupings
- Strengthening Regional Climate Outlook Fora by providing training and workshops
- Building on the success of the African Ministerial Conference on Meteorology and regionwide conferences for ministerial level officials to highlight the socio-economic benefits of investing in NMHSs and the expanding services required of them
- Establishing collaborative arrangements with entities in the Region, whose mandates are complementary to those of WMO, to extend WMO advocacy and support for NMHSs.

**Priorities for Strategic Objective 5**

- Clarify roles of WMO bodies and regional centers in capacity development
- Continue and expand direct country assistance (advocacy, assessments, project formulation and strategic planning)
- Strengthen regional offices: increase staff in Regions with emphasis on building partnerships with regional economic groupings and organizations
- Continued engagement at regional level with ministers responsible for Meteorology and Climate Services.

**Strategic Objective 6: Increase education and research opportunities**

CHF 5,953,000

**6A: Improve access to and provision of fellowships**

Key activities of WMO:
- Providing fellowships and enhancing fellowship opportunities by building partnerships with academic institutions and academic societies
- Providing education and training advice to Regional Training Centres.

**6B: Strengthen applications of research findings**

Key activities of WMO:
- Workshops and seminars to share information and findings
- Training workshops on the application of new research findings for operational use.

**Priorities for Strategic Objective 6**

- Expand opportunities for developing countries to participate in research and share new findings for operational use
- Continue and expand education and fellowship opportunities especially in priority areas such as Climate Services, Aviation Forecasting and Disaster Risk Reduction.
3.2 Roles

WMO Secretariat

The role of the WMO Secretariat in the implementation of CDS includes:

- Developing guidance material
  - Manuals and Guides are prepared to assist NMHSs in their work. This material contains standards and technical information, practical advice on data collection and exchange, policies and practices as well as specific guidance on the role of the NMHSs. Manuals and Guides are a reference for establishing the requirements of NMHSs.
- Assisting with country assessments
  - The assistance of WMO experts or the facilitation of experts from other NMHSs in the assessment of capacities often provides the objectivity required by governments and donors in the preparation of strategic plans for the development of NMHSs.
- Collecting and disseminating best practices
- Providing scientific context and input
- Organizing education and training activities
- Organizing forums, meetings and workshops for discussion and exchange
- Organizing data/product exchange
- Providing advocacy at global, regional and national levels
- Assisting in resource mobilization
- Assisting in project development and coordination
- Implementing demonstration and pilot projects at regional, subregional and national levels;
- Facilitating group meetings, reports, pilot and demonstration projects and other capacity development work of WMO constituent bodies
- Developing tools for collecting and sharing information
- Monitoring capacity development of weather, climate and hydrology services in Member NMHSs.

WMO Programmes

All WMO Programmes contribute to the ultimate aim of the Organization: to "provide world leadership in expertise and international cooperation in weather, climate, hydrology and water resources and related environmental issues, and thereby contribute to the safety and well-being
of people throughout the world and to the economic benefit of all nations”. Most of the 20 Programmes have specific responsibilities for the implementation of CDS. For more information on this issue, see Annex 6: Programme support for capacity development.

WMO Constituent Bodies

World Meteorological Congress
Congress is the highest level of decision-making regarding CDS activities and will guide the work of the other constituent bodies and the Secretariat. Congress has tasked the Executive Council (with preparing a capacity-development strategy and reporting back on its implementation at the next session of Congress. This strategy defines how the WMO community can better develop the capacities of NMHSs to deliver meteorological, climatological and hydrological services.

Executive Council
The Executive Council, following input from Congress, guides the work of WMO. Under the guidance of the Executive Council, the Working Group on Capacity Development (EC WG-CD) has primary oversight of the capacity-development activities of WMO. The EC WG-CD consults with the Executive Council Panel on Education and Training and seeks inputs from WMO Technical Commissions, Regional Associations, other Executive Council Working Groups and the Informal Planning Meeting of the Voluntary Cooperation Programme. The WMO Secretariat will be responsible for the provision of cross-programme capacity-development activities and project coordination with the Education and Training Programme, the WMO Programme for Least Developed Countries, the Regional Programme, WMO technical programmes and resource mobilization efforts. More specifically, the Executive Council will approve CDS and will receive regular reports on its implementation.

Regional Associations
Some countries have accepted special responsibility for the provision of basic regional services in priority areas such as aviation, tropical cyclones, climate services and training (see Annex 7: Global and regional centres in support of CD). WMO six Regional Associations (RAs) are at the hub of these activities, recommending and monitoring regional centres, organizing regional working groups, pilot and demonstration activities, seminars and workshops to implement those priorities at regional and subregional levels. Through definition of regional requirements and gaps at the regional level, capacity-development priorities can be reflected in global agendas and in National Development Plans, and addressed through regional/subregional partnerships and funding initiatives. Regional Associations draw attention within a Region to urgent issues, such as the International Civil Aviation Organization (ICAO) requirements for aeronautical weather forecasting, widespread flooding, food security and health issues stemming from climate variability or change. They can also encourage regional or subregional mitigation activities such as participation in the Severe Weather Forecast Demonstration Project or projects using the information derived from satellite observations and other tools for disaster risk reduction. More specifically, RAs will directly contribute to Strategic Objective 5: Strengthen global, regional and subregional mechanisms.

Technical Commissions
The eight technical commissions are composed of experts designated by Members and are responsible for studying meteorological, climatological and hydrological operational systems, applications and research. They establish methodology and procedures and make recommendations to the Executive Council and Congress. More specifically, technical commissions define gaps and needs from an operational perspective for capacity-development work. They also form task teams and working groups to address specific requirements.

WMO Members
Members have the overall responsibility for the development of their NMHSs. While Members have differing arrangements, NMHSs are normally governmental institutions and play an
important role in support of a wide range of national and international responsibilities. Members must, therefore, define the duties of NMHSs. Once defined and agreed on at the appropriate legislative or government level, they help determine the service and resources needed to fulfil those responsibilities. While WMO can provide examples of the basic duties of NMHSs, resources required and best practices, the division of responsibilities and levels of service to be sustained are national decisions.

In addition to maintaining a plan reflecting basic duties and special services, exhibiting good management and building relationships with the scientific community and users, NMHSs need to be involved in national planning. Arrangements for development assistance within the United Nations system and funding from other organizations are largely based on country strategies. Moreover, support from other government departments or agencies for special services in agriculture, energy, health, water, land management, transport and civil aviation, to name a few, voiced at the national level, adds to the likelihood of sustained development. Global weather and climate models do require global data. As NMHSs extend their activities to provide responses to policy issues such as climate change, the interdependence of NMHSs around the world becomes more evident. Countries must contribute to international efforts, but the benefits outweigh the costs of doing so. More developed countries serve as global or regional centres, providing guidance to other countries. Some countries, which actively participate in WMO bodies, also assist other countries on a bilateral basis.

For a more detailed description of the capacities of NMHSs, see Annex 5: Categorization of NMHSs. For more information on the responsibility for carrying out various activities in support of CDS, see Annex 9: Implementation plan table.

### 3.3 Resource mobilization

The World Meteorological Organization receives funding from its Members through assessed contributions to support core budget activities, including the work of the Secretariat, Regional Associations and Technical Commissions. In addition to regular budget funding, WMO mobilizes voluntary resources (extrabudgetary) through a range of funding modalities to support specific capacity-development activities. Resource mobilization activities are further described in a separate Resource Mobilization Strategy (see Annex 8).
4. ANNEXES

ANNEX 1: DEFINITIONS


ANNEX 2: CASE STUDIES


ANNEX 3: THE CAPACITY DEVELOPMENT PROCESS, DIMENSIONS AND QUALITY MANAGEMENT APPROACH


ANNEX 4: CDS AND WMO PRIORITIES


ANNEX 5: CATEGORIZATION OF NMHSS


ANNEX 6: PROGRAMME SUPPORT FOR CAPACITY DEVELOPMENT


ANNEX 7: GLOBAL AND REGIONAL CENTRES IN SUPPORT OF CD


ANNEX 8: RESOURCE MOBILIZATION STRATEGY


ANNEX 9: IMPLEMENTATION PLAN TABLE

Resolution 17 (EC-65)

COMPETENCY REQUIREMENTS FOR PROVIDERS OF EDUCATION AND TRAINING TO METEOROLOGICAL, HYDROLOGICAL AND CLIMATE SERVICES

THE EXECUTIVE COUNCIL,

Recalling the request of the Sixteenth World Meteorological Congress to the WMO Technical Commissions to make the development of competence standards for personnel a priority for this financial period,

Further recalling the discussion at the sixty-fourth session of the Executive Council about the desirability for training institutes that were not accredited as formal training providers in their host countries to follow ISO 29990:2010(E): Learning Services for Non-formal Education and Training – Basic Requirements for Service Providers,

Noting that the training institutes of National Meteorological and Hydrological Services (NMHSs) should contribute to the NMHS quality management systems in their host country, particularly if they are training personnel who will provide meteorological services to international civil aviation,

Further noting that for education and training the Executive Council Panel of Experts on Education and Training (Panel) acts as the key advisory group for the Executive Council,

Considering that the Panel has overseen the preparation of Competency Requirements for Education and Training Providers for Meteorological, Hydrological and Climate Services, along with a companion publication providing application guidance for Members,

Further considering that these documents were distributed for review via the Education and Training Focal Points and points of contact for Regional Training Centres; that they were shared and discussed with participants in the Training Seminar on the Management of Meteorological Training Institutions, held in December 2012; and that the feedback received by many reviewers guided the final revision,

Agreed that the Competency Requirements for Education and Training Providers for Meteorological, Hydrological and Climate Services, along with their associated descriptions, performance criteria and knowledge requirements, should be submitted to Members for final review prior to their becoming an amendment to the Technical Regulations (WMO-No. 49), Volume I;

Requests the Secretary-General to provide Members with the new Competency Requirements in all official languages and solicit their feedback;

Authorizes the Secretary-General to make any consequent amendments and advise Members accordingly;

Decides that, following consultations with Members and assuming consensus on the text, the Competency Requirements should be included in the Technical Regulations (WMO-No. 49), Volume I, and become a recommended practice for the operations of the WMO Regional Training Centres;

Urges Members to adopt the new Competency Requirements in their national training institutes.
Resolution 18 (EC-65)

AMENDMENTS TO THE TERMS OF REFERENCE OF THE EXECUTIVE COUNCIL WORKING GROUP ON CAPACITY DEVELOPMENT

THE EXECUTIVE COUNCIL,

Noting:

(1) Resolution 1 (EC-LV) – Executive Council Advisory Group of Experts on Technical Cooperation,

(2) Resolution 24 (Cg-XV) – The WMO Voluntary Cooperation Programme,

(3) Resolution 4 (EC-LIX) – Executive Council Working Group on Capacity-Building,

(4) Resolution 10 (EC-LX) – Executive Council Working Group on Capacity-Building, as modified by the Executive Council at its sixty-third session and by Resolution 21 (EC-64) – Terms of reference of the Executive Council Working Group on Capacity Development,

Considering the need for a continued mechanism to review on a regular basis issues related to the capacity development of Members in respect of the eight Expected Results of the WMO Strategic Plan (2012–2015), in particular Expected Result 6: Enhanced capabilities of National Meteorological and Hydrological Services (NMHSs), particularly in developing and least developed countries, to fulfil their mandates,

Decides:

(1) To revise the terms of reference of the Executive Council Working Group on Capacity Development established by Resolution 4 (EC-LIX) and revised by Resolution 10 (EC-LX), to address all aspects of assistance provided by WMO and its partners to Members, with emphasis on developing and Least Developed Countries and Small Island Developing States, and to request the Working Group on Capacity Development to provide advice on and pursue a coherent approach to:

(a) Identifying national, subregional, regional and global development priorities based on the needs of end-users and stakeholders of National Meteorological and Hydrological Services, and developing a process to set levels of priorities;

(b) The overarching WMO Capacity Development Strategy to give concrete guidance to all WMO Members, development partners, WMO constituent bodies (regional associations and technical commissions) and the Secretariat with the goal of improving Members’ service delivery capabilities to meet end-user needs;

(c) Improving capacity in all WMO Regions, with a special emphasis on developing and Least Developed Countries and Small Island Developing States, and creating a system for monitoring WMO actions at country level;

(d) Advocating socio-economic benefits to governments and development partners of products and services of NMHSs, including their contribution to the achievement of the United Nations Millennium Development Goals and subsequent goals as may be established;
(e) Developing strategic partnerships with external stakeholders;

(f) Mobilizing resources in support of the above;

(2) That to achieve these objectives, the Working Group shall:

(a) Give the highest priority to the development objectives set by the Regional Associations and the Congress to guide the work of the Technical Commissions, the Secretariat and other development partners;

(b) Prepare an Implementation Plan for the remainder of the 2012–2015 financial period with clear responsibilities, milestones and measurable outcomes. These should be reported to the Executive Council on an annual basis and to the Congress to allow these bodies to give better guidance on WMO capacity-development activities;

(c) Provide guidance on the coordination of the Voluntary Cooperation Programme (VCP) and Trust Funds to the Informal Planning Meeting of the VCP;

(d) Strengthen the interface between technical and human resource development in collaboration with the Executive Council Panel of Experts on Education and Training;

(e) Strengthen the interface between WMO and relevant organizations leading to enhanced capacity development of NMHSs;

(f) Invite relevant funding and development agencies, including the World Bank and the European Commission, to contribute to the activities of the Working Group;

(g) Invite interested Members to designate experts in capacity development and representatives of stakeholder communities to participate in the activities and attend sessions of the Working Group;

(h) Take into consideration the WMO Policy on Gender Mainstreaming;

Authorizes the Working Group to establish sub-groups and task teams as and when required;

Requests the Secretary-General to promote the active participation of all WMO departments in connection with externally funded development projects and take relevant actions to support the Working Group’s activities including assisting in the creation of a system for monitoring WMO actions at country level;

Requests the co-chairs, in consultation with Working Group members, the Secretary-General, relevant Technical Commissions, Regional Associations and WMO departments to propose changes to the terms of reference of the Group, whenever required, to be approved by the Executive Council.

Note: This resolution replaces Resolution 21 (EC-64), which is no longer in force.
Resolution 19 (EC-65)

BUDGET FOR THE BIENNium 2014–2015

THE EXECUTIVE COUNCIL,

Noting:

(1) Financial Regulations – Articles 3, 4, 5, 6 and 7,

(2) Financial Rules 106.1, 106.2, 107.1 and 107.2,

(3) Resolution 37 (Cg-XVI) – Maximum expenditure for the sixteenth financial period (2012–2015),

(4) Resolution 9 (EC-LXIII) – Budget for the biennium 2012–2013,

(5) Resolution 22 (EC-65) – Assessment of proportional contributions of Members for the years 2014 and 2015,

Further noting that the budget proposed by the Secretary-General was prepared in accordance with the above-mentioned regulatory framework,

Having considered the activities and the allocation of budgetary resources proposed by the Secretary-General,

Adopts the regular budget for the biennium 2014–2015 financed from the regular resources, as given in Annex 1 to the present resolution;

Takes note of the requirements for the priority-funded voluntary resources for the biennium 2014–2015, as given in Annex 2 to the present resolution;

Authorizes the Secretary-General:

(1) To re-appropriate any unspent balance that may arise from the first biennial budget (2012–2013) to the corresponding Expected Results of the second biennial budget (2014–2015) in accordance with Financial Regulation 7.3;

(2) To make transfers between sections within the appropriation lines of the budget for the biennium, as necessary, to achieve the Expected Results in accordance with Financial Regulation 4.2.
Annex 1 to Resolution 19 (EC-65)

BUDGET FOR THE BIENNIUM 2014–2015 BY EXPECTED RESULTS
(in Swiss francs)

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<th>Expected Results</th>
<th>Budget 2014–2015</th>
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<tbody>
<tr>
<td>1. Enhanced capabilities of Members to deliver and improve access to high-quality weather, climate, water and related environmental predictions, information, warnings and services in response to users’ needs, and to enable their use in decision-making by relevant societal sectors.</td>
<td>12,894,400</td>
</tr>
<tr>
<td>2. Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate, water and related environmental elements.</td>
<td>5,340,700</td>
</tr>
<tr>
<td>3. Enhanced capabilities of Members to produce better weather, climate, water and related environmental information, predictions and warnings to support in particular disaster risk reduction and climate impact and adaptation strategies.</td>
<td>12,056,200</td>
</tr>
<tr>
<td>4. Enhanced capabilities of Members to access, develop, implement and use integrated and interoperable Earth- and space-based observation systems for weather, climate and hydrological observations, as well as related environmental and space weather observations, based on world standards set by WMO.</td>
<td>17,881,000</td>
</tr>
<tr>
<td>5. Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and the related environmental science and technology development.</td>
<td>11,443,200</td>
</tr>
<tr>
<td>6. Enhanced capabilities of NMHSs, in particular in developing and least developed countries, to fulfil their mandates.</td>
<td>29,272,800</td>
</tr>
<tr>
<td>7. New and strengthened partnerships and cooperation activities to improve NMHSs’ performance in delivering services and to increase the value of the contributions of WMO within the United Nations system, relevant international conventions and national strategic issues.</td>
<td>11,091,200</td>
</tr>
<tr>
<td>8. An effective and efficient Organization</td>
<td>38,020,500</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>138,000,000</strong></td>
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Annex 2 to Resolution 19 (EC-65)

PRIORITY-FUNDED VOLUNTARY RESOURCES
(in Swiss francs)

<table>
<thead>
<tr>
<th>Priorities</th>
<th>Resources</th>
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<td>1. Global Framework for Climate Services (GFCS)*</td>
<td>37,186,000</td>
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<td>2. Aviation meteorological services**</td>
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<td>3. Capacity-building for the developing and least developed countries***</td>
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<tr>
<td>4. Implementation of the WMO Integrated Global Observing System (WIGOS) and WMO Information System (WIS)****</td>
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<tr>
<td>5. Disaster risk reduction*****</td>
<td>2,284,000</td>
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</table>

Total 73,000,000

* Cross-cutting among Expected Results, excluding activities/resources indicated for Priorities 2 to 5.
** Key Outcome of Expected Result 1
*** Expected Result 6
**** Expected Result 4
***** Expected Result 2

Resolution 20 (EC-65)

OUTLINE PRIORITIES AND BUDGET RESOURCES FOR THE SEVENTEENTH FINANCIAL PERIOD (2016–2019)

THE EXECUTIVE COUNCIL,

Noting that it should discuss the priorities and resources for the next financial period, and that such a discussion is normally held at the session of the Executive Council that takes place two years before Congress,

Noting further that, taking into account the guidance provided by the Council, the Secretary-General will submit his proposed budget for the seventeenth financial period (2016–2019) for consideration by the Council in 2014,

Decides:

(1) That the proposed budget for the seventeenth financial period (2016–2019) be determined taking into account up-to-date estimates of regular resources from other income (income from rent, programme support, interest, sales of publications and others) as well as voluntary resources;

(2) That the proposed budget be presented in the results-based budget format, as indicated in the annex to the present resolution, and include the presentation of both regular and voluntary resources;
Requests:

The Secretary-General to develop the budget proposal for the seventeenth financial period (2016–2019) and to address the following issues:

(1) Affordability for Members;
(2) A needs assessment in the context of the Strategic Plan;
(3) Implication for core activities/WMO Programmes of anticipated voluntary funding in relation to the regular budget requirements;
(4) Additional efficiencies;
(5) Additional information on line budget items, including staff and travel costs;
(6) Presenting options for the budget, including the zero-nominal growth option, and the needs assessment for consideration;
(7) Implications of non-implementation of proposed activities,

taking into account, as appropriate, the document on the preliminary discussion of the budget for the seventeenth financial period (2016–2019).

Annex to Resolution 20 (EC-65)


I. OVERVIEW

II. PRIORITIES 2016–2019

III. PROPOSED BUDGET 2016–2019 BY EXPECTED RESULTS (subject to final decision on next Strategic Plan)

- Expected Result 1: Enhanced capabilities of Members to deliver and improve access to high-quality weather, climate, water and related environmental predictions, information, warnings, and services in response to users’ needs and to enable their use in decision-making by relevant societal sectors
- Expected Result 2: Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate and water and related environmental elements
- Expected Result 3: Enhanced capabilities of Members to produce better weather, climate, water and related environmental information, predictions and warnings to support in particular disaster risk reduction and climate impact and adaptation strategies
- Expected Result 4: Enhanced capabilities of Members to access, develop, implement and use integrated and interoperable Earth- and space-based observation systems for weather, climate and hydrological observations, as well as related environmental and space weather observations, based on world standards set by WMO
- Expected Result 5: Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and the related environmental science and technology development
- Expected Result 6: Enhanced capabilities of NMHSs, in particular in developing and least developed countries, to fulfil their mandates
- Expected Result 7: New and strengthened partnerships and cooperation activities to improve NMHSs’ performance in delivering services and to increase the value of the contributions of WMO within the United Nations system, relevant international conventions and national strategic issues
- Expected Result 8: An effective and efficient Organization
IV. INCOME ESTIMATES 2016–2019

ANNEXES

A. Budget by organizational entity
B. Budget for support services apportioned to Expected Results (resource management, capital assets and joint costs)
C. Calculation of inflation adjustment and glossary of budgetary terms
D. Organizational chart of the WMO Secretariat for 2016–2019
E. Guidance of EC-65 and EC-66 for the preparation of the budget proposal for 2016–2019

Resolution 21 (EC-65)

FINANCIAL STATEMENTS OF THE WORLD METEOROLOGICAL ORGANIZATION FOR THE YEAR 2012

THE EXECUTIVE COUNCIL,

Recalling Resolution 21 (EC-LXII) – Consideration of the accounts of the World Meteorological Organization for the year 2009,

Noting Articles 14 and 15 of the Financial Regulations,

Considering the report of the Secretary-General on the financial statements of the Organization for the year ending 31 December 2012 and the report of the External Auditor to the Executive Council,

Formally approves the audited financial statements of the World Meteorological Organization for the year 2012;

Requests the Secretary-General to transmit the financial statements together with his report and the report of the External Auditor thereon to all Members;

Noting with concern the substantial amounts of outstanding assessed contributions of certain Members,

Urges the Members to clear their dues at an early date.
Resolution 22 (EC-65)

ASSESSMENT OF PROPORTIONAL CONTRIBUTIONS OF MEMBERS
FOR THE YEARS 2014 AND 2015

THE EXECUTIVE COUNCIL,

Recalling Resolution 39 (Cg-XVI) - Assessment of proportional contributions of Members for the sixteenth financial period,

Noting:

(1) That the scale of assessments of proportional contributions of Members for the years 2014 and 2015 has been based on the United Nations scale of assessments adopted by the United Nations General Assembly at its sixty-seventh session, in December 2012, and adjusted for differences in membership,

(2) That the minimum rate of assessment was retained at 0.02 per cent and that corrections have been made to ensure that no Member's rate of assessment would increase to a level exceeding 200 per cent of the WMO scale for 2012 and 2013,

Adopts the scale of assessments of proportional contributions of Members for the years 2014 and 2015 as presented in the annex to the present resolution.

Annex to Resolution 22 (EC-65)

PROPORTIONAL CONTRIBUTIONS OF MEMBERS
FOR THE YEARS 2014 AND 2015

<table>
<thead>
<tr>
<th>Member</th>
<th>2013 assessment</th>
<th>2014 and 2015 assessment</th>
<th>Increase/ (decrease)</th>
</tr>
</thead>
<tbody>
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<td>Per cent</td>
<td>Amount (in Swiss Francs)</td>
<td>Per cent</td>
</tr>
<tr>
<td></td>
<td>(B)</td>
<td>(C)</td>
<td>(D)</td>
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<tr>
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<td></td>
<td>Per cent (B)</td>
<td>Amount (in Swiss Francs)</td>
<td>Per cent (D)</td>
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### ABRIDGED FINAL REPORT OF THE SIXTY-FIFTH SESSION OF THE EXECUTIVE COUNCIL

#### Review of previous resolutions of the Executive Council

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* Total for 2013 is higher because South Sudan and Tuvalu were assessed at full rates in 2013, having become Members in 2012, after the scale of assessments for 2012 and 2013 had already been approved by Cg-XVI

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**Resolution 23 (EC-65)**

### REVIEW OF PREVIOUS RESOLUTIONS OF THE EXECUTIVE COUNCIL

THE EXECUTIVE COUNCIL,

**Noting:**

1. Resolution 27 (EC-64) – Review of previous resolutions of the Executive Council,

2. Regulation 156 (9) of the General Regulations (2012 edition), concerning the review of the Executive Council resolutions,

3. Rule 27 of the Rules of Procedure of the Executive Council on the same subject,

**Having examined** its previous resolutions still in force,

**Decides:**

1. To keep in force the following resolutions:

   EC-IV 2
   EC-XII 6
   EC-XXV 12
   EC-XXXIV 13
   EC-XXXV 21
   EC-XXXVI 6
(2) Not to keep in force the other resolutions adopted before its sixty-fifth session;

Requests the Secretary-General to publish the in-force resolutions, including those with corrigenda, in a new issue of *Resolutions of Congress and the Executive Council* (WMO-No. 508) and to bring this publication to the attention of all concerned parties.

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**Note:** This resolution replaces Resolution 27 (EC-64), which is no longer in force.

* Indicates that some resolution(s) mentioned in the given resolution are now not in force (see the annex to the present resolution).

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**Annex to Resolution 23 (EC-65)**

**FOOTNOTES TO THE FOLLOWING RESOLUTIONS**


   *Resolutions 1 (EC-LIX), 23 (Cg-XV) not in force*

2. **Resolution 20 (EC-LXII) – Mandatory publications and publication distribution policy for the sixteenth financial period**

   *Resolutions 10 (EC-LXI), 26 (Cg-XV) not in force*


   *Resolution 11 (EC-LXII) not in force*

4. **Resolution 6 (EC-LXIII) – Executive Council Working Group on Service Delivery**

   *Resolution 5 (EC-LX) not in force*
5. Resolution 7 (EC-LXIII) – Executive Council Working Group on WMO Strategic and Operational Planning

Resolution 2 (EC-LIX) not in force

6. Resolution 8 (EC-LXIII) – Terms of reference and membership of the Audit Committee

Resolution 10 (EC LVIII) not in force

7. Resolution 15 (EC-64) – Global Climate Observing System

Resolution 13 (EC-LXII) not in force

8. Resolution 20 (EC-64) – WMO Programme Support Cost Policy

Resolution 19 (EC-LVI) not in force

9. Resolution 24 (EC-64) – Guidelines on the planning and production of WMO publications

Resolution 13 (EC-LVI) not in force


Resolution 21 (EC-LXII) not in force
ANNEXES

ANNEX I

Annex to paragraph 2.3.1 of the general summary

RECOMMENDATIONS OF THE FINANCIAL ADVISORY COMMITTEE

1. Report of the Audit Committee

   Recommendation 1:

   That the Executive Council accept Recommendations 1 and 2 of the Audit Committee, taking into account the discussion of FINAC.

2. Financial statements for 2012, including the report of the External Auditor

   Recommendation 2:

   That the Executive Council approve the financial statements for 2012, as formulated in Resolution 21(EC-65).

3. Scale of assessments for 2014 and 2015

   Recommendation 3:

   That the Executive Council adopt the scale of assessments of proportional contributions of Members for the years 2014 and 2015 as proposed by the Secretary-General in Resolution 22 (EC-65).

4. Status of Members' contributions

   Recommendation 4:

   That the Executive Council urge Members in arrears to settle their dues as early as possible.

5. Voluntary contributions pledged in 2013

   Recommendation 5:

   That the Executive Council consider the implication of a possible shortfall of voluntary contributions and additional measures to achieve the required funding targets.


   Recommendation 6:

   That the Council adopt the budget proposals for the biennium 2014–2015 as reflected in paragraph 4.8.4 of the general summary and Resolution 19 (EC-65), taking into account the discussion held at FINAC.

Recommendation 7:

That the Council request the Secretary-General to develop the budget proposal for the seventeenth financial period (2016–2019), addressing issues of:

(a) Affordability for Members;
(b) A needs assessment in the context of the Strategic Plan;
(c) Implication for core activities/WMO Programmes of anticipated voluntary funding in relation to the regular budget requirements;
(d) Additional efficiencies;
(e) Additional information on line budget items, including staff and travel costs;
(f) Presenting options for the budget, including the zero-nominal growth option, and the needs assessment for consideration;
(g) Implications of non-implementation of proposed activities,

taking into account, as appropriate, the discussion of FINAC as well as paragraph 4.8.5 of the general summary on the preliminary discussion of the budget for the seventeenth financial period (2016–2019).

8. Other business

Recommendation 8:

That the Council approve the requests of the Governments of the Comoros and the Islamic Republic of Mauritania to enter new agreements for the payment of their arrears of contributions.
ANNEX II

Annex to paragraph 3.2.4 of the general summary

THE ROLE AND OPERATION OF NATIONAL METEOROLOGICAL AND HYDROLOGICAL SERVICES

A Statement by the World Meteorological Organization for Directors of NMHSs

Introduction

The Statement by the World Meteorological Organization (WMO) on the Role and Operation of National Meteorological and Hydrological services (NMHSs) presents information on the role and operation of National Meteorological and Hydrological Services (NMHSs) worldwide. The four sections of the document present the functions of NMHSs, their contribution to social and economic development, the services they provide, the basic systems to support service delivery, legislative and institutional matters, including governance, partnership and cooperation, and future development opportunities among other issues.

It is recognized that weather, climate, water and related environmental conditions have a significant influence on the socio-economic development of countries worldwide. The increase in world population, and extension of settlements and life supporting activities into areas vulnerable to the impacts of weather-, climate- and water-related disasters makes it necessary to improve the capacities of NMHSs, especially in developing and least developed countries, to provide better services to reduce disaster risks, and support national development and life supporting activities. The increase in the frequency and intensity of natural hazards due to climate variability and change pose critical challenges to many countries.

The NMHSs, as recognized in the WMO Convention\(^1\), are a fundamental part of national infrastructure and play an important role in supporting vital functions of governments. Inadequate infrastructure and limited human resources in some NMHSs, especially those in developing and least developed countries, are among the factors that limit their capacity to take advantage of the advances in science and technology to improve their services.

NMHSs undertake activities directed at improving our understanding of the weather, climate, and the hydrological cycle over both land and sea, undertake monitoring of weather, climate and water-related phenomena, provide forecasts, and provide weather, climate, water and related environmental services to a range of users to respond to relevant national, regional and global needs. National Meteorological and Hydrological Services will therefore play a central role in the

\(^1\) The WMO Convention, adopted on 11 October 1947 and revised in 2007 reaffirmed “the vital importance of the mission of the NMHSs in observing and understanding weather and climate and in providing meteorological, hydrological and related services in support of relevant national needs which should include the following areas:

(a) Protection of life and property;
(b) Safeguarding the environment;
(c) Contributing to sustainable development;
(d) Promoting long-term observation and collection of meteorological, hydrological and climatological data, including related environmental data;
(e) Promotion of endogenous capacity-building;
(f) Meeting international commitments;
(g) Contributing to international cooperation.”
Global Framework for Climate Services at the national and regional levels and in some cases at the global level as well. They will engage with other organizations at these different levels, providing coordination capacity for establishing and operating climate services at the national level where feasible.

The observations and data gathered by NMHSs form the foundation for the monitoring and prediction of weather, climate, water and related environmental conditions as well as the issuance of warnings and alerts. However, there is marked disparity in the observation networks with developing and least developed countries having sparse networks that do not adequately represent the weather and climate conditions affecting these countries. The sparse observation networks ultimately affect the quality and range of services that NMHSs can provide.

The NMHSs also use telecommunications networks which are vital for the exchange of data and products to enable them to fulfil their national mandates. The telecommunication networks used by some NMHSs are inadequate and obsolete hampering efficient flow of observations and products including multi-hazard early warnings.

The Climate Services Information System of the GFCS will build on the experiences and production systems of National Meteorological and Hydrological Services, as well as those of other organizations, for developing products and delivering services. It will utilize the World Meteorological Organization’s Information System as its primary underlying data dissemination system. National Meteorological and Hydrological Services own and operate an effective and extensive system for collecting and sharing climate observations over both land and sea and in some cases a system for disseminating climate forecasts as well.

The efficient provision and delivery of services can significantly reduce the impacts of hydrometeorological hazards which cause large losses of life and property worldwide.

The media offer an important means to deliver forecasts and warnings to the public, hence developing constructive relationships and partnerships with the media is important to enhance service delivery to the public.

This Statement is developed on the decision of Fifteenth Congress, May 2007, to assist the Heads of NMHSs to address the evolving scientific, technological and societal challenges within the purview of their respective mandates, and in their collaboration with government agencies and the user sectors. It has been further updated in 2013, responding to Resolution 48 of Cg-XVI to address the rapidly growing needs of the GFCS in support of adaptation planning and climate risk management. This statement informs decisions by Heads of NMHSs and decision-makers on further development of their respective NMHSs.
PART 1: MISSION

Functions of NMHSs

1. The National Meteorological and Hydrological Services (NMHSs) own and operate most of the infrastructure that is needed for providing the weather, climate, water and related environmental services for the protection of life and property, economic planning and development, and for the sustainable exploitation and management of natural resources. Most of the NMHSs:

(a) Develop and distribute forecasts, warnings and alerts for safety of life and property and to support efforts to reduce the impacts of weather, climate, water and related environmental natural hazards;
(b) Provide essential data, information and products necessary for designing/planning, developing and managing infrastructure, settlements and other essential sectors such as agriculture, water resources, energy and transport for improving the well-being of societies;
(c) Maintain a continuous, reliable and comprehensive historical record of its national weather, climate, water and related environmental data;
(d) Provide relevant advice on weather, climate, water and related environmental issues for decision-making;
(e) Advancing science and technology related to weather, climate and water as well as developing and improving their own operations and services through research and development;
(f) Participate in the development, implementation and operation of national multi-hazard early warning systems including those in seismology, volcanic ash monitoring, transboundary pollution, and in ocean-related phenomena such as tsunami;
(g) Fulfill relevant international commitments, including those under the Convention of the World Meteorological Organization (WMO), and the furthering of national interests by participation in the appropriate international programmes and activities;
(h) Establish and operate observing station networks that gather observations of the earth-atmosphere-ocean system in real-time to support the provision of weather, climate, water and related environmental services and research activities including the assessment and projection of climate change;
(i) Establish and operate telecommunication networks for rapid exchange of observation, data and services;
(j) Acquire and operate data-processing and forecasting systems to provide real-time weather, climate, water and related environmental services including warnings and alerts to the public and sectors such as agriculture, water resources, energy, health, shipping, aviation, national defence and environment; and
(k) Acquire and operate a product dissemination system for efficient and effective delivery of information and services to users to enable planning, preparedness and decision making for socio-economic development.

Contribution to economic and social development activities in their countries

2. Weather, climate, water and related environmental services are useful inputs for socio-economic planning and development. The influence of weather, climate, water and related environmental conditions continue to shape the cultures, traditions and development paths of societies worldwide. The challenges of climate variability and change will require efficient provision and application of weather, climate, water and related environmental services to enable societies to manage the associated risks. Improved understanding of weather, climate and hydrological processes together with their prediction enables the NMHSs to
provide better services to their countries. However, some NMHSs have not been able to take advantage of the advances in science and technology due to inadequate infrastructure and limited human resource capacities.

3. The potential benefits from enhancing the quality and use of meteorological, climate, and hydrological data, information and products in decision-making are enormous, but realizing these benefits will require improvement in infrastructure, human resources development, and engagement between the providers and users to improve the process for decision-making and realization of social and economic benefits. The efforts undertaken by NMHSs, in conjunction with other relevant national partners and institutions, in the context of the GFCS User Interface Platform, in particular at national level and below, are crucial to this.

Contribution to international efforts on sustainable development

4. Weather systems and changing climate conditions do not stop at national boundaries. In order to forecast weather and ascertain future climate conditions, the NMHSs require meteorological, hydrological and environmental data, information and products not only from within their own territory but also from outside its borders. The requirement for sharing data and information in a common format has been recognized since the establishment of the first National Meteorological Services (NMSs) in the 1850s and motivated the formation of the International Meteorological Services (NMSs) in 1873 to coordinate data sharing and development of user/sector specific products and services. The World Meteorological Organization (WMO), an intergovernmental specialized agency within the UN system, replaced the IMO in 1950.

5. The NMHSs make important contributions to international systems established by the Members of WMO to coordinate the collection of observations based on common standards of accuracy and reliability, to process these observations and data into weather forecasts and advisories, and to exchange information and products among all NMHSs in real-time. The success in the operation of this established international system is dependent on the contribution of individual countries.

6. WMO carries out its work through ten major scientific and technical programmes. These are designed to assist all Members to provide, and benefit from, a wide range of meteorological and hydrological services and to address present and emerging problems. The programmes are based on the concept and experience that mutual benefits are gained from cooperative use of the pool of knowledge that has been and is still being created by worldwide sharing of the meteorological, hydrological and related information among Members. The programmes of WMO make possible the provision of meteorological and related services through NMHSs in all countries at costs far below those that would be incurred if each Member acted alone.

7. The observational data gathered and kept by NMHSs holds tremendous tapped and untapped potential to provide useful information to advise national governments on international and regional environmental agreements and working arrangements related to weather, climate, water and the environment, particularly if leveraged as part of the GFCS User Interface Platform.
PART 2: SERVICE DELIVERY

Services provided by NMHSs

8. The NMHSs provide weather, water, climate and related environmental services to a wide range of sectors, including agriculture, water, energy, tourism, transport and health, to assist them reduce the risks of, and derive economic benefits from, the associated conditions. The provision of user-targeted products together with their application requires close collaboration between NMHSs and users to enable the integration of user needs in the development of services and facilitate feedback for their improvement. The rapid delivery of warnings and alerts needs close collaboration with the media and telecommunication service providers.

9. The NMHSs provide meteorological and related services to the agricultural community to help improve production; reduce losses and risks; and reduce costs and increase efficiency in the use of water and energy, among others.

10. The NMHSs provide data, products, and services to the civil aviation sector that contribute to the safety of aviation and economic operation of the sector both nationally and internationally. The measurements and forecasts of conditions en route and at, or in the approach to, terminal aerodromes are useful for minimizing aircraft operating costs. By increasing operating efficiency of flights, the NMHSs also contribute to reduction in the negative impacts of aircraft emissions on global climate change and stratospheric ozone.

11. The NMHSs provide early warnings and alerts of extreme events that when coupled with effective emergency response systems contribute to reducing the impact of these events. NMHSs rely on communication infrastructure to issue timely warnings. The NMHSs in most countries are part of multi-sectoral systems for disaster risk reduction and response. Some of them participate in the development, implementation and operation of multi-hazard early warning systems including those in seismology and in ocean-related phenomena such as tsunami. The integration of weather, climate, water and related environmental information into national planning and development policies is an essential element in reducing the risks associated with severe weather and extreme climate events.

12. The NMHSs provide forecasts and warnings of floods, water levels and discharge within river basins, watersheds and coastal areas. These products are critical for protecting life and property, safeguarding the environment, and for efficient management of water resources as a contribution to sustainable development. In some countries, National Meteorological Services and National Hydrological Services are provided by separate institutions making it essential for close collaboration for efficient delivery of services.

13. The NMHSs provide marine meteorological forecasts and warnings of coastal and open ocean conditions that are vitally important for marine transport and operations, safety of life and property in coastal areas and for operations of ports and harbours.

14. The NMHSs provide data, products, and services, such as daily forecasts of temperature, humidity and air-quality as well as long-range predictions and severe weather warnings, that help in monitoring disease outbreaks important for planning and providing public health.

15. The above-mentioned services of NMHSs are major contributions to the GFCS Climate Service Information System and an important part of the User Interface Platform.
Basic Systems to support the delivery of services

- **Observing and Monitoring the Atmosphere and related Environment**
  
  16. Observations of the atmosphere and the related environment form the foundation for the production of weather, climate, water and related environmental services. These observations are also essential for conducting research to improve services, assessing changes in the climate system, and for developing and operating systems in weather and climate dependent sectors such as agriculture, water, transport, and energy, among others, to support efforts of communities to reduce disaster risks and adapt to climate variability and change.

  17. Observation is one of the pillars of the Global Framework for Climate Services (GFCS), established by the Heads of State and Government, Ministers and Heads of Delegations, “to strengthen the production, availability, delivery and application of science-based climate prediction and services.” The pillar on observation forms the foundation for achieving the expectations from the other pillars of the GFCS namely Climate Research, Modelling and Prediction; a Climate Services Information System; and a Climate User Interface Programme.

  18. The NMHSs establish and operate observation networks that form the WMO Global Observing System (GOS), a component of the WMO Integrated Global Observing System (WIGOS). The system is comprised of operationally reliable surface- and space-based subsystems. These systems are owned and operated by the WMO Member countries, which undertake to meet certain standards and responsibilities in the agreed global system, for the benefit of all nations.

  19. The GOS forms the foundation for the development and implementation of the WMO Integrated Global Observing System (WIGOS). The WIGOS is a coordinated, standardized system of systems for gathering meteorological and other environmental observations on a global scale in support of all WMO Programmes. It aims to significantly improve the availability of observational data and products for all Members.

- **Exchange of Observations, Data and Products – Nationally and Internationally**

  20. The NMHSs establish and operate telecommunication networks that together form the WMO Global Telecommunications System (GTS) that facilitates rapid exchange of observations, data and products to enable NMHSs worldwide meet their national and international obligations. In the ocean domain for example, this includes playing a key role in the dissemination of Tsunami early warnings around the world and of in situ sea surface temperature (SST) observations, which are crucially important for climate assessment and prediction.

  21. The GTS forms the foundation for the development and implementation of the WMO Information System (WIS). The WMO Members are cooperating in the design and implementation of the WIS to improve the current data communications and dissemination of weather, climate and water data, information and products. By using a broader array of communication and data technologies, including the Internet, WIS will reduce the operations costs and enhance the reliability of data communications and provide easier, more user-friendly ways to share data and products internationally. In addition to its automated dissemination of observed data and products, WIS will provide data discovery, access and retrieval services for all weather, climate, water and related data and products produced by WMO centres and Members.
22. WMO policy on the availability of meteorological data and hydrological data is determined to a large degree by Resolution 40 (Cg-XII) and Resolution 25 (Cg-XIII), respectively. These resolutions commit "to broadening and enhancing the free and unrestricted international exchange" of meteorological, climatological, hydrological, and related data and products, as a fundamental WMO principle. These data and products are major contributions to the GFCS Climate Service Information System and important part of the User Interface Platform.

• **Data Processing and Forecasting**

23. The observations and data gathered by NMHSs are processed to generate products that can support decision-making in addressing events such as tropical cyclones/hurricane, heatwaves, disease outbreaks, flash floods and drought among others. The quality of the products is dependent on the adequacy of processing facilities and human resources. All NMHSs contribute to these products through the sharing of observations, which are the basis for generating the forecasts and warnings.

24. WMO has designated some NMHSs as Regional Specialized Meteorological Centres (RSMCs) which provide forecast products to all other NMHSs. Specializations include geographical, tropical cyclone and emergency response. In addition, WMO has designated Global Producing Centres (GPCs) and Regional Climate Centres (RCCs) which focus on longer range predictions. The climate predictions and information provided by GPCs and RCCs are useful tools for planning and developing activities in climate sensitive sectors such as agriculture, water resources, energy and health among others.

25. The NMHSs can then utilize RSMC products to develop forecasts and warnings of severe weather and climate extreme events for their respective countries to support socio-economic development activities.

PART 3: THE ELEMENTS FOR SUCCESSFUL OPERATION OF THE NMHS

Legislative and institutional matters

• **National legal instruments to define the mission and mandate of NMHSs**

26. The legal instrument establishing a NMHS is an important element in its successful operation. Cg-XIII reaffirmed the importance of having national legal instruments that define the mission and mandate of NMHSs to ensure clarity in the definition of their responsibilities and recognition of their contribution to society to facilitate allocation of adequate resources. The advantages of such a legal instrument are:

(a) Duties and areas of responsibility of the NMHSs are defined for the benefit of both the NMHS and the governments;
(b) NMHS is clearly designated as the “official” weather, climate and flood warning service and as the “National Authority” in warning situations, to avoid public confusion;
(c) Ensuring legal protection of the field equipment and of officers in their duties;
(d) Direct access to essential international communications is assured;
(e) Coordination of various weather, climate, water and related environmental activities in the country is provided; and
(f) A basis for determining the level of funding needed to fulfil the agreed role is clarified; including provisions for retaining revenues earned to improve the NMHS.
27. Over half of the NMHSs operated by Members of WMO have formal legal instruments (such as a law, act, or decree), covering their responsibilities; establishment and operation of their facilities; and state regulation and legal responsibility. Other issues included in the legal instruments are the roles of the NMHSs in the prevention/mitigation of natural disasters; international cooperation; and supplementary provisions and funding.

- **Impacts of International Agreements**

28. Observations and data gathered, processed and archived by NMHSs provide useful information for addressing international conventions and agreements especially those related to climate, water and environment. Most governments are parties to some international conventions, agreements, or declarations, such as the Millennium Declaration, including the Millennium Development Goals, UNFCCC, UNCCD, and Ozone Convention among others. The NMHSs often, working with other national agencies, are involved in developing and supporting government positions at relevant international meetings such as those related to weather, climate, water and related environmental issues. The recent increase in the number of agreements addressing climate, water and related environmental issues together with the significant influence of climate on sustainable development will lead to more involvement of NMHSs in related activities. This will require improvements in the gathering, processing and archiving of terrestrial and marine meteorological and hydrological observations and data.

**Governance**

29. The governance structure of a NMHS has a strong influence on its operation and efficient delivery of services. The organizational structures of NMHSs, aimed at facilitating efficient provision of services to their countries, vary considerably from country to country. They are influenced by: (1) a government’s approach or models for delivery of public services; (2) the size and character of the country, its population distribution, and the services provided; (3) the availability of trained staff and appropriate technology; (4) the availability and means for obtaining resources; and (5) the nature of the user communities and the degree of outreach. They are also dependent on the model of the NMHS, which include government agencies, semi-autonomous government agencies, government owned organizations, and private companies. In countries where private and government owned agencies exist, every effort needs to be made to assign clear responsibilities to minimize conflicts.

30. With the increasingly broad challenges facing countries and the international community, the NMHSs may need to adopt flexible organizational models and management strategies that allow for strengthened interactions with relevant national agencies, as well as international and regional institutions.

**Partnerships and cooperation**

31. The delivery of weather, climate, water, and related environmental services over land and sea is founded on cooperation among NMHSs worldwide. NMHSs are mutually dependent on the gathering and sharing of observations, data and products to provide services. WMO coordinates the policy and programmes for the global exchange of observations and data.

32. Many NMHSs have noted the advantages of closer regional and sub-regional cooperation to aid their operations, especially where they have been able to enhance joint capability through sharing of resources, reducing duplication or promoting capacity building through technology exchange. Regional initiatives such as Regional Climate Outlook Fora that bring together the providers and users of weather, climate, water and related environmental services in a region continue to play an important role in efforts to improve service quality.
and service delivery. The WMO Regional Training Centres (RTCs), Regional Instrument Calibration Centres (RICs), and Regional Climate Centres (RCCs) ensure that NMHSs can access cost-effective regional education, training and services. The WMO Regional Associations and Regional Offices play an important role in promoting capacity building between developed and developing countries.

33. Given the magnitude of the scientific challenges of providing accurate and reliable weather, climate and water services and the difficulties of obtaining adequate resources, many NMHSs benefit from close cooperation with regional and international institutions. In particular, academic and research institutions offer the opportunity for developing user specific services to meet the ever-evolving needs of the users. The partnership with the Association of Hydro-Meteorological Equipment Industry (HMEI) continues to provide good linkage between the developers and producers of hydrometeorological equipment, and the users. The NMHSs also have the opportunity to contribute to the activities of other UN agencies that can benefit their countries, such as those related to economic development and environmental protection.

34. Since the media offer an important means to deliver forecasts and warnings to the public, developing constructive relationships with global, regional, national, and local electronic and print media is important to enhance service delivery to the public.

35. NMHSs can bring their expertise in "service delivery through partnerships" as an important contribution to the GFCS, particularly as it pertains to the User Interface mechanism where the collaboration of service providers, researchers and economic sectors will be critical.

PART 4: FUTURE DEVELOPMENT OF AND OPPORTUNITIES FOR NMHSs

Exploiting greater scientific understanding

36. The services provided by NMHSs are dependent on the sustained investments of WMO Member countries in research and development (R&D), and capacity building. Further improvement of current services will require: (1) effective transitioning of R&D results into fully operational products and services; (2) R&D that is responsive to the specific needs of NMHSs and their constituencies; and (3) effective means to develop linkages with decision-makers and users, especially through effective use of their PWS to communicate scientific research translated into tools, products and services, that are useful for decision-making, in easily understandable and actionable language.

37. Scientific research using a seamless approach to modelling allows Numerical Weather Prediction (NWP) and climate models to systematically include more realistic representations and additional components of the Earth system. This not only contributes to increased predictability, but also significantly increases the range of climate services possible and provides opportunities for NMHSs and their partners to address increasing climate service needs.

Exploiting technological advances

38. With the development of the WIGOS and WIS, the NMHSs will have the benefit of access to more and better data including data to provide services. The WIS will also provide NMHSs with more effective ways to disseminate information and products to users.

39. The challenge for many NMHSs will be to develop the data processing and prediction systems that will effectively utilize these high-volume, complex data streams.
40. New modelling approaches, such as ensemble prediction and “seamless” prediction systems, benefit from improved supercomputing capabilities.

41. New and developing technologies and techniques, such as Internet delivery of data and products and networking, offer the NMHSs the opportunity to expand the availability and use of their products and services and thus of their influence.

Education and Training

42. Education and training activities are focused on subjects such as meteorology (including marine meteorology and tropical meteorology), weather forecasting, agriculture, aviation, climate and climate prediction, disaster prevention, environment, hydrology, instruments (including satellite and in situ remote-sensing) and observations, oceanography, telecommunications, and many others.

43. Education and training is important not just on technical matters but also on applications to address the ability of users to integrated weather, climate, water and related environmental services into decision-making. Training is also required to improve the capacities in conducting targeted research to improve services; planning and institutional management; communication and public relations; and other administrative and support functions. Priority needs to be given to enhancing skills through education and training to improve the provision, delivery and application of services from NMHSs.
DO 1: We, the Heads of State and Government, Ministers, Heads of Delegations and Experts, attending the High Level Meeting on National Drought Policy (HMNDP) in Geneva, 11 – 15 March 2013:

(PREAMBULAR PART)

Urgency of the problem

PP 1: Acknowledging that droughts are natural phenomena that have caused human suffering since the beginning of humanity, and are being aggravated as a result of climate change;

PP 2: Noting the interrelationships between drought, land degradation and desertification (DLDD), and the high impacts of DLDD in many countries, notably the developing and the least developed countries, and the tragic consequences of droughts, particularly in Africa;

PP 3: Acknowledging the role of the UN agencies, and in particular the United Nations Convention to Combat Desertification (UNCCD) in line with its mandate, provisions and principles in particular Parts II and III of the Convention, to assist in the combat against drought and desertification;

PP 4: Observing that drought has major implications in terms of the loss of human lives, food insecurity, degradation of natural resources, negative consequences on the environment’s fauna and flora, poverty and social unrest and that there are increasingly immediate short-term and long-term economic losses in a number of economic sectors including, inter alia, agriculture, animal husbandry, fisheries, water supply, industry, energy production and tourism.

PP 5: Concerned with the impacts of climate variability and change and the likely shift in the patterns of droughts and possible increase in the frequency, severity, and duration of droughts, thus further increasing the risk of social, economic and environmental losses;

PP 6: Underscoring that addressing climate change can contribute to reducing the aggravation of droughts and that it requires action, in accordance with the principles and provisions of the United Nations Framework Convention on Climate Change;

PP 7: Noting that desertification, land degradation and drought are global challenges that continue to pose serious challenges for the sustainable development of all countries, in particular the developing countries;

PP 8: Acknowledging that there are insufficient policies for appropriate drought management and pro-active drought preparedness in many countries around the world and that there is need for enhancing international cooperation to support all countries, in particular developing countries in managing droughts and building resilience, and that countries continue to respond to droughts in a reactive, crisis management mode;

PP 9: Recognizing also the urgent needs for countries to manage droughts effectively, and better cope with their environmental, economic and social impacts;
PP 10: Recognizing that to better cope with droughts, countries need to understand the need for improved risk management strategies and develop preparedness plans to reduce drought risks.

**Scientific progress in drought monitoring and early warning systems**

PP 11: Recognizing that advances in drought monitoring and early warning and information systems, under government authority, and the use of local knowledge and traditional practices can contribute to enhanced societal resilience and more robust planning and investment decisions, including the reduction of consequences of drought impacts;

PP 12: Recognizing that scientific advances in seasonal to inter-annual and multi-decadal climate predictions offer an additional opportunity for the continued development of new tools and services to support improved management of droughts.

**Need for vulnerability and impact assessment**

PP 13: Noting the need for urgent intersectoral coordination of the assessment of drought vulnerability and drought management.

**Need for rapid relief and response**

PP 14: Noting the need to identify emergency measures that will reduce the impact of current droughts while reducing vulnerability to future occurrences, relief must be targeted to the affected communities and socio-economic sectors and reach them in a timely fashion.

PP 15: Noting also the need to create synergies between drought relief measures and the preparedness, mitigation and adaptation actions for long-term resilience.

**Need for effective drought policies**

PP 16: Recalling the commitment in the outcome document of the UN Conference on Sustainable Development (Rio +20) to significantly improve the implementation of Integrated Water Resources Management at all levels, as appropriate.

PP 17: Recalling that the UNCCD is pertinent to the promotion of sustainable development and that it calls for the establishment of effective policies to combat land degradation and desertification and mitigate the effects of droughts.

PP 18: Recalling also the call of the COP10 of UNCCD for an advocacy policy framework on drought for promoting the establishment of national drought management policies.

PP 19: Recalling the decision of governments to create the Global Framework for Climate Services (GFCS) to strengthen production, availability, delivery and application of science-based climate prediction and services.

(OPERATIVE PART)

OP 1: Encourage all Governments around the world to develop and implement National Drought Management Policies, consistent with their national development laws, conditions, capabilities and objectives, guided, inter alia, by the following:

- Develop proactive drought impact mitigation, preventive and planning measures, risk management, fostering of science, appropriate technology and innovation, public outreach and resource management as key elements of effective national drought policy.
- Promote greater collaboration to enhance the quality of local/national/regional/global
  observation networks and delivery systems.

- Improve public awareness of drought risk and preparedness for drought.

- Consider, where possible within the legal framework of each country, economic
  instruments, and financial strategies, including risk reduction, risk sharing and risk transfer
  tools in drought management plans.

- Establish emergency relief plans based on sound management of natural resources and
  self-help at appropriate governance levels.

- Link drought management plans to local/national development policies.

**OP 2:** Urge the World Meteorological Organization, the UNCCD and the Food and
Agriculture Organization of the United Nations (FAO), other related UN agencies, programmes and treaties, as
well as other concerned parties, to assist governments, especially the developing countries, in the
development of National Drought Management Policies and their implementation;

**OP 3:** Urge the developed countries to assist developing countries, especially the least developed
countries, with the means of implementation towards the comprehensive development and
implementation of National Drought Management Policies in accordance with the principles and
provisions of the UNCCD;

**OP 4:** Encourage the promotion of international cooperation, including north-south cooperation
complemented by south-south cooperation, as appropriate, to foster drought policies in developing
countries;

**OP 5:** Invite WMO, UNCCD and FAO to update the draft versions of the Science and Policy
documents taking into account the recommendations from the HMNDP and circulate them to all
Governments for their review prior to finalization, to assist governments in the development and
implementation of the National Drought Management Policies.
ANNEX IV

Annex to paragraph 4.4.5 of the general summary

WORLD METEOROLOGICAL ORGANIZATION

WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS)

WIGOS FRAMEWORK IMPLEMENTATION PLAN (WIP)
Version 1.0.5
(20/03/2013)
## VERSION CONTROL

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WIGOS FRAMEWORK IMPLEMENTATION PLAN

1. INTRODUCTION AND BACKGROUND

1.1 Purpose of WIGOS and Scope of the WIGOS framework Implementation Plan (WIP)

The WMO Integrated Global Observing System (WIGOS) provides a new framework for WMO observing systems, including the contributions of WMO to co-sponsored observing systems. It is important to recognize that WIGOS is not replacing the existing observing systems, but is rather an over-arching framework for the evolution of these systems which will continue to be owned and operated by a diverse array of organizations and programmes. WIGOS will focus on the integration of governance and management functions, mechanisms and activities to be accomplished by contributing observing systems, according to the resources allocated on a global, regional and national level.

This plan for the implementation of the WIGOS Framework (WIP) addresses the necessary activities to establish an operational WIGOS Framework by the end of the period 2012–2015, as per the directive of the WMO Congress. Yet WIGOS implementation will continue beyond 2015 through the governance and management mechanisms established by the execution of this plan.

The WIP also addresses a number of additional activities that would substantially improve the operational capabilities of WIGOS beyond the 2012–2015 Framework implementation; however these activities are dependent on resources in addition to the regular budget. If these activities are not completed, WIGOS can still be considered operational. The resulting system will, however, be less effective in achieving its goals and benefits to Members will be reduced or delayed.

This plan is laid out in several chapters that identify and describe the various activity areas to be addressed. Specific activities for each area are included in Table 2 (see Section 4), which identifies deliverables, timelines, responsibilities, costs and risks, and applicability to global, regional or national levels of implementation. Similar activities are grouped under the title corresponding to the respective sub-section of Section 2.

Following the Congress and Executive Council guidance WIGOS has produced and published a number of valuable documents detailing the concept, architecture, vision and brochure for WIGOS. These were used to great benefit by the WIGOS Pilot and Demonstration Projects and can be accessed from the following link: WIGOS Basic and Communications Documents

1.2 WIGOS Vision and Congress Guidance for WIGOS Implementation

The Sixteenth World Meteorological Congress decided that the enhanced integration of the WMO observing systems should be pursued as a strategic objective of WMO and identified this as a major expected result of the WMO Strategic Plan1.

WIGOS vision calls for an integrated, coordinated and comprehensive observing system to satisfy, in a cost-effective and sustained manner, the evolving observing requirements of Members in delivering their weather, climate, water and related environmental services. WIGOS will enhance the coordination of WMO observing systems with those of partner organizations for the benefit of society. Furthermore, WIGOS will provide a framework for enabling the integration and optimized

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1 see http://www.wmo.int/pages/about/documents/1069_en.pdf
evolution of WMO observing systems, including WMO’s contribution to co-sponsored systems. Together with the WMO Information System (WIS), this will allow continuous and reliable access to an expanded set of environmental data and products, and associated metadata, resulting in increased knowledge and enhanced services across all WMO Programmes.

WIGOS implementation should be undertaken in an active and prudent manner in the sixteenth financial period and will focus on a framework for improved governance, management, integration and optimization of the multiple observing systems coordinated by WMO, so as to achieve a smooth transition, and no effort should be spared to make WIGOS operational by 2016.

The implementation of WIGOS should build upon and add value to the existing WMO observing systems with emphasis on integration of surface- and space-based observations in an evolutionary process to satisfy requirements of WMO and WMO co-sponsored Programmes. Since all WMO Programmes would benefit, each should actively participate and contribute its own expertise and resources in implementing WIGOS.

In implementing WIGOS, it is imperative that the current management, governance and support activities be reviewed and aligned with WMO priorities. This alignment would promote cooperation and coordination at the technical, operational and administrative levels.

Integrated satellite systems are an important and unique source of observational data for monitoring of weather, climate and the environment. It is important to further advance instrument intercalibration, data exchange, data management standardization, user information and training, in order to take full advantage of space-based capabilities in the context of WIGOS.

WIGOS will be essential for the Global Framework for Climate Services (GFCS), aviation meteorological services, disaster risk reduction, and capacity development as WMO priorities. It will also ensure a coordinated WMO contribution to the co-sponsored GCOS, GOOS, GTOS, and to the Global Earth Observation System of Systems (GEOSS).

2. KEY ACTIVITY AREAS FOR WIGOS IMPLEMENTATION

The component observing systems of WIGOS comprise the Global Observing System (GOS), the observing component of the Global Atmosphere Watch (GAW), the WMO Hydrological Observing Systems (including the World Hydrological Cycle Observing System (WHYCOS)) and the observing component of the Global Cryosphere Watch (GCW), including their surface-based and space-based components. The above component systems include all WMO contributions to the co-sponsored systems, i.e., GCOS, GOOS, GTOS, as well as the WMO contributions to GFCS and GEOSS.

To migrate the existing observing systems into a more integrated single system that is WIGOS, focused effort is required in the following key areas, detailed in the sub-chapters to follow:

(a) Management of WIGOS implementation;

(b) Collaboration with the WMO co-sponsored observing systems and international partner organizations and programmes;

(c) Design, planning and optimized evolution;

(d) Observing System operation and maintenance;

(e) Quality Management;
(f) Standardization, system interoperability and data compatibility;
(g) The WIGOS Operational Information Resource;
(h) Data and metadata management, delivery and archival;
(i) Capacity development;
(j) Communications and outreach.

2.1 Management of WIGOS Implementation

WIGOS implementation is an integrating activity for all WMO and co-sponsored observing systems: it supports all WMO Programmes and activities. The Executive Council and regional associations, through their respective working bodies, have a governing role in the implementation of WIGOS. The Sixteenth WMO Congress (Cg-XVI) decided that the technical aspects of WIGOS implementation would be guided by the technical commissions, with leadership provided through CBS and CIMO. Within the WMO Secretariat, WIGOS implementation will be supported by the WIGOS Project Office.

Executive Council

The WMO Executive Council will continue to monitor, guide, evaluate and support the implementation of WIGOS. Following the guidance by Cg-XVI, EC-LXIII established the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) with a view to providing technical guidance and assistance for the planning, implementation and further development of the WIGOS component observing systems. Progress on implementation of WIGOS will be reported to subsequent sessions of EC. The Council designated the president of CBS as chairperson of ICG-WIGOS.

Technical Commissions

Given the need for significant and active cooperation and enhanced coordination among the technical commissions, in particular those with responsibility for the WIGOS component observing systems, the ICG-WIGOS will ensure that technical aspects of WIGOS implementation are incorporated in the work programmes and implementation plans of all those WMO Technical Commissions concerned.

Regional Associations

Regional associations will play an essential role in WIGOS implementation. Regional associations, through their WIGOS regional working bodies (working groups, or task teams), will coordinate planning and implementation of WIGOS on the regional level taking into account all WMO future priorities, such as GFCS and DRR. The regional working bodies, under guidance from ICG-WIGOS, will be responsible for:

(a) The development of regional WIGOS Implementation Plans;
(b) The integration of WIGOS regional network components into a concept such as the Regional Basic Observing Network; and
(c) The evolution of their regional networks according to the implementation plan for the evolution of global observing systems (EGOS-IP)$^2$.

$^2$ http://www.wmo.int/pages/prog/www/OSY/gos-vision.html#egos-ip
Regional WIGOS implementation plans will also address regional aspects of requirements, standardization, observing system interoperability, data compatibility, data management, Quality Management procedures including performance monitoring and data quality monitoring, and proposed improvements in observing networks/systems. An important role of RAs will be to assess and continuously monitor regional requirements, identify regional gaps and identify capacity development projects to address those gaps.

**WMO Members**

Building on the WIGOS Framework Implementation Plan (WIP) and the Regional WIGOS Implementation Plan (R-WIP), Members are requested to develop their National WIGOS Implementation Plan (N-WIP) to help them to plan, implement, operate and maintain national networks and observing programmes based on the standards and best practices stated in the WMO Technical Regulations and its WIGOS Manual. They will be encouraged to adopt a composite network approach to their networks and to include the acquisition, and onward transmission, of data from external sources, including NMHSs and other government agencies, the commercial sector and members of the public. A particular area of focus for WMO Members under WIGOS will be increased attention to site protection and radio frequency spectrum protection.

Plans should also be developed to strengthen cooperation through partnership with different owners overseeing the WIGOS component observing systems. Specifically, these activities aim to enhance cooperation amongst meteorological, hydrological, marine/oceanographic and academic/research institutions/services where they are separated at the national level.

Concerning Radio Frequency Spectrum Protection, Members should maintain close coordination with their national telecommunication authorities to register their frequencies for adequate protection, and to defend the availability of frequencies for Meteorology, Climatology and Earth observations, influencing positively the national delegations to the World Radiocommunication Conferences (WRC).

**WMO Secretariat**

The overall coordination and support to WIGOS implementation will be performed by the WIGOS Project Office\(^3\) under the guidance of the WMO constituent bodies and the WIGOS Project Oversight Board (POB/WIGOS) which is responsible for the coordination mechanism within the Secretariat. The WIGOS Project Office will also be in regular contact with the relevant partner organizations in relation to the implementation of WIGOS.

### 2.2 Collaboration with the WMO co-sponsored observing systems and international partner organizations and programmes

WIGOS will be an integrated, comprehensive, and coordinated system primarily comprising the surface-based and space-based observing components of the GOS, GAW, GCW, and WMO Hydrological Observing System (including WHYCOS), including all WMO contributions to GCOS, GOOS and GTOS. It should be noted that in contrast to the primarily NMHS owned observing systems upon which the WWW was built, the proposed WIGOS component observing systems are owned and operated by a diverse array of organizations, both research and operational. Therefore, the interaction between these various communities is important for the implementation of WIGOS. In particular, strengthening the interaction between research and operational observing communities is important for sustaining and evolving observing systems and practices, in line with new science and technology outcomes. WIGOS is a major observing component of GFCS and will also provide indispensable contributions to GEOSS.

\(^3\) Established following Resolution 50 (Cg-XVI).
**Partner Organizations and Programmes**

Improved coordination and cooperation will need to be supported by a high-level reconciliation mechanism to be defined in the WMO-UNESCO/IOC-UNEP-FAO-ICSU MOU, in order to resolve possible problems in data policy, product delivery and other governance issues. These interagency and inter-observing system coordination mechanisms will need to be complemented and supported through similar cooperation and coordination arrangements among NMHSs and through national implementation mechanisms for GFCS, GCOS, GOOS, GTOS, and GEOSS.

The Architecture for Climate Monitoring from Space should be defined as an end-to-end system, involving the different stakeholders including operational satellite operators and R&D space agencies, the Coordination Group for Meteorological Satellites (CGMS), the Committee on Earth Observation Satellites (CEOS), the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP) and the Group on Earth Observations (GEO). Within the WMO context, the Architecture shall be part of the space-based component of WIGOS. Therefore, particular emphasis will be placed on their coordinated contribution to WIGOS, building on existing coordination mechanisms stated above.

2.3 Design, planning and optimized evolution of WIGOS component observing systems

The WMO has agreed on the Vision for the Global Observing Systems in 2025⁴ which provides high-level goals to guide the evolution of the global observing systems during the coming decades. To complement and respond to this Vision, an Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) was approved by CBS-15 (September 2012) for consideration by EC-65 (May 2013). This EGOS-IP focuses on the long-term evolution of WIGOS component observing systems, while the WIGOS-IP focuses on the integration of these component observing systems. Beyond 2015 these plans will provide Members with clear and focused guidelines, specifying actions that stimulate the cost-effective evolution of the observing systems to address in an integrated way the requirements of all WMO Programmes and relevant parts of co-sponsored programmes.

Concerning the surface-based sub-system of WIGOS, the current composition of mainly separate networks of observing stations comprises numerous different types of sites, for example:

(a) Surface synoptic stations (Land and Sea stations);
(b) Upper-air synoptic stations (Land and Sea stations);
(c) Aircraft meteorological stations;
(d) Aeronautical meteorological stations;
(e) Research and special-purpose vessel stations;
(f) Climatological stations;
(g) GCOS Surface Network (GSN);
(h) GCOS Upper-Air Network (GUAN);
(i) Agricultural meteorological stations;
(j) Hydrological stations; and
(k) Special stations, that include:
(l) Weather radar stations;

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(m) Radiation stations;
(n) Wind profiler stations;
(o) Atmospherics detection stations (lightning detection network stations);
(p) Micrometeorological flux stations;
(q) Plant phenology observing stations;
(r) Meteorological rocket stations;
(s) Global Atmosphere Watch (GAW) stations;
(t) Global Cryosphere Watch stations;
(u) Planetary boundary-layer stations;
(v) Data buoys (drifting and moored) and ocean surface gliders;
(w) Ocean profiling floats and sub-surface gliders;
(x) Ship-based observations (surface marine, oceanographic, and upper-air);
(y) Tide-gauge stations; and
(z) Tsunami monitoring stations.

With the implementation of WIGOS, these separate networks will continue to evolve but will also be given a more prominent collective identity as the WIGOS surface-based sub-system and for some purposes may be considered as a single composite system of observing (fixed or mobile) sites/platforms. Regional associations will adopt a broader role in coordinating the implementation of relevant elements of the WIGOS surface-based sub-system, evolving from the previous concepts of the synoptic and climatological networks.

Similarly, the space-based sub-system of WIGOS is composed of many different platforms and types of satellites. There is already partial integration due to the existence of a globally coordinated plan, which is maintained by WMO and CGMS, and which takes into account the needs of a number of application areas. However, it should be further developed and expanded to better support certain application areas that, at present, are not benefiting from the full potential of space-based observations, for example, other components of GAW and the WMO Hydrological Observing System and new initiatives like GFCS and GCW. In addition, further integration shall be pursued in terms of inter-calibration, data and product harmonization, and composite product delivery. Regional associations will adopt an active role for compiling the views of Members and maintaining documented requirements and priorities for data and products to be available from the WIGOS space-based sub-system.

**Rolling Review of Requirements (RRR)**

Coordinated strategic planning at all levels will be based on the RRR process, and will be supported by the WIGOS regulatory material.

The RRR process involves regularly reviewing the observational data requirements for each of the defined WMO Application Areas and all required variables (see Table 1). The RRR process also involves reviewing the capabilities of WMO observing systems and co-sponsored systems, and the

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6 The RRR describes data requirements, which are expressed in terms of space/time resolution, uncertainty, timeliness, etc., for each of the required observed variables, and are measures independent of observing technology.
details of the networks/platforms in existence\(^7\), for both space-based and surface-based systems, in delivering data on different variables. The comprehensive information collected for the globe on both requirements and capabilities is quantitatively recorded in a database accessible through the Observing Systems Capability Analysis and Review tool (OSCAR\(^8\)) of the WIGOS Operational Information Resource (WIR, see section 2.7 below). The information on surface-based networks and instrumentation details is currently recorded in WMO Publication No. 9, Volume A, but will ultimately be available, with additional metadata, through OSCAR. Space-based capabilities are also recorded and made available through OSCAR. OSCAR allows the performance of gap analyses to identify weaknesses in existing observing programmes.

The above steps represent the analysis phase of the RRR, which is as objective as possible. Next is the prioritization and planning phase of the RRR in which experts from the various application areas interpret the gaps identified, draw conclusions, identify key issues and priorities for action. This input is composed as Statements of Guidance (SoG) from each application area. The technical commissions respond to the SoG by formulating new global observing system requirements and the regulatory and guidance publications to assist Members in addressing the new requirements. Additionally, CBS and other technical commissions draw on the SoGs to develop a Vision and an Implementation Plan for further developments of WIGOS.

<table>
<thead>
<tr>
<th>No.</th>
<th>Application Area</th>
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<tbody>
<tr>
<td>1</td>
<td>Global NWP</td>
</tr>
<tr>
<td>2</td>
<td>High Resolution NWP</td>
</tr>
<tr>
<td>3</td>
<td>Nowcasting &amp; Very Short-range Forecasting</td>
</tr>
<tr>
<td>4</td>
<td>Seasonal to Inter-annual</td>
</tr>
<tr>
<td>5</td>
<td>Aeronautical Meteorology</td>
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<tr>
<td>6</td>
<td>Atmospheric Chemistry</td>
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<td>7</td>
<td>Ocean Applications</td>
</tr>
<tr>
<td>8</td>
<td>Agricultural Meteorology</td>
</tr>
<tr>
<td>9</td>
<td>Hydrology(^9)</td>
</tr>
<tr>
<td>10</td>
<td>Climate Monitoring</td>
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<tr>
<td>11</td>
<td>Climate Applications</td>
</tr>
<tr>
<td>12</td>
<td>Space Weather</td>
</tr>
</tbody>
</table>

### Table 1: The 12 recognized WMO Application Areas

At the Regional Level

The primary coordination of the RRR will lie with CBS for overall WIGOS planning. Regional associations, through their respective WIGOS regional working bodies, will follow the technical guidance of the technical commissions as represented in the EGOS-IP and other observing system implementation plans in order to evolve and implement observing systems in the various Regions.

Regional associations will also be encouraged to examine, and report back to CBS, the global requirements for data, taking into account the particular requirements of the Region and international river basin authorities. This process will involve, in essence, the use of the global data to prepare regional data requirements, then use this for planning of WIGOS component observing systems at the regional scale and then encourage Members within the Region to implement these components, subject to further review at the national or sub-regional level, where appropriate.

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\(^7\) Capabilities are derived from the individual platforms characteristics submitted by Members to WMO e.g. through WMO-No. 9, Volume A, or its evolution.


\(^9\) Hydrological information only; water quality monitoring and information are currently excluded.
The regional associations will also coordinate and identify issues regarding the data and product utilization needs of Members especially in regard to the application of actions and guidance from EGOS-IP and this Plan to inform and influence global level implementation and activities including the RRR.

At the National or Subregional Level

WMO Members will contribute to the collective regional effort to evolve and implement observing systems following the EGOS-IP and other observing system implementation plans.

WMO Members will also have available the global and regional data requirements information available to use as guidance for the preparation of national requirements information which can then be used to carry out the detailed planning for evolution of national WIGOS component observing systems.

In some cases, where countries are small and geographically close or already have established multilateral working relationships, there may be more merit in taking a subregional, as opposed to national, approach to WIGOS observing infrastructure planning. In this case, it will be necessary for the Members concerned to work in close cooperation to prepare subregional reviews of requirements to be used as a basis for detailed planning at that scale.

2.4 Observing System Operation and Maintenance

Observing system owners or custodians are responsible for operating and maintaining their systems and for complying with the regulations of the WMO and co-sponsored observing systems to which they contribute. System owners are generally NMHSs or other organizations within WMO Member countries but are sometimes other entities.

WIGOS involves, between observing systems, a process for sharing of operational experiences, of ideas and best practices, of expertise and for pooling resources for joint activities, such as done within EUMETNET. The benefit is to realize synergies and greater efficiencies. These interactions may be between different teams within a single organization (such as an NMHS) or between organizations. These may benefit from technical guidance from relevant technical commissions and, while occurring primarily at a national level, may also occur at a regional or global level. For example:

(a) Maintenance visits: meteorological, hydrological and other networks often require their technicians to visit similar geographical areas to maintain observing equipment. It may be possible, where appropriate, to manage maintenance visits as a joint activity thereby realizing efficiencies;

(b) Spectrum management: greater influence nationally which feeds into ITU;

(c) Calibration and Traceability: Potential for efficiencies and improvements to observational data quality through combining efforts at a national, regional and global level;

(d) Procurement: considerable effort is often required to conduct procurement processes for observing systems. Where requirements allow, a joint procurement exercise can realize significant efficiencies;

(e) Protection of weather radar from wind turbine interference: shared risk and greater influence with planning objections;

10 A grouping of 29 European National Meteorological Services that provides a framework to organise co-operative programmes between its Members in the various fields of basic meteorological activities.
Many synergies are achieved by satellite operators through CGMS and the WMO Space Programme by harnessing the joint efforts of satellite operators, and these best practices will be expanded further to new WMO initiatives like GFCS.

It should also be noted that WMO Members need to increase their efforts to maintain metadata and provide it to WMO so that WIGOS support tools are effective.

2.5 Quality Management

Meeting the quality requirements and expectations of users will be critical to the success of WIGOS. This would require an in-depth examination of current practices used by WMO observing programmes, specific mission-related requirements that were already in place, and available technological opportunities. The WIGOS Quality Management would specify all processes for WIGOS component observing systems including guidance on its effective management.

The WIGOS Quality Management approach is to apply the WMO Quality Management Framework (QMF) to the WIGOS component observing systems (see WMO Technical Regulations (WMO-No. 49), Vol. IV). WIGOS Quality Management will strive for compliance of all components of WIGOS with international standards, such as ISO 9001/9004 and the ISO 17025 standard where appropriate (i.e. with respect to instrument calibration and traceability of data). In addition to the WMO QMF document, further guidance to Members on WIGOS Quality Management will be provided via the standards and best practices described in the Regulatory Materials, such as the WIGOS Manual and Guide. Such guidance, for both mandatory and desirable practices, can be referenced for the application and implementation of quality management in national observing systems. In this context, WIGOS will give attention to:

(a) The examination of current quality management practices being used by WMO observing programmes;
(b) The documentation of the quality of observation at all stages of data processing; and
(c) Ensuring, where possible, traceability to the International System of Units (SI).

One component of WIGOS worthy of particular mention in the context of quality management is the space-based component. CGMS, in coordination and collaboration with WMO, supports the development of quality assurance standards and formats for satellite observations, multi-satellite and multi-sensor algorithms for estimating retrieved data and products, and advanced atmospheric sounding derivation packages for use by WMO Members. This is a well-established and effective process and it is expected it will continue to address WMO’s new requirements and to make significant contributions. To assist this effort, WIGOS will also ensure that surface-based sites that are needed for calibration/validation of satellite data are specified.

A key aspect of WIGOS Quality Management that requires particular attention under WIGOS is the systematic and rigorous performance monitoring and evaluation (PM&E) of WIGOS capabilities, in terms of both: (a) the flow of observational data/products to models; and (b) provision of products/information for decision-support tools and services in accordance with requirements specified by end users. Effective PM&E can improve the overall performance of WIGOS and its ability to effectively interact with its user community and to meet community needs and requirements.

In summary, responsibility for the development of WIGOS Quality Management, and for the provision of guidance to Members on how to achieve compliance with the relevant technical standards, lies with the WMO Technical Commissions and with CGMS, while the responsibility for ensuring compliance with the WIGOS quality principles (such as ISO 9001, 9004, 17025) will fall primarily to the WMO Members themselves.
2.6 Standardization, System Interoperability\textsuperscript{11} and Data Compatibility

WIS plays an important role in WIGOS implementation, in relation to data exchange and discovery, and the provision of effective standards and practices for data management. It is important that WIGOS and WIS implementation activities are closely coordinated.

Taking into account the ongoing rapid progress in technology that will continue to provide a basis for further improvements in the capability, reliability, quality and cost-effectiveness of observations, WIGOS must utilize international standards and best practices set by WMO and partner organizations.

The required key areas of standardization are:

(a) Instruments and methods of observation across all components including surface-based and space-based elements (observations and their metadata);
(b) WIS information exchange, as well as discovery, access and retrieval (DAR) services; and
(c) Data Management (Data Processing, Quality Control, Monitoring and Archival).

The interoperability (including data compatibility) of WIGOS component observing systems is achieved through utilization and application of the same, internationally accepted standards and best practices (that is, standardization). Data compatibility is also supported through the use of standardized data representation and formats. In this regard, observing system interoperability and data compatibility are key to turning observations into effective data/products that meet real needs of various users.

All standard practices will be documented in the WMO Technical Regulations through the WIGOS Manual and other relevant Manuals. Recommended practices will be documented in the Guides and other technical documentation under the responsibility of the respective technical commissions.

2.7 The WIGOS Operational Information Resource

The WIGOS Operational Information Resource (WIR), accessible via a centralized point (web portal), will provide access to all WIGOS related operational information, including observational user requirements, a description of the contributing observing networks (instrument/site/platform metadata), and their capabilities, list of standard and recommended practices and procedures used in the WIGOS framework, data policies applicable, and information on how to access data. It will also provide general information on WIGOS benefits, and impacts to Members. It will be a tool for conducting critical reviews as part of the Rolling Review of Requirements process, and assist Members and regional associations for conducting observing network design studies as appropriate. It will be providing guidance on how to develop capacities in developing countries according to WIGOS requirements, and will be providing them with a toolbox to be used nationally if and when required. The information collected is intended in particular to identify the gaps in the observing networks, identify areas where existing observing systems could be used, or their scope expanded at limited cost to address the requirements of more application areas. The information provided on standard and recommended practices and procedures will support the production of more homogeneous data-sets and make the observations traceable and of known quality.

The WIR will also include information on planned observing networks, and the planned evolution of existing observing systems, allowing having a vision of the future global, regional, and national contributions to WMO networks, and how they will address user requirements. It will rely on and give access to key WIGOS support tools as shown schematically in Figure 1. Based on feedback from Members and users of the information resource, the need for additional functionality and/or

\textsuperscript{11} Interoperability is a property referring to the ability of diverse systems to work together (inter-operate).
information sources to be accessible from within the resource will be considered by ICG-WIGOS once it has been implemented.

The key support tools of WIR are:

1. **The Portal**: A portal with access to general information and to the other components;
2. **The “Standardization of Observations” Reference Tool (SORT)**: A tool linking to information on WIGOS standards and recommended practices and procedures;
3. **The Observing Systems Capabilities Analysis and Review tool (OSCAR)**: A tool for Rolling Review of Requirements (RRR) process, network design and planning, providing information on observational user requirements and observing systems capabilities, including description of WIGOS component observing systems (i.e. observational metadata), and linkages to existing databases (e.g. WMO Country Profile database, when applicable).

For further details, reference is made to the Functional Requirements of the WIGOS Operational Information Resource (WIR) available at www.wmo.int/wigos (Principal Documents).

### 2.8 Data Discovery, Delivery and Archival

Within the WIGOS framework, the WMO Information System (WIS\textsuperscript{12}) provides exchange of data and interpretation metadata\textsuperscript{13}, and management of related discovery metadata\textsuperscript{14}. These discovery metadata play an important role in the discovery, access and retrieval of WIGOS observations and products.

Submission, management and archival of the data themselves is generally the responsibility of observing system owners/data custodians. However, several World Data Centres and a number of

\textsuperscript{12} [http://www.wmo.int/wis](http://www.wmo.int/wis)

\textsuperscript{13} Interpretation metadata is the information required to interpret the data.

\textsuperscript{14} Discovery metadata is the information describing the data-sets, generally using ISO-19115 standard, and WMO core profile in case of WIS.
regional or specialized data centres exist that collect, manage and archive basic observational data that are relevant to WMO Applications.

An important aspect of WIGOS implementation is to ensure all participants adopt WIGOS and WIS standards and make their data and metadata available through WIS for delivery or for discovery, access and retrieval services. In this regard, promotion and implementation of DCPCs (Data Collection and Production Centres) as well as National Centres will be supported and encouraged. Guidance will be developed and provided through the appropriate WIGOS regulatory and technical documents.

2.9 Capacity Development

A coordinated capacity-development effort at global, regional and national levels is of paramount importance to the developing countries. This is especially the case for NMHSs of Least Developed Countries (LDCs) and Small Island Developing States (SIDSs), to enable them to develop, improve and sustain national WIGOS component observing systems. This needs to be complemented by capacity development efforts outside of WIGOS but in closely related areas to improve access to, and effective utilization of, observations, data and products, and related technologies. The WIGOS capacity development activities at national and regional levels are focused on:

(a) Providing assistance to Members to introduce or improve institutional mandates and policies that enable effective implementation, operation and management of observing systems;

(b) Filling the existing gaps in the design, operation and maintenance of WIGOS observing systems, including both the infrastructure and human capacities development;

(c) Technological innovation, technology transfer, technical assistance and decision-support tools.

Capacity development in satellite applications for developing countries, LDCs and SIDSs are also addressed in the Implementation Plan for the Evolution of the GOS (see WMO/TD-No. 1267). The virtual lab (VL) will continue to grow and help all WMO Members realize the benefits of satellite data.

2.10 Communications and Outreach

WIGOS will establish its communications and outreach strategy through the efforts of WMO Members, Programmes, Regional Associations (RAs) and Technical Commissions (TCs), and co-sponsors. The strategy will start by describing its purpose, the target audiences and the key messages to convey to those audiences.

The strategy will provide details on WIGOS benefits, increased effectiveness, and efficiency, and impact on the WMO Members activities, as well as on the socio-economic benefits of WIGOS data. It will take advantage of outreach programmes developed and effectively deployed so far by WMO and its partner organizations. A suggested list of outreach materials identified to support WIGOS is shown in Annex I.

The WIGOS Portal will provide convenient access to relevant information on communications, outreach and capacity development, aimed at complementing, not duplicating, others’ efforts. A variety of outreach materials will be developed to educate the Members, funding agencies, policy-makers and the general public, on the importance of WIGOS to society. Materials include posters and other educational material for elementary and high school classes, a WIGOS brochure, a semi-annual or annual newsletter, an online photo and video library, and information on the current state of the observing systems.
3. **PROJECT MANAGEMENT**

3.1 **Project Framework**

The implementation of the WIGOS framework will proceed with the support of the WIGOS Project Office and with the following project oversight arrangements:

(a) EC-LXIII established ICG-WIGOS to provide technical guidance and assistance for the planning, implementation and further development of the WIGOS framework and designated the president of CBS as chairperson of ICG-WIGOS; and

(b) The administrative structure within the WMO Secretariat. The WMO Secretariat, through the WIGOS Project Oversight Board (POB/WIGOS), with WIGOS-relevant programmes and departments (OBS, RES, CLW, WDS and DRA) provides integrated support to ICG-WIGOS, its Task Teams and other relevant working bodies.

3.2 **Project monitoring, review and reporting mechanism**

(a) The Executive Council will monitor, review, guide and support the overall implementation of WIGOS;

(b) The ICG-WIGOS will report to subsequent sessions of the Executive Council on the progress in implementation of WIGOS;

(c) The WIGOS Project Office, under the institutional guidance of the WMO constituent bodies and through the Secretariat internal coordination and oversight mechanism, will be responsible during the implementation phase for reporting to all WMO constituent bodies and Members on a regular basis, to present and document the progress in the WIGOS implementation as well as for the purpose of their close and active involvement.

3.3 **Project Evaluation**

The evaluation methodology will be designed against WIGOS implementation activity tables, i.e. with respect to the activities, deliverables, timeline, responsibility and budget allocations. This will include a schedule of monitoring and evaluation activities and related responsibilities. Mid-term evaluation, interim progress reports and post-implementation reviews are planned as a means of providing early feedback on progress towards success, and as a means of meeting accountability and transparency requirements for the whole implementation phase. RAs, TCs and NMHSs will provide progress reports at the request of the WIGOS Project Office.

4. **IMPLEMENTATION**

4.1 **Activities, Deliverables, Milestones, Costs and Risks**

Cg-XVI established a goal of WIGOS becoming operational by 2016. Table 2 presents the key implementation activities that are required for WIGOS implementation within the timeframe 2012–2015. The table is arranged to correspond to the activity areas presented in Section 2. In the table each implementation activity is presented along with its associated deliverables, timelines, responsibilities, costs and associated risk.

For each activity in Table 2, a detailed activity plan will be developed by the responsible entity or entities, with support of the WIGOS Project Office and guidance from ICG-WIGOS. The Project Office has responsibility for tracking execution of these activities and this plan itself.
Table 2  WIGOS Implementation Activities

Activities in bold are considered the most critical for WIGOS to be implemented by 2015. Depending on the implementation scale, planned activities are specified as follows: G = Global activity, R = Regional activity and N = National activity.

Key to activity numbers: a.b.c, where a is number of respective sub-section of section 2, b is for a global (1), regional (2) or national (3) activity, and c is a sequential number to distinguish activities from one another. RQ: Required Resources. RB = Regular Budget.

(Evaluation of Progress: Completed; On-Track; Overdue indicated in the column for “Target Date for Completion”)

|-----|----------|--------------|----------------------------|----------------|-----------------------------------|----------------|-----|-----|-----------|-------------|
| 1.1.1 | G | 1) Develop/Revise/Update WMO Regulatory Material to include WIGOS Regulations  
2) Develop WIGOS Guide  
3) Develop WIGOS Functional Architecture (FA) | 1) Updated WMO Technical Regulations (WMO-No. 49) and the new WIGOS Manual for Cg-17 approval  
2) WIGOS Guide  
3) WIGOS FA | 1) Cg-17  
2) Cg-17  
3) 2016 | ICG-WIGOS | 500 | Very High | 3.1.1; 4.1.1  
5.1.1, 5.1.2  
6.1.1; 7.1.1  
8.1.1 |
| 1.1.2 | G | Incorporate technical aspects of WIGOS implementation and continuing evolution into existing/new TCs and RAs working structures and procedures | 1) RA & TC working structure adjusted to address WIGOS activities  
2) Cross body coordination mechanisms in place | 1) 2014  
2) 2014 | 1) RAs; TCs  
2) ICG-WIGOS | 0 | Low |
| 1.1.3 | G | Provide annual reports and recommendations to EC and Cg on progress in WIGOS implementation | Annual reports to EC, Cg on WIGOS implementation status | EC-65  
EC-66  
Cg-17 | ICG-WIGOS | 0 | Low |
| 1.2.1 | R | Develop Regional WIGOS Implementation Plans (R-WIPs) | R-WIPs developed | 2013 | RAs | 50 | Low |
| 1.3.1 | N | Develop National WIGOS Implementation Plans (N-WIPs) | N-WIPs developed | From 2013 | Members | 100 | Medium |
2. Collaboration with the WMO co-sponsored observing systems and international partner organizations and programmes

| 2.1.1 G | Develop guidance, mechanisms and procedures for engagement, coordination and collaboration with partner organizations (to be used on all, global, regional and national levels) | 1) Strategy for working with Partners is published & available on the Portal 2) MOU concluded with interested Partners | 1) 2014 2) 2014 | ICG-WIGOS Partners | 0 | Med 7.1.1 |
| 2.1.2 G | Develop Collaboration framework for the Architecture for Climate Monitoring from Space (ACMS) *(Note: for the development of ACMS itself, see new 3.1.2)* | 1) ACMS strategy approved by Partners 2) Collaboration framework for 3.1.2 developed 3) ACMS governance scheme approved by Partners | 1) 2013 2) 2014 3) 2015 | CGMS, CEOS SAT, CBS | 35 | Low |
| 2.2.1 R | Examine and recommend areas where closer regional cooperation and coordination would be beneficial | Recommendations to be included in regional WIPs | 2015 | RAs | 0 | Low |
| 2.3.1 N | Establish closer collaboration at the national level, NMHS with other government agencies, and with potential external data providers | 1) Guidance for establishing national collaboration frameworks; 2) National collaboration frameworks established | 1) 2014 2) 2015 | ICG-WIGOS, Members, RAs | 0 | Medium |

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15 Congress emphasized that strong support and close collaboration among Members were needed to advance scientific knowledge and technical infrastructure to meet the WIGOS requirements. Within the Regions, it would be desirable to strengthen cooperation and partnership through Region-wide organizations or subregional groupings overseeing the WIGOS observing components. It specifically refers to enhanced cooperation among meteorological, hydrological and marine/oceanographic institutions/services where they are separated at the national level.
<p>| | | | | | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>3. Design, planning and optimized evolution of WIGOS and its regional, sub-regional and national component observing systems</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>3.1.1</strong></td>
<td><strong>G</strong></td>
<td>Complete RRR practices, procedures, responsibilities and mechanisms for all systems and agreed application areas</td>
<td>1) RRR included in the WIGOS regulatory material; consistency achieved with other WMO regulatory material; 2) Appropriate bodies have RRR responsibilities identified in their ToRs</td>
<td>1) 2014</td>
<td>CBS other TCs</td>
</tr>
<tr>
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<tr>
<td><strong>3.1.2</strong></td>
<td><strong>G</strong></td>
<td>Develop the Architecture for Climate Monitoring from Space (ACMS) focusing on GFCS four priorities</td>
<td>1) ACMS logical model 2) ACMS physical planning 3) ACMS implementation status</td>
<td>1) 2013 2) 2014 3) 2015</td>
<td>CGMS, CEOS, CBS, SAT</td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>3.1.3</strong></td>
<td><strong>G</strong></td>
<td>Using the RRR process &amp; capitalizing on relevant experience of Members, develop guidance regarding observing network design principles</td>
<td>Guidance document on network design provided to Members</td>
<td>2015</td>
<td>IPET-OSDE, ICG-WIGOS, TCs</td>
</tr>
<tr>
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<tr>
<td><strong>3.1.4</strong></td>
<td><strong>G</strong></td>
<td>To develop a concept of Regional Basic Observing Network (RBON) to be applied by RAs</td>
<td>Description of RBON concept applied by Regions</td>
<td>2015 onwards</td>
<td>ICG-WIGOS, RAs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>3.2.1</strong></td>
<td><strong>R</strong></td>
<td>Evolve and implement observing systems in the Region following the technical guidance of the technical commissions as represented in the EGOS-IP and other observing system implementation plans</td>
<td>1) Report back to IPET-OSDE on the actions detailed in the EGOS-IP 2) EGOS-IP initiated within the Region</td>
<td>1) 2014 2) 2015</td>
<td>RAs</td>
</tr>
<tr>
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<td></td>
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</tr>
<tr>
<td><strong>3.2.2</strong></td>
<td><strong>R</strong></td>
<td>Update the global RRR database to take into account regional user requirements</td>
<td>Refined RRR database (OSCAR)</td>
<td>2015</td>
<td>RAs; IPET-OSDE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.2.3</strong></td>
<td><strong>R</strong></td>
<td>Migrate from the existing RBSN/RBCN into an integrated RBON</td>
<td>RBONs adopted by RAs</td>
<td>2015 onwards</td>
<td>RAs, Members</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.3.1</strong></td>
<td><strong>N</strong></td>
<td>Contribute to the collective regional effort to evolve and implement observing systems following the EGOS-IP and other observing system implementation plans</td>
<td>1) Report back to IPET-OSDE on the actions detailed in the EGOS-IP 2) EGOS-IP initiated at a National level</td>
<td>1) 2014 2) 2015</td>
<td>Members</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.3.2</strong></td>
<td><strong>N</strong></td>
<td>Define sub-Regional user requirements for observations</td>
<td>Updated RRR database (OSCAR)</td>
<td>2015</td>
<td>Members</td>
</tr>
</tbody>
</table>
### 4. Observing System Operation and Maintenance

#### 4.1.1 Develop guidance, mechanisms and procedures for improved integration of observational data and products

<table>
<thead>
<tr>
<th>G</th>
<th>Development</th>
<th>Details</th>
<th>Completion</th>
<th>Responsible</th>
<th>Grade</th>
<th>Relevancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.1</td>
<td>1) Guidance included in the WIGOS Guide 2) Work is underway for some specific product integration activities</td>
<td>1) 2015 2) 2015</td>
<td>ICG-WIGOS</td>
<td>0</td>
<td>High</td>
<td>1.1.1; 3.1.1; 4.1.2; 6.1.1; 8.1.1</td>
</tr>
</tbody>
</table>

#### 4.1.2 Develop guidance for the process of sharing, between component observing systems, operational experiences, sharing of expertise and a guidance for resourcing joint activities

<table>
<thead>
<tr>
<th>G</th>
<th>Development</th>
<th>Details</th>
<th>Completion</th>
<th>Responsible</th>
<th>Grade</th>
<th>Relevancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.2</td>
<td>Guidance included in the WIGOS Guide</td>
<td>2015</td>
<td>ICG-WIGOS</td>
<td>90</td>
<td>Medium</td>
<td>4.1.1</td>
</tr>
</tbody>
</table>

### 5. Quality Management (QM)

#### 5.1.1 Develop WIGOS Quality Management guidance, mechanism, practices and procedures

<table>
<thead>
<tr>
<th>G</th>
<th>Development</th>
<th>Details</th>
<th>Completion</th>
<th>Responsible</th>
<th>Grade</th>
<th>Relevancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.1</td>
<td>1) WIGOS QM to be incorporated into WIGOS Regulatory material 2) Appropriate bodies have responsibilities identified in their ToRs</td>
<td>1) 2015 2) 2015</td>
<td>ICG-WIGOS Relevant TCs</td>
<td>280</td>
<td>High</td>
<td>(Resources) 5.1.2 8.1.1</td>
</tr>
</tbody>
</table>

#### 5.1.2 Examination of current quality management practices being used by WMO observing programmes

<table>
<thead>
<tr>
<th>G</th>
<th>Development</th>
<th>Details</th>
<th>Completion</th>
<th>Responsible</th>
<th>Grade</th>
<th>Relevancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.2</td>
<td>Report on QM practices used with identification of areas for improvement</td>
<td>2014</td>
<td>ICG-WIGOS</td>
<td>200</td>
<td>High</td>
<td>(Resources) 5.1.1</td>
</tr>
</tbody>
</table>
### 6. Standardization, System Interoperability and Data Compatibility

#### 6.1.1 G

1) Develop guidance for WIGOS standards
2) Document the implemented standard and recommended practices and procedures on instruments, methods of observation, data products, etc.

1) Guidance to WIGOS standardization developed
2) Implemented standard and recommended practices and procedures are documented and available at the Portal as appropriate
3) Newly developed standard and recommended practices documented in the WIGOS regulatory material

<table>
<thead>
<tr>
<th>Relevante TCs</th>
<th>1) 2015</th>
<th>Relevant TCs</th>
<th>100</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>TT-WRM WIGOS PO</td>
<td>2015</td>
<td></td>
<td></td>
<td>1.1.1; 7.1.1; 7.1.3; 8.1.1;</td>
</tr>
</tbody>
</table>

#### 7. The WIGOS Operational Information Resource (WIR)

#### 7.1.1 G

**Design and develop the WIGOS Information Resource (WIR)**

1) Technical Specification
2) Decision made on developments of WIGOS Information Resource (internal vs. call for tender)
3) Operational Acceptance

<table>
<thead>
<tr>
<th>1) 2013</th>
<th>2) 2013</th>
<th>Secretariat in cooperation with Members</th>
<th>330 &amp; HR: 2 Y (^{16})</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAT, CBS</td>
<td>0</td>
<td>Low</td>
<td>3.1.1, 3.1.3, 3.2.1, 3.2.2, 3.3.1, 3.3.2</td>
</tr>
</tbody>
</table>

#### 7.1.2 G

**Investigate the need for a database describing the Global Observational Products (Satellite Data, Weather Radar)**

Documented requirements for the database

2013

SAT, CBS

0

Low

#### 7.1.3 G

**Survey WMO Members on what they could offer to support development and operations of WIGOS Operational Information Resource**

Published survey results and resulting decisions

2013

WIGOS-PO

50

Low

#### 7.3.1 N

**Provide information required by WIR**

Required information available in WIR and maintained

From 2013

Members

0

Medium

\(^{16}\) HR: Human resources in number of years
8. Data discovery, delivery and archival

<table>
<thead>
<tr>
<th>8.1.1</th>
<th>Develop WIGOS metadata standards, practices and procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>1) WIGOS Metadata standards, practices and procedures approved and incorporated in WIGOS regulatory material</td>
</tr>
<tr>
<td></td>
<td>2) Initial access to WIGOS Metadata provided through the WIR</td>
</tr>
<tr>
<td></td>
<td>3) Practices established in WIGOS Manual &amp; Guide</td>
</tr>
<tr>
<td></td>
<td>4) Mechanism for maintenance of MD standards established</td>
</tr>
<tr>
<td></td>
<td>1) 2015</td>
</tr>
<tr>
<td></td>
<td>2) 2014</td>
</tr>
<tr>
<td></td>
<td>3) 2015</td>
</tr>
<tr>
<td></td>
<td>4) 2015</td>
</tr>
<tr>
<td></td>
<td>TCs</td>
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<tr>
<td></td>
<td>ICG-WIGOS</td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>7.1.1</td>
</tr>
<tr>
<td></td>
<td>5.1.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8.1.2</th>
<th>To develop a mechanism to assist Members in implementing and exploiting WIGOS metadata standards, practices and procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>1) Mechanism developed</td>
</tr>
<tr>
<td></td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>ICG-WIGOS</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>4.1.1, 8.1.1, 10.1.1</td>
</tr>
</tbody>
</table>
### 9. Capacity development

**9.1.1**

<table>
<thead>
<tr>
<th>G</th>
<th>Develop a WIGOS Capacity Development (WCD) strategy including education and training</th>
<th>1) WCD Strategy developed &amp; available on the WIR 2) WCD activities underway</th>
<th>1) 2013 2) 2015</th>
<th>ICG-WIGOS ETR, RAs</th>
<th>0</th>
<th>medium 1.1.1, 1.2.1 2.3.1, 3.1.1, 3.2.1, 4.1.1, 4.1.2, 5.1.1, 6.1.1, 7.1.1, 8.1.1, 9.1.3, 9.3.1, 9.3.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1.2</td>
<td>Assistance provided to Members regarding WIGOS implementation</td>
<td>Assistance provided to Members for the development of N-WIPs</td>
<td>2015</td>
<td>WMO Secretariat Members</td>
<td>200</td>
<td>medium 3.1.1, 4.1.1 5.1.1, 5.1.2 6.1.1, 7.1.1 8.1.1</td>
</tr>
<tr>
<td>9.1.3</td>
<td>Develop WIGOS related guidelines and training materials and other relevant documentation</td>
<td>Training materials and guidelines developed</td>
<td>2015</td>
<td>WIGOS-PO TCs</td>
<td>100</td>
<td>medium 1.1.1, 7.1.1, 7.1.3, 6.1.1, 8.1.1</td>
</tr>
<tr>
<td>9.3.1</td>
<td>Mobilize resources for WIGOS implementation</td>
<td>More resources made available to NMHSs for WIGOS implementation</td>
<td>2015</td>
<td>WMO Members with assistance from the WMO Secretariat</td>
<td>0</td>
<td>medium</td>
</tr>
<tr>
<td>9.3.2</td>
<td>Assist Members in using WIR Tools for the design and management of national WIGOS networks</td>
<td>Initial steps taken to improve design on national networks</td>
<td>2015</td>
<td>WMO Members</td>
<td>120</td>
<td>medium 7.1.1</td>
</tr>
<tr>
<td>9.3.3</td>
<td>Assist Members in implementing WIGOS metadata</td>
<td>Tools available to assist Members in providing the WIGOS metadata</td>
<td>2014</td>
<td>WMO Secretariat Members</td>
<td>250</td>
<td>medium 8.1.1</td>
</tr>
</tbody>
</table>

### 10. Communications and outreach

**10.1.1**

<table>
<thead>
<tr>
<th>G</th>
<th>Develop an effective WIGOS communications and outreach strategy</th>
<th>WIGOS Communications and Outreach Strategy developed</th>
<th>2013</th>
<th>ICG-WIGOS</th>
<th>0</th>
<th>low</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1.2</td>
<td>Develop communications and outreach materials (see Annex I for suggestions)</td>
<td>Communications and outreach materials available on the WIGOS Portal</td>
<td>2015</td>
<td>WIGOS-PO</td>
<td>125</td>
<td>low 7.1.1</td>
</tr>
</tbody>
</table>
5. RESOURCES

The timely completion of the WIGOS implementation in the sixteenth financial period directly depends on the available resources. Therefore, the Congress assigned a high priority to the proposed budget allocations for WIGOS activities. Congress also urged Members to continue to provide resources to support the implementation of WIGOS. Congress recognized that the key role to be played by the technical commissions in WIGOS implementation would require additional resources, and therefore further urged Members to also provide the resources to enable this role to be fully realized, as a part of their voluntary contributions.

The full staffing requirement of the WIGOS Project Office would need to be met primarily through the secondment of experts from NMHSs. In this connection, Congress urged Members to provide secondment services to the Secretariat during the WIGOS Implementation to ensure its successful completion.

The investment for fully implementing WIGOS should be given a high priority in Members’ development and implementation plans. In addition, extra resources will need to be provided to the WMO Secretariat for both staff and non-staff costs for the implementation and coordination that are beyond the normal programmatic activities of the Secretariat. To ensure the funding needed for WIGOS implementation, provision of the following resources should be considered:

(a) WMO Regular Budget for WIGOS implementation support activities;
(b) WIGOS Trust Funds to supplement the WMO Regular Budget;
(c) In kind contributions;
(d) Staff secondments;
(e) Voluntary Cooperation Programme funds for WIGOS related technical cooperation and capacity-development activities;
(f) Regional fund-raising activities to support WIGOS; and
(g) Operational hosts for information systems.

The strong need to assist the three regular staff must be met primarily through the secondment of experts, including Junior Professional Officer (JPO) from Members, for completion of the key Project Office tasks, as follows:

(a) To assist the regular staff for the management and coordination of WIGOS projects and plans (JPO, extrabudgetary CHF 200 K is needed);
(b) To design, develop and maintain the WIGOS Operational Information Resource (WMO temporary staff, extrabudgetary CHF 400 K is needed);
(c) To assist the development of WIGOS technical documentation (secondments, extrabudgetary CHF 150 K is needed);
(d) To assist the WIGOS global and regional activities (secondment), and coordinate the management of the content of the WIGOS Operational Information Resource.

Table 3 below provides a summary of the staff requirements for the WIGOS Framework implementation.
Table 3: WIGOS Project Office additional staff resources needed for a period 2013–2015

<table>
<thead>
<tr>
<th>No.</th>
<th>Position</th>
<th>Additional resources needed</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>WIGOS Project Officer (P.3) (Responsible for the WIGOS Operational Information Resource development and implementation)</td>
<td>Yes CHF 400 K</td>
<td>Initial consultations with donors</td>
</tr>
<tr>
<td>5.</td>
<td>Junior Professional Officer (Responsible for coordination of WIGOS regional and national plans and related projects, including the capacity development projects)</td>
<td>Yes CHF 150 K</td>
<td>Initial consultations with Members</td>
</tr>
<tr>
<td>6.</td>
<td>Seconded Experts (Responsible for the development of WIGOS Regulatory Material)</td>
<td>Yes CHF 150 K</td>
<td>Initial consultations with Members</td>
</tr>
</tbody>
</table>

**TOTAL:** CHF 700 K

6. **RISK ASSESSMENT/MANAGEMENT**

The Risk Management Plan (RMP) will be developed for each implementation activity/projects, including risk mitigation. The following risk areas were identified:

(a) Complexity of WIGOS;
(b) Availability of basic infrastructure;
(c) The firm commitment of all stakeholders to implement initial activities/projects within the agreed time frame, including a provision of required resources, both human and financial;
(d) The requirement for appropriate leadership for the implementation of activities/projects;
(e) Partial interests of stakeholders not converging into the stated objectives;
(f) Coordination of interdependent projects;
(g) Provision of an effective interface between users of services and entities operating observing systems;
(h) Authority and responsibilities of entities and individuals for the implementation of projects;
(i) Lack of transparency in the management of the implementation;
(j) The potential for inadequate implementation if human resources are not available.

7. **OUTLOOK**

This document has described the key activities for the period 2012 to 2015. As determined by Cg-XVI, the goal is to have WIGOS operational by 2016. This is a challenging task. The experience gained during the WIGOS test of the concept phase clearly shows that it will be impossible to complete integration of all observing systems on global, regional and national levels in only four years. While WIGOS operations should start in 2016, there will still be a strong need to continue a significant number of implementation activities. It is essential to realize that additional
resources will be needed to ensure the secretariat support for the continuation of the implementation process. However, it is too early to make a precise statement on how many resources in terms of staff and funding should be made available. The decision on these matters should be taken by the time of Cg-17.
## ANNEX I

### SUGGESTED WIGOS COMMUNICATIONS AND OUTREACH MATERIALS

<table>
<thead>
<tr>
<th>Targeted audience</th>
<th>Type and size of document</th>
<th>Activity</th>
<th>Time-frame</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web portal</td>
<td>WMO Members RAs, TCs</td>
<td>Web pages with links to other materials</td>
<td>2012–2013</td>
<td>To be done</td>
</tr>
<tr>
<td></td>
<td>Space Agencies Partner</td>
<td></td>
<td></td>
<td>Status: To be done</td>
</tr>
<tr>
<td></td>
<td>Organizations General Public</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIGOS Imperative</td>
<td>WMO Members</td>
<td>10-page document (pdf)</td>
<td>2012</td>
<td>Done</td>
</tr>
<tr>
<td>WIGOS brochure</td>
<td>General Public</td>
<td>2-page brochure (pdf)</td>
<td>2012</td>
<td>Materials exist</td>
</tr>
<tr>
<td>WIGOS standard presentation (to be used at various events and adjusted as needed)</td>
<td>WMO Members</td>
<td>20-page presentation (ppt)</td>
<td>2012</td>
<td>Materials exist</td>
</tr>
<tr>
<td>WIGOS standard poster (to be used at various events and adjusted as needed)</td>
<td>Ad hoc Conferences</td>
<td>Poster (A2, pdf)</td>
<td>2012</td>
<td>Materials exist</td>
</tr>
<tr>
<td>WIGOS rationale</td>
<td>WMO Members Space Agencies Partner Organizations</td>
<td>1-page document (pdf)</td>
<td>2012</td>
<td>Materials exist</td>
</tr>
<tr>
<td>WIGOS benefits in terms of, observing systems implementation effectiveness, and efficiency</td>
<td>WMO Members Space Agencies Partner Organizations</td>
<td>2-page document (pdf)</td>
<td>2012</td>
<td>To be done as new document</td>
</tr>
<tr>
<td>Socio-economic benefits of WIGOS data</td>
<td>Governments WMO Members Funding Agencies Space Agencies Partner Organizations General Public</td>
<td>2-page document (pdf)</td>
<td>2012</td>
<td>To be done as new document</td>
</tr>
<tr>
<td>Impact on WMO Members of WIGOS implementation</td>
<td>WMO Members</td>
<td>5 to 10 page document (pdf)</td>
<td>2012–2013</td>
<td>To be done as new document</td>
</tr>
</tbody>
</table>
ANNEX II

REFERENCED DOCUMENTS

Reports of WMO constituent bodies

1. Fifteenth World Meteorological Congress, Abridged Final Report with Resolutions (WMO-No. 1026)
2. Sixteenth World Meteorological Congress, Abridged Final Report with Resolutions (WMO-No. 1077)
3. EC-LVIII, Abridged Final Report with Resolutions (WMO-No. 1007)
4. EC-LIX, Abridged Final Report with Resolutions (WMO-No. 1027)
5. EC-LXI, Abridged Final Report with Resolutions (WMO-No. 1032)
6. EC-LXII, Abridged Final Report with Resolutions (WMO-No. 1042)
7. EC-LXIII, Abridged Final Report with Resolutions (WMO-No. 1059)
8. EC-LXIII, Abridged Final Report with Resolutions (WMO-No. 1078)
9. CBS-XIV, Abridged Final Report with Resolutions and Recommendations (WMO-No. 1040)
10. CBS-Ext.(2010), Abridged Final Report with Resolutions and Recommendations (WMO-No. 1070)
11. Final report of the 1st session of the EC WG on WIGOS-WIS (December, 2007)
12. Final report of the 2nd session of the EC WG on WIGOS-WIS (May, 2009)
13. Final report of the 3rd session of the EC WG on WIGOS-WIS (March, 2010)
14. Final report of the 4th session of the EC WG on WIGOS-WIS (February, 2011)
15. Final report of the 1st session of the Subgroup on WIGOS of the EC WG on WIGOS-WIS (November, 2008)
16. Final report of the 2nd session of the Subgroup on WIGOS of the EC WG on WIGOS-WIS (October, 2009)
17. Final report of the 3rd session of the Subgroup on WIGOS of the EC WG on WIGOS-WIS (October, 2010)
18. Final report of the 1st session of ICG-WIGOS (September, 2011)

Other relevant documentation

20. WIS Project and Implementation Plan (v. 1.2, February, 2010)
23. Implementation Plan for Evolution of Space-and Surface-based Subsystems of the Global Observing system (WMO/TD-No. 1267)
27. EUCOS programme management documentation
28. THORPEX International Research Implementation Plan (WMO/TD-No. 1258)
**LIST OF ACRONYMS**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>CEOS</td>
<td>Committee on Earth Observation Satellites</td>
</tr>
<tr>
<td>CGMS</td>
<td>Coordination Group for Meteorological Satellites</td>
</tr>
<tr>
<td>CONOPS</td>
<td>Concept of Operations</td>
</tr>
<tr>
<td>DAR</td>
<td>Discovery, Access and Retrieval</td>
</tr>
<tr>
<td>DB</td>
<td>Database</td>
</tr>
<tr>
<td>DCPC</td>
<td>Data Collection or Production Centre (of WIS)</td>
</tr>
<tr>
<td>DRR</td>
<td>Disaster Risk Reduction</td>
</tr>
<tr>
<td>ET</td>
<td>Expert Team (of WMO Technical Commission)</td>
</tr>
<tr>
<td>EUMETNET</td>
<td>Network of European Meteorological Services</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>GAW</td>
<td>Global Atmosphere Watch</td>
</tr>
<tr>
<td>GCOS</td>
<td>Global Climate Observing System</td>
</tr>
<tr>
<td>GCW</td>
<td>Global Cryosphere Watch</td>
</tr>
<tr>
<td>GEO</td>
<td>Group on Earth Observations</td>
</tr>
<tr>
<td>GEOSS</td>
<td>Global Earth Observation System of Systems</td>
</tr>
<tr>
<td>GISC</td>
<td>Global Information System Centre (of WIS)</td>
</tr>
<tr>
<td>GFCS</td>
<td>Global Framework for Climate Services</td>
</tr>
<tr>
<td>GOOS</td>
<td>Global Ocean Observing System</td>
</tr>
<tr>
<td>GTOS</td>
<td>Global Terrestrial Observing System</td>
</tr>
<tr>
<td>ICG-WIGOS</td>
<td>Inter-Commission Coordination Group on WIGOS</td>
</tr>
<tr>
<td>ICPC</td>
<td>Interagency Coordination and Planning Committee for Earth Observations</td>
</tr>
<tr>
<td>ICSU</td>
<td>International Council for Science</td>
</tr>
<tr>
<td>IOC</td>
<td>Intergovernmental Oceanographic Commission</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization of Standardization</td>
</tr>
<tr>
<td>ITU</td>
<td>International Telecommunication Union</td>
</tr>
<tr>
<td>LDCs</td>
<td>Least Developed Countries</td>
</tr>
<tr>
<td>MOU</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>NMHS</td>
<td>National Meteorological and Hydrological Service</td>
</tr>
<tr>
<td>NOS</td>
<td>National Observing System</td>
</tr>
<tr>
<td>OSEs</td>
<td>Observing Systems Experiments</td>
</tr>
<tr>
<td>OSSEs</td>
<td>Observing System Simulation Experiments</td>
</tr>
<tr>
<td>QA</td>
<td>Quality Assurance</td>
</tr>
<tr>
<td>QC</td>
<td>Quality Control</td>
</tr>
<tr>
<td>QMF</td>
<td>Quality Management Framework</td>
</tr>
<tr>
<td>QMS</td>
<td>Quality Management System</td>
</tr>
<tr>
<td>RA</td>
<td>Regional Association</td>
</tr>
</tbody>
</table>
ANNEX V

Annex to paragraph 4.4.11 of the general summary

PROPOSED STRUCTURE OF THE SECTIONS ON THE WMO INTEGRATED GLOBAL OBSERVING SYSTEM CONTAINED IN THE TECHNICAL REGULATIONS (WMO-NO. 49)

(Words to delete shown with strike-through, words to add shown with underline)

Document revision track record
General Provisions
Definitions

VOLUME I – General Meteorological Standards and Recommended Practices (20xx edition)
PART I. WMO Integrated Global Observing System (WIGOS)
I.1 Scope of WIGOS
I.2 Common attributes of component systems
I.3 Common attributes specific to the surface-based sub-system of WIGOS
I.4 Common attributes specific to the space-based sub-system of WIGOS
I.35 Observing component of the Global Atmosphere Watch (GAW)
I.6 Observing component of the Global Cryosphere Watch (GCW)
I.27 Global Observing System (GOS) of WWW
I.5 Climatological data and Global Climate Observing System (GCOS) ECVs
I.7 Meteorological instruments and methods of observation

ANNEX VI

Annex to paragraph 4.6.13 of the general summary

GUIDANCE FOR CONSIDERATION OF REQUESTS FOR A FAMILIARIZATION VISIT BY RECENTLY APPOINTED PERMANENT REPRESENTATIVES FOLLOWED BY THE WMO FELLOWSHIP COMMITTEE

(a) Will a minimum of six months have elapsed between the Permanent Representative taking up his/her duties and the proposed start of the familiarization visit?
(b) Is the applicant expected to continue his/her role as Permanent Representative for a minimum of one year following the familiarization visit?
(c) What is the development status of the country? Preference given to least developed countries.
(d) Has the applicant been a Permanent Representative for less than four years?
(e) Has the applicant had previous exposure to WMO activities that are relevant to the familiarization visit?
(f) Has the country benefited from support for a familiarization visit in the two years prior to the receipt of the visit request?
(g) Has a report of the previous familiarization visit or a report identifying its impacts been received by the Secretary-General?
(h) Have responses to key questionnaires, such as the Monitoring Questionnaire, and fellowship reports been provided to the Secretary-General?
(i) Is it possible to undertake the visit within three months of an official offer by the Secretary-General?
(j) The availability of funds, with a view to maintaining expenditure on familiarization visits below 10 per cent of the Funds available for fellowships from the Regular Budget;
(k) Opportunities to co-fund the proposed visit with other programmes, conferences, workshops, etc.
ANNEX VII
Annex to paragraph 4.6.35 of the general summary

VCP(F) PROPOSAL FOR ALLOCATIONS IN 2013 (IN SWISS FRANCs)

<table>
<thead>
<tr>
<th>VCP Trust Fund 2013</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal allocation</td>
<td>Allocation 2013</td>
</tr>
<tr>
<td>Balance at 01/01/13</td>
<td>643,575</td>
</tr>
<tr>
<td>Obligations</td>
<td>57,755</td>
</tr>
<tr>
<td>Anticipated contributions 2013</td>
<td>150,000</td>
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<tr>
<td>Anticipated available 2013</td>
<td>735,820</td>
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</table>

Priority Areas

<table>
<thead>
<tr>
<th>Activity</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCP spares/shipping</td>
<td>30,000</td>
</tr>
<tr>
<td>Expert services</td>
<td>50,000</td>
</tr>
<tr>
<td>(Short-term) fellowships and training activities</td>
<td>100,000</td>
</tr>
<tr>
<td>Project development activities for regional development projects</td>
<td>30,000</td>
</tr>
<tr>
<td>Improvement of GTS</td>
<td>50,000</td>
</tr>
<tr>
<td>Improvement of observing systems</td>
<td>70,000</td>
</tr>
<tr>
<td>Improvement of GDPFS</td>
<td>30,000</td>
</tr>
<tr>
<td>Agricultural meteorology activities</td>
<td>30,000</td>
</tr>
<tr>
<td>Support to CDMS and climatological activities</td>
<td>30,000</td>
</tr>
<tr>
<td>Emergency assistance</td>
<td>50,000</td>
</tr>
<tr>
<td>Operational hydrology activities</td>
<td>30,000</td>
</tr>
<tr>
<td>Improvement of satellite reception</td>
<td>30,000</td>
</tr>
<tr>
<td>Communications</td>
<td>50,000</td>
</tr>
</tbody>
</table>

Sub Total                                      | 580,000  |

Reserve unallocated                            | 155,820  |
ANNEX VIII

Annex to paragraph 4.8.1.2 (a) of the general summary

THE WMO STRATEGIC PLAN 2016–2019

Conceptual Diagram of WMO Strategic Plan

Diagram currently used by WMO to present the strategic planning process and linkages amongst the various elements

Schematic Representation of WMO Strategic Planning Process
Linkages between the SP, OP, RBB and M&E

OP (2016-19)

RBB (2016-2019)

WMO M&E
ANNEX IX

Annex to paragraph 4.8.3 of the general summary

CONDITIONS AND PROCEDURES UNDER WHICH SESSION DOCUMENTS CAN BE CONSIDERED AND PROCESSED AS NON-CONTROVERSIAL

1. **Definition:** Non-controversial documents contain draft decisions of a body (resolutions and/or texts for inclusion in the general summary of a session), which are to be adopted by that body, possibly without plenary discussion.

   Note: Any draft decision with financial, political or institutional implications for the Organization should be tabled for discussion.

2. **Who suggests** which documents could be treated as non-controversial?

   - Documents for Congress and the Executive Council: the Secretariat and WMO Bureau prior to the session, and the Coordination Committee during the session;
   - Documents for technical commissions and regional associations: the Secretariat and Management Groups prior to the session, and the Coordination Committee during the session.

3. **Who proposes** to adopt non-controversial documents without discussion?

   The Chair of the Plenary session.

4. **Who decides** how to treat non-controversial documents?

   The Plenary decides to adopt non-controversial documents without discussion. The document should be opened for discussion if so requested by delegates.

5. **Examples** of documents that could be considered as non-controversial:

   (a) Recommendation from subsidiary body(s) and other constituent body(s), who carefully studied or prepared the draft decision in accordance with their mandate in the specific area under consideration;

   (b) General reports by presidents of constituent bodies and their subsidiary bodies, submitted for noting/information, which do not contain substantive recommendations for decision of the body. Any specific recommendation for decision could be formulated in a separate document. Any recommendation relating to specific matters in the agenda of the body could be presented in a separate document;

   (c) Documents supported by positive recommendations of the Financial Advisory Committee (FINAC), the Audit Committee and the External Auditor, such as financial statements;

   (d) Summary of the opening ceremony, organization of business, results of elections and other procedural matters prepared by the Secretariat for inclusion in the general summary of sessions, following the completion of these agenda items. Editorial comments to such texts, if any, could be submitted to the Secretariat by e-mail;

   (e) Report on previous resolutions submitted by designated rapporteurs.
6. **Status of non-controversial documents**

Non-controversial documents are intended for adoption. Therefore, they are subject to the same regulations as any other session documents, e.g. they should be submitted in the required languages. In order to accommodate non-controversial documents for decision but not for discussion, the session Website folder “Drafts for discussion” should be renamed “Drafts for adoption”.

Information documents and progress reports are not intended for adoption, hence they do not need to be discussed.

7. **Notifications:** delegates at a session of a body will be notified on the proposed non-controversial document as follows:

   (a) The document summary could contain the following statement followed by information on which body prepared/recommended the decision, and other relevant arguments:

   **“Non-controversial document for adoption”**
   Recommendations of CBS-15 submitted to EC-65;

   (b) Non-controversial documents will be identified in the list of documents and the calendar/daily order of business of the session;

   (c) At plenary meetings, the Chair should propose non-controversial documents for adoption without discussion and proceed with the agreement of the body.

8. **Pre-session discussions** tried out by several Technical Commissions could be put into practice for all constituent bodies. This would result in improved pre-session documents and help identify those that may be processed as non-controversial. Members of a body could be invited to send their comments on pre-session documents as they appear on the Website, and the Secretariat could issue revised pre-session documents (potentially non-controversial) or summarize comments received in presenting the documents and then accommodate successive in-session drafts.
### TABLE 1. APPOINTMENTS

List of appointments made since EC-64 through competition after issuance of vacancy notices

<table>
<thead>
<tr>
<th>Name and Nationality</th>
<th>WMO Region</th>
<th>Title, grade and organizational unit</th>
<th>Effective date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALEXIEVA, Mrs A. (Bulgaria)</td>
<td>RA VI</td>
<td>Monitoring and Evaluation Officer (P.2), Strategic Planning Office; Office of the Assistant Secretary-General</td>
<td>1 August 2012</td>
</tr>
<tr>
<td>PARRISH, Mr P. (United States)</td>
<td>RA IV</td>
<td>Chief (P.5), Training Activities Division, Education and Training Office; Development and Regional Activities Department</td>
<td>1 August 2012</td>
</tr>
<tr>
<td>EGERTON, Mr P. (United Kingdom)</td>
<td>RA VI</td>
<td>WMO Representative and Coordinator to UN and other International Organizations in North America (P.5), New York Liaison Office; Cabinet and External Relations Department</td>
<td>1 September 2012</td>
</tr>
<tr>
<td>BELFIORE, Mr S. (Italy)</td>
<td>RA VI</td>
<td>Executive Assistant to the Secretary-General (P.4), Office of the Secretary-General</td>
<td>1 September 2012</td>
</tr>
<tr>
<td>POUSSE, Mrs V. (France)</td>
<td>RA VI</td>
<td>Translator / Editor (P.4), Language, Conference and Publishing Services Department</td>
<td>15 October 2012</td>
</tr>
<tr>
<td>OSTROWSKA, Ms K. (Poland)</td>
<td>RA VI</td>
<td>Technical Development Officer (P.2), Language, Conference and Publishing Services Department</td>
<td>15 October 2012</td>
</tr>
<tr>
<td>Li, Ms F. (China)</td>
<td>RA II</td>
<td>Translator / Editor (P.4), Language, Conference and Publishing Services Department</td>
<td>1 December 2012</td>
</tr>
<tr>
<td>HECHLER, Mr P. (Germany)</td>
<td>RA VI</td>
<td>Scientific Officer (P.4), WIS Data Management Applications Division; WMO Information System Branch; Observing and Information Systems Department</td>
<td>1 January 2013</td>
</tr>
<tr>
<td>CARDINES, Ms M. (Italy)</td>
<td>RA VI</td>
<td>Translator / Editor (P.4), Language, Conference and Publishing Services Department</td>
<td>4 February 2013</td>
</tr>
<tr>
<td>WELLENS-MENSAH, Mr J. (Ghana)</td>
<td>RA I</td>
<td>Chief (P.5), Basic Systems in Hydrology Division; Hydrology and Water Resources Branch; Climate and Water Department</td>
<td>20 February 2013</td>
</tr>
<tr>
<td>PARK, Mr C.K. (Republic of Korea)</td>
<td>RA II</td>
<td>Director (D.1), Regional Office for Asia and the South-West Pacific; Development and Regional Activities Department</td>
<td>1 March 2013</td>
</tr>
<tr>
<td>ANNONI, Ms E. (France)</td>
<td>RA VI</td>
<td>Conference Officer (P.2), Conference Services Unit; Language, Conference and Publishing Services Department</td>
<td>1 March 2013</td>
</tr>
<tr>
<td>MUKHALA, Mr E. (Zambia)</td>
<td>RA I</td>
<td>WMO Representative for Eastern and Southern Africa (P.4), Regional Office for Africa; Development and Regional Activities Department</td>
<td>17 March 2013</td>
</tr>
<tr>
<td>Name and Nationality</td>
<td>WMO Region</td>
<td>Title, grade and organizational unit</td>
<td>Effective date</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------</td>
<td>--------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>SIGHOMNOU, Mr D. (Cameroon)</td>
<td>RA I</td>
<td>Scientific Officer (P.4), Basic Systems in Hydrology Division; Hydrology and Water Resources Branch; Climate and Water Department</td>
<td>15 April 2013</td>
</tr>
<tr>
<td>FAN, Ms H. (China)</td>
<td>RA II</td>
<td>Fellowship Officer (P.4), Education and Training Office; Development and Regional Activities Department</td>
<td>1 May 2013</td>
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</tbody>
</table>

List of appointments made since EC-64 without competition

<table>
<thead>
<tr>
<th>Name and Nationality</th>
<th>WMO Region</th>
<th>Title, grade and organizational unit</th>
<th>Effective date</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOURIS, Mr J. (United States)</td>
<td>RA IV</td>
<td>Project Officer (P.3), Disaster Risk Reduction Division; Weather and Disaster Risk Reduction Services Department (Regularization of long-term short-term)</td>
<td>9 June 2012</td>
</tr>
<tr>
<td>BELBEOCH, Mr Mathieu (France)</td>
<td>RA VI</td>
<td>Technical Coordinator (P.3), Weather and Disaster Risk Reduction Services Department (Transfer from UNESCO in accordance with funding arrangements)</td>
<td>1 October 2012</td>
</tr>
<tr>
<td>STROKER, Ms Kelly (United States)</td>
<td>RA IV</td>
<td>Assistant Programme Specialist (P.2), Weather and Disaster Risk Reduction Services Department (Transfer from UNESCO in accordance with funding arrangements)</td>
<td>1 October 2012</td>
</tr>
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</table>

List of appointments made since EC-64 of Junior Professional Officers

<table>
<thead>
<tr>
<th>Name and Nationality</th>
<th>WMO Region</th>
<th>Title, grade and organizational unit</th>
<th>Effective date</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOLTERHOF, Ms J. (Germany)</td>
<td>RA VI</td>
<td>Junior Professional Officer (P.2), Global Climate Observing System Secretariat; Observing and Information Systems Department</td>
<td>2 February 2013</td>
</tr>
</tbody>
</table>

**TABLE 2. LIST OF EXTENSIONS OF APPOINTMENT BEYOND THE STATUTORY AGE OF RETIREMENT SINCE EC-64**

<table>
<thead>
<tr>
<th>Name and Nationality</th>
<th>WMO Region</th>
<th>Title, grade and organizational unit</th>
<th>Effective date</th>
</tr>
</thead>
<tbody>
<tr>
<td>MÜLLER, Mr J. (Germany)</td>
<td>RA VI</td>
<td>Director (D.2), Resource Management Department</td>
<td>3 months to 31 July 2013</td>
</tr>
</tbody>
</table>
### TABLE 3. LIST OF TRANSFERS, NOMINATIONS AND PROMOTIONS SINCE EC-64

<table>
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<th>Name and Nationality</th>
<th>WMO Region</th>
<th>Title, grade and organizational unit</th>
<th>Effective date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROMEO MAGNAT, Ms A. (Italy)</td>
<td>RA VI</td>
<td>Linguistic Services Support Officer (P.3), Language, Conference and Publishing Services Department</td>
<td>1 October 2011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Promotion following reclassification of post from P.2)</td>
<td></td>
</tr>
<tr>
<td>TERBLANCHE, Mr D. (South Africa)</td>
<td>RA I</td>
<td>Director (D.2), Director, Atmospheric Research and Environment Branch –</td>
<td>1 May 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Promotion to the grade of the post)</td>
<td></td>
</tr>
<tr>
<td>KAHAMA, Ms G. (United Republic of Tanzania)</td>
<td>RA I</td>
<td>Personal Assistant to the Secretary-General (P.2), Office of the Secretary-General</td>
<td>1 October 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Nomination with promotion following competition after issuance of Vacancy Notice)</td>
<td></td>
</tr>
<tr>
<td>EWA, Ms J. (Ghana)</td>
<td>RA I</td>
<td>Programme Officer (P.4), Secretariat of the Intergovernmental Panel on Climate Change</td>
<td>1 December 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Promotion following reclassification of post from P.3)</td>
<td></td>
</tr>
<tr>
<td>OJHA, Mr A.K. (India)</td>
<td>RA II</td>
<td>Director (D.1), Internal Oversight Office, Office of the Secretary-General (Promotion following</td>
<td>1 March 2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>competition after issuance of Vacancy Notice and approval of President of WMO acting on behalf of the Council</td>
<td></td>
</tr>
</tbody>
</table>
**APPENDIX**

**LIST OF PARTICIPANTS**

1. **Officers**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>David GRIMES</td>
<td>President</td>
</tr>
<tr>
<td>Antonio Divino MOURA</td>
<td>First Vice-President</td>
</tr>
<tr>
<td>Mieczyslaw S. OSTOJSKI</td>
<td>Second Vice-President</td>
</tr>
<tr>
<td>Mamadou Lamine BAH</td>
<td>President of RA I</td>
</tr>
<tr>
<td>Ahmed Abdulla MOHAMMED</td>
<td>President of RA II</td>
</tr>
<tr>
<td>Julián BÁEZ</td>
<td>Acting president of RA III</td>
</tr>
<tr>
<td>Juan Carlos FALLAS SOJO</td>
<td>President of RA IV</td>
</tr>
<tr>
<td>Sri Woro B. HARIJONO (Ms)</td>
<td>President of RA V</td>
</tr>
<tr>
<td>Ivan ČAČIČ</td>
<td>President of RA VI</td>
</tr>
</tbody>
</table>

2. **Elected members of the Executive Council**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gerhard ADRIAN</td>
<td>Elected member</td>
</tr>
<tr>
<td>A.C. ANUFOROM</td>
<td>Elected member</td>
</tr>
<tr>
<td>Juan Manuel CABALLERO</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Daniel CANO</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Héctor Horacio CIAPPESONI</td>
<td>Elected member</td>
</tr>
<tr>
<td>Luigi DE LEONIBUS</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Alexander V. FROLOV</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Laura FURGIONE (Ms)</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Mitsuhiko HATORI</td>
<td>Elected member</td>
</tr>
<tr>
<td>John HIRST</td>
<td>Elected member</td>
</tr>
<tr>
<td>Che Gayah ISMAIL (Ms)</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>François JACQ</td>
<td>Elected member</td>
</tr>
<tr>
<td>Agnes L. KIJAZI (Ms)</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Ilsoo LEE</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Camille LOUMOUAMOU</td>
<td>Elected member</td>
</tr>
<tr>
<td>Linda MAKULENI (Ms)</td>
<td>Elected member</td>
</tr>
<tr>
<td>Saad Mohamad S. MOHALFI</td>
<td>Elected member</td>
</tr>
<tr>
<td>Joseph Romanus MUKABANA</td>
<td>Elected member</td>
</tr>
<tr>
<td>Carlos NARANJO JACOME</td>
<td>Elected member</td>
</tr>
<tr>
<td>Jacob NKOMOKI</td>
<td>Elected member</td>
</tr>
<tr>
<td>L.S. RATHORE</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Tyrone W. SUTHERLAND</td>
<td>Elected member</td>
</tr>
<tr>
<td>Petteri TAALAS</td>
<td>Elected member</td>
</tr>
<tr>
<td>Abdoul-karim TRAORE</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Robert VERTESSY</td>
<td>Elected member (acting)</td>
</tr>
<tr>
<td>Guoguang ZHENG</td>
<td>Elected member</td>
</tr>
</tbody>
</table>

3. **Alternates and Advisers to the Executive Council members**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qamar Uz Zaman CHAUDRY</td>
<td>Alternate A. ABDULLA MOHAMMED</td>
</tr>
<tr>
<td>Detlev FROMMING</td>
<td>Alternate Gerhard ADRIAN</td>
</tr>
<tr>
<td>Johannes CULLMANN</td>
<td>Adviser Gerhard ADRIAN</td>
</tr>
<tr>
<td>Thomas FITSCHEN</td>
<td>Adviser Gerhard ADRIAN</td>
</tr>
<tr>
<td>Bjorn ORIWOHL</td>
<td>Adviser Gerhard ADRIAN</td>
</tr>
<tr>
<td>Claudia RUBART (Ms)</td>
<td>Adviser Gerhard ADRIAN</td>
</tr>
<tr>
<td>Axel THOMALLA</td>
<td>Adviser Gerhard ADRIAN</td>
</tr>
<tr>
<td>Amos MAKARAU</td>
<td>Adviser Mamadou Lamine BAH</td>
</tr>
</tbody>
</table>
Mike GRAY  Alternate John HIRST
Harry DIXON  Adviser John HIRST
Fiona GREEN (Ms)  Adviser John HIRST
Ian LISK  Adviser John HIRST
Karen MCCOURT (Ms)  Adviser John HIRST
Ken MYLNE  Adviser John HIRST
Karen PIERCE (Ms)  Adviser John HIRST
Mark RUSH  Adviser John HIRST
Rob VARLEY  Adviser John HIRST
Jane WARDLE (Ms)  Adviser John HIRST
Selby WEEKS  Adviser John HIRST
Marc GILLET  Alternate François JACQ
Patrick BENICHOU  Adviser François JACQ
Jean-Sebastien CASES  Adviser François JACQ
Sebastien CHATELUS  Adviser François JACQ
Hamza A. KABELWA  Alternate Agnes L. KIJAZI (Ms)
George LUGOMELA  Adviser Agnes L. KIJAZI
Sewon KIM  Alternate Ilsoo LEE
Yong-seob LEE  Adviser Ilsoo LEE
Namsan CHO  Adviser Ilsoo LEE
Byungjun KIM  Adviser Ilsoo LEE
Sungwha SON (Ms)  Adviser Ilsoo LEE
Jengeun LEE (Ms)  Adviser Ilsoo LEE
Chang-heum LEE  Adviser Ilsoo LEE
Woo-seop LEE  Adviser Ilsoo LEE
Mark MAJODINA  Alternate Linda MAKULENI
Abdulla AL MANNAI  Adviser Ahmed Abdulla MOHAMMED
R. MONIKUMAR  Adviser Ahmed Abdulla MOHAMMED
Emma Giada MATSCHINSKE  Alternate Antonio Divino MOURA
Osvaldo Luiz Leal MORAES  Adviser Antonio Divino MOURA
Cleber Souza CORREA  Adviser Antonio Divino MOURA
James G. KONGOTI  Alternate Joseph K. MUKABANA
Nicholas W. MAINGI  Adviser Joseph K. MUKABANA
Pawel ROLA  Alternate Mieczyslaw OSTOJSKI
S.D. ATTRI  Adviser L.S. RATHORE
Sh B.N. REDDY  Adviser L.S. RATHORE
Fred SAMBULA  Alternate Tyrone SUTHERLAND
David FARELL  Adviser Tyrone SUTHERLAND
Keithley MEADE  Adviser Tyrone SUTHERLAND
Glendell DE SOUZA  Adviser Tyrone SUTHERLAND
Maria HURTOLA (Ms)  Alternate Petteri TAALAS
Jaakko NUOTTOKARI  Adviser Petteri TAALAS
Joanna SÅÅRINEN (Ms)  Adviser Petteri TAALAS
Ray CANTERFORD  Alternate Rob VERTESSY
Sue BARRELL  Alternate Rob VERTESSY
Jon GILL  Adviser Rob VERTESSY
Commander Francis KEAN  Adviser Alipate WAQAICELUA
Xiaonong SHEN  Alternate Guoguang ZHENG
Jianfeng GU  Adviser Guoguang ZHENG
Mingmei Li (Ms)  Adviser Guoguang ZHENG
Xuexiang YAO Adviser Guoguang ZHENG
Hongbing CHEN Adviser Guoguang ZHENG
Pu XIE Adviser Guoguang ZHENG
Zhihua WANG Adviser Guoguang ZHENG
Qiyuan SUN Adviser Guoguang ZHENG
Yuefeng SHI Adviser Guoguang ZHENG
Heng ZHOU Adviser Guoguang ZHENG
Jun YANG Adviser Guoguang ZHENG
Jianqing YANG Adviser Guoguang ZHENG

4. Presidents of technical commissions

Michel BELAND Commission for Atmospheric Sciences (CAS)
Frederick R. BRANSKI Commission for Basic Systems (CBS)
Bertrand CALPINI Commission for Instruments and Methods of Observation (CIMO)
Byong-Lyol LEE Commission for Agricultural Meteorology (CAgM)
Harry LINS Commission for Hydrology (CHy)
Thomas C. PETERSON Commission for Climatology (CCI)
Chi-ming SHUN Commission for Aeronautical Meteorology (CAeM)
Johan STANDER Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM)

5. Hydrological Advisers

Hassen L. FRIGUI Hydrological Adviser to the President of RA I
Sung KIM Hydrological Adviser to the President of RA II
Dora GONIADZKI (Mrs) Hydrological Adviser to the President of RA III
Eduardo Planos GUTIERREZ Hydrological Adviser to the President of RA IV
Markku PUUPPONEN Hydrological Adviser to the President of RA VI

6. Representatives of WMO Members

Martin Ondo ELLA Gabon
Mina JABBARI (Ms) Iran (Islamic Republic of)
Farah MOHAMMADI (Ms) Iran (Islamic Republic of)
B. SANAEI Iran (Islamic Republic of)
Ali Abdulkaleq ALI Iraq
Eman Shalal Habib AZZAWI Iraq
Gilles REALINI Monaco
James LUNNY New Zealand
Mubarak HUSAIN Pakistan
Salman BAL Switzerland
Christian PLUSS Switzerland
Alex RUBLI Switzerland
Gabriela SEIZ (Ms) Switzerland
Gerhard ULMANN Switzerland

7. Permanent Missions of Members in Geneva

Carlos José Escobedo MENENDEZ Guatemala
Carla Maria RODRIGUEZ (Ms) Guatemala
Mikhail KHVOSTOV Belarus
Vitali KORNEU Belarus
8. Representatives of international organizations

Simeon ZOUMARA  
Agence pour la sécurité de la navigation aérienne en Afrique et à Madagascar (ASECNA)

Abdel Wahab Ali Kamel  
Arab Academy for Science, Technology and Maritime Transport

ABDEL ALEEM

Brian DAY  
Association of Hydro-Meteorological Equipment Industry (HMEI)

Andy MCDONALD  
European Centre for Medium-Range Weather Forecast (ECMWF)

Raul S. MCQUIVEY

Bledi MEHMETI  
European Commission

Tanja PORJA  
European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)

Ashish RAVAL  
Group on Earth Observations (GEO)

Lothar SCHULTE-SASSE

Alan J. THORPE  
International Association of Broadcast Meteorology (IABM)

Claus BRUNING  
International Telecommunication Union (ITU)

Paul COUNET  
International Union of Geodesy and Geophysics (IUGG)

Mikael RATTENBORG  
International Union of Meteorology and Geophysics (IUMG)

Ann TAUBE (Ms)  
International Union of Pure and Applied Physics (IUPAP)

Alexia MASSACAND (Ms)  
International Union of Pure and Applied Physics (IUPAP)

Barbara RYAN (Ms)  
International Union of Pure and Applied Physics (IUPAP)

Espen VOLDEN  
International Union of Pure and Applied Physics (IUPAP)

Gerald FLEMING  
International Union of Pure and Applied Physics (IUPAP)

Carles GARRIGA  
International Union of Pure and Applied Physics (IUPAP)

Tomas MOLINA  
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Xavier TORRAS  
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Cristina BUETI  
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Arthur ASKEW  
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Steve NOYES  
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Emmanuel CHINYAMAKOBVU  
International Union of Pure and Applied Physics (IUPAP)

Volodymyr DEMKINE  
International Union of Pure and Applied Physics (IUPAP)

Jan DUSIK  
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Pascal PEDUZZI  
International Union of Pure and Applied Physics (IUPAP)

Jacob VAN WOERDEN  
International Union of Pure and Applied Physics (IUPAP)

Ron WITT  
International Union of Pure and Applied Physics (IUPAP)

Rocio LICHTE (Ms)  
International Union of Pure and Applied Physics (IUPAP)

Susanne FUEH (Ms)  
International Union of Pure and Applied Physics (IUPAP)

Istvan POSTA  
International Union of Pure and Applied Physics (IUPAP)

Cihan TERZI  
International Union of Pure and Applied Physics (IUPAP)

Andres Smith SERRANO  
Network of European Meteorological Services (EUMETNET)

Daniel KULL  
World Bank (WB)

David ROGERS  
World Trade Organization

Vladimir TSIRKUNOV  
World Federation of Engineering Organizations (WFEO)

Daniel FAVRAT  
World Federation of Engineering Organizations (WFEO)

Devin MCDANIELS  
World Federation of Engineering Organizations (WFEO)
9. **Invited experts**

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antonio J. BUSALACCHI</td>
<td>World Climate Research Programme (WCRP)</td>
</tr>
<tr>
<td>Rajendra PACHAURI</td>
<td>Intergovernmental Panel on Climate Change (IPCC)</td>
</tr>
<tr>
<td>Adrian SIMMONS</td>
<td>Global Climate Observing System (GCOS)</td>
</tr>
<tr>
<td>Thomas STOCKER</td>
<td>Intergovernmental Panel on Climate Change (IPCC)</td>
</tr>
<tr>
<td>Steven WILSON</td>
<td>International Council for Science (ICSU)</td>
</tr>
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