**WORLD METEOROLOGICAL ORGANIZATION**

**INTER-COMMISSION COORDINATION GROUP**

**ON THE WMO INTEGRATED GLOBAL OBSERVING SYSTEM**

**Sixth Session**

***Geneva, Switzerland, 12-14 January 2017***

**FINAL REPORT**



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**Executive Summary**

The Sixth Session of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS-6) was held at the WMO Secretariat in Geneva, Switzerland, from 12 to 14 January 2017. The session was co-chaired by Dr Sue Barrell (Australia), Co-Chair of ICG-WIGOS, and Prof Bertrand Calpini, Co-Chair of ICG-WIGOS and President of CIMO.

ICG-WIGOS reviewed the progress towards the implementation of WIGOS achieved by the Technical Commissions (TCs) and the Regional Associations (RAs). Further, it reviewed outcomes from ICG-WIGOS Task Team meetings, and WIGOS-relevant workshops. In this regard, ICG-WIGOS expressed its appreciation of the progress achieved and thanked all involved experts and contributors ([see Item 4](#Item_4)).

ICG-WIGOS further discussed the progress made in the five key priority areas of the WIGOS pre-operational phase (2016-2019). Based on its deliberations, ICG-WIGOS formulated its recommendations and guidance on a further development and implementation of the WIGOS pre-operational phase; recommendations to EC-69 were also formulated ([see Item 10](#Item_10)).

Finally, ICG-WIGOS considered its future working structure and developed its Future Work Programme and Action Plan (see [Appendix II](#Appendix_II)).

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**General summary**

**1.** **ORGANIZATION OF THE SESSION**

**1.1 Opening of the meeting**

1.1.1 The Sixth Session of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS-6) was held at the WMO Secretariat in Geneva, Switzerland, from 12 to 14 January 2017. The session was co-chaired by Dr Sue Barrell (Australia) and Prof Bertrand Calpini, President of CIMO. The Co-Chairs welcomed the participants to the meeting, and expressed their wishes for a successful session.

1.1.2 Prof P. Taalas, Secretary-General of WMO, opened the session and welcomed the participants to Geneva. He highlighted WIGOS as one of the WMO priority areas for the 2016-2019 financial period and the need for regional associations and technical commissions to work together in this area. Close collaboration with GCOS and GCW as well with the private sector is also needed.

1.1.3 He highlighted the goal of the session, which was to review the progress made in development of WIR, WIGOS technical regulations, WIGOS data quality monitoring, and Regional WIGOS Centres, and to formulate recommendations to EC-69. At the end of his opening statement, he assured the participants of full support to their work by the WMO Secretariat.

1.1.3 The list of participants is given in [Appendix I](#Appendix_I).

**1.2 Adoption of the agenda**

ICG-WIGOS adopted the [Agenda](#AGENDA) for the meeting, which is reproduced at the beginning of this report.

**1.3 Working arrangements**

1.3.1 ICG-WIGOS agreed on its working hours and adopted a tentative work plan for consideration of the individual Agenda Items.

1. **REPORT FROM THE CO-CHAIRS**
   1. Dr Barrell briefed the meeting on the achievements since ICG-WIGOS-5, such as an operational release of OSCAR/Surface, Pilot RWC in Region VI; regional WIGOS events organized in every WMO Region; adoption of the Plan for the WIGOS pre-operational phase and endorsement of the Concept note for establishing RWCs by EC-68; endorsement of the draft Guide to WIGOS and of the RBON concept by CBS-16; achievements by WEdB, TT-WMD, TT-WDP, and TT-WDQMS and outcomes from their sessions; a series of the WIGOS workshops; four editions of the WIGOS Newsletter, etc. The progress in OSCAR/surface and WDQMS was highlighted as critical.
   2. Dr Barrell identified the following key objectives for ICG-WIGOS-6: 1) To review activities and accomplishments of RAs, TCs; 2)To review the status of the WIGOS pre-operational phase priority areas; and 3) To consider deliverables and recommendations to EC-69, especially regarding the future of WIGOS after the pre-operational phase, and the development of indicators or metrics of success for the WIGOS implementation.
2. **RELEVANT DECISIONS AND GUIDANCE FROM EC-68**
   1. Dr L. P. Riishojgaard, PM/WIGOS, briefed the session on the guidance and recommendations received from EC-68 regarding the implementation of WIGOS.
   2. The most important was Recommendation 2 on the Plan for the WIGOS preoperational phase, Recommendation 3 on ICG-WIGOS and Decision 30 on the RWC Concept note.
3. **PROGRESS TOWARD IMPLEMENTATION OF WIGOS**

**4.1 REVIEW OF WIGOS ACTIVITIES AND OUTCOMES FROM wmo TECHNICAL COMMISSIONS and Global cryosphere watch**

* + 1. The representatives of the WMO Technical Commissions presented their brief reports. The brief summary of this briefing could be as follows.
    2. ***CBS:*** The focus was given on the outcomes from CBS-16, namely the recommendations on the technical regulations, guidance material, OSCAR, RBON concept, Vision for WIGOS in 2040, radio-frequency spectrum, GCOS Implementation Plan, GCW, and the approval of a global data centre for aircraft-based observations. The subsequent discussion focused mainly on how such global centre(s) might be used as global WIGOS centres for the WDQMS.
    3. ***CIMO:*** There was no specific presentation by the CIMO representative. Prof Calpini briefed the meeting on the theme of the World Meteorological Day on 23 March 2017 which is “Understanding Clouds”. It celebrates the release of a new edition of the International Cloud Atlas, which has its roots in the 19th century and was last updated in 1987. WMO has now undertaken a major revision of the Atlas, with the aim of providing a user-friendly, digital product to serve as an authoritative, comprehensive and up to date source of reference for both meteorologists and cloud enthusiasts around the world. The new edition also introduces certain new types of clouds.
    4. ***CAS:*** The CAS representative provided a briefing on CAS and GAW contributions to WIGOS, such as a new GAW Implementation Plan endorsed by EC-68; enhancing data management through GAWSIS. Traceability of measurement accuracy was mentioned as a critical issue and important attribute of each observation. During the subsequent discussion the lack of availability of real-time/near-real-time observations from GAW was flagged as a continuing challenge. It was pointed out that this was an example of the difficulty experienced on both sides with partnerships between NMHSs and external partners.
    5. ***CAeM:*** The importance of WIGOS and WIS for the Aeronautical Meteorology was stressed. WIGOS contributes to the improvement of the aviation weather services, stimulating safety. In this regard, the importance of the *Technical Regulations* (WMO-No. 49), Vol. I and Vol. II, was highlighted. Apart from standard weather observations, CAeM has a strong interest in volcanic ash observations, space weather and nuclear emergencies. Implementation of a Quality Management System is one of the main vehicles for improving Aeronautical Meteorology at present. The following challenges are still to be addressed: a) to promote WIGOS at a regional level and specifically for Aeronautical Meteorology applications; b) to stimulate co-operation with the aviation community (ICAO) to improve exchange of quality approved observational data; and c) to stimulate the aviation community to clearly state its requirements for observations (RRR).
    6. ***CAgM:*** A main goal of CAgM is active engagement in implementing the pre-operational WIGOS for enhanced impact-based forecast and risk-based early warning, especially through the Global Initiative for Agricultural Monitoring (GIAM). The importance of WIGOS for the Agricultural Meteorology and Agricultural Monitoring was underlined.
    7. ***CCl:*** Information was provided on the project “Volunteer Rain Gauge observing network in the Bahamas” as a CoCoRaHS network, and on the development of a reference station network, including guidance material, building on the concept of tiered network anchored by a set of reference climate stations.
    8. ***CHy:*** The report focused on the outcomes from recent Session of the Commission, CHy-15, in particular on Resolution 4.1(3)/1 (CHy-15) on the further implementation of the WHOS, Phase I, an initial concept of Phase II, and related development of the implementation plan. Consideration was also given to the evolving role of the global data centres and their contribution to WHOS phase II [(see Appendix II)](#Appendix_II).
    9. ***JCOMM:*** JCOMM and JCOMMOPS activities in support of WIGOS were presented. It was noted that there is still only limited appreciation and understanding of WIGOS in the oceanographic community. A key aspect will be to establish partnerships and interfaces between WIGOS and the (non JCOMM-owned) partner observing networks (e.g. Argo and OceanSITES), where JCOMMOPS and TT-MOWIS will have key roles. In this regard, guidance on implementation of marine observations into WIGOS was requested by President of RA V [(see Appendix II)](#Appendix_II). Compliance with WIGOS metadata is an issue for JCOMM. The situation will improve significantly when machine-to-machine interface is available for uploading metadata from JCOMMOPS to OSCAR, but this will not resolve the issue that many metadata elements that are considered mandatory for WIGOS are not reported to JCOMMOPS. A further issue is the fact that the research community tends to rely on different file formats from those stipulated in WMO regulatory and guidance material, e.g. NetCDF instead of BUFR. Since WMO is not in a position to enforce compliance with its file formats toward external partners, conversion tools are needed.
    10. ***GCW:*** GCW is a cross-cutting activity dependent on partnerships; a robust, sustained surface- and space-based observing system is essential for GCW to achieve its mission. The GCW achievements, e.g. the development of CryoNet as a tiered network, development of regulatory and guidance material, review of observational requirements, and the GCW portal, were presented. The meeting was informed that 16 CryoNet sites have been approved and that a further 20 sites are under evaluation. Some challenges were discussed as well, such as interoperability and integration of GCW observation in WIGOS. Similarly to JCOMM, the GCW community tends to use NetCDF rather than BUFR for storing and exchanging observational data. Therefore, there is the need to develop software for conversion of NetCDF messages to/from BUFR format. GCW and JCOMM are requested to work together in developing such a tool [(see Appendix II)](#Appendix_II).

**4.2 REVIEW OF WIGOS ACTIVITIES AND OUTCOMES FROM wmo REGIONAL ASSOCIATIONS**

Representatives from the WMO Regional Associations presented their reports. Brief summaries of the reports follow below.

4.2.1 ***RA I***: The outcomes and recommendations from the WMO RA-I Workshop on WIGOS (French-speaking countries), Dakar, Senegal, September 2016, to the RA I Management Group were presented. The President of RA I briefed on the preparedness of the Region to implement WIGOS and the way forward; he mentioned that as a tool to help individual Members plan their WIGOS activities a “WIGOS Readiness Checklist” would be helpful [(see Appendix II)](#Appendix_II). The request for workshops on management of AWS networks and on training in OSCAR/Surface was emphasized [(see Appendix II)](#Appendix_II).

4.2.2 ***RA II***: The current status of the WIGOS implementation, progress in meeting the targets laid out in R-WIP-II and activities planned for 2017-2020 were presented. The main objective is to continue with implementation of the updated Regional WIGOS Implementation Plan, including its Projects, with high priority given to the establishment of RWCs in pilot mode and a pilot RBON implementation. High priority will be given also to the Joint RA-II/RA-V WIGOS Satellite Data Project and Joint RA-II/RA-V WIGOS Radar Data Project.

4.2.3 ***RA III***: A short progress report on WIGOS-related activities in Region III with an update on the WIGOS-SAS/CP Project was presented together with a way forward, including population of the OSCAR/Surface database. A request for a regional workshop on OSCAR/Surface and WIGOS station identifiers was submitted as a matter of urgency.

4.2.4 ***RA IV***: Brief information on the implementation of WIGOS activities in RA-IV was presented. The Concept of establishing RWCs in the Region will be discussed at the forthcoming RA IV Management Group session. The WIGOS-PO was requested to work closely with the Regional Office on the subject [(see Appendix II)](#Appendix_II). The need for OSCAR/Surface training was underlined (see 5.1.5).

4.2.5 ***RA V***: Specific WIGOS related priorities in the Region V are: a) Radar mosaics for SE Asia as joint activity with RA II; b) Improved operational uptake of satellite data (especially in the Pacific part of the Region) in accordance with Jakarta Declaration, 2014; c) Guidance on a network design, supported by OSCAR/Surface and EGOS-IP; d) Strengthening/rehabilitating the conventional network, especially in the Pacific part of the Region; e) AMDAR implementation; and f) establishment of RWCs.

4.2.6 Dr Neville Smith, co-chair of TPOS 2020, presented an overview of the Tropical Pacific Observing System 2020 Project (TPOS 2020), its status, and various issues facing its implementation.

4.2.7 The Tropical Pacific Observing System is relevant to most Members in the Region and to several Members also from other Regions. The network will address requirements articulated from several of the application areas supported in the RRR. Stakeholders include not only NHMSs but also many external partners. Hence, TPOS 2020 would like to engage through WIGOS to when building the necessary coalitions and partnerships.

4.2.8 ICG-WIGOS recognized TPOS 2020 as a WIGOS project for its pre-operational phase and suggested that could be a valuable example of WIGOS integration and partnerships. In this regard, it was suggested to organize a side event on TPOS 2020 and JCOMMOPS during EC-69; the issue of the lack of a suitable inter-regional coordination mechanism should be addressed by EC-69 [(see Appendix II)](#Appendix_II). Further, ICG-WIGOS suggested that this project should be formally included as a WIGOS Project in the next version R-WIP-V [(see Appendix II)](#Appendix_II).

4.2.9 ICG-WIGOS noted that the proposed TPOS 2020 activities pose a challenge, as there is no specific mechanism or vehicles in WMO to facilitate and manage at inter-regional collaboration. The involvement of players beyond the NMHSs of the WMO Members and the associated need for partnerships is an opportunity for WIGOS to test how to develop and build such partnerships.

4.2.10 ***RA VI***: The President of RA VI provided a presentation focusing on: a) activities related to the implementation of RWCs in RA VI; b) proposed RWCs functionalities; c) RA VI RWC “in a nutshell”; and d) further steps foreseen. RWCs should be established as a network of contributing NMHSs (RWC as a virtual centre). There is also consideration and activities for establishing a specific RWC for the Adriatic Sea and WMO-IOC Regional Marine Instrument Centre.

**4.3 REVIEW OF OUTCOMES FROM icg-wigos TASK TEAMS AND WORKSHOPS[[1]](#footnote-1)**

**4.3.1 Sixth Workshop on the Impact of Various Observing Systems on NWP**

4.3.1.1 The Sixth WMO Impact Workshop was held 10-13 May 2016, Shanghai, China. It was stressed that these workshops are extremely important for WIGOS due to their role in the WMO Rolling Review of Requirements. They bring together the major NWP centres, research community and other stakeholders to discuss the contribution to forecast skills of various WIGOS/GOS components.

4.3.1.2 The importance to NWP of free and open data sharing was emphasized by many participants, in response to a perceived shift in private sector toward wanting to sell observational data rather than just selling observing systems. A few key messages from Shanghai: i) Addition of observations almost always leads to improvements in skill; ii) Addition of observations from secondary (operational back-up) satellites often leads to significant improvement in skill beyond the baseline achieved using the primary satellites; iii) Positive impact now also of some sensors for which this was difficult to demonstrate in the past (e.g. scatterometers, wind profilers, MISR winds, …); and iv) regional/mesoscale/convective scale data assimilation and NWP has made significant progress in the direct use of observational data. The workshop developed a number of formal recommendations, partly to the WMO Members (via CBS), partly to the space agencies, and partly to the NWP community itself. The recommendations are included in the Final Report of the Workshop.

**4.3.2 Regional Basic Observing Network (RBON) workshop**

4.3.2.1 The Regional Basic Observing Network (RBON) workshop was held at the WMO Secretariat in Geneva, Switzerland, from 18 to 20 May 2016. Considering the guidance from CBS/IPET-OSDE-2 and ICT-IOS-9 the Workshop further developed the RBON Concept. The new Regional Basic Observing Network (RBON) should lead to improved services by delivering more and improved observations to stakeholders, and enable the full benefit of regional observing capabilities to be realized. As such, RBON will be a substantive and valuable subset of WIGOS.

4.3.2.2 CBS-16 endorsed the RBON concept and tasked OPAG-IOS to lead its further development, incorporating feedback from all stakeholders. The concept should be brought to the attention of all RAs for their feedback. The WIGOS Editorial Board should coordinate the development of the regulatory material for a new edition of the Manual on WIGOS.

**4.3.3 First session of the WIGOS Editorial Board (WEdB-1)**

4.3.3.1 The first session of the ICG-WIGOS/WIGOS Editorial Board (WEdB) was held in Geneva from 13 to 15 June 2016. WEdB completed an assessment and compilation of material to be included in the initial version of the Guide to WIGOS. The draft of this document was made available on the WMO website (<http://www.wmo.int/pages/prog/www/wigos/WGM.html>) on 17 June 2016.

4.3.3.2 ICG-WIGOS agreed with two recommendations from the Chair, WEdB of a) the scope of WEdB and its Terms of Reference should include the Guide to WIGOS, not just the “initial version”; b) all new and updated WIGOS regulatory and guidance material should be reviewed by WEdB before being submitted to any WMO constituent body session for approval. WEdB does not prepare the content of regulatory and guidance material, but it provides a place where materials from many different sources can be reviewed and cross-checked for to ensure consistency and avoidance of repetition or gaps, to guide the work of authors and the Secretariat.

**4.3.4 First Session of the Task Team on WIGOS Data and Partnerships (TT-WDP-1)**

4.3.4.1 The first session of the ICG-WIGOS Task Team on WIGOS Data and Partnerships (TT-WDP-1) was held in Geneva, from 29 to 31 August 2016. TT-WDP developed the Draft outline of the Guidance on Data Partnerships; it reviewed and updated the Terms of Reference for the Team and developed its Work Plan for the development of the draft Guidance on Data Partnerships.

**4.3.5 Workshop on the Vision for WIGOS in 2040**

4.3.5.1 The Workshop on the Vision for WIGOS in 2040, Surface-based perspective, was held in Geneva from 18 to 20 October 2016. An overall structure of the integrated Vision was proposed and the road map and action plan for its development were agreed.

4.3.5.2 The JCOMM representative requested the draft Vision to be circulated to all TCs for feedback [(see Appendix II)](#Appendix_II).

4.3.5.3 A draft of an “integrated” Vision will be finalized by ICG-WIGOS-7 (2018) [(see Appendix II)](#Appendix_II).

**4.3.6 Fifth session of the Task Team on WIGOS Metadata (TT-WMD-5)**

4.3.6.1 The Fifth Session of the ICG-WIGOS Task Team on WIGOS Metadata (TT-WMD-5) was held from 5 to 7 December 2016 in Geneva, Switzerland. It agreed on a set of conclusions, recommendations and actions related to: 1) the WIGOS Metadata Standard (WMDS); 2) the WMDS Code tables; 3) the further development of the Guide to WIGOS; 4) the further development of the WIGOS Metadata Exchange Model; 5) the status and operation of OSCAR/Surface and further development; and (6) the training for WMDS and OSCAR/Surface. There was also consensus that TT-WMD should continue and finalize its work during 2017.

4.3.6.2 ICG-WIGOS was informed about the low number of National OSCAR/Surface Focal Point nominated so far (less than 50% at the time of the meeting). Further, it was requested to make a decision on how to share results of a status of compliance by Members [(see Appendix II)](#Appendix_II).

4.3.6.3 Taking into account that the some tasks remain to be finalized by this Task Team, ICG-WIGOS agreed that the Team will continue until ICG-WIGOS-7 (2018).

**4.3.7 First session of the Task Team on WIGOS Data Quality Monitoring System (TT-WDQMS-1)**

4.3.7.1 The First Session of the ICG-WIGOS Task Team on WIGOS Data Quality Monitoring System (TT-WDQMS-1) was held from 13 to 15 December 2016 at Geneva, Switzerland. The major outcomes were:

1) The WDQMS should be interoperable with OSCAR/Surface and should feed specific monitoring data into that system, but it was recognized that WDQMS and OSCAR/Surface are distinct systems serving different purposes;

2) The integration of other non-GOS observing components into WDQMS should build on monitoring practices already put in place for these components rather than replace the existing monitoring systems;

3) The notion of Global WIGOS Centres should be considered in the structure of the system, as additional level to the concept of Regional WIGOS Centres (see also 5.5.4);

4) Good progress was achieved by the Monitoring pilot project developed in cooperation with Global NWP Centres - monitoring files are being produced and made operationally available by ECMWF, JMA, NCEP and DWD (MSC plans to join this effort as well);

5) The method(s) for aggregating the monitoring results (Evaluation Function), to be made available to Members, needs further development;

6) A WDQMS global web-tool developed by the WIGOS-PO using the files from NWP centres to display the 6-hourly results on maps is available online;

7) The Incident Management (IM) function will not replace any existing national IMS, but the results produced by RWCs should be provided to the NMHSs for their further action;

8) A set of graphical representations of the WDQMS were developed, starting with simple schemes that can be more and more detailed;

9) The results from the demonstration project in RA I, were assessed (national reports were received from the participating Members, Kenya and Tanzania). The project was considered to have been beneficial both for the consolidation of the WDQMS concept and for the participating Members, but there is a clear need for additional training;

10) There is the need for National Focal Points for WDQMS to be nominated by PRs (ToRs are not developed yet) [(see Appendix II)](#Appendix_II);

11) A guidance document on WDQMS for RWCs, drafted by EUMETNET is applicable to the stations of the GOS;

12) The following sequence of development steps of WDQMS is proposed: (i) Finish the work on land-based surface pressure observations (GOS) and include timeliness of observations; (ii) Extend the demonstration project to include radiosonde observations; (iii) Include GOS Ocean observations of surface pressure and sea surface temperature; (iv) Include GOS aircraft observations of temperature, wind and humidity; (v) Include CLIMAT messages from GSN & RBCN.

13) Clarification is needed regarding the content and frequency of the mechanisms for routine reporting of monitoring results to EC, regional associations and Members by end of 2017, listed under item (f) of the roadmap for WDQMS in the Plan of WIGOS Pre-operational Phase.

4.3.7.2 ICG-WIGOS agreed with the Work-Programme/Action Plan of the Team for 2017 (detailed in the Annex of [ICG-WIGOS-6/Doc.4.3.7](http://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings/ICG-WIGOS-6/Doc-4-3-7_TT-WDQMS-1.docx)), which includes the extension of the demonstration project in RA I to cover all the expected types of quality issues for both surface and upper-air observations [(see Appendix II)](#Appendix_II), and also includes a Workshop with representatives from all WIGOS Observing components towards a fully integrated system [(see Appendix II)](#Appendix_II).

4.3.7.3 ICG-WIGOS agreed that this development should continue; it also underlined that the link between OSCAR and WDQMS is essential for implementing the Vision for WIGOS. It was furthermore emphasized that the potential for interoperability or closer integration between these two systems and other WMO GIS-based applications such as the Country Profile Database should be investigated further, in order to eliminate the possibility of developing mutually redundant and partly overlapping approaches.

4.3.7.4 ICG-WIGOS further requested that a draft Concept note for establishing Global WIGOS Centres (GWC) should be submitted to ICG-WIGOS-7 for endorsement (see 5.5.4).

1. **STATUS OF THE KEY ACTIVITY AREAS IMPLEMENTATION OF THE PLAN FOR THE WIGOS PRE-OPERATIONAL PHASE**
   1. **National WIGOS implementation**
      1. ICG-WIGOS was briefed on the progress achieved in this area.
      2. The representative of RA IV requested the Secretariat to ensure that the Guidance reproduced in Annex of [ICG-WIGOS-6/Doc.5.1](http://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings/ICG-WIGOS-6/Doc-5-1_NWI_ver2.docx) be made available for RA-IV-17. For this reason, ICG-WIGOS requested all participants to provide their feedback on the Annex by 23 January 2017 [(see Appendix II)](#Appendix_II).
      3. In this regard, ICG-WIGOS welcomed a proposal of ASG to organize side events on national WIGOS implementation at each RA session [(see Appendix II)](#Appendix_II).
      4. In the follow-up discussion, representatives of several RAs repeatedly requested more WIGOS related missions to NMHSs; more frequent sessions of WIGOS-related regional Task Teams and Working Groups; more communication and outreach material; a request for establishing a WIGOS help desk was made. The WIGOS PM responded that the WIGOS PO would in principle be willing to respond to these requests, but that the level of support would be dependent on additional resources being made available, e.g. through secondments, contributions to the WIGOS Trust Fund, etc. [(see Appendix II)](#Appendix_II).
      5. Regarding training activities, ICG-WIGOS requested the WIGOS-PO to work closely with the Education and Training Office on engaging the WMO Regional Training Centres in WIGOS-related training activities. The WIGOS PO was requested to develop a “training needs and priorities” template to be used by each RA to specify its WIGOS training needs by order of priority [(see Appendix II)](#Appendix_II).
      6. Training of trainers was suggested as a general strategy for maximizing the reach of the WIGOS-related training rather than relying on regional training workshops. See also 5.3.7. and 8.3.
      7. The draft Guidance on WIGOS Data Partnerships was presented and discussed.
      8. ICG-WIGOS was appreciative of the effort of the Task Team in dealing with this highly important and very complex matter; it was recognized that the guidance is still under development; the missing Section 4.4 on Establishing and Sustaining Data Partnerships is a key piece and its absence constitutes a significant gap. Further comments were related to:
2. Access by Partners: in addition to guidance to NMHSs on how to reach out to external organizations, guidance on how external organizations may reach in to NMHSs was recommended (e.g. how to engage NMHSs, gain access to data, etc.) [(see Appendix II)](#Appendix_II);
3. Positioning of the private sector: It was recognized that the TT-WDP had been explicitly instructed not to address matters of data policy, but it was requested to expand the level of guidance concerning other aspects of dealing with the private sector, e.g. guidance on buying data and services, fair terms and conditions, quality assurance, data constraints, identification of data policy challenges, etc.
4. WIGOS Metadata: it was agreed that some flexibility for external partners will be required and that strict enforcement of the WIGOS Metadata Standard (WMDS) must not become a barrier to the contribution of useful data to WIGOS. The case of some existing JCOMM data contributors was identified as an example where full compliance is unlikely to be achieved; in this regard, JCOMM was asked to identify which metadata parameters were unlikely to become available. ICG-WIGOS reminded the importance of metadata for knowledge of data quality; there is some flexibility built into WMDS and it should be used. TT-WDP and TT-WMD were requested to work together to develop the relevant section in the guidance that balances the target of full compliance with real-world practicality [(see Appendix II)](#Appendix_II).
   * 1. The ICG-WIGOS members agreed to provide their feedback to Chair, TT-WDP, by 29 January 2017; they further agreed on the following schedule: A next, complete version of the guidance should be available by the end of February (4-6 weeks after the meeting) in order to permit its review by WEdB (via a WebEx session) and by ICG-WIGOS prior to its submission to EC-69 (by Mid-April). The most substantive piece of a required work is Section 4.4. The other enhancements and missing sections are relatively minor and manageable within this time period. Consultation beyond ICG-WIGOS prior to submission to EC-69 was not considered essential since the ICG-WIGOS is representative of the WIGOS stakeholders [(see Appendix II)](#Appendix_II).
     2. The JCOMM representative requested that a JCOMM expert be involved in the further development of the guidance [(see Appendix II)](#Appendix_II).
     3. Further, the representatives of CAS and GCW were requested to provide the WIGOS-PO with case studies of establishing partnerships between research institutions/organizations and NMHSs [(see Appendix II)](#Appendix_II).
     4. WIGOS Performance Indicators (PIs) were discussed in a break-out group; the summary of the discussion is:

* PIs must be SMART (see [Annex](#Annex_5_1_12) to this paragraph for definition of “SMART”);
* PIs must be generated automatically using OSCAR & WDQMS;
* PIs should be reviewed annually;
* PIs must be dynamic to monitor performance vs. time, changes and evolution of the performance. Stoplight colours should be used for monitoring performance using performance indicators;
* National indicators must be checked very carefully before being published;
* PIs should enable tracking and display of evolution and improvement;
* PIs should monitor the progress made from implementation readiness and a pre-operational phase to an operational phase based on examples;
* In addition to indicators related to the observing systems themselves, indicators tracking administrative/organizational performance should be considered, including at the national level;
* Vol. A to OSCAR transition criteria and performance indicators being developed by the Secretariat and MeteoSwiss can also be used as a basis;
* Readiness: Do we have the tools available for monitoring the performance of WIGOS during the operational phase? Measuring success of developing those tools needs specific performance indicators for addressing the WIGOS readiness during the pre-operational phase.
* Measure of success with regard to training: e-learning tools are needed, and they can then be used to monitor how those tools are being used.
  + 1. The OBS Department Objectives, including indicators for 2017 ([Annex](#Annex_5_1_13) to this paragraph) can be used as a basis for further developing the WIGOS readiness indicators of the pre-operational phase [(see Appendix II)](#Appendix_II).
  1. **WIGOS Regulatory Material complemented with necessary guidance material to assist Members with the implementation of the WIGOS technical regulations**

5.2.1 ICG-WIGOS was briefed on the further development of WIGOS regulatory and guidance material during the Pre-operational Phase; in addition the timeline for critical activities and milestones was presented.

5.2.2 ICG-WIGOS agreed that any draft material should be submitted to WEdB to ensure consistency and avoidance of repetition or gaps, to guide the work of authors and the Secretariat. Further, it endorsed the timeline for further development of the WIGOS Regulatory Material for the Manual on WIGOS and the guidance material for the Guide to WIGOS as presented in Annex of [ICG-WIGOS-6/Doc.5.2](http://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings/ICG-WIGOS-6/Doc-5-2_WRM-GM_ver2.docx).

5.2.3 The President of CHy agreed to provide name and contact details of their new representative in WEdB [(see Appendix II)](#Appendix_II).

* 1. **Further development of the WIGOS Information Resource (WIR), with special emphasis on the operational deployment of the OSCAR databases**

5.3.1 The meeting was briefed on the further development of the WIGOS Information Resource (WIR). In terms of its three components, OSCAR, SORT and Portal, the development of the OSCAR databases currently requires the most effort.

5.3.2 OSCAR/Surface was launched into operations in May 2016. While the system is now being used regularly by many Members, efforts need to be made on capacity development combining in-class and e-learning material, and the implementation of an API (Machine 2 Machine interface) in order to ensure that the system is taken up by all Members. For this, monitoring of the transition phase as well as the quality of the metadata will be crucial. Quantitative monitoring information from WDQMS can now be added to the station record and will provide valuable additional information. The Aircraft Based Observing System module is expected to be added in 2017.

5.3.3 OSCAR/Space, v2.0, was launched in 2016 with a new expert assessment module. As OSCAR/Space will not be operated by MeteoSwiss for the foreseeable future, a separate strategy is needed to assure operations and context updates in the long term. (See also 5.3.8)

5.3.4 The Portal is expected to be redesigned when WMO will move to a new Extranet in 2017.

5.3.5 Regarding SORT, the WIGOS-PO continues to examine solutions, including the usage of AI technology for text processing. However, in order for the full benefits of SORT to materialize, the entirety of WMO Regulatory Material would have to be integrated, making the development of SORT an organization-wide activity rather than something unique to WIGOS.

5.3.6 ICG-WIGOS expressed its appreciation of the achievements made by the WIR Project Team and thanked MeteoSwiss for its very significant contribution to it; it also thanked to Germany and China for their financial contributions to the implementation and uptake of OSCAR.

5.3.7 ICG-WIGOS considered the OSCAR/Surface training activities. It agreed with the proposed OSCAR/Surface training plan as endorsed by CBS-16; however, it was noted that both classroom and e-learning will be needed and it was suggested to focus both types of events on “training of trainers” and to use existing WMO RTCs to the extent possible. In this regard, WIGOS-PO was requested to consider how to improve a situation with NFPs [(see Appendix II)](#Appendix_II).

5.3.8 Regarding the further development, ICG-WIGOS requested:

1. Implementation of a machine-to-machine interface, allowing automated ingest of metadata into OSCAR/Surface by April 2017, and demonstration of its functionality at an EC-69 side-event,
2. Quantitative monitoring information from the WDQMS to become part of the station report in OSCAR/Surface,
3. Inclusion one or more indicators measuring the degree of compliance of a station metadata to the station report,
4. WIGOS webpages (WIR Portal) to be reviewed and updated before migrating them to the new Extranet,
5. OSCAR/Space 2.0 to be presented at the CGMS-45 meeting with an aim to discuss the role of space agencies at its further development,
6. WIGOS-PO to continue exploring possible options for developing SORT as part of a WMO larger document effort to facilitate navigating its regulatory and guidance material, including the request of EC-69 for financial contributions from WMO Members.

([see Appendix II](#Appendix_II) for actions responding to the requests)

5.3.9 The Terms of Reference of the newly established ICG-WIGOS Task Team on OSCAR/Surface Development were discussed. ICG-WIGOS agreed on the version that is reproduced in [Annex](#Annex_5_3_8) to this paragraph and tasked WIGOS-PO with finalizing them and make the necessary arrangements for establishing this new team as soon as possible and with organizing the first meeting of this team [(see Appendix II)](#Appendix_II).

5.3.10 Regarding the membership, ICG-WIGOS agreed that J. Klausen, co-chair of TT-WMD, should be attending this TT as an invited expert and lead representative of the OSCAR/Surface development team.

* 1. **Development and implementation of the WIGOS Data Quality Monitoring System (WDQMS)**

5.4.1. The progress achieved in the development and implementation of the WIGOS Data Quality Monitoring System (WDQMS) was presented.

5.4.2 In terms of items (a) "Initial WIGOS (land surface stations of the GOS) monitoring capability at ECMWF, NCEP and/or other NWP centres, evaluation and incident management functions ", and (b) "Functional specifications and the pilot components developed, following a demonstration project in RA I", both by end of 2016, the Monitoring pilot project was developed in cooperation with four global NWP centres, ECMWF, NCEP, JMA and DWD, all of which provide routine monitoring output to a central repository managed by the WIGOS PO. Sample results from the monitoring are displayed on a prototype web-tool. A demonstration project in RA I developed in cooperation with EUMETNET, ran from July to November 2016, with the evaluation and incident management functions operated by Kenya with collaboration from Tanzania; the demonstration project was assessed and used to consolidate the WDQMS concept. A list of links to the current monitoring and incident management tools available online is provided in the Annex to document [ICG-WIGOS-6/Doc.5.4](http://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings/ICG-WIGOS-6/Doc-5-4_WDQMS.docx).

5.4.4 In terms of items (c) "Full WIGOS (GOS surface-based components) operational monitoring and incident management functionality by end of 2018", and (g) "Mechanisms and regional structures in place to handle incident management actions and support Members in improving the data availability and quality by 2018", both are dependent on the establishment of RWCs (see item 5.5 below).

5.4.5 In terms of item (e) "Initial monitoring capability for all WIGOS components by the end of 2018" it is dependent on item (d) "Monitoring Workshop(s) for JCOMMOPS, GAW, GCOS, GCW and hydrology components of WIGOS in 2016-2017", which is planned to be held in July 2017. ICG-WIGOS endorsed the organization of this workshop.

5.4.6 In terms of item (f) "Mechanisms for routine reporting of monitoring results to EC, regional associations and Members by end of 2017”, it was not clear to the meeting participants what should be the specific content and frequency of reporting. ICG-WIGOS requested the TT-WDQMS to make proposals for consideration [(see Appendix II)](#Appendix_II).

* 1. **Concept development and initial establishment of Regional WIGOS Centres**
     1. A short document on the progress achieved, including draft Technical Guidance on establishing a RWC in pilot mode, was submitted; due to lack of time, the draft guidance was not discussed; the participants were requested to provide their feedback by 31 January 2017 [(see Appendix II)](#Appendix_II).
     2. The topic was further discussed in a breakout group; the representatives of all RAs, with the exception of RA II, presented their approaches and roadmaps for establishing RWCs in their respective Regions.
     3. In some Regions (e.g. RAs III and VI), the concept of a virtual RWC (a RWCs network) is under consideration and development; in RA I the implementation would likely be in the form of an individual Centre for each subregion; in RAs IV and RA V only very preliminary discussions had taken place so far.
     4. As an outcome of the discussion, WIGOS-PO was requested to develop a draft Concept note for establishing Global WIGOS Centres (GWC) be submitted to ICG-WIGOS-7 for endorsement (see also 4.3.7.4) [(see Appendix II)](#Appendix_II).

1. **UPDATE ON THE IMPLEMENTATION OF WIS**
   1. The presentation on WIS was provided by D. Thomas, chief, ITS. WIS is operational, with the global infrastructure, regulatory material and guidance all in place. However, national uptake of the new functionalities provided by WIS is lagging. WIS is being implemented in two parallel parts, consisting of the evolution of the GTS and the new functionality of information discovery and access, where:
   * The WIS programme-wise is progressing with 324 out of the 371 identified contributing centres to WIS having been successfully audited as WIS compliant and have been entered into the Manual on WIS (WMO No 1060) as able to publish in WIS;
   * CAeM, CAgM, CAS, CCl, CHy and JCOMM all have centres registered to publish in WIS;
   * However, many potential contributors are still not sure how to publish or use WIS;
   * A major concern is that the corporate knowledge of WIS and the level of implementation of WIS at the national level are still too low; ICG-WIGOS emphasized that successful implementation of WIGOS, like other priority projects, requires both WIS to be implemented nationally as well as a reasonable level of the corporate knowledge of WIS and how to use and benefit from WIS.
   * ICG-WIGOS recommended that the national implementation of WIS should be a regional priority and as such regional WIGOS implementation activities should ensure they include any necessary elements on WIS implementation.
   1. The WIGOS metadata representation have been developed and can be presented to EC-69, however, there is a proposal that the new metadata representation be tested by more Members before approval by EC. Therefore WIS asked ICG-WIGOS about its preference:

* either to refine the metadata representation through implementation testing before having them approved by EC-70 in 2018, or
* have them approved by EC-69 in 2017 and make any subsequent changes using the fast track process? [(see Appendix II)](#Appendix_II).
  1. ICG-WIGOS was also asked to consider the issues of the seamless linkage between WIGOS metadata and WIS discovery metadata:
* For WIS metadata to point to OSCAR records, OSCAR will need to provide URL access to each metadata record.
* For WIGOS metadata to point to WIS metadata records, this can be done using the SRU interface in WIS (Search and retrieval by URL), the question is what records does OSCAR need to point to. It can be the GTS messages or the archive data set. It could be either or both [(see Appendix II)](#Appendix_II).
  1. ICG-WIGOS requested the TT-WMD to advise on this issue by (deadline - asap). It further recognized the need to hold a joint WIGOS and WIS metadata meeting in 2017 to resolve any outstanding issues [(see Appendix II)](#Appendix_II).
  2. ICG-WIGOS noted that IT security is a major issue for WIS; however, it noted that as elements of the observing systems have increased levels of connectivity, they must also address security issues. It was recommended that ICG-WIGOS and CBS should highlight the issues of both IT and physical security to EC and Congress to ensure that Members are aware of the importance of this topic and the need to manage the risks [(see Appendix II)](#Appendix_II).
  3. ICG-WIGOS noted that Cg-17 had tasked CBS to look at information management across all programmes and that this was being addressed as WIS part C. In this regard, WIGOS experts need to be involved in the development of guidance and regulatory material relating to information management by engagement in ICT-ISS led teams working on this topic.
  4. ICG-WIGOS noted the report on the development of WIS 2.0 and the associated evolution of the WIS (eWIS) to be driven by user requirements. It noted that many of the emerging data issues facing WIGOS will depend on WIS for the access and information exchange, including the fundamental changes in how people access, process and use data from WIGOS. The work on the evolution of the WIS over the next ten years is an important element of the development of WIGOS towards 2040. ICG-WIGOS should monitor eWIS and ensure WIGOS representation in the processes and appropriate coordination between WIS 2.0 and WIGOS 2040.

1. **SPACE PROGRAMME AND SPACE WEATHER**
   1. T. Kurino, Chief, WMO Space Programme, briefed the meeting on five key topics for WMO Space Programme in 2017: (1) Improvement of user readiness for the new generation of meteorological satellites; (2) Defining the physical architecture for climate monitoring from space in support of GFCS and DRR; (3) Development of a 2040 Vision on WIGOS Space, and activities in support of the WMO RRR Process; (4) Improvement of exchange and availability of satellite data on WIS (e.g. implementing consistent monitoring of DBNet performance, and improvement of timeliness, and implementing WIS metadata standard for DBNet products); (5) Development of space weather services according to "Four-year Plan: 2016 - 2019" for developing the WMO’s initiative for worldwide coordination of Space weather services responds to the growing demand of WMO Members.
   2. ICG-WIGOS was further informed that EC-68 had approved a Four-year Plan for WMO Coordination of Space Weather Activities (the Plan), and had requested CAeM and CBS to establish an Inter-Programme Expert Team on Space Weather Information, System and Services (IPT-SWeISS), whose main tasks are: i) Implementation of a Space Weather Basic System, ii) Promoting of Space Weather Science, and iii) Development of Space Weather Application.
2. **COMMUNICATIONS AND OUTREACH**
   1. A presentation was delivered on WIGOS Communication and Outreach (C&O), focusing on the possible/available tools/channels to be used.
   2. The presentation introduced the target audiences and the contents of the Communication and Outreach material (why, how, to whom and on what?) and then provided a brief assessment of the effectiveness and cost/benefit ratio of each type of tools/channels.
   3. A number of actions with suggested priority levels were proposed; ICG-WIGOS agreed on the following summary: i) high priority should be given to the WIGOS website (the most urgent), staff missions/visits, e.g. “jump-start” for RWCs, WIGOS Newsletter, webinars (as very effective and very good for training of trainers), Wikipedia and online documentation; ii) medium priority be given to workshops, flyers and posters, video clips; iii) lower priority given to social media, blogs and forums [(see Appendix II)](#Appendix_II).
3. **COLLABORATION AND ENGAGEMENT WITH CROSS-CUTTING WMO PRIORITIES**
   1. **Global Framework for Climate Services (GFCS)**

9.1.1 Mr. F. Lucio, D/GFCS Office delivered a general overview presentation on the progress in the implementation of the Global Framework for Climate Services (GFCS), including priority needs approved by IBCS-4.

9.1.2 ICG-WIGOS welcomed an initiative of GFCS to assess national observing capabilities in RA I.

9.1.3 ICG-WIGOS noted that in many cases observational data are not available when the project was funded by the World Bank. ICG-WIGOS was of the opinion that the WMO data policy on data sharing should be followed in all donor-funded projects and that this issue should be discussed at the EC-69/EC-70 and Congress [(see Appendix II)](#Appendix_II).

* 1. **Global Climate Observing System (GCOS)**

9.2.1 T. Oakley, Network Manager of the GCOS Secretariat, provided an update on GCOS, highlighting the key points from the GCOS Status Report submitted to ICG-WIGOS-6. These were as follows: a) the approval by COP-21 of a new GCOS Implementation Plan; b) the climate observing system requirements to be documented in OSCAR/Requirements; c) GCOS use of the WIGOS Metadata Standard; d) development of a surface reference network for climate purpose and e) the current monitoring statistics for the GUAN and GSN networks. He concluded with acknowledging the excellent collaboration between GCOS and WIGOS across a broad range of task teams, expert teams and relevant meetings.

9.2.2 The outcomes of the discussion were as follows:

1. ICG-WIGOS noted the approval of the new GCOS Implementation Plan by COP-21 and requested that all its expert/task teams should be made aware of the actions listed in the plan, and that they should contribute as far as possible to those that are relevant [(see Appendix II)](#Appendix_II).
2. ICG-WIGOS supported the revised application areas that were proposed for the climate observing system requirements as detailed in OSCAR. It requested that GCOS, through its science panels, update the requirements for the climate monitoring, and where relevant, climate services application areas, and provide this back to OSCAR through ET-OSDE [(see Appendix II)](#Appendix_II).
3. ICG-WIGOS recognized the importance of the ‘machine to machine’ interface for metadata being provided to OSCAR and noted the urgent need to prioritize regular funding for the OSCAR.
4. ICG-WIGOS noted the work being managed by GCOS in drafting a proposal for a reference surface network for climate. The concept of tiered networks is recognized as an important element for network design principles, as documented by ET-OSDE. It was requested that the final document be sent to the WIGOS PO for reference and potential follow-up work [(see Appendix II)](#Appendix_II).
   1. **Global Earth Observation System of Systems (GEOSS)**

9.3.1 D. Cripe, the GEO Secretariat, made a presentation about the ongoing and evolving collaboration between GEOSS and WIGOS.

9.3.2 It was noted that WIS is a major user of a GEOSS Portal.

1. **DELIVERABLES TO EC-69**
   1. The deliverables to EC-69 should be as follows [(see Appendix II](#Appendix_II), the actions No.):

* 8 - Organize a side event on TPOS 2020 & JCOMMOPS,
* 10 - Highlight the issue of the lack of a suitable inter-regional coordination mechanism,
* 26 - Submit the Guidance on WIGOS Data Partnerships,
* 33 - Organize a side event on OSCAR/Surface (a practical demonstration),
* 38 - Continue exploring possible options for developing SORT as part of a larger WMO document effort, including the request of EC-69 for financial contributions from WMO Members,
* 47 - Highlight the issues of both IT and physical security to EC and Cg-18 to ensure that Members are aware of the importance of this topic and the need to manage the risks,
* 49 - Submit a draft decision on the WMO data policy on data sharing to be followed in all donor-funded projects,
* 53 - Draft decision for the EC-69 regarding a development of the proposal for a future (post-2020) place for WIGOS in the WMO programmatic structure.

1. **FUTURE WORK PROGRAMME AND ACTION PLAN OF ICG-WIGOS; REVIEW OF TORs**
   1. ICG-WIGOS considered its future working structure. It decided that the WIGOS Editorial Board, the Task Team on the WIGOS Data Quality Monitoring System, the Task Team on WIGOS Data and Partnership will continue. Regarding TT-WMD, it was decided to keep the team active until ICG-WIGOS-7; a new Task team on OSCAR/Surface Development will be established (see 5.3.9).
   2. ICG-WIGOS also discussed the future of WIGOS. Clear understanding of requirements, needs and functions WIGOS should meet and perform; mechanisms that should be in place to enable the Vision for WIGOS Vision in 2040; cross-cutting and integrating nature of WIGOS; all these aspects and several others should be taken into account for such a consideration.
   3. ICG-WIGOS agreed that EC-69 should start a discussion on the future of WIGOS. Therefore, it requested WIGOS-PO to draft document on this topic for EC-WG/SOP (Geneva, 1-3 March 2017) [(see Appendix II)](#Appendix_II).
   4. The Future Work Programme and Action Plan was prepared based on the outcomes from discussion of individual Agenda Items; it is reproduced in Appendix II.
2. **ANY OTHER BUSINESS**
   1. There was no other business discussed.
3. **CLOSURE OF THE SESSION**
   1. The session closed on Saturday, 14 2017, at 15:15 hours.

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**Appendix I**

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| --- | --- |
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**Annex to paragraph 5.3.8**

**Draft Terms of Reference for the ICG-WIGOS Task Team on OSCAR Development**

1. Review the current functionalities of the OSCAR/Surface web interface and advise on possible improvements;
2. Advise on issues regarding integration and/or interoperability with the WIGOS DATA Quality Monitoring System (WDQMS);
3. Promote and coordinate the migration of the WMO catalogue of radiosondes into OSCAR/Surface;
4. Liaise with the regional activities related to the operational uptake of OSCAR/Surface, in particular with the establishment of RWCs to support the management of WIGOS metadata;
5. Coordinate and oversee the implementation of the Machine-to-Machine API for OSCAR/Surface;
6. Oversee and support the development and provision of training on OSCAR/Surface;
7. Develop the requirements for the OSCAR/Analysis module;
8. Coordinate and advise on the integration of the various OSCAR modules/databases, in collaboration with IPET/OSDE (responsible for OSCAR/Requirements) and ET/SAT (responsible for OSCAR/Space);
9. Contribute to the revision and further development of guidance material related to the use of the various modules of OSCAR;
10. Report to ICG-WIGOS on progress made;
11. Investigate if/how an "open source OSCAR/Surface compatible package" could be made available for Members to be used at national level.

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**Annex to paragraph 5.1.12**

**Definition of SMART Key Performance Indicators (KPIs):**

* Specific - It has to be clear what the KPI exactly measures. There has to be one widely-accepted definition of the KPI to make sure the different users interpret it the same way and, as a result, come to the same and right conclusions which they can act on.
* Measurable - The KPI has to be measurable to define a standard, budget or norm, to make it possible to measure the actual value and to make the actual value comparable to the budgeted value.
* Achievable - Every KPI has to be measurable to define a standard value for it. It is really important for the acceptance of KPIs and Performance Management in general within the organization that this norm is achievable. Nothing is more discouraging than striving for a goal that you will never obtain.
* Relevant - The KPI must give more insight in the performance of the organization in obtaining its strategy. If a KPI is not measuring a part of the strategy, acting on it doesn’t affect the organizations’ performance. Therefore an irrelevant KPI is useless.
* Time phased - It is important to express the value of the KPI in time. Every KPI only has a meaning if one knows the time dimension in which it is realized. The realization and standardization of the KPI therefore has to be time phased.

**Annex to paragraph 5.1.13**

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| ***KPI*** | ***OBS Dept. Objective*** | ***Performance Indicator*** |
| KPI 4.1.1  (WIGOS Pre-operational Stage) | 1 | Progress in the implementation of WIGOS Pre-Operational Phase as measured by a weighted score:  Deliverables (d1 to d6, each having values 0 to 1):   1. Manual on WIGOS, 2nd edition (integrating the current Manual on the GOS). 2. Guide to WIGOS, including guidance on national implementation, WIGOS partnership arrangement and WIGOS data management. 3. Vision for WIGOS in 2040. 4. OSCAR/Surface fully operational and functional for all WIGOS components 5. WDQMS, including incident management component. 6. Regional WIGOS Centres operating in pilot mode in at least three WMO Regions.   Sub-Performance indicators (spi1 to spi4, each having values 0 to 1):   1. Ratio of countries compliant with WIGOS in the following areas:    1. National Implementation Plan for WIGOS adopted    2. National WIGOS Partnership agreements concluded    3. Implementation of WIGOS Metadata Standard via OSCAR/Surface    4. Implementation of incident management via WDQMS 2. Ratio of OSCAR/Surface use by Members    1. Ratio of countries editing their station metadata in OSCAR (with at least 90% of VolA metadata recorded in OSCAR) 3. WDQMS (a+b)/2 :    1. Ratio of Countries having at least 50% of their WIGOS stations delivering observations to end users at agreed frequency and timeliness    2. Overall quality index of observations measured against NWP background, by station, Member and Region. 4. Regional WIGOS Centres    1. Ratio of Members covered by (and actively participating in) RWC. |
| KPI 4.1.2  (WIGOS Surface based systems) | 2 | Progress in the maintenance and evolution of surface based observing systems as measured by a weighted score:  **Objective 4.1.2.1:** CBS OPAG IOS Deliverables (db1 to db10, each having values 0 to 1):   1. CBS review of the integrated WIGOS Vision 2040 concerning surface-based observing systems completed 2. Initial draft of Technical Regulation on RBON produced 3. New draft WIGOS guidance on surface-based observing systems 4. Updated observational user requirements in OSCAR per IPET-OSDE-1 recommendations 5. Transition from VolA to OSCAR completed 6. Further development of OSCAR Platform with MeteoSwiss according to objectives agreed with OSCAR/Surface Committee 7. Development of the WDQMS for SBO: (i) draft framework for the WDQMS for incorporation into the manual on WIGOS; and (ii) draft requirements for WDQMS operation for surface systems for the Guide on WIGOS 8. Preliminary assessment of progress of implementation of EGOS-IP actions by identified actors completed with recommendations to address remaining gaps 9. New AMDAR programme agreements for AMDAR development in place in WMO Regional II and V (two in each region of RA-V and central Asia to cooperate on development of new AMDAR programmes) 10. Planning implementation of upper air network (EGOS-IP Action G10)   **Objective 4.1.2.2:** JCOMM OPA deliverables (dj1 to dj15, each having values 0 to 1):   1. New ocean observing network specifications agreed in response to new GCOS Implementation Plan and gaps identified in the Rolling Review of Requirements (RRR). The specifications shall include implementation targets and performance metrics. 2. Updated DBCP and SOT Implementation Strategies taking into account new targets 3. Measure (0 to 1) of sustainability of the JCOMM *in situ* Observations Programme Support Centre (JCOMMOPS) and its staff 4. Marine Climate Data System (MCDS) Technical Regulations completed and approved by JCOMM-5 5. Progress of CMOC/China according to the agreed workplan 6. Ratio of GDACs established by JCOMM-5 (target = 2, weight=1/2). Ratio of additional GDACs identified, applications submitted and reviewed (target = 2, weight=1/2) 7. Ratio of new candidate CMOC(s) identified (target=1) 8. New Argos tariff negotiated by JTA-EC 9. Percentage of completion of having JCOMMOPS fully interoperable with OSCAR via machine to machine interface 10. Development of the WDQMS for Marine Observing Systems: (i) draft framework for the WDQMS for incorporation into the manual on WIGOS; and (ii) draft requirements for WDQMS operation for marine observing systems for the Guide on WIGOS 11. Training provided to North Pacific and Marginal Seas (NPOMS) region (workshop) 12. Training provided to Pacific Islands (electronically) 13. Letter of Agreement with Rep. of Korea for NPOMS Training Centre signed 14. Ratio of new candidate RMICs having submitted letters of commitment and compliance, and which evaluation by JCOMM has started (target: 1 centre in RA-I and 1 centre in RA-VI) 15. Effective contribution of RMICs and other JCOMM activities to the WIGOS Regional Centres defined.   **Objective 4.1.2.3:** CIMO deliverables (di1 to di6, each having values 0 to 1):   1. Traceability concepts available for CIMO and Members approval for: (1/3 each), (i) evaluation of world references for solar and terrestrial radiation; (ii) concept for a unique system for traceability of pressure measurements; and (iii) ratio of RIC websites providing 2016 RICs capabilities 2. WMO is reconfirmed as being the world authority on cloud classification (ICA website is finalized and launched prior to World-Met-Day 2017, ICA printable version is available) 3. Best practices and guidance material on instruments and methods of observation are developed (1/4 each):    1. Standardization of weather radar practices through the active work of IPET-Operational Weather Radars    2. Experience with operation of AWS is more widely shared: Recording of AWS conference presentations available for viewing by all Members.    3. Update of the CIMO Guide, and publication of other relevant guidance documents such as IOM reports    4. 1 common WMO-ISO standards published in 2017, other(s) under development 4. Increased collaboration with other WMO bodies and programmes (TCs, RAs, GCW-SC, BSRN, GRUAN) is achieved 5. Plan for “reshaping” CIMO in accordance to the new CIMO vision (and WIGOS vision) is initialized, and way forward for updated CIMO structure agreed by CIMO MG 6. Testing of measurement systems to ensure Members requirements are met (1/2 each):    1. Publication of SPICE final report    2. Plan for upper-air instrument intercomparison, and report of inter-laboratory intercomparison. |
| KPI 4.1.3  (WIGOS Space based systems | 3 | Progress in the maintenance and evolution of space based observing systems as measured by a weighted score of:  **Objective 4.1.3.1:** Improve user readiness for new-generation meteorological satellites, including coordinated product development and training (ds11 to ds14, each having values 0 to 1):   1. Ratio of Regions having more than 50% of their Members using new-generation satellite data, with positive impact on services (esp nowcasting) 2. Ratio of Regions having more than 50% of their Members targeted by VLab or having participated in VLab training events 3. SATURN portal available (1/2 each): (i) Portal available, and (ii) ratio of Regions having more than 50% of their Members been using the portal (based on usage statistics of the online SATURN portal).   **Objective 4.1.3.2:** Advance the WIGOS Space Component – Defining the physical Architecture for Climate Monitoring from Space in support of GFCS and DRR   1. Commitment in 2017, and follow-through by 2018, by the relevant satellite agency coordination mechanisms to perform system-level gap analysis in support of the physical Architecture. 2. Gap analysis and SCOPE-CM (1/2 each): (i) Gap analysis of satellite-based ECV records produced and planned worldwide, based on ECV dataset inventory; and (ii) implementation plan on SCOPE-CM contribution to the Architecture available. 3. Requirements (1/2 each): (i) process defined for identifying quantitative and qualitative user requirements for satellite based climate records by the operational centres; (ii) develop pilot use cases to demonstrate the benefits of satellite-based datasets for WMO RCCs and WMO climate statements.   **Objective 4.1.3.3:** Advancing the WIGOS Space Component - Development of a 2040 Vision on WIGOS Space and activities in support of the WMO RRR process   1. Draft version 2.0 of the Space Vision 2040 available. 2. Establishment of a sustainable framework of maintaining and upgrading of OSCAR/Space V2 with the support of the Satellite Operators and Space Agencies (CGMS, CEOS), and Global Space-based Inter-Calibration System (GSICS) Executive Panel and WGs Members by the implementation of OSCAR/Space V2 Support Team and Science and Technical Advisory Team (including evaluation of OSCAR/Space for possible improvements).   **Objective 4.1.3.4:** WIS Support to WIGOS, GFCS, and GCOS – Improving exchange and availability of satellite data   1. Updated user requirements in RA-I, RA-III/IV, and initial draft in RA-II and RA-V available. 2. DBNet regional network leads in place, and statistics on latency and consistency available 3. Satellite data monitoring prototype available.   **Objective 4.1.3.5:** Advancing the WIGOS Space Component - Development of space weather services (Four-year Plan 2016-2019)   1. Implementation of an operational framework with WMO Members for utilizing space weather information. 2. Training and outreach (1/3 each): (i) Trust Fund established, and voluntary Contributions made in support of training and outreach activities. (ii) Selection of existing training material and making it available on line through the Space Weather Product Portal with Identifying target audiences, including NMHS meteorologists who wish to establish space weather service delivery within their organization, and training objectives; and (iii) training sessions conducted in coordination with the VLab and partner organizations, and tutorial tools provided. 3. Space Weather (a/2 each): (i) Space weather observation requirements and the Statement of Guidance for space weather observation updated as part of the WMO RRR process, and the key ground-based measurements to be performed on a routine operational basis listed, with required observation cycles; and (ii) assessment of space-based capabilities for space weather observation in OSCAR/space as a support to gap analysis updated. 4. Promoting Space Weather data exchange in the WIS Framework: Ratio of number of centres acting as DBCPs for Space Weather information (target=6). |

**Appendix II**

**FUTURE WORK PROGRAMME AND ACTION PLAN OF ICG-WIGOS AND TASK TEAMS**

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| **Action[[2]](#footnote-2)** | **Action/Activity** | **Deadline** | **Responsible** | **Status[[3]](#footnote-3)** | **Comment** |
| 1. (4.1.8) | Inform ICG-WIGOS-7 on the evolving role of the global data centres and their contribution to WHOS phase II | ICG-WIGOS-7 | President CHy |  |  |
| 1. (4.1.9) | Provide guidance on implementation of marine observations into WIGOS and building the partnership (requested by President of RA V) | ICG-WIGOS-7 | WIGOS-PO |  |  |
| 1. (4.1.10) | GCW and JCOMM work together in developing software/tools for conversion of NetCDF messages to/from BUFR format | On-going | GCW and JCOMM |  |  |
| 1. (4.2.1) | Develop a “WIGOS Readiness Checklist” as a tool to help Members to plan their WIGOS activities | ICG-WIGOS-7 | WIGOS PO |  |  |
| 1. (4.2.1) | Organize RA I workshops on:  a) management of AWS networks and  b) training in OSCAR/Surface | ICG-WIGOS-7 | PM/WIGOS |  |  |
| 1. (4.2.3) | Organize a RA III workshop on OSCAR/Surface and WIGOS station identifiers | ICG-WIGOS-7 | PM/WIGOS |  |  |
| 1. (4.2.4) | Work closely with the RA IV Regional Office on establishing RWC(s) and organizing the OSCAR/Surface training event | RA IV-17 | PM/WIGOS |  |  |
| 1. (4.2.8) | Organize a side event on TPOS 2020 & JCOMMOPS at EC-69 | EC-69 | PM/WIGOS |  |  |
| 1. (4.2.8) | Update R-WIP-V incorporating TPOS 2020 as its Project | RA V-17 | President RA and RA-V Infrastructure WG |  |  |
| 1. (4.2.8) | Highlight the issue of the lack of a suitable inter-regional coordination mechanism to EC-69 | EC-69 | PM/WIGOS |  |  |
| 1. (4.3.5.2) | Circulate the draft Vision for WIGOS to all TCs for feedback | In due course | PM/WIGOS |  |  |
| 1. (4.3.5.3) | Finalize the first draft of an integrated Vision for WIGOS | ICG-WIGOS-7 | PM/WIGOS |  |  |
| 1. (4.3.6.2) | Find a solution for sharing the status of compliance by Members | ICG-WIGOS-7 | PM/WIGOS |  |  |
| 1. (4.3.7.1/10) | Draft Terms of Reference and initiate a nomination process for National WDQMS Focal Points | ICG-WIGOS-7 | PM/WIGOS |  |  |
| 1. (4.3.7.2) | Extend the demonstration project in RA I to cover all the expected types of quality issues for both surface and upper-air observations | In due course | WIGOS-PO |  |  |
| 1. (4.3.7.2) | Organize a Workshop with representatives from all WIGOS Observing components towards a fully integrated system | June/July 2017 | WIGOS-PO |  |  |
| 1. (5.1.2) | Provide feedback on the Annex to Doc.5.1 | ICG-WIGOS-7 | ICG-WIGOS Members | Completed |  |
| 1. (5.1.3) | Organize a side event on national WIGOS implementation at each RA session | On-going | D/OBS; ASG |  |  |
| 1. (5.1.4) | Investigate how to establish an operational WIGOS Help Desk to provide support to Members and Regions | ICG-WIGOS-7 | PM/WIGOS |  |  |
| 1. (5.1.5) | Work closely with the Education and Training Office on how to engage the WMO Regional Training Centres in WIGOS related training activities | Ongoing | D/OBS; PM/WIGOS |  |  |
| 1. (5.1.5) | Develop a “training needs and priorities” template to be used by each RA to specify their WIGOS training needs by order of priority | ICG-WIGOS-7 | PM/WIGOS |  |  |
| 1. (5.1.8a) | Develop guidance on how external organizations may reach in to NMHSs | ICG-WIGOS-7 | WIGOS-PO |  |  |
| 1. (5.1.8c) | Work together to develop the relevant section in the guidance that balances the target of full compliance with real-world practicality. | Ongoing | Chairs, TT-WDP and TT-WMD |  |  |
| 1. (5.1.9) | Provide feedback on Guidance on WIGOS Data Partnerships to chair, TT-WDP | 29 January 2017 | ICG-WIGOS Members |  |  |
| 1. (5.1.9) | Provide WEdB with Guidance on WIGOS Data Partnerships for a review | Mid March 2017 | Chair, TT-WDP |  |  |
| 1. (5.1.9) | Submit Guidance on WIGOS Data Partnerships to EC-69 | EC-69 | PM/WIGOS |  |  |
| 1. (5.1.10) | Involve JCOMM in the further development of Guidance on WIGOS Data Partnerships | Ongoing | PM/WIGOS |  |  |
| 1. (5.1.11) | Provide the WIGOS-PO with case studies of establishing partnerships between research institutions/organizations and NMHSs | Ongoing | ICG-WIGOS representatives of CAS and GCW |  |  |
| 1. (5.1.13) | Further develop the WIGOS readiness indicators of the pre-operational phase. | ICG-WIGOS-7 | WIGOS-PO |  |  |
| 1. (5.2.3) | Nominate CHy member of WEdB | asap | President, CHy |  |  |
| 1. (5.3.7) | Take actions to improve the situation with OSCAR/Surface NFPs | On-going | WIGOS-PO |  |  |
| 1. (5.3.8a) | Finalize M2M OSCAR/Surface specification and  Develop an operational OSCAR/Surface API | March 2017  April 2017 | WIGOS-PO |  |  |
| 1. (5.3.8a) | Organize a side event on OSCAR/Surface (a practical demonstration) at EC-69 | EC-69 | WIGOS-PO |  |  |
| 1. (5.3.8b) | Incorporate quantitative monitoring information from the WDQMS in the station report in OSCAR/Surface | In due course | WIGOS-PO |  |  |
| 1. (5.3.8c) | Include one or more indicators measuring the degree of compliance of a station metadata to the station report | In due course | WIGOS-PO |  |  |
| 1. (5.3.8d) | Review and update the WIGOS webpages before migrating them to the new WMO Extranet | In due course | WIGOS-PO |  |  |
| 1. (5.3.8e) | Present OSCAR/Space 2.0 at CGMS-45 with an aim to discuss the role of space agencies at its further development | CGMS-45 | OBS/SAT |  |  |
| 1. (5.3.8f) | Continue exploring possible options for developing SORT as part of a larger WMO document effort, including the request of EC-69 for financial contributions from WMO Members | EC-69 | OBS |  |  |
| 1. (5.3.9) | Establish TT-OSCAR/Surface and organize its first meeting | ICG-WIGOS-7 | WIGOS-PO |  |  |
| 1. (5.4.6) | Make proposals for "Mechanisms for routine reporting of monitoring results to EC, regional associations and Members by end of 2017” | ICG-WIGOS-7 | WIGOS PO, Chair, TT-WDQMS |  |  |
| 1. (5.5.1) | Provide feedback to a draft Technical Guidance on establishing a RWC in pilot mode | January 2017 | ICG-WIGOS Members |  |  |
| 1. (5.5.4) | Develop a draft Concept note for establishing Global WIGOS Centres (GWC) | ICG-WIGOS-7 | WIGOS-PO |  |  |
| 1. (6.2) | Make a decision on an approval of WIGOS MD representation (EC-69 or EC-70) | In due course | WIGOS-PO |  |  |
| 1. (6.3) | Consider the issues of the seamless linkage between WIGOS metadata and WIS discovery metadata | In due course | OBS/WIGOS-PO/WIS |  |  |
| 1. (6.4) | Advise on the seamless linkage between WIGOS metadata and WIS discovery metadata. | July 2017 | TT-WMD |  |  |
| 1. (6.4) | Organize a joint WIGOS and WIS metadata meeting to resolve any outstanding issues | December 2017 | WIGOS-PO |  |  |
| 1. (6.5) | Highlight the issues of both IT and physical security to EC and Cg-18 to ensure that Members are aware of the importance of this topic and the need to manage the risks | EC-69; Cg-18 | WIS; WIGOS-PO |  |  |
| 1. (8.3) | Adjust communications and outreach activities according to the priorities suggested by ICG-WIGOS | Ongoing | WIGOS-PO |  |  |
| 1. (9.1.3) | Submit a draft decision on the WMO data policy on data sharing to be followed in all donor-funded projects to EC-69; consequently to EC-70 and Congress as appropriate | EC-69/70 and Cg-18 | WIGOS-PO |  |  |
| 1. (9.2.2a) | Be aware of, and contribute to the new GCOS IP implementation as appropriate | Ongoing | ICG-WIGOS Task Teams |  |  |
| 1. (9.2.2b) | Update the requirements for climate monitoring, and where relevant, climate services application areas, and provide this back to OSCAR through ET-OSDE | July 2018 | OSD; GCOS Secretariat |  |  |
| 1. (9.2.2d) | Submit a final draft for a reference surface network for climate with the concept of tiered networks to the WIGOS-PO for reference and potential follow-up work | In due course | GCOS Secretariat |  |  |
| 1. (11.4) | Draft decision for the EC-69 regarding a development of the proposal for a future (post-2020) place for WIGOS in the WMO programmatic structure;  The first step should be to draft document on this topic for EC-WG/SOP (Geneva, 1-3 March 2017) | EC-69  EC-WG/SOP | WIGOS-PO, Chairs, ICG-WIGOS  WIGOS-PO |  |  |

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1. The final reports from these events are available at: <http://www.wmo.int/pages/prog/www/WIGOS-WIS/reports.html> [↑](#footnote-ref-1)
2. With the reference to the paragraph of the General Summary, Final report from ICG-WIGOS-6 [↑](#footnote-ref-2)
3. Status column entries will be one of the following descriptors: **Completed; On-Track; Overdue** [↑](#footnote-ref-3)