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| **World Meteorological Organization**  **Inter-Commission Coordination Group on WIGOS**  **Eighth Session** Geneva, Switzerland, 24-26 January 2019 | **ICG-WIGOS-8/Doc 4.4** |
| Submitted by: TT-WDQMS/Secretariat  21.01.2019  **DRAFT 1** |

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**4. STATUS OF THE PRIORITY AREAS IMPLEMENTATION OF THE PLAN FOR THE WIGOS PRE-OPERATIONAL PHASE (PWPP)**

**4.4 Development and implementation of the**

**WIGOS Data Quality Monitoring System**

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| **Summary and purpose of document**  The document provides the status of the development and implementation of the WIGOS Data Quality Monitoring System, as the priority area No. 4 of the PWPP. |

**Action proposed**

The session will be invited to review the progress made, and particularly to advise on the Recommendations, Conclusions and Actions from the Third session of the ICG-WIGOS Task Team on WIGOS Data Quality Monitoring System (TT-WDQMS-3), as well as on how to proceed further in this priority area.

**References:**

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**4.4 Development and implementation of the WIGOS Data Quality Monitoring System**

**4.4.1 Background**

According to the Plan for The WIGOS Pre-Operational Phase (PWPP) the fourth priority area is the “Development and implementation of the WIGOS Data Quality Monitoring System (WDQMS)”.

The ICG-WIGOS Task Team on WIGOS Data Quality Monitoring System (TT-WDQMS), is developing and maturing the concept of a WDQMS applicable to all WIGOS observing components, based on three major functions: the monitoring, the evaluation and the incident management functions, following a pilot project with Global NWP Centres (GNWPCs) and a demonstration project in RA I. In the context of the pilot project with GNWPCs, the Secretariat and the TT-WDQMS have developed a prototype of a WDQMS Webtool for the near-real time monitoring of the performance of the land surface and upper-air stations of the GOS currently producing results for the data availability (<http://128.65.196.37/wdqms/map>).

**4.4.2 Progress achieved since ICG-WIGOS-7**

(a) A detailed technical guidance (standalone) document was finalized and endorsed by EC-70 to become part of the new edition of the Guide to WIGOS (WMO-No. 1165) as an attachment: “Technical Guidelines for Regional WIGOS Centres (RWCs) on the WIGOS Data Quality Monitoring System (WDQMS) for surface-based stations of the Global Observing System (GOS)”;

(b) Contributions made to the new draft edition of the Manual on WIGOS (WMO-No. 1160) with some proposed edits and updates relevant to the WDQMS, as well as a proposed generic description of WDQMS, including its functions and the responsibilities at global, regional and national levels, to be included as a new appendix for the new draft edition of the Manual on WIGOS (WMO-No. 1160);

(c) The pilot project with GNWPCs continued to:

- develop and implement the monitoring files for the upper-air observations,

- progress with development of monitoring files for the aircraft observations,

- progress with development of the monitoring outputs to be recorded in OSCAR/Surface, and possibly in other WMO monitoring tools,

- not much progress with the integration of the monitoring from the marine observations, neither from the other WIGOS observing components (GAW, GCW, WHOS). In most cases, such as with JCOMM and GAW observations, there are already monitoring systems in place, for which there is a need to find a good way to cooperate with those programmes instead of building something new; nevertheless, it doesn’t make the whole system less complex.

(d) Also in the context of the pilot project with GNWPCs, the WDQMS Webtool prototype was further developed and tested for the monitoring of data availability from surface and upper-air stations:

- the development of the GBON concept and its draft provisions for the Manual on WIGOS, are already a substantial impact of the project that was based on the experimental results from the WDQMS Webtool prototype,

- ECMWF and WMO signed an agreement for the development and hosting of a fully operational version of the WDQMS Webtool, which should be available in 2019, with a pre-operational version for demonstration at Congress-18.

(e) Output generated by the GNWPC Pilot was shown at the CBS TECO in March 2018, and the relatively poor status of exchange of surface observations led to the CBS MG putting this issue in front of EC-70 as a matter to be urgently addressed by organization.

Similar results were presented at EC-70, and the Council decided to take immediate action to improve this situation. The Council thus requested the Commission for Basic System to develop an overarching design for a Global Basic Observing Network (GBON) that would meet threshold requirements or better for Global NWP and climate analysis, and it requested ICG-WIGOS to develop the relevant provisions reflecting this design and incorporate them in the new draft Manual on WIGOS to be submitted for approval by Cg-18.

(f) Initial discussions were held with the space-based observations community, both at the Fourth Session of the Inter-Programme Expert Team on Satellite Utilization and Products (IPET-SUP-4, 26 February-1 March 2018) and TT-WDQMS-3 (4-6 December 2018, Geneva, Switzerland), on the future integration and better alignment with the generic concept of the WDQMS, of the current monitoring activities for the satellite observations.

**4.4.3 Issues and challenges**

The TT-WDQMS has struggled with time and resources to develop all the expected deliverables by the proposed deadlines/milestones, due to the complexity of the whole WDQMS, so most focus and much effort was put on maturing the WDQMS concept and its external links in terms of monitoring the observations from the GOS; In particular the integration of the monitoring from the non-GOS observations is very challenging and requires more time and an extended membership of the task team, to include representatives from the other WIGOS observing components (JCOMM, GAW, GCW, WHOS).

On the other hand, as it was stated in the PWPP, the implementation of the WDQMS is dependent on the establishment of RWCs, in terms of the operational activities particularly those related to the evaluation and to the incident management functions.

**4.4.4 Recommendations, Conclusions and Actions from TT-WDQMS-3**

Below is the full list of the recommendations, conclusions and actions from TT-WDQMS-3.

**RECOMMENDATIONS:**

1. For ICG-WIGOS: to consider the need for capacity building activities in the near future, in support of establishing RWCs, particularly training on WDQMS, noting that they are not in the current mandate of TT-WDQMS.
2. For ICG-WIGOS: to discuss and define a vision for the WDQMS in the long-term, within the context of the whole WIGOS.
3. For ICG-WIGOS: to refresh/review the ToRs of TT-WDQMS.
4. For ICG-WIGOS: It was agreed that Members establishing RWCs should provide input for the development of the WDQMS Webtool, as future users, in terms of the information that is needed to be displayed.
5. For ICG-WIGOS: to advise on the future evolution of WDQMS, such as on the flexibility that is needed to integrate WIS monitoring (e.g. regarding timeliness), as well as on data licencing issues that need to be taken into account since all the data will be publicly available on the Webtool.
6. For ICG-WIGOS: there should be mechanisms to allow the exchange of monitoring information across various RWCs.
7. For ICG-WIGOS: to endorse the edits to the new draft edition of the Manual on WIGOS, as well as to review some provisions.
8. For SECRETARIAT: the monitoring results shown on other WMO/WIGOS Tools (e.g. the CPDB) should have a clear description of what they refer to and how they were computed as compared to the WDQMS Webtool.
9. For GSICS (accepted): to map their results against the user requirements, e.g. WMO and GCOS, to allow future integration with WDQMS.
10. For ECMWF: The Webtool should have filtering features, e.g. to select the variable for the combined map of quality results, which should be based on the "best model" (closest fit).
11. For ICG-WIGOS: recognizing that the quality results are not mature enough for OSCAR/Surface, (first we need the Webtool available to gain some experience with the quality results) a dedicated workshop is suggested to be organized in a near future to discuss this, involving NWP and observations experts, to better understand exactly what the various NWP results really mean.
12. For ICG-WIGOS: representatives from GAW, GCW, WHOS to be members of TT-WDQMS, in addition to current ones, for a better engagement towards progressing with the integration – for WHOS there is an opportunity to engage with the La Plata basin project in RA III, as a demonstration project, taking into account that the hydro and the meteo communities are already working together in the region.

**CONCLUSIONS:**

1. It is recognized that there is still a huge amount of work to do for the integration of all the WIGOS observing components in the WDQMS, especially the non-GOS components. There is a need to follow-up on the outcomes from the “Integration Workshop” in 2017, with representatives from the various programmes.
2. TT-WDQMS is concerned with the risk of losing momentum in developing the technical activities of WDQMS during the transition phase of WIGOS in the context of the WMO reform.
3. It would be beneficial if additional Global NWP Centres join the pilot project; Action for Secretariat: to contact CMA who already expressed the willingness to join and to reach out to others, e.g. BoM-Australia.
4. The structure/format of the monitoring files are reaching a maturity level that they could be a proposal for a WIGOS data exchange standard - the files format are now version controlled in a wiki of ECMWF.
5. The Webtool should be developed in two steps, first the results on data availability and second the results on data quality, which is more challenging and requires more resources.
6. It is important to develop an auditing process for on WDQMS for RWCs; It was recognized that the requirement for competencies in Incident Management Systems for Members to run a RWC should be flexible to allow exceptions in some Regions.
7. Performance results should be compared with a baseline - there should be more than one, such as one based on the declared performance (OSCAR/Surface) and one based on user requirements (OSCAR/Requirements).
8. The GSICS is aligned with the WDQMS concept and they are willing to be more engaged with the WDQMS, e.g. they will plan for having a IMS (for the moment they use emails and logs); They produce and publish on the web correlation coefficients in real time, as well as annual assessments.
9. The tools/outputs for the Evaluation Function should have a map of the availability just showing the numbers of reports “available to data assimilation”; The approach for the combined availability alert map should be a "Maximum across centres".

**ACTIONS:**

1. For TT-WDQMS to be integrated in the workplan:
   * to add a field for the WSIs in all monitoring file templates and the flagging system (developed by the pilot project with Global NWP Centres) to make them compatible with the WSIs;
   * on the exchange of ABO monitoring files, the template was agreed with ET-ABO, but there is a need to further distinguish among various other originating ABO observing systems (ADS-C, ADS-B), because different systems use different sensors produce diverse data quality;
   * to define what minimum functionalities a centre has to have to become a WIGOS monitoring centre;
   * to review code table 7-07 of the WMDS and map it to the currently used code list;
   * to add the observation field in the templates, wherever is possible;
   * to insert a header for the template version, so allowing different NWP centres to use different template versions at a certain point;
   * to work with the Task Team on OSCAR Development (TT-OD) and with the OSCAR/Surface Development Team in order to implement the Machine-to-Machine interface for the automatic exchange of information between OSCAR/Surface and WDQMS Webtool (both metadata and monitoring results).
2. For ECMWF and Secretariat: to continue to develop a WDQMS Webtool, following the developments of the prototype and the requirements and project plan agreed with WMO (technical design in Q1, implementation in Q2, available in Q3 2019); the latter should be adjusted in order to have a pre-operational version to demonstrate some capabilities at Congress-18.
3. For TT-WDQMS: to produce quick descriptions of what the published monitoring results are/what is their meaning.
4. For TT-WDQMS and Secretariat: to investigate how to proceed with developing a monitoring capability for the timeliness - the JSON files from the GISCs don't have enough information on that yet.
5. For TT-WDQMS: to engage further with the marine community/JCOMM-OPS, to discuss in detail what/how to do the integration of monitoring.
6. For TT-WDQMS (low priority): to create a template for radars similar to that for radiosondes, to collect results from NWP centres assimilating wind profilers/radars profiles (ECMWF, NCEP, JMA) for both availability & quality (o-b).
7. For TT-WDQMS: to integrate ASAP observations using the radiosonde template, but availability results won't have any comparison target.
8. For TT-WDQMS: to review/edit the “Top Level Description of WDQMS” document with the outcomes from TT-WDQMS-3: the monitoring results produced and made available by NWP centres are part of the Monitoring Function; The comparison results are part of Evaluation Function; The Evaluation Function requests the creation of incidents; The Incident Management Function creates/registers the incident, provides an incident number and manages the incident using a proper tool also available to the Evaluation Function.
9. For TT-WDQMS (Cristina Prates and Estelle Grüter): to update the definitions and tables related to the aggregation rules, initially proposed by Estelle Grüter/Stuart Goldstraw, with the results of the discussion.

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