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RA I DISSEMINATION EXPERT GROUP

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4th MEETING

Agenda item : 5

GENEVA, SWITZERLAND, 11-12 JUNE 2013

ENGLISH ONLY

**IMPLEMENTATION OF WMO INTEGRATED GLOBAL OBSERVING
SYSTEM (WIGOS) IN RA I (AFRICA)**

(Submitted by the Secretariat)

Summary and purpose of document

The document presents a brief background on WIGOS and its implementation in RA I (Africa).

Action Proposed

The meeting is invited to consider information presented in the document for the development of actions on addressing data user requirements for meteorological data exchange in RA I in a coordinated way.

Annex: WIGOS Background Information

Reference(s):

- (1) [Regional WIGOS Implementation Plan for RA I \(R-WIP-I\)](#)
- (2) [EC-65-d04-4\(1\)-WIGOS-draft1_en.doc](#)

STATUS ON THE WIGOS IMPLEMENTATION

EC-65 on WIGOS Implementation

1. The Council (May 2013) adopted the updated version of WIGOS Framework Implementation Plan (WIP) with improved estimation of resource requirements, adjusted target dates for tasks' completion and identification of risks as requested by EC-64. Effective implementation and operation of WIGOS will 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.

2. The WIGOS framework Implementation Plan (WIP) addresses the necessary activities to establish an operational WIGOS by the end of the period 2012-2015, as per the direction of WMO Congress. To migrate the existing observing systems (GOS, GAW, WMO Hydrological Observing System, incl. WHYCOS, and GCW, including surface-based and space-based components and all WMO contributions to GFCS, GCOS, GOOS, GTOS and GEOSS) into a more integrated single system that is WIGOS, focused effort is required in the following key areas identified and described in the WIP:

- (a) Management of WIGOS implementation;
- (b) Collaboration with WMO and co-sponsored observing systems;
- (c) Design, planning and optimized evolution;
- (d) Integrated Observing System operation and maintenance;
- (e) Integrated 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) Communication and outreach.

3. The WIP also addresses a number of additional activities that would substantially improve the operational capabilities of WIGOS beyond the 2012-2015. During the implementation of WIGOS, the Rolling Review of Requirements (RRR) process, originally developed in formulating the Implementation Plan for the Evolution of the Global Observing Systems (EGOS-IP) will be a major tool for observational gap analysis and observing network design.

4. The Council appreciated that the Regional WIGOS Implementation Plans (R-WIP)¹ are well advanced in all WMO Regions and already adopted by RAs II and IV. R-WIPs take into account regional and subregional needs, requirements and priorities. In this regard, Members' commitment to, and leadership for WIGOS implementation is essential, including provision of sufficient resources.

5. The sustainability of the regional basic networks in some regions, and the reduced availability of data from those networks, is an issue of concern. WIGOS has 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.

6. 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) of the WIGOS Operational Information Resource (WIR)². The WIR Functional Requirements had been developed by the Secretariat and considered by ICG-WIGOS (Geneva, 18-22 March 2013).

¹ www.wmo.int/pages/prog/www/wigos/documents.html

² See Annex and www.wmo.int/pages/prog/www/wigos/tools.html

ICG-WIGOS and Task Teams

7. In accordance with Resolution 4 (EC-LXIII) and based on the discussion at PTC-2012, the following ICG-WIGOS Task Teams (TT) have been established: TT on the WIGOS Implementation Plan (TT-WIP), TT on WIGOS Regulatory Material (TT-WRM) and TT on WIGOS Metadata (TT-WMD).

8. TT-WIP-1 (March 2012) finalized the WIGOS framework Implementation Plan (WIP) that was submitted to EC-64 for consideration. TT-WRM-1 (November 2012) agreed on the Draft structure of the WIGOS sections in WMO Technical Regulations (WMO-No. 49), Vol. I., Part I. WIGOS, and the Action Plan for the developing the WIGOS regulatory material. TT-WMD-1 (March 2013) focused on the standardization of WIGOS component observing system metadata.

9. The Second session of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS-2)³ was held at the WMO Secretariat in Geneva, Switzerland, from 18 to 22 March 2013. The session was chaired by Dr Sue Barrell (Australia), Chair of ICG-WIGOS and the vice-president of CBS.

10. ICG-WIGOS reviewed the status of the WIGOS Key Activity Areas and agreed on the updated version of the WIGOS Framework Implementation Plan (WIP) that was submitted to EC-65. Further, it reviewed deliberations of its Task Teams, Regional Associations and Technical Commissions relevant to the WIGOS framework Implementation Plan (WIP) and agreed on: (1) The structure of the WIGOS sections to be included in the WMO Technical Regulations and the draft structure of the Manual on WIGOS; (2) The guidance for WIGOS metadata development; (3) The self assessment checklist to assist Members in a national self-assessment of their readiness for WIGOS implementation; (4) The draft of the WIGOS Capacity Development Strategy; (5) The draft of the WIGOS Communications and Outreach Strategy; (6) The way forward for the Regional Associations in developing and executing their Regional Implementation Plans (R-WIPs).

Regional Implementation of WIGOS in RA I

11. At the kind invitation of the Government of Kenya, the First Session of the Regional Association I (Africa) Task Team on WMO Integrated Global Observing System (WIGOS) (RAI/TT-WIGOS) was held in Nairobi, Kenya, 17-21 September 2012. TT-WIGOS developed the draft R-WIP-I⁴ submitted to RAI-MG for consideration and for its approval in due course.

12. The meeting also recommended that five subregional workshops should be organized for each RA I Sub-Region. The goals of these workshops are to:

- (a) Raise the awareness and understanding of the WIGOS Framework Implementation Plan (WIP) and to seek contributions from all countries in Africa to refine the draft R-WIP-I;
- (b) Address the ten Key Activity Areas from the sub-regional perspective, taking into account sub-regional requirements, priorities and needs; and
- (c) Refine WIGOS Implementation Activities (Table 2 of the Plan), which lists specific work to be done in each of the ten Key Activity Areas, taking into account existing sub-regional priorities for observing systems, as well as existing and planned sub-regional projects, and their relevance to R-WIP-I.

13. At present, the first workshop is organized for the Southern Africa (in Harare, Zimbabwe; 5-7 June 2013), aimed at members of senior management of the NMHSs responsible for observing networks and their integration. The other workshops are planned for the second half of 2013.

³ See the Final Report at: www.wmo.int/pages/prog/www/WIGOS-WIS/reports.html

⁴ See Reference (1): [Regional WIGOS Implementation Plan for RA I \(R-WIP-I\)](#)

WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS)

BACKGROUND INFORMATION

Purpose of WIGOS

1. 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 that 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.

2. WIGOS will enable all Members and the WMO Programmes to provide timely, quality-assured, quality-controlled, and well-documented compatible long-term observations for enhanced and extended services.

Collaboration with the WMO co-sponsored observing systems and international partner organizations and programmes

3. 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 (incl. World Hydrological Cycle Observation System, WHYCOS), including all WMO contributions to the GCOS, GOOS and GTOS. It should be noted that in contrast to the primarily NMHS owned observing systems upon which the World Weather Watch (WWW) was built, the proposed WIGOS component observing systems are owned and operated by a diverse array of organizations and programmes, both research and operational.

4. Strengthening the interaction between research and operational observing communities is therefore important for sustaining and evolving observing systems and practices, in line with new science and technology outcomes, and for operational availability and migration to operations, where appropriate, of some research-based observing systems.

Design, Planning and Optimized Evolution of WIGOS component observing systems

5. WIGOS provides a mechanism to meet the evolving observing requirements of WMO Members and partner organizations. Coordinated planning based on gap analysis and the [Rolling Review of Requirements \(RRR\)](#) process with new application areas important from the climate, cryosphere and other perspectives have great potential to enhance observing system capabilities and to increase cost-effectiveness of observing efforts and investments.

6. An observing network design will be addressed through a coordinated effort of NMHSs and other data providers by minimizing duplication and optimizing the observing network design and its flexibility to incorporate new observing systems/networks after their successful testing and evaluation. It can be a mix of systems with the optimized geospatial/temporal distribution of observing points and data to meet global/regional/subregional/national needs in accordance with requirements of significant users and application areas. Where there are a large number of smaller countries and/or large areas of ocean, this may be a practical move forward.

Observing System Operation and Maintenance

7. 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. 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) Calibration and Traceability: Potential for efficiencies and improvements to observational data quality through combining efforts at a national, regional and global level;
- (c) Spectrum management: greater influence nationally which feeds into the International Telecommunication Union (ITU).

Quality Management

8. 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 the ISO 17025 standard (i.e. with respect to instrument calibration and traceability of data) and others where appropriate.

9. In addition to the WMO QMF document, further guidance to Members on WIGOS Quality Management will be provided via the standard and recommended practices and procedures specified in the WMO Technical Regulations (WMO-No. 49), Vol. I) and further described in the WIGOS related 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).

10. 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.

11. 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.

Standardization, System Interoperability⁵ and Data Compatibility

12. 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.

13. 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).

⁵ Interoperability is a property referring to the ability of diverse systems to work together (inter-operate)

14. 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.

15. All standard and recommended practices and procedures will be documented in the WMO Technical Regulations (WMO-No. 49). Technical guidelines will be documented in the Guides and other technical documentation under the responsibility of the respective technical commissions.

The WIGOS Operational Information Resource (WIR)

16. 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.

17. 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.

18. 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 information sources to be accessible from within the resource will be considered by ICG-WIGOS once it has been implemented.

Data Discovery, Delivery and Archival

19. Within the WIGOS framework, the [WMO Information System \(WIS\)](#) provides exchange of data and interpretation metadata⁶, and management of related discovery metadata⁷. These discovery metadata play an important role in the discovery, access and retrieval of WIGOS observations and products.

20. 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 regional or specialized data centres exist that collect, manage and archive basic observational data that are relevant to WMO Applications.

21. 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.

⁶ Interpretation metadata is the information required to interpret the data

⁷ Discovery metadata is the information describing the data-sets, generally using ISO-19115 standard, and WMO core profile in case of WIS

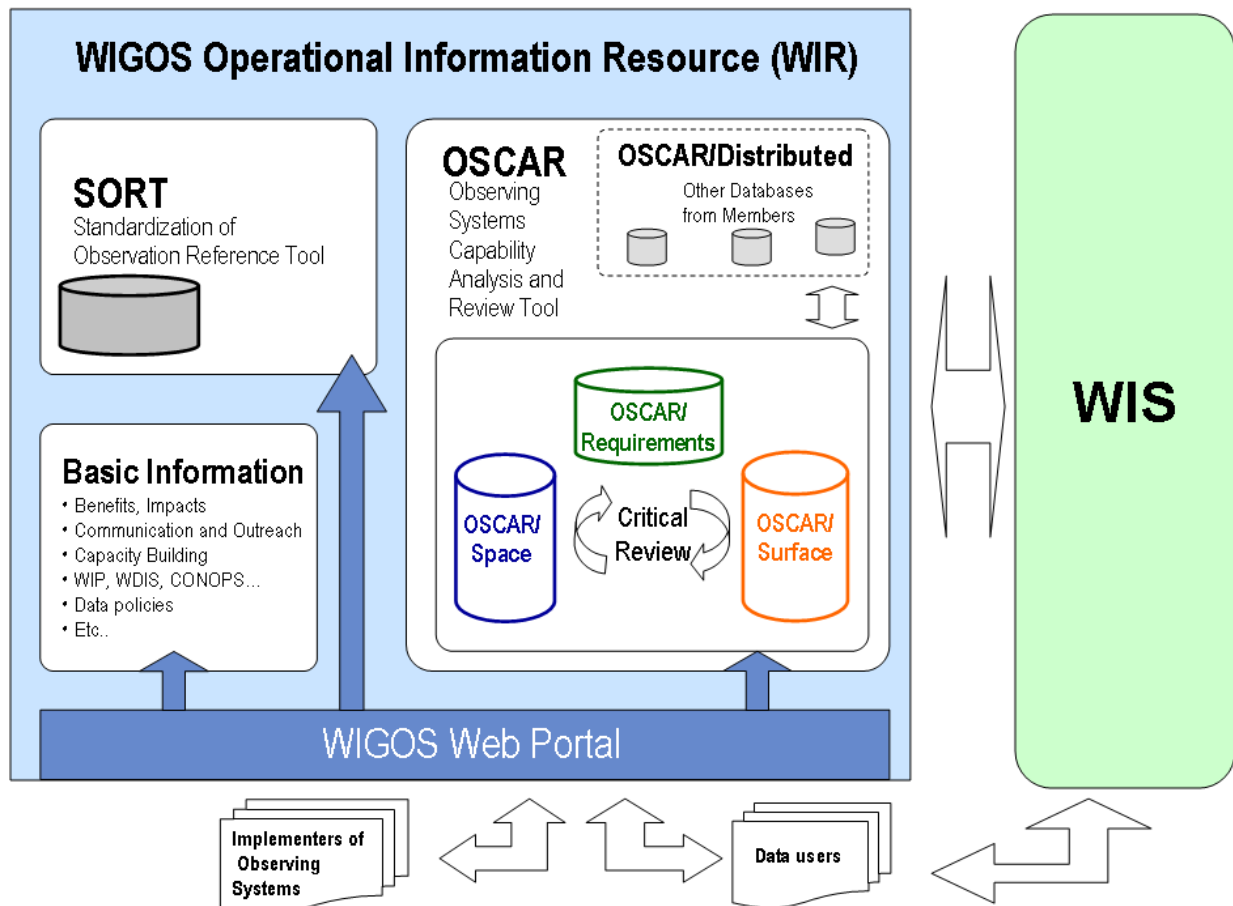


Figure 1: WIGOS Operational Information Resource (WIR) and its Key Support Tools

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).