

UPDATE ON WIGOS

(Submitted by the Secretariat)

Summary and Purpose of Document

An update of the WMO Integrated Observing System (WIGOS) framework and its implementation is provided, along the following six priority areas:

- Design, Planning and Optimized Evolution of WIGOS component observing systems (including space-based observing systems)
- Observing System Operation and Maintenance
- Quality Management
- Standardization, System Interoperability and Data Compatibility
- Development of the WIGOS Information Resource
- Data discovery, delivery and archival

It is noted that all WMO Regions are now developing Region-based WIGOS Implementation Plans, reflecting their specific observing needs and priorities.

This summary includes satellite-related activities and appropriate references to other ET-SUP documents where these activities are discussed in detail.

ACTION PROPOSED

The seventh session is invited to take note of the information provided in this document, and to give guidance on the WIGOS-related implementation activities with a satellite component.

WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS)

Purpose of WIGOS

1. The WMO Integrated Global Observing System (WIGOS) is an integrated, comprehensive, and coordinated system which is comprised of the present WMO global observing systems, in particular of the *in situ* and space-based components of the Global Observing System (GOS), the Global Atmosphere Watch (GAW), the Global Cryosphere Watch (GCW), and the World Hydrological Cycle Observing System (WHYCOS). Strengthening the interaction between research and operational observing communities will be important for sustaining and evolving observing systems and practices in support of WIGOS, in line with new science and technology outcomes.

2. WIGOS provides a new framework for coordination and evolution of WMO observing systems, including the contributions of WMO to co-sponsored observing systems. This framework aims at advancing:

- Design, Planning and Optimized Evolution of WIGOS component observing systems (including space-based observing systems)
- Observing System Operation and Maintenance
- Quality Management
- Standardization, System Interoperability and Data Compatibility
- Integration of governance and management functions
- Data discovery, delivery and archival (through the WMO Information System (WIS))

The WIGOS framework will be supported by a comprehensive WIGOS Information Resource (WIR), consisting of a web portal providing access to all WIGOS related operational information, user requirements and observing capabilities.

More detail on each of these elements is given below.

WIGOS Implementation

3. WIGOS was endorsed by Congress-XVI in 2011, and WMO Executive Council (EC-64) in May 2012 adopted the WIGOS Framework Implementation Plan¹. The Plan:

- Recognizes the essential and often unique role of satellites observations as basic systems underpinning all WMO Programmes
- Recognizes the key contribution by satellite operators, through Members operating satellites and internationally through CGMS and CEOS, to WIGOS
- Includes implementation activities in support of WIGOS with a satellite component:
 - Development of the Architecture for Climate Monitoring from Space focusing on GFCS priorities [cf. ET-SUP-7/Doc. 7.2; ET-SAT-8/Doc. 5.2]
 - Refine the WMO Rolling Review of Requirements procedures for all WMO application areas
 - Investigate the need for a database describing Global Observations Products (Satellite Data, Weather Radar) [cf document ET-SUP-7/Doc. 10.1 (Product Access Guide)]
 - Develop guidance for the process of sharing, between component observing systems, operational experiences, of expertise and for resourcing joint activities
 - Capacity development in utilizing satellite data, through the VLab and otherwise [cf. ET-SUP-7/Doc. 13.1]

4. 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.

¹ [http://www.wmo.int/pages/prog/www/wigos/documents/Principal_Docs/WIP_en_APP-d04-4\(1\).doc](http://www.wmo.int/pages/prog/www/wigos/documents/Principal_Docs/WIP_en_APP-d04-4(1).doc)

5. 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.

6. All WMO Regions have started developing Region-specific WIGOS-related Implementation Plans, reflecting their specific needs and priorities².

a) Design, Planning and Optimized Evolution of WIGOS component observing systems

7. 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.

8. Observing network design will be addressed through coordinated efforts of NMHSs, satellite agencies 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.

b) Observing System Operation and Maintenance

9. 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.

c) Quality Management

10. 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.

11. 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).

12. 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.

13. Responsibility for the development of WIGOS Quality Management, and for the provision of guidance to Members on how to achieve compliance with the relevant technical standards, lies with the WMO Technical Commissions and with CGMS, while the responsibility for ensuring compliance with the WIGOS quality principles (such as ISO 9001, 9004, 17025) will fall primarily to the WMO Members themselves.

² <http://www.wmo.int/pages/prog/www/wigos/documents.html>

d) Standardization, System Interoperability³ and Data Compatibility

14. 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.

15. 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).

16. 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.

e) The WIGOS Operational Information Resource (WIR)

17. 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.

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.

f) Data Discovery, Delivery and Archival

19. Within the WIGOS framework, the [WMO Information System \(WIS\)](#) provides exchange of data and interpretation metadata⁴, and management of related discovery metadata⁵. 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.

³ Interoperability is a property referring to the ability of diverse systems to work together (inter-operate)

⁴ Interpretation metadata is the information required to interpret the data

⁵ Discovery metadata is the information describing the data-sets, generally using ISO-19115 standard, and WMO core profile in case of WIS

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.

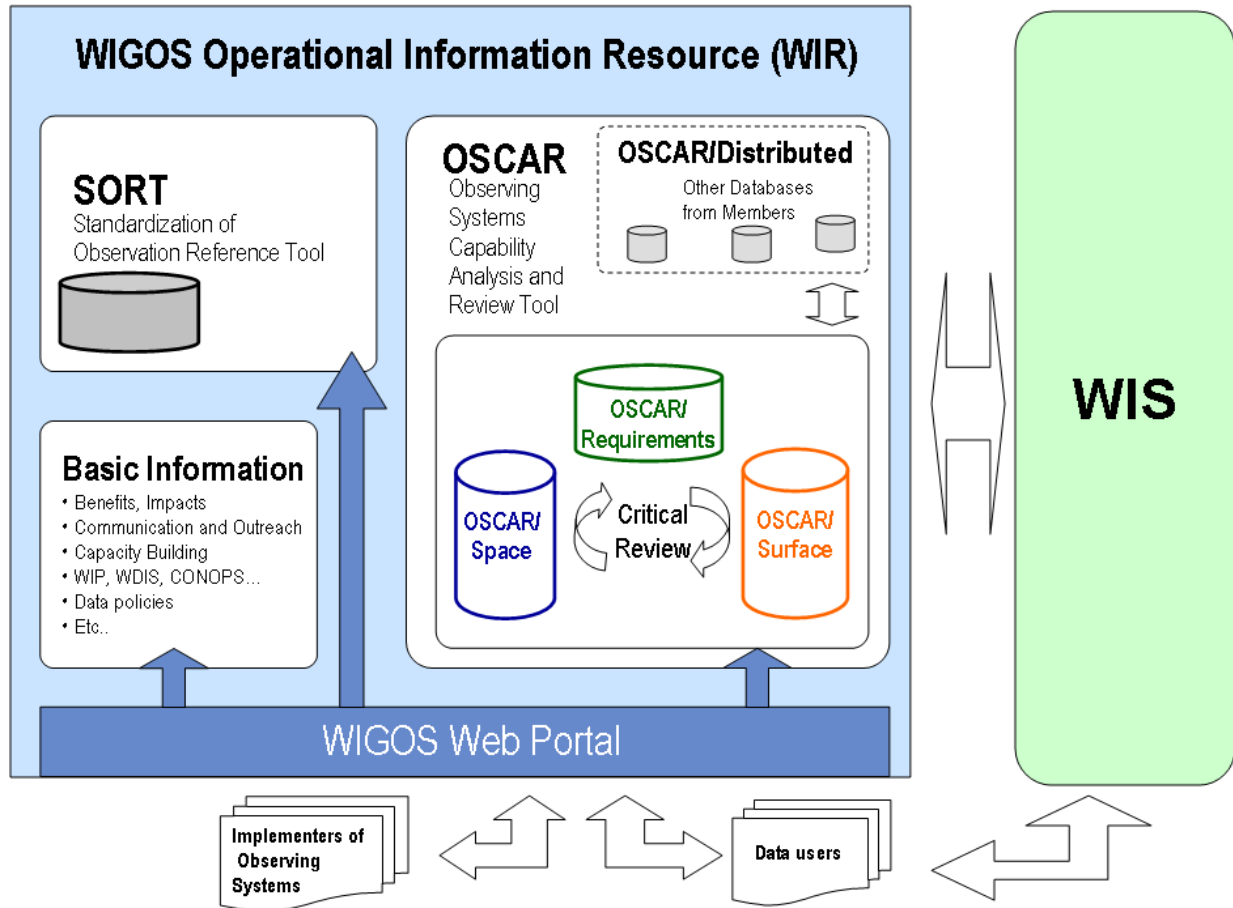


Figure 1: WIGOS Operational Information Resource (WIR) and its Key Support Tools

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).