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EXECUTIVE COUNCIL WORKING GROUP ON

THE WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS)
AND
THE WMO INFORMATION SYSTEM (WIS)

ITEM: 3.1

FIRST SESSION

GENEVA, 4– 7 DECEMBER 2007

**DEVELOPMENT OF AN OVER-ARCHING
WIGOS DEVELOPMENT AND IMPLEMENTATION PLAN**

Draft Detailed WIGOS Description

(Submitted by the Secretariat)

Summary and Purpose of Document

This document provides a more detailed description of WIGOS concept based on top-level definitions presented in Doc. 3.1(1) to this session.

ACTION PROPOSED

The Working Group is invited to consider the above information when elaborating a WIGOS Development and Implementation Plan.

APPENDIX: Draft Detailed WIGOS Description of the WMO Integrated Global Observing Systems (WIGOS).

References:

1. Cg-XV, PINK 7.4(3), Evolution of NMHSs and WMO, Towards Enhanced Integration between the WMO Observing Systems.
2. Res. 2/4 (EC-LIX) — Executive Council Working Group on the WMO Integrated Global Observing System (WIGOS) and the WMO Information System (WIS).
3. Towards Enhanced Integration between the WMO Observation Systems (Revised EC-TT/WIGOS Doc. 3, submitted by Jim Rasmussen 15 July 2007)

DISCUSSION

1. The preparation of a WMO Integrated Global Observing Systems (WIGOS) Development and Implementation Plan requires a description of WIGOS. Such a description should be articulated at a top level for Senior Managers with a more detailed description for all users. Based on the top level and detailed descriptions, a WIGOS Development and Implementation Plan can be prepared.

Annex to this document contains a Draft Detailed WIGOS Description.

***Draft Detailed WIGOS Description of the
WMO Integrated Global Observing Systems (WIGOS).***

Draft Executive Summary of WIGOS

The WMO Integrated Global Observing Systems (WIGOS) is a comprehensive, coordinated and sustainable system of observing systems. WIGOS is based on all WMO Programmes' observational requirements. It ensures availability of required information and facilitates access by the WMO Information System (WIS) according to identified timeliness requirements, including real and quasi-real time, of all required information. Additionally, it affords high data quality standards and benefits from archiving and technological innovations.

As a system of systems, WIGOS encompasses four broad objectives: to improve management and governance of component systems; to increase interoperability between the various systems with particular attention given to complementarity between the space-based and *in-situ* components; to address atmospheric, oceanic and terrestrial including hydrological domains; and to ensure that broader governance frameworks (e.g. inter-agency co-sponsorship of systems) and relationships with other international initiatives are respected, sustained and strengthened.

The components of WIGOS (surface and space-based) include: weather observing networks (e.g. WWW/GOS, AMDAR, ASAP etc); atmospheric composition observing networks (e.g. GAW); radiation observing networks (e.g. BSRN); marine meteorological networks and arrays (e.g. VOS, drifting and moored buoy arrays etc.); hydrological observing networks (e.g. observing components of WHYCOS etc.); and the climate components of various atmospheric, oceanographic and terrestrial observing systems contributing to GCOS.

As the single coordinated global information infrastructure, the WMO Information System (WIS):

- Will be used for the collection and sharing of information for all WMO and related international programmes;
- Will provide a flexible and extensible structure that will allow the participating centres to enhance their capabilities as their national and international responsibilities grow;
- Implementation will build upon the most successful components of existing WMO information systems in an evolutionary process;
- Development will pay special attention to a smooth and coordinated transition;
- Core communication network will be based on communication links used within the World Weather Watch (WWW) for the high priority real-time data;
- Will utilise international industry standards for protocols, hardware and software.

Detailed description of WIGOS

The Fifteenth WMO Congress (Cg-XV) decided to establish WIGOS through enhanced integration amongst all WMO observing systems. Cg-XV agreed that integration, in the context of WMO global observing systems, should be defined as establishment of a comprehensive, coordinated and sustainable system of observing systems, ensuring interoperability between its component systems, and aiming to:

1. Address in the most cost-effective way all of the WMO Programme requirements with a view to reducing the financial load on Members and maximizing administrative and operational efficiencies;

2. Ensure the availability of the required information produced within the various WMO observing systems (e.g. GOS, GAW, etc.), and the WMO components of co-sponsored systems (e.g. GCOS, GOOS etc.) with particular emphasis on information generated by satellite, radar, wind-profilers, aircraft systems, ARGO, and other new technology systems;
3. Facilitate the access, in real/quasi-real time, to observations required for WMO and WMO co-sponsored programmes and relevant international conventions, but which are generated by systems implemented and managed by cooperating agencies, organizations and programmes;
4. Ensure required data quality standards are met and sustained for all programme requirements;
5. Facilitate archiving and technological innovation.

Cg-XV also envisaged that the integration process should encompass four broad objectives:

1. Improving management and governance (use of resources, planning, institutional and programme structures, and monitoring);
2. Increasing interoperability between the various systems with particular attention given to the complementarity between the space-based and *in-situ* components of the systems;
3. Addressing the domains (atmospheric, oceanic and terrestrial including hydrological) as a comprehensive total system;
4. Ensuring that broader governance frameworks (e.g. inter-agency co-sponsorship of systems) and relationships with other international initiatives (e.g. GEO) are respected, sustained and strengthened.

WIGOS components (surface and space-based)

1. the Global Observing System (GOS) of the World Weather Watch;
2. the Global Atmosphere Watch (GAW) networks and systems for observations of atmospheric chemical composition and related environmental parameters;
3. the various radiation networks both observing solar and net radiation (e.g. the BSRN);
4. the marine meteorological observations from ships including the Voluntary Observing Ship (VOS) programmes and the Automatic Shipboard Aerological Programme (ASAP);
5. the moored and drifting buoy arrays developed as research arrays during GARP and WCRP related research projects, and which are now operational networks and arrays supporting weather and climate as well as oceanographic objectives;
6. the climate component of atmospheric, oceanographic and terrestrial observing systems contributing to GCOS observing requirements (e.g. ARGO floats, sea level observations etc.);
7. the Aircraft Meteorological Data Relay (AMDAR) systems initially developed and implemented as a GARP project and then expanded to an operational status including expansions of aircraft measurement capabilities for atmospheric composition constituents;
8. the regional, river basin and global hydrological networks;
9. space-based observing systems that are currently a major component of virtually all WMO observing programmes including the geostationary. Meteorological satellite constellation, the core polar-orbiting meteorological constellation, and the other components of the space-based observing system serving the needs of operational and research applications;

10. the observing component of the Cryosphere Watch recently approved by the fifteenth WMO Congress.

The concept of WIGOS is based on the premise that the general standards and recommended practices as laid down by WIGOS will apply to all WMO and sponsored observing systems and Programmes. WIGOS characteristics include:

- *All WIGOS observational data and metadata and processed observational products which will:*
 - be exchanged via WIS using agreed WIS data and metadata representation forms and formats;
 - use WIGOS compatible hardware and software
 - adhere to WIGOS standards for instruments and methods of observation and standard observing network practices and procedures;
 - be archived in WIGOS approved forms and resolutions at WMO agreed centers.

- *WIGOS will:*
 - Develop strategies to satisfy observational requirements from WMO Programmes through the WMO Rolling Requirements Review Process;
 - Develop strategies to guarantee the interoperability, including data quality, of observing systems and instruments used.
 - Evaluate current WIGOS capabilities before developing, acquiring, and or deploying new observing systems or sensors;
 - Exploit existing platforms and employ multi-sensor platform concepts to the maximum possible extent;
 - Coordinate requirements, plans and activities with all appropriate Technical Commissions, Regional Associations and Programmes;
 - Be built upon existing observing systems as a system of observing systems.

This list will be refined and clarified during the implementation of WIGOS.

Congress emphasized that working towards enhancing integration between the WMO global observing systems should proceed in parallel with the planning and implementation of the WMO Information System (WIS). The combination of both efforts would allow for an integrated WMO end-to-end system of systems designed to improve Members capability to effectively provide a widening range of services and to better serve research programme requirements. Congress noted that the parallel development would have an impact on the structure and functions of WMO, including aspects of:

- WMO Technical Regulations and relevant mandatory publications;
- data policy;
- the roles, terms of reference, and working arrangements of the technical commissions;
- the WMO programme structure; and
- the WMO Secretariat.

It must be emphasized that the observing programmes of WMO are actually carried out by the WMO Member States themselves either individually, or in some instances (notably for some satellite systems) cooperatively with consortia of countries operating a system jointly. Integration therefore has direct relationship to national programmes and activities as well as on the coordination through the international organization.

Benefits derived through integration

Cg-XV noted that benefits of the integration to the Organization and to Members themselves would fall into four categories:

- Improved services;
- Increased quality and access to observations;
- More efficient use of resources; and
- Better preparedness to incorporate new observing systems and to interface with non-WMO systems.

Cg-XV also identified challenges associated with embarking upon enhancing the integration between the WMO observing systems, which include:

- The cross cutting nature of the overall project will require unprecedented cooperation and coordination efforts by all concerned;
- Time will be a critical risk factor. The development of a detailed, comprehensive Implementation Plan and the elaboration of meaningful Pilot Projects need to be addressed early in the period; and
- Effective and constructive coordination and collaboration with co-sponsoring and cooperating Organizations is a sensitive issue that must be carefully undertaken to avoid misunderstandings.

Purpose and Goals of the Integration

The strategic purpose for WIGOS is to create an organizational, programmatic, procedural and governance structure that will significantly minimize the complexity of the present arrangements and which will provide a single focus for the operational and management functions of all WMO observing systems. The integration will lead to efficiencies and cost savings that can be reinvested to overcome known deficiencies and gaps in the present structure and working arrangements.

Integration will provide an architecture and governance structure, and a process for developing, implementing and sustaining it. Standardization and interoperability, including data compatibility, will be primary factors to enable integration. WIGOS will meet several sub-goals as follows:

- Improve the production, use and application of data and information from across all WMO systems and sources, in a seamless way, to satisfy user requirements;
- Be designed to accommodate the diversity among Members with respect to their capabilities and needs and strengthen the ability of all Members to access and utilize, observations and analysis products from all WMO systems;

- Ensure compatibility, connectivity and interoperability including interface arrangements within and among all WMO system components and externally with GEOSS and other users;
 - Allow for the continuous review of the requirements placed on the integrated system and have the capability to effectively adjust and respond to changing requirements;
 - Ensure the continuing sense of ownership by the various groups that have initiated and developed the individual observing system components through directly involving these groups in the planning and implementation of the WIGOS;
 - Promote the development, testing and comparison of new observing capabilities and provide mechanisms to easily integrate them into the WMO operational system;
 - Ensure the optimum integration of the surface based and space based components of all observing programmes;
 - Ensure the optimum integration of the surface based in-situ and the surface based remote sensing observing system components;
 - Increase efficiencies by reducing as far as possible redundancies and overlaps of systems and the management activities supporting them;
 - Facilitate more rapid and efficient assimilation of technological advances and apply them as far as possible across all observing programmes;
 - Foster co-location of observing sites of complementary systems as far as practical thereby reducing redundancies; and
 - Ensure the involvement of the various scientific and user communities in the activities of setting requirements, and monitoring and assessing system performance.
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