ANNEX TO RESOLUTION 4.4/1 (EC-64)

WIGOS IMPLEMENTATION PLAN

WORLD METEOROLOGICAL ORGANIZATION

WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS)

WIGOS framework IMPLEMENTATION PLAN

(WIP)

Version 1.0

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WIGOS FRAMEWORK IMPLEMENTATION PLAN

1. INTRODUCTION AND BACKGROUND

1.1 Purpose of WIGOS and Scope of the WIGOS framework Implementation Plan (WIP)

The WMO Integrated Global Observing System (WIGOS) provides a new framework for WMO observing systems and 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 which 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.

This plan for the implementation of WIGOS (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. Yet WIGOS will continue to evolve and improve beyond 2015 through the governance and management mechanisms established by the execution of this plan.

The WIP also addresses a number of additional activities that would substantially improve the operational capabilities of WIGOS beyond the 2012-2015 implementation; however these activities are dependent on resources in addition to the regular budget. If these activities are not completed, WIGOS can still be considered operational. The resulting system will, however, be less effective in achieving its goals and benefits to Members will be reduced or delayed.

This plan is laid out in several chapters that identify and describe the various activity areas to be addressed. Specific activities for each area are included in Table 2 (see Section 4), which identifies deliverables, timelines, responsibilities, costs and risks, and applicability to global, regional or national levels of implementation. Similar activities are grouped under the title corresponding to the respective sub-section of Section 2.

Following the Congress and Executive Council guidance WIGOS has produced and published a number of valuable documents detailing the concept, architecture, vision and brochure for WIGOS. These were used to great benefit by the WIGOS Pilot and Demonstration Projects and can be accessed from the following link:

http://www.wmo.int/pages/prog/www/wigos/principal_documents.html

1.2 WIGOS Vision and Congress Guidance for WIGOS Implementation

The Sixteenth World Meteorological Congress decided that the enhanced integration of the WMO observing systems should be pursued as a strategic objective of WMO and identified this as a major expected result of the WMO Strategic Plan[1].

Congress agreed with the WIGOS vision that calls for an integrated, coordinated and comprehensive observing system to satisfy, in a cost-effective and sustained manner, the evolving observing requirements of Members in delivering their weather, climate, water and related environmental services. WIGOS will enhance the coordination of WMO observing systems with those of partner organizations for the benefit of society. Furthermore, WIGOS will provide a framework for enabling the integration and optimized evolution of WMO observing systems, and of

[1] see http://www.wmo.int/pages/about/documents/1069_en.pdf

WMO's contribution to co-sponsored systems. Together with the WMO Information System (WIS), this will allow continuous and reliable access to an expanded set of environmental data and products, and associated metadata, resulting in increased knowledge and enhanced services across all WMO Programmes.

Congress further decided that the WIGOS implementation be undertaken in an active and prudent manner in the sixteenth financial period and ***will focus on a framework for improved governance, management, integration and optimization of the multiple observing systems coordinated by WMO***, so as to achieve a smooth transition, and no effort should be spared to make WIGOS operational by 2016.

Congress emphasized that the implementation of WIGOS should build upon and add value to the existing WMO observing systems with emphasis on integration of surface- and space-based observations in an evolutionary process to satisfy requirements of WMO and WMO co-sponsored Programmes. Congress noted that, since all WMO Programmes would benefit, each should actively participate and contribute its own expertise and resources in implementing WIGOS.

Congress agreed that in implementing WIGOS, it is imperative that ***the current management, governance and support activities be reviewed and aligned with WMO priorities***. This alignment would promote cooperation and coordination at the technical, operational and administrative levels.

Congress reaffirmed the importance of integrated satellite systems as a unique source of observational data for monitoring of weather, climate and the environment. It stressed the importance of further advancing instrument intercalibration, data exchange, data management standardization, user information and training, in order to take full advantage of space-based capabilities in the context of the WMO Integrated Global Observing Systems (WIGOS).

Congress underlined that WIGOS will be essential for the Global Framework for Climate Services (GFCS), aviation meteorological services, disaster risk reduction, and capacity development as WMO priorities. It will also ensure a coordinated WMO contribution to the co-sponsored GCOS, GOOS, GTOS, and to the Global Earth Observation System of Systems (GEOSS).

2. KEY ACTIVITY AREAS FOR WIGOS IMPLEMENTATION

To migrate the existing observing systems (the Global Observing System (GOS), the Global Atmosphere Watch (GAW), the WMO Hydrological Cycle Observing System (WHYCOS) and the Global Cryosphere Watch (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[2], focused effort is required in the following key areas, detailed in the sub-chapters to follow:

(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;

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[2] The WIGOS Functional Architecture document provides a description of the integrated single system that is WIGOS and which represents the goal of this Implementation Plan. That document is in early draft form at the time of this version of WIGOS-IP (version 1).

(g) The WIGOS Operational Information Resource;

(h) Data and metadata management, delivery and archival;

(i) Capacity development;

(j) Communication and outreach.

2.1 Management of WIGOS Implementation

WIGOS implementation is an integrating activity for all WMO and co-sponsored observing systems: it supports all WMO Programmes and activities. The Executive Council and regional associations, through their respective working bodies, have a governing role in the implementation of WIGOS. WMO Congress (Cg-XVI) has decided that the technical aspects of WIGOS implementation will be guided by the technical commissions, with leadership provided through CBS and CIMO. Within the WMO Secretariat, WIGOS implementation will be supported by the WIGOS Project Office.

Executive Council

The WMO Executive Council will continue to monitor, guide, evaluate and support the implementation of WIGOS. Following the guidance by Cg-XVI, EC-LXIII established the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) with a view to providing technical guidance and assistance for the planning, implementation and further development of the WIGOS components. Progress on implementation of WIGOS will be reported to subsequent sessions of EC. The Council designated the president of CBS as chairperson of ICG-WIGOS.

Technical Commissions

Given the need for significant and active cooperation and enhanced coordination among the technical commissions, in particular those with responsibility for the WIGOS observing system components, the ICG-WIGOS will ensure that technical aspects of WIGOS implementation are incorporated in the work programmes and implementation plans of all those WMO Technical Commissions concerned.

Regional Associations

Regional associations will play an essential role in WIGOS implementation. Regional associations, through their WIGOS regional working bodies (working groups, or task teams), will coordinate planning and implementation of WIGOS on the regional level taking into account all WMO future priorities, such as GFCS and DRR. The regional working bodies, under guidance from ICG-WIGOS, will be responsible for:

(a) The development of regional WIGOS Implementation Plans;

(b) The integration of WIGOS regional network components; and

(c) The evolution of their regional networks according to the implementation plan for the evolution of global observing systems (EGOS-IP)[3].

Regional WIGOS implementation plans will also address regional aspects of requirements, standardization, observing system interoperability, data compatibility, data management, Quality Management System (QMS) procedures including performance monitoring and data quality monitoring, and proposed improvements in observing networks/systems. An important role of RAs will be to assess and continuously monitor regional requirements, identify regional gaps and identify capacity development projects to address those gaps.

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[3] http://www.wmo.int/pages/prog/www/OSY/gos-vision.html#egos-ip.

WMO Members

Members will plan, implement, operate and maintain national networks and observing programmes based on the standards and best practices stated in the WMO Technical Regulations and its WIGOS Manual. They will be encouraged to adopt a composite network approach to their networks and to include the acquisition, and onward transmission, of data from external sources, including NMHSs and other government agencies, the commercial sector and members of the public. A particular area of focus for WMO Members under WIGOS will be increased attention to site protection and radio frequency spectrum protection.

Plans should also be developed to strengthen cooperation through partnership with different owners overseeing the WIGOS observing components. Specifically, these activities aim to enhance cooperation amongst meteorological, hydrological, marine/oceanographic and academic/ research institutions/services where they are separated at the national level.

WMO Secretariat

The overall coordination and support to WIGOS implementation will be performed by the WIGOS Project Office under the guidance of the WMO constituent bodies and a Project Oversight Board on WIGOS (POB/WIGOS) which is responsible for the coordination mechanism within the Secretariat. The WIGOS Project Office will also be in regular contact with the relevant partner organizations in relation to the implementation of WIGOS.

2.2 Collaboration with WMO and co-sponsored observing systems

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 WHYCOS, plus all WMO contributions to GCOS, GOOS and GTOS. It should be noted that in contrast to the primarily NMHS owned observing systems upon which the WWW was built, the proposed WIGOS component observing systems are owned and operated by a diverse array of organizations, both research and operational. Therefore, the interaction between these various communities is important for the implementation of WIGOS. In particular, strengthening the interaction between research and operational observing communities is important for sustaining and evolving observing systems and practices, in line with new science and technology outcomes.

Partner Organizations

Improved coordination and cooperation will need to be supported by a high-level reconciliation mechanism to be defined in the WMO-UNESCO/IOC-UNEP-FAO-ICSU MoU, in order to resolve possible problems in data policy, product delivery and other governance issues. These interagency and inter-observing system coordination mechanisms will need to be complemented and supported through similar cooperation and coordination arrangements among NMHSs and through national implementation mechanisms for GFCS, GCOS, GOOS, GTOS, and GEOSS.

Congress agreed that the Architecture for Climate Monitoring from Space should be defined as an end-to-end system, involving the different stakeholders including operational satellite operators and R&D space agencies, the Coordination Group for Meteorological Satellites (CGMS), the Committee on Earth Observation Satellites (CEOS), the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP) and the Group on Earth Observations (GEO). Within the WMO context, the Architecture shall be part of the space-based component of WIGOS. Therefore, particular emphasis will be placed on their coordinated contribution to WIGOS, building on existing coordination mechanisms stated above.

2.3 Design, Planning and Optimized Evolution of WIGOS component observing systems

The WMO has agreed on the Vision for the Global Observing Systems in 2025[4] which provides high-level goals to guide the evolution of the global observing systems during the coming decades. To complement and respond to this Vision, an Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) will be submitted to CBS-15 for approval. This EGOS-IP will focus on the long term evolution of WIGOS observing systems components, while the WIGOS IP will focus on the integration of these observing system components. Beyond 2015 these plans will provide Members with clear and focused guidelines, specifying actions that stimulate the cost-effective evolution of the observing systems to address in an integrated way the requirements of all WMO Programmes and relevant parts of co-sponsored programmes.

Concerning the surface-based sub-system of WIGOS, the current composition of mainly separate networks of observing stations comprises numerous different types of sites, for example:

(a) Surface synoptic stations (Land and Sea stations);

(b) Upper-air synoptic stations;

(c) Aircraft meteorological stations;

(d) Aeronautical meteorological stations;

(e) Research and special-purpose vessel stations;

(f) Climatological stations;

(g) GCOS Surface Network (GSN);

(h) GCOS Upper-Air Network (GUAN);

(i) Agricultural meteorological stations;

(j) Hydrological stations; and

(k) Special stations, that include:

(l) Weather radar stations;

(m) Radiation stations;

(n) Wind profiler stations;

(o) Atmospherics detection stations (lightning detection network stations);

(p) Micrometeorological flux stations;

(q) Plant phenology observation stations;

(r) Meteorological rocket stations;

(s) Global Atmosphere Watch (GAW) stations;

(t) Global Cryosphere Watch stations;

(u) Planetary boundary-layer stations;

(v) Data buoys (drifting and moored) and ocean surface gliders;

(w) Ocean profiling floats and sub-surface gliders;

(x) Ship-based observations (surface marine, oceanographic, and upper-air);

(y) Tide-gauge stations; and

(z) Tsunami monitoring stations.

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[4] Available from the WMO Website at: http://www.wmo.int/pages/prog/www/OSY/gos-vision.html

With the implementation of WIGOS, these separate networks will continue to evolve but will also be given a more prominent collective identity as the WIGOS surface-based sub-system and for some purposes may be considered as a single composite system of observing (fixed or mobile) sites/platforms. Regional associations will adopt a broader role in coordinating the implementation of relevant elements of the WIGOS surface-based sub-system, evolving from the previous concepts of the synoptic and climatological networks.

Similarly, the space-based sub-system of WIGOS is composed of many different platforms and types of satellites. There is already partial integration due to the existence of a globally coordinated plan, which is maintained by WMO and CGMS, and which takes into account the needs of a number of application areas. However, it should be further developed and expanded to better support certain application areas that, at present, are not benefiting from the full potential of space-based observations, for example, other components of GAW and WHYCOS and new initiatives like GFCS and GCW. In addition, further integration shall be pursued in terms of inter-calibration, data and product harmonization, and composite product delivery. Regional associations will adopt an active role for compiling the views of Members and maintaining documented requirements and priorities for data and products to be available from the WIGOS space-based sub-system.

Rolling Review of Requirements (RRR)[5]

Coordinated strategic planning at all levels will be based on the RRR process, and will be supported by the WIGOS regulatory material.

The RRR process involves regularly reviewing the observational data requirements[6] for each of the defined WMO Application Areas and all required variables (see Table 1). The RRR process also involves reviewing the capabilities of WMO observing systems and co-sponsored systems, and the details of the networks/platforms in existence[7], for both space-based and surface-based systems, in delivering data on different variables. The comprehensive information collected for the globe on both requirements and capabilities is quantitatively recorded in the WMO RRR Database, which is currently accessible from the WMO Website[8] and will ultimately be accessible via the WIGOS Portal. The information on surface-based networks and instrumentation details is currently recorded in Volume A, but will ultimately be available, with additional metadata, in the WIGOS Operational Database, a component of the WIGOS RRR database (see also Section 2.7), and to be accessible via the WIGOS Portal. Space-based capabilities are also recorded in the RRR database. When these databases are made available, gap analyses can be performed to identify weaknesses in existing observing programmes.

The above steps represent the analysis phase of the RRR, which is as objective as possible. Next is the prioritization and planning phase of the RRR in which experts from the various application areas interpret the gaps identified, draw conclusions, identify key issues and priorities for action. This input is composed as Statements of Guidance (SoG) from each application area. The technical commissions respond to the SoG by formulating new global observing system requirements and the regulatory and guidance publications to assist Members in addressing the new requirements. Additionally, CBS and other technical commissions draw on the SoGs to develop a Vision and an Implementation Plan for further developments of WIGOS.

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[5] Currently specified in the *Manual on the Global Observing System* (WMO-No. 544), elaborated in the *Guide to the Global Observing System* (WMO-No. 488), and described further on the WMO Website at http://www.wmo.int/pages/prog/www/OSY/GOS-RRR.html

[6] The RRR describes data requirements, which are expressed in terms of space/time resolution, uncertainty, timeliness, etc., for each of the required observed variables, and are measures independent of observing technology.

[7] Capabilities are derived from the individual platforms characteristics submitted by Members to WMO e.g. through WMO No. 9, Volume A, or its evolution

[8] Requirements: http://www.wmo.int/pages/prog/www/OSY/RRR-DB.html: Space-based capabilities: http://www.wmo.int/pages/prog/sat/gos-dossier_en.php; the surface-based capabilities database is currently under development

Table 1: The 12 recognized WMO Application Areas

No	Application Area	No	Application Area
1	Global NWP	7	Ocean Applications
2	High Resolution NWP	8	Agricultural Meteorology
3	Nowcasting & Very Short-range Forecasting	9	Hydrology[9]
4	Seasonal to Inter-annual	10	Climate Monitoring
5	Aeronautical Meteorology	11	Climate Applications
6	Atmospheric Chemistry	12	Space Weather

At the Regional Level

The primary coordination of the RRR will lie with CBS for overall WIGOS planning. Regional associations, through their respective WIGOS regional working bodies, will follow the technical guidance of the technical commissions as represented in the EGOS-IP and other observation system implementation plans in order to evolve and implement observing systems in the various Regions.

Regional associations will also be encouraged to examine, and report back to CBS, the global requirements for data, taking into account the particular requirements of the Region and international river basin authorities. This process will involve, in essence, the use of the global data to prepare regional data requirements, then use this for planning of observing system components at the regional scale and then encourage Members within the Region to implement these components, subject to further review at the national or sub-regional level, where appropriate.

The regional associations will also coordinate and identify issues regarding the data and product utilization needs of Members especially in regard to the application of actions and guidance from EGOS-IP and this Plan to inform and influence global level implementation and activities including the RRR.

At the National or Sub-Regional Level

WMO Members will contribute to the collective regional effort to evolve and implement observing systems following the EGOS-IP and other observation system implementation plans.

WMO Members will also have available the global and regional data requirements information available to use as guidance for the preparation of national requirements information which can then be used to carry out the detailed planning for evolution of national observing components of WIGOS.

In some cases, where countries are small and geographically close or already have established multilateral working relationships, there may be more merit in taking a sub-regional, as opposed to national, approach to WIGOS observing infrastructure planning. In this case, it will be necessary for the Members concerned to work in close cooperation to prepare sub-regional reviews of requirements to be used as a basis for detailed planning at that scale.

[9] Hydrological information only; water quality monitoring and information is currently excluded.

2.4 Integrated Observing System Operation and Maintenance

Observing system owners or custodians are responsible for operating and maintaining their systems and for complying with the regulations of the WMO and co-sponsored observing systems to which they contribute. System owners are generally NMHSs or other organizations within WMO Member countries but are sometimes other entities.

WIGOS involves, between observing systems, a process for sharing of operational experiences, 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) Spectrum management: greater influence nationally which feeds into ITU;

(c) Calibration and Traceability: Potential for efficiencies and improvements to observational data quality through combining efforts at a national, regional and global level;

(d) Procurement: considerable effort is often required to conduct procurement processes for observing systems. Where requirements allow, a joint procurement exercise can realize significant efficiencies;

(e) Protection of weather radar from wind turbine interference: shared risk and greater influence with planning objections;

(f) Many synergies are achieved by satellite operators through CGMS and the WMO Space Programme by harnessing the joint efforts of satellite operators, and these best practices will be expanded further to new WMO initiatives like GFCS.

It should also be noted that WMO Members need to increase their efforts to maintain metadata and provide it to WMO so that WIGOS support tools are effective.

2.5 Integrated Quality Management

Congress recognized that meeting the quality requirements and expectations of users will be critical to the success of WIGOS. This would require an in-depth examination of current practices used by WMO observing programmes, specific mission-related requirements that were already in place, and available technological opportunities. The WIGOS implementation strategy would specify all processes of the Quality Management System (QMS) for WIGOS observing components including guidance on effective management of such a component.

The WIGOS Quality Management approach is to apply the WMO QMF to the WIGOS observing components (see Technical Regulation 49, Part 4). WIGOS quality management will strive for compliance of all components of WIGOS with international standards, such as ISO 9001/9004 and the ISO 17025 standard where appropriate (i.e. with respect to instrument calibration and traceability of data). Compliance with international standards should be pursued in all quality assurance (QA) procedures applied by Members to all their national WIGOS observing components. In addition to the WMO QMF document, further guidance to Members will be provided by WMO via the standards and best practices described in the Regulatory Materials, such as the WIGOS Manual and Guide. Such guidance, for both mandatory and desirable practices, can be referred to 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).

One component of WIGOS worthy of particular mention in the context of quality management is the space-based component. CGMS, in coordination and collaboration with WMO, supports the development of quality assurance standards and formats for satellite observations, multi-satellite and multi-sensor algorithms for estimating retrieved data and products, and advanced atmospheric sounding derivation packages for use by WMO Members. This is a well-established and effective process and it is expected it will continue to address WMO's new requirements and to make significant contributions. To assist this effort, WIGOS will also ensure that surface-based sites that are needed for calibration/validation of satellite data are specified.

A key aspect of 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.

In summary, 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 management principles (such as ISO 9001, 9004, 17025) will fall primarily to the WMO Members themselves.

2.6 Standardization, System Interoperability[10] and Data Compatibility

Congress recognized the important role of WIS in WIGOS implementation, in relation to data exchange and discovery, and the provision of effective standards and practices for data management. Congress stressed ***the importance of coordination between WIGOS and WIS implementation activities***.

Congress also stressed that 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.***

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).

The interoperability (including data compatibility) of WIGOS observing components 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.

All standard practices will be documented in the WMO Technical Regulations through the WIGOS Manual and other relevant Manuals. Recommended practices will be documented in the Guides

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

and other technical documentation under the responsibility of the respective technical commissions.

2.7 The WIGOS Information Resource

The WIGOS Information Resource, accessible via a centralized point (web portal), will provide 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 standards 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, and assist Members and regional associations for conducting observing network design studies as appropriate. 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 observational 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 standards will support the production of more homogeneous data-sets and make the observations traceable and of known quality.

The WIGOS Information Resource 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.

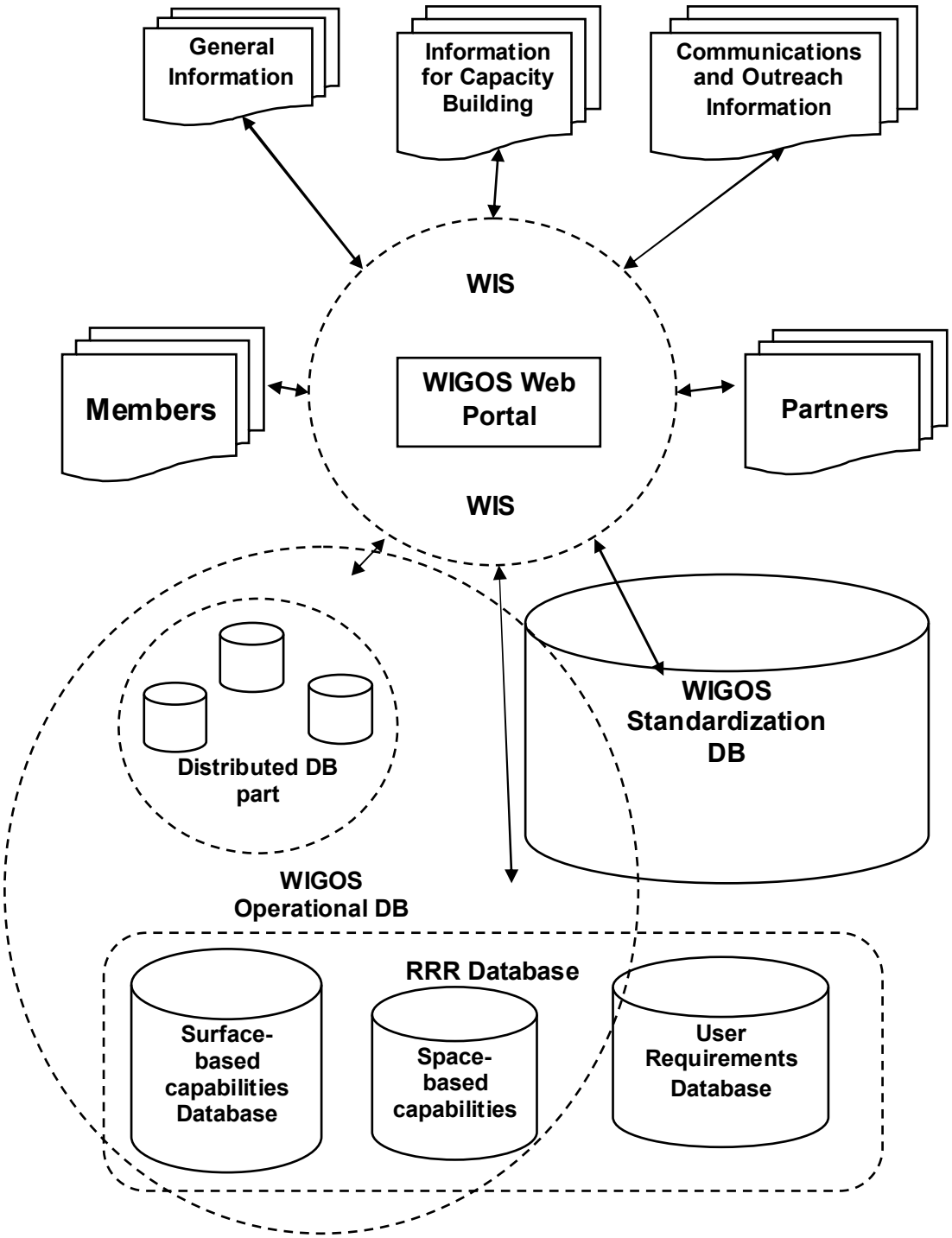

Figure 1: WIGOS Information Resource and its Key Support Tools

The key support tools of WIGOS are:

(a) **A central web portal** (WIGOS Portal) providing access to all the other support tools;

(b) **The WIGOS Standardization Database**, which provides user-friendly direct access to on-line search tools for all WMO standards, guidelines, best practices, procedures, etc., addressing all aspects of observations (instruments, methods of observation, metadata format, coding, data formats, etc.). This database enables the network managers and operators to easily access the information they need to set-up and run their systems and to

help the data users to understand the standards used in generating specific observations needed for their applications;

(c) **The Rolling Review of Requirements (RRR) Database**, which is used to support gap analysis, network evaluation, redesign and optimization. It contains the following parts to permit conducting the critical review by comparing the user requirements with the observing systems capabilities:

(i) Observational user requirements for the 12 WMO Application Areas (see Table 1) (for each variable, the requirements are expressed in terms of threshold, breakthrough, and goal for each of the space/time resolution, uncertainty, timeliness, criteria);

(ii) Space-based observing capabilities;

(iii) Surface-based observing capabilities.

(d) **The Operational Database**, which describes all WIGOS observing components and provides end users with relevant metadata. It is divided in two parts:

(i) A centralized version with limited and standardized metadata consisting of two parts: (1) space-based capabilities; and (2) an expanded version of WMO No. 9, Volume A, *Observing Stations* with limited site/platform metadata, as well as capabilities. These two databases are those used to represent capabilities as an input to the RRR process; supplemented by,

(ii) A distributed version connected to the centralized version, whereby Members make detailed metadata about the sites/observing platforms they operate available through national websites (or web services); access (e.g. web service) to the information of individual platforms is standardized internationally, but the information returned is not standardized (or it is only a national standard). Supplementary information on space-based observing systems can also be provided through distributed databases by the Space Agencies and Members as appropriate.

Network owners and data custodians, in the case of 'external' data sources, are responsible for providing detailed and correct metadata related to all parts of their observing systems and networks. Generally, the WIGOS operational database includes the following:

(a) Basic observing component characteristics (governance, management, observing programme, standard compliance information, data policy, planning, etc.);

(b) Basic site/platform characteristics (name, number/identifier, geographical coordinates, observing programme, etc.);

(c) Basic instrument characteristics (siting, exposure, sensor type, principle of operation, instrument performance); data-processing, handling, transmission, quality assurance information, etc.).

The operational database is also supported by WMO and Partner's catalogues on observing programmes, related statistics and standards.

2.8 Data Discovery, Delivery and Archival

Within the WIGOS framework, the WMO Information System (WIS[11]) provides exchange of data and interpretation metadata[12], and management of related discovery metadata[13]. These discovery metadata play an important role in the discovery, access and retrieval of WIGOS observations and products.

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[11] http://www.wmo.int/wis
[12] Interpretation metadata is the information required to interpret the data
[13] Discovery metadata is the information describing the data-sets, generally using ISO-19115 standard, and WMO core profile in case of WIS

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.

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.

2.9 Capacity Development

A coordinated capacity-development effort at global, regional and national levels is of paramount importance to the developing countries. This is especially the case for NMHSs of Least Developed Countries (LDCs) and Small Island Developing States (SIDSs), to enable them to develop, improve and sustain national WIGOS observing components. This needs to be complemented by capacity development efforts outside of WIGOS but in closely related areas to improve access to and effective utilization of observations, data and products, and related technologies. The WIGOS capacity development activities at national and regional levels are focused on:

(a) Providing assistance to Members to introduce or improve institutional mandates and policies that enable effective implementation, operation and management of observing systems;

(b) Filling the existing gaps in the design, operation and maintenance of WIGOS observing systems, including both the infrastructure and human capacities development;

(c) Technological innovation, technology transfer, technical assistance and decision-support tools.

Capacity development in satellite applications for developing countries, LDCs and SIDSs are also addressed in the Implementation Plan for the Evolution of the GOS (see WMO/TD-No. 1267). The virtual lab (VL) will continue to grow and help all WMO Members realize the benefits of satellite data.

2.10 Communication and Outreach

WIGOS will establish its communication and outreach strategy through the efforts of WMO Members, Programmes, Regional Associations (RAs) and Technical Commissions (TCs), and co-sponsors. The strategy will start by describing its purpose, the target audiences and the key messages to convey to those audiences.

The strategy will provide details on WIGOS benefits, increased effectiveness, and efficiency, and impact on the WMO Members activities, as well as on the socio-economical benefits of WIGOS data. It will take advantage of outreach programmes developed and effectively deployed so far by WMO and its partner organizations. A suggested list of outreach materials identified to support WIGOS is shown in Annex I.

The WIGOS Portal will provide convenient access to relevant information on communication, outreach and capacity development, aimed at complementing, not duplicating, others' efforts. A variety of outreach materials will be developed to educate the Members, funding agencies, policy-makers and the general public, on the importance of WIGOS to society. Materials include posters and other educational material for elementary and high school classes, a WIGOS brochure, a semi-annual or annual, newsletter, an online photo and video library, and information on the current state of the observing systems.

3. PROJECT MANAGEMENT

3.1 Project Framework

The WIGOS project framework consists of two parts:

(a) The organizational framework set up by the WMO Executive Council in order to monitor, guide and support the implementation of WIGOS in accordance with Congress decisions. EC-LXIII established ICG-WIGOS with a view of providing technical guidance and assistance for the planning, implementation and further development of WIGOS and designated the president of CBS as chairperson of ICG-WIGOS; and

(b) The administrative structure within the WMO Secretariat. The WMO Secretariat, through the Project Oversight Board on WIGOS (POB/WIGOS), with WIGOS-relevant programmes and departments (OBS, RES, CLW and DRA) provides integrated support to ICG-WIGOS, its Task Teams and other relevant working bodies.

Further, Cg-XVI, through Resolution 50, requested the Secretary-General to establish a WIGOS Project Office. The staff of the Project Office, duties and staff cost are presented in Chapter 5 below.

3.2 Project monitoring, review and reporting mechanism

(a) The Executive Council will monitor, review, guide and support the overall implementation of WIGOS;

(b) The ICG-WIGOS will report to subsequent sessions of the Executive Council on the progress in implementation of WIGOS;

(c) The WIGOS Project Office, under the institutional guidance of the WMO constituent bodies and through the secretariat internal coordination and oversight mechanism, will be responsible during the implementation phase for reporting to all WMO constituent bodies and Members on a regular basis, to present and document the progress in the WIGOS implementation as well as for the purpose of their close and active involvement.

3.3 Project Evaluation

The evaluation methodology will be designed against WIGOS implementation activity tables, i.e. with respect to the activities, deliverables, timeline, responsibility and budget allocations. This will include a schedule of monitoring and evaluation activities and related responsibilities. Mid-term evaluation, interim progress reports and post-implementation reviews are planned as a means of providing early feedback on progress towards success, and as a means of meeting accountability and transparency requirements for the whole implementation phase. RAs, TCs and NMHSs will provide progress reports at the request of the Project Office.

4. IMPLEMENTATION

4.1 Activities, Deliverables, Milestones, Costs and Risks

In its discussions of WIGOS at Cg-XVI (agenda item 11.3), Congress recognized the progress being made with WIGOS and decided that WIGOS implementation be undertaken with the establishment of a WIGOS Project Office and the delivery of an implementation plan by the end of 2012, with the goal of WIGOS becoming operational by 2016. Table 2 presents the key implementation activities that are required for WIGOS implementation within the timeframe 2012-2015. The table is arranged to correspond to the activity areas presented in Section 2. In the table each implementation activity is presented along with its associated deliverables, timelines, responsibilities, costs and associated risk.

For each activity in Table 2, a detailed activity plan will be developed by the responsible entity or entities, with support of the Project Office and guidance from ICG-WIGOS. The Project Office has responsibility for tracking execution of these activities and this plan itself.

Table 2 WIGOS Implementation Activities

Activities in bold are considered the most critical for WIGOS to gain operational acceptance by 2015.
Depending on the implementation scale, planned activities are specified as follows: **G** = Global activity, **R** = Regional activity and **N** = National activity.
Key to activity numbers: **a.b.c**, where **a** is number of respective sub-section of section 2, **b** is for a global (1), regional (2) or national (3) activity, and **c** is a sequential number to distinguish activities from one another. ARB = Available Regular Budget. RB = Regular Budget.

No	Activity	Deliverables	Timeline	Responsibility	Estimated Costs (2012-2015) K CHF			*Potential Risks*
					Total	*ARB*	Shortfall	
1. Management of WIGOS Implementation								
1.1.1 G	**Develop/Revise/Update WMO Regulatory Material (Technical Regulations, WIGOS Manual). Develop WIGOS Guide. Develop WIGOS Functional Architecture (FA)**	**Updated WMO Technical Regulation No. 49 WIGOS Manual for Cg-17 approval WIGOS Guide and Functional Architecture**	**Cg-17 (2015)**	**ICG-WIGOS**	**400K**	**245K**	**155K**	**Coordination, communities' interest**
1.1.2 G	**Incorporate technical aspects of WIGOS Implementation and continuing evolution into existing/new TCs and RAs working structures and procedures**	**1) RA &TC working structure adjusted to address WIGOS activities. 2)Cross body coordination mechanisms in place**	**2012-2014**	**CBS, CIMO CAS, CHy, CAgM JCOMM,CCI RAs ICG-WIGOS**	**RB from relevant departments**			**Low**
1.1.3 **G**	Provide annual reports and recommendations to EC and Cg on progress in WIGOS implementation	Annual reports to EC, Cg on WIGOS implementation status	EC-65, EC-66, Cg-17	ICG-WIGOS	**RB from relevant departments**			Low
1.2.1 **R**	**Develop regional WIGOS Implementation Plans**	**Regional WIGOS Implementation Plans**	**2012/13**	**RAs**	**RB from relevant departments**			**Low**
2. Collaboration with WMO and co-sponsored observing systems[1]								

[1] Congress emphasized that strong support and close collaboration among Members were needed to advance scientific knowledge and technical infrastructure to meet the WIGOS requirements. Within the Regions, it would be desirable to strengthen cooperation and partnership through Region-wide organizations or sub-regional groupings overseeing the

2.1.1 G	**Develop guidance, mechanisms and procedures for engagement coordination and collaboration with partner organizations**	**1) Partner Strategy is published & available on the Portal 2) Appropriate bodies have responsibilities in their TORS**	**1) 2014 2) 2014**	**ICG-WIGOS Partners**	**RB from relevant departments**			**Med**
2.1.2 G	**Develop the Architecture for Climate Monitoring from Space (ACMS) focusing on GFCS four priorities**	**1) ACMS design docs 2) Initial implementation**	**1) 2013 2) 2015**	**CGMS, CEOS WSP, CBS**	**RB from relevant departments**			**Low**
2.2.1 **R**	Examine and recommend areas where closer regional cooperation and coordination would be beneficial	Recommendations to be included in regional WIPs	2013-2015	RAs	**RB from relevant departments**			Low
2.3.1 **N**	Establish closer collaboration at the national level, within NMHS, with other government agencies, and with potential external data providers	Reports from Members (individually or through RAs) to CBS and CIMO	2012, 2014	Members, RAs	**RB from relevant departments**			Medium
3. Design, planning and optimized evolution of WIGOS and its regional, sub-regional and national observing components								
3.1.1 G	**Complete RRR practices, procedures, responsibilities and mechanisms for all systems and agreed application areas**	**1) RRR included in the Manual 2) Responsible bodies have RRR responsibilities identified in their TORs**	**1) 2013 2) 2014**	**CBS other TCs**	**RB from relevant departments**			**High**
3.1.3 **G**	Using the RRR process & capitalizing on relevant experience of Members, develop procedures for and carry out a design for WIGOS at the global scale	Initial global-scale specification for WIGOS observing infrastructure	2012 - 2015	ET-EGOS, ICG-WIGOS, TCs	250	0	250	High
3.2.1	Evolve and implement observing systems in the Region following	1) Report back to ET-EGOS on the actions detailed in the	1) 2013	RAs	80	0	80	High

WIGOS observing components. It specifically refers to enhanced cooperation among meteorological, hydrological and marine/oceanographic institutions/services where they are separated at the national level.

R	the technical guidance of the technical commissions as represented in the EGOS-IP and other observation system implementation plans	EGOS-IP. 2) Initiate the EGOS-IP within the Region.	 2) 2015					
3.2.2 **R**	Validate current global RRR against regional user requirements and update WMO database	Refined RRR database	2014-2015					
3.3.1 **N**	Contribute to the collective regional effort to evolve and implement observing systems following the EGOS-IP and other observation system implementation plans	1) Report back to ET-EGOS on the actions detailed in the EGOS-IP. 2) Initiate the EGOS-IP at a National level.	1) 2013 2) 2015	Members	Members			High
3.3.2 **N**	Update the global RRR database to take into account sub-regional and national user requirements	Refined RRR database	2014-2015	Members	Members			High
4. Integrated Observing System Operation and Maintenance								
4.1.1 **G**	**Develop guidance, mechanisms and procedures for improved integration of observational data and products**	**1) Integration Strategy is published & available on the Portal** **2) Appropriate bodies have responsibilities in their TORS** **3) Work is underway for some specific product integration activities**	**2015**	**ICG-WIGOS**	**RB from relevant departments**			**High**
4.1.2 **G**	Develop guidance for the process of sharing, between component observing systems, operational experiences, of expertise and for resourcing joint activities.	Proposed text for inclusion in Guide on WIGOS.	2013	ICG-WIGOS	Expert + Sec Time			Medium
5. Integrated Quality Management								

5.1.1 G	**Develop WIGOS Quality Management guidance, mechanism, practices and procedures to include monitoring**	**1)WIGOS QMF to be incorporated into WIGOS Manual and Guide 2) Appropriate bodies responsibilities identified in their ToRs**	**2014**	**ICG-WIGOS Relevant TCs**	**RB from relevant departments**			**Medium**
5.1.2 G	Examination of current quality management practices being used by WMO observing programmes.	Report which documents processes used and identifies areas for improvement.	2013	ICG-WIGOS	Expert + Sec Time			Medium
6. Standardization, System Interoperability and Data Compatibility								
6.1.1 G	**1) Develop guidance for WIGOS standards 2) Document the implemented standards, including best practices, procedures on instruments, methods of observations, data products, etc.**	**1) Guidance to WIGOS standardization 2) Implemented standards and best practices incorporated into WIGOS Manual, Guide and Portal as appropriate**	**2013**	**Relevant TCs WIGOS PO**	**RB from relevant departments**			**Low**
6.1.2 G	Develop and maintain the Standardization, Operational and RRR databases.	Operational Acceptance of the databases in the WIGOS Information Resource.	Cg-17	ICG-WIGOS	**RB from relevant departments**			High
7. The WIGOS Operational Information Resource								
7.1.1 G	**Design and develop the WGOS Information Resource**	**1) Technical Specification 2) Make decision on developments of WIGOS Information Resource (internal vs. call for tender) 3) Operational Acceptance**	**1) 2013 2) 2013-14 3) 2015**	**Secretariat in cooperation with Members**	**330**	**97**	**233**	**Medium**
7.1.2 G	Investigate the need for a database describing the Global Observations Products (Satellite Data, Weather Radar)	Documented requirements for the database	2012	ICG-WIGOS, TCs	**RB from relevant departments**			Low
7.1.3	Survey WMO Members on what	Survey results and resulting	2012	WIGOS-PO	**RB from relevant**			Low

G	they could offer to support development and operations of WIGOS Information Resource.	decisions			**departments**	
7.3.1 **N**	Collect, maintain and provide the metadata required by WIGOS support tools.	Compliance on requirements for metadata by all Members.	Cg-17	Members	Members	Medium/ High
8. Data discovery, delivery and archival						
8.1.1 **G**	**Develop WIGOS metadata standards and guidance practices for maintenance of and access to WIGOS metadata**	**1) Initial WIGOS Metadata standard approved** **2) Initial access to WIGOS Metadata through portal** **3) Practices established in manual & guide** **4) Body(s) created or identified for maintenance of MD standard**	**1) 2015** **2) 2013** **3) 2015** **4) 2013**	**CBS, CIMO CAS, CHy JCOMM ICG-WIGOS Members**	**RB from relevant departments**	**Medium**
8.1.2 **G**	To initiate and develop a mechanism and outreach strategy for the integration of more relevant observation data and associated interpretation metadata.	Mechanism and outreach strategy in place	2012-2013	ICG-WIGOS	**RB from relevant departments**	Low
8.3.1 **N**	Outreach activities targeting more observational data available through WIS	More relevant observational data made visible and accessible trough WIS	2014-2015	WMO Members with support from the WMO Secretariat	Nationally funded activities; WMO Secretariat activities covered in RB budget	Low/ Medium
9. Capacity development[1]						
9.1.1 **G**	**Develop a WIGOS Capacity Development (WCD) strategy including education and training**	**1) WCD Strategy is published & available on the WIGOS Information Resource.**	**1) 2013** **2) 2014**	**ICG-WIGOS ETR, RAs**	**RB from relevant departments**	**Medium**

[1] Congress stressed that an effective capacity-building strategy is an essential component of the WIGOS implementation. Specialized education, training activities and improvement of necessary observing infrastructure should be reflected in the regional, sub-regional and national WIGOS implementation plans, especially for NMHSs of LDCs, LLDCs and SIDS. Hence, capacity building is not to be limited to scientific and technological concerns, but also to strategic and management consideration including human resources development, resource mobilization and communications and outreach activities.

		2) Appropriate bodies have responsibilities in their ToRs **3) WCD activities underway**	**3) 2015**			
9.1.2 **G**	Assistance to WMO Members regarding WIGOS integration	National observational networks better responding to WMO Applications requirements	2012-2015	WMO Secretariat	**RB from relevant departments**	Medium
9.1.3 **G**	Develop WIGOS related guidelines and training materials and other relevant documentation	Training materials and guidelines available	2013	WIGOS-PO	**RB from relevant departments**	Low
9.3.1 **N**	Resource mobilization	More resources made available to NMHSs and partner organizations for better integration of observational networks contributing to WMO Applications	2012-2015	WMO Members with assistance from the WMO Secretariat	Nationally funded activities; WMO Secretariat activities covered in RB budget	Medium
9.3.2 **N**	Tools from the WIGOS Information Resource to be used nationally for the design and management of national WIGOS networks.	WIGOS Operational Information Resource and tools used by WMO Members	2014	WMO Members	Nationally funded activities; WMO Secretariat activities covered in RB budget	Medium
10. Communication and outreach						
10.1.1 **G**	**Develop an effective communication, outreach, capacity development, and education strategy**	**WIGOS Communication and outreach Strategy**	**2012**	**ICG-WIGOS**	**RB from relevant departments**	Medium
10.1.2 **G**	Develop communication and outreach materials (see Annex 1 for suggestions) and make them available via the WIGOS Portal	Communication and outreach materials available	2012-2013	WIGOS-PO	**RB from relevant departments**	Low

5. RESOURCES

Congress agreed that the timely completion of the WIGOS implementation in the sixteenth financial period directly depended on the available resources. Congress assigned a high priority to the proposed budget allocations for WIGOS activities. Congress also urged Members to continue to provide resources to help support the implementation of WIGOS. Congress recognized that the key role to be played by the technical commissions in WIGOS implementation would require additional resources, and therefore further ***urged Members to also provide the resources to enable this role to be fully realized, as a part of their voluntary contributions***.

Congress agreed that the full staffing requirement would need to be met primarily through the secondment of experts from NMHSs. In this connection, Congress ***urged Members to provide secondment services to the Secretariat during the WIGOS Implementation to ensure its successful completion***.

The investment for fully implementing WIGOS should be given a high priority in Members' development and implementation plans. In addition, extra resources will need to be provided to the WMO Secretariat for both staff (see Table 3 below) and non-staff costs for the implementation and coordination that are beyond the normal programmatic activities of the Secretariat. To ensure the funding needed for WIGOS implementation, provision of the following resources should be considered:

(a) WMO Regular Budget for WIGOS implementation support activities;

(b) WIGOS Trust Funds to supplement the WMO Regular Budget;

(c) In kind contributions;

(d) Staff secondments;

(e) Voluntary Cooperation Programme funds for WIGOS related technical cooperation and capacity-development activities;

(f) Regional fund-raising activities to support WIGOS; and

(g) Operational hosts for information systems.

The strong need to assist the two regular staff must be met primarily through the secondment of experts, including Junior Professional Officer (JPO) from Members, for completion of the key Project Office tasks, as follows:

(a) To assist the regular staff for the management and coordination of WIGOS project (JPO, extrabudgetary 200 KCHF is needed);

(b) To design, develop and maintain the WIGOS Information Resource (JPO, extrabudgetary 200 KCHF is needed);

(c) To assist the development of WIGOS technical documentation (secondments);

(d) To assist the WIGOS global and regional activities (secondment), and coordinate the management of the content of the WIGOS Operational Information Resource.

Table 3: WIGOS Project Office Regular staff resources needed for a period 2012-2015

No	Position	Activities/Duties	Staff cost for 2012-2015 (CHF)
1	WIGOS Project Manager	To lead the WIGOS Implementation Project Office to ensure the management of, and support to, the WIGOS implementation process and activities, including support to the ICG-WIGOS sessions and its Task Team meetings, CBS and other technical commission WIGOS relevant working structure meetings and activities. Coordinate with Members, the technical commissions and the regional associations to identify needs for nominated experts, including National Focal Points, and to work with Members to fill those needs. Oversee and coordinate the development of appropriate regulatory documentations. Undertake the necessary liaison within the Secretariat and stakeholders to ensure effective coordination and collaboration with partner organizations and programmes in WIGOS activities.	900,000 Needed from extrabudgetary support
2	WIGOS Scientific Officer	To review existing Technical Documentation and Regulations for observing systems and to support the production of WIGOS technical material, such as WIGOS Manual, Guide and WIGOS Metadata and related guidelines. To provide technical support to the WIGOS global and regional working bodies meetings. To oversee and guide the development of WIGOS Information Resource. To collaborate with Development and Regional Activities (DRA) department to provide technical assist to regional associations (including the Members in the Regions, especially in least developed countries) for their WIGOS implementation activities. To work together with WMO Education and Training Programme to support WIGOS education, training and outreach activities.	RB
		TOTAL	**900 KCHF**

6. RISK ASSESSMENT/ MANAGEMENT

The Risk Management Plan (RMP) will be developed for each implementation activity/projects, including risk mitigation. The following risk areas were identified:

(a) Complexity of WIGOS;

(b) Availability of basic infrastructure;

(c) The firm commitment of all stakeholders to implement initial activities/projects within the agreed time frame, including a provision of required resources, both human and financial;

(d) The requirement for appropriate leadership for the implementation of activities/projects;

(e) Partial interests of stakeholders not converging into the stated objectives;

(f) Coordination of interdependent projects;

(g) Provision of an effective interface between users of services and entities operating observing systems;

(h) Authority and responsibilities of entities and individuals for the implementation of projects;

(i) Lack of transparency in the management of the implementation;

(j) The potential for inadequate implementation if human resources are not available.

7. OUTLOOK

This document has described the key activities for the period 2012 to 2015. As determined by Cg-XVI, the goal is to have WIGOS operational by 2016. This is a challenging task. The experience gained during the WIGOS test of the concept phase clearly shows that it will be impossible to complete integration of all observing systems on global, regional and national levels in only four years. While WIGOS operations should start in 2016, there will still be a strong need to continue a significant number of implementation activities. It is essential to realize that additional resources will be needed to ensure the secretariat support for the continuation of the implementation process. However, it is too early to make a precise statement on how many resources in terms of staff and funding should be made available. The decision on these matters should be taken by the time of Cg-17.

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ANNEX I

SUGGESTED WIGOS COMMUNICATION AND OUTREACH MATERIALS

	Targeted audience	***Type and size of document***	***Activity***	***Time-frame***	***Status***
Web portal	WMO Members RAs, TCs Space Agencies Partner Organizations General Public	Web pages with links to other materials	WIGOS-PO to oversee development of the portal	2012-2013	To be done
WIGOS Imperative	WMO Members	10-page document (pdf)	WIGOS-PO to update doc.	2012	Done
WIGOS brochure	General Public	2-page brochure (pdf)	WIGOS-PO to produce draft brochure, circulate to ICG-WIGOS and relevant experts, updated and seek approval from ICG-WIGOS Chair	2012	Materials exist
WIGOS standard presentation (to be used at various events and adjusted as needed)	WMO Members	20-page presentation (ppt)	WIGOS-PO to produce draft standard presentation, circulate to ICG-WIGOS and relevant experts, updated and seek approval from ICG-WIGOS Chair	2012	Materials exist
WIGOS standard poster (to be used at various events and adjusted as needed)	*Ad hoc* Conferences	Poster (A2, pdf)	WIGOS-PO to produce draft poster, circulate to ICG-WIGOS and relevant experts, updated and seek approval from ICG-WIGOS Chair	2012	Materials exist
WIGOS rationale	WMO Members Space Agencies Partner Organizations	1-page document (pdf)	WIGOS-PO to consolidate information on WIGOS rationale from various existing materials	2012	Materials exist
WIGOS benefits in terms of, observing systems implementation effectiveness, and efficiency	WMO Members Space Agencies Partner Organizations	2-page document (pdf)	WIGOS-PO to draft first version, circulate to ICG-WIGOS and relevant experts, updated, and seek approval from ICG-WIGOS Chair		To be done as new document
Socio-economical benefits of WIGOS data	Governments WMO Members Funding Agencies	2-page document (pdf)	WIGOS-PO to draft first version, with other Departments (WDS, RES), update document,	2012	To be done as new document

	Space Agencies Partner Organizations General Public		circulate to ICG-WIGOS and relevant experts, updated and seek approval from ICG-WIGOS Chair		
Impact on WMO Members of WIGOS implementation	WMO Members	5 to 10 page document (pdf)	WIGOS-PO to draft first version, consult Members via survey, update document, circulate to ICG-WIGOS and relevant experts, update and seek approval from ICG-WIGOS Chair	2012-2013	To be done as new document

ANNEX II

REFERENCED DOCUMENTS

Reports of WMO constituent bodies

1. Fifteenth World Meteorological Congress, Abridged Final Report with Resolutions (WMO-No. 1026)
2. Sixteenth World Meteorological Congress, Abridged Final Report with Resolutions (WMO-No. 1077)
3. EC-LVIII, Abridged Final Report with Resolutions (WMO-No. 1007)
4. EC-LIX, Abridged Final Report with Resolutions (WMO-No. 1027)
5. EC-LX, Abridged Final Report with Resolutions (WMO-No. 1032)
6. EC-LXI, Abridged Final Report with Resolutions (WMO-No. 1042)
7. EC-LXII, Abridged Final Report with Resolutions (WMO-No. 1059)
8. EC-LXIII, Abridged Final Report with Resolutions (WMO-No. 1078)
9. CBS-XIV, Abridged Final Report with Resolutions and Recommendations (WMO-No. 1040)
10. CBS-Ext.(2010), Abridged Final Report with Resolutions and Recommendations (WMO-No. 1070)
11. Final report of the 1st session of the EC WG on WIGOS-WIS (December, 2007)
12. Final report of the 2nd session of the EC WG on WIGOS-WIS (May, 2009)
13. Final report of the 3rd session of the EC WG on WIGOS-WIS (March, 2010)
14. Final report of the 4th session of the EC WG on WIGOS-WIS (February, 2011)
15. Final report of the 1st session of the Subgroup on WIGOS of the EC WG on WIGOS-WIS (November, 2008)
16. Final report of the 2nd session of the Subgroup on WIGOS of the EC WG on WIGOS-WIS (October, 2009)
17. Final report of the 3rd session of the Subgroup on WIGOS of the EC WG on WIGOS-WIS (October, 2010)
18. Final report of the 1st session of ICG-WIGOS (September, 2011)

Other relevant documentation

19. Vision for the GOS in 2025 (CBS-XIV, 2009)
20. WIS Project and Implementation Plan (v. 1.2, February, 2010)
21. Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC (GCOS-138, WMO/TD-No. 1523)
22. WMO Global Atmosphere Watch (GAW) Strategic Plan: 2008-2015 (WMO/TD-No. 1384)
23. Implementation Plan for Evolution of Space-and Surface-based Subsystems of the Global Observing system (WMO/TD-No. 1267)
24. WCRP Implementation Plan 2010-2015 (WMO/TD-No. 1503
25. The first U.S. Integrated Ocean Observing System (IOOS) Development Plan, Washington, DC, January 2006
26. Global Earth Observation System of Systems GEOSS 10-Year Implementation Plan (GEO 1000, February 2005)
27. EUCOS programme management documentation
28. THORPEX International Research Implementation Plan (WMO/TD-No. 1258)
29. JCOMM Observing System Implementation Goals for Building a Sustained Global Ocean Observing System in Support of the Global Earth Observation System of Systems (2009)

30. Overarching Implementation Plan for the Ocean Data Portal and WIGOS Pilot Projects for IODE and JCOMM (6 November 2008)

ANNEX III

LIST OF ACRONYMS

CEOS	Committee on Earth Observation Satellites
CGMS	Coordination Group for Meteorological Satellites
CONOPS	Concept of Operations
DAR	Discovery, Access and Retrieval
DB	Database
DCPC	WIS Data Collection or Production Centre
DRR	Disaster Risk Reduction
ET	Expert Team (of WMO Technical Commission)
FAO	Food and Agriculture Organization
GAW	Global Atmosphere Watch
GCOS	Global Climate Observing System
GCW	Global Cryosphere Watch
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GISC	WIS Global Information System Centre
GFCS	Global Framework for Climate Services
GOOS	Global Ocean Observing System
GTOS	Global Terrestrial Observing System
ICG-WIGOS	Inter-Commission Coordination Group on WIGOS
ICPC	Interagency Coordination and Planning Committee for Earth Observations
ICSU	International Council for Science
IOC	Intergovernmental Oceanographic Commission
ISO	International Standards Organization
ITU	International Telecommunication Union
LDCs	Least Developed Countries
MOU	Memorandum of Understanding
NMHS	National Meteorological and Hydrological Service
NOS	National Observing System
OSEs	Observing Systems Experiments
OSSEs	Observing System Simulation Experiments
QA	Quality Assurance
QC	Quality Control
QMF	Quality Management Framework

QMS	Quality Management System
RA	Regional Association
RCC	Regional Climate Centre
RIC	Regional Instrument Centre
RMIC	Regional Marine Instrument Centre
RRR	Rolling Review of Requirements
SIDS	Small Island Developing States
SoG	Statement of Guidance
SLA	Service Level Agreement
TC	Technical Commission
TOR	Terms of Reference
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WCRP	World Climate Research Programme
WIGOS	WMO Integrated Global Observing System
WIP	WIGOS framework Implementation Plan
WIS	WMO Information System
WHYCOS	World Hydrological Cycle Observation System
WWW	World Weather Watch

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