

WORLD METEOROLOGICAL ORGANIZATION

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EXECUTIVE COUNCIL WORKING GROUP ON
THE WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS)
AND
THE WMO INFORMATION SYSTEM (WIS)

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FIRST SESSION

ITEM: 3.2

GENEVA, 4– 7 DECEMBER 2007

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

Refinement of the WIS Development and Implementation Plan

(Submitted by Prof. G. R. Hoffmann, Chair of ICG/WIS)

Summary and Purpose of Document

This document provides an overview of the WMO Information System project plan and implementation schedule.

ACTION PROPOSED

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

- References:**
- (1) Cg-XV, PINK 3.1.2, WWW Information System and Services, Including The Global Telecommunication System And Data Management
 - (2) WIS project plan ([DRAFT v0.5](http://www.wmo.int/pages/prog/www/WIS-Web/RefDocuments.html))
<http://www.wmo.int/pages/prog/www/WIS-Web/RefDocuments.html>

DISCUSSION

Background

1. In its mission as a world leader in weather, climate, water, and related environmental issues, the World Meteorological Organization (WMO) contributes to the safety and well-being of people throughout the world, and to the societal and economic benefit of all nations. The current WMO Strategic Plan recognizes that understanding the state of the environment is essential, and that understanding depends upon the collection and open sharing of information, often using rapid and highly reliable methods. The challenge today is that Member nations of WMO need to achieve such ambitious results without a significant increase in resources. The WMO Information System (WIS) is a key strategy to optimize the efficiency and effectiveness of WMO services, leveraging the long-standing collaborative culture of WMO as well as new technologies.

2. In WMO planning terms, 'Development and Implementation of WIS' is Expected Result 5, part of the Science and Technology strategic thrust: to monitor and observe the environment; to forecast and warn of significant weather, water and climate conditions; and to understand the Earth system. WIS has also a critical contribution to Expected Result 4, 'Integration of WMO observing systems'. Beyond WMO, WIS will play a leading role in the weather, water, climate and natural disaster areas for the Global Earth Observation System of Systems (GEOSS). Interoperability between WIS and GEOSS will enhance accessibility to related Earth observations for WMO members as well.

3. Cg XIV (Geneva, 2003) formally adopted the concept of WIS, stating that an overarching approach was required for solving the data management problems for all WMO and related international programmes. In particular, Congress stated that WIS will:

- (a) Be used for the collection and sharing of information for all WMO and related international programmes;
- (b) Provide a flexible and extensible structure that will allow the participating centres to enhance their capabilities as their national and international responsibilities grow;
- (c) Build upon the most successful components of existing WMO information systems in an evolutionary process;
- (d) Pay special attention to a smooth and coordinated transition;
- (e) Build on the Global Telecommunication System for highly reliable delivery of time-critical data and products and base its core communication network on the Improved Main Telecommunication Network;
- (f) Utilise international industry standards for protocols, hardware and software.

4. With regard to WMO communications networks, Cg-XV has required WIS to be implemented in two parallel parts: Part A being the continued evolution of the GTS and Part B being the new functionality of WIS. Accordingly, WIS will incorporate the connectivity of GTS and the flexibility of new systems such as the Internet, whilst ensuring that a data management framework is able to encompass all WMO information. This is a natural evolution, building upon GTS while expanding the overall information system capabilities. However, there is a change in focus with introduction of WIS: from managing communication links to managing data and products.

5. Much like modern library systems, WIS is designed around catalogues that contain metadata describing the full set of data and products available across WMO. These catalogues, plus metadata describing dissemination options, will be hosted by up to ten WIS Global Information System Centres (GISCs). Collaboration across all GISCs will assure that each not only supports

comprehensive search across catalogues, but each can disseminate WMO data and products intended for global exchange and hold them for at least 24 hours. An important WIS component, the Integrated Global Data Distribution System (IGDDS) focuses on the exchange and dissemination of data and products generated by space-based observing systems. Data and products will flow to a GISC from Data Collection or Production Centres (DCPCs) and from National Centres (NCs) within its area of responsibility. The relationship between these centres is shown in figure 1, The WIS Vision.

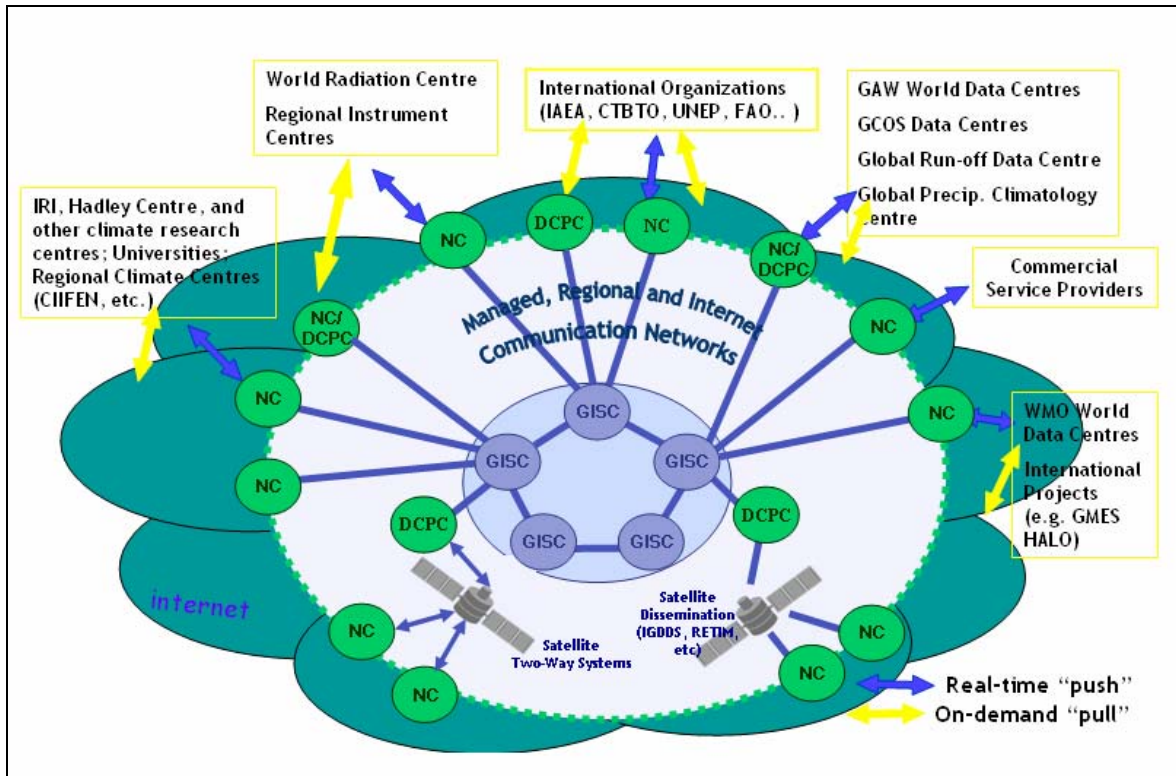


Figure 1 The WIS Vision

Implementation of WIS

6. As described in this WIS Project Plan, development of WIS depends on WMO Members and related organizations taking on the roles delineated for GISCs, DCPCs and NCs. There is clear consensus that the benefits of WIS will far outweigh the costs overall, but potential participants need to know exactly what is expected of each type of WIS Centre. Accordingly, this WIS Project Plan will be supplemented by two other documents: one describing User Requirements and one providing Compliance Specifications for a GISC, DCPC, or NC. These will form the basis for the required statement of compliance with the prescribed WIS functions, compiled and regularly reviewed by the Commission for Basic Systems, the Inter-Commission Coordination Group on WIS (ICG/WIS) and finally endorsed by the WMO Executive Council.

7. Cg-XIV requested particular attention be given to the impact of WIS on Members' responsibilities and resources. Existing National Meteorological Centres, as defined in the Manual on GTS, are expected to become WIS NCs. It emphasized that introduction of WIS would not result in new responsibilities or additional resource requirements for most Members. Rather, the stated expectation is that WIS would result in lower costs, especially for the least developed Members, through expanded use of commercial off-the-shelf technology and increased use of the Internet. With regard to DCPCs, it was noted that Members operating a Regional Specialized Meteorological Centre (RSMC) or a Regional Telecommunication Hub (RTH) were likely to operate as a DCPC. In addition to handling time critical data for others, DCPCs have the responsibility of

providing data and products through request/reply services especially via the Internet. Congress also noted that various centres around the world provide through international agreements a variety of products for WMO Programmes, such as specialized data (e.g. buoys), hydrological products, and climatological products. Such centres could participate in WIS as a DCPC, or arrange for another DCPC to receive and disseminate its products. Either case does entail changes in practices and procedures, such as providing metadata associated with the products.

8. Cg-XIV stated that no centre was currently providing all of the functions envisioned for a GISC, although the function somewhat corresponds to those RTHs associated with large numerical modelling centres as these already provide global products. In becoming a GISC, creation and maintenance of a data and product catalogue would be the most significant additional responsibility.

9. Considering Congress's requirements from a project management perspective, the WIS project can be viewed as having six main activities: 1) consolidation of WIS plans, 2) establishment of the WMO metadata standard, 3) development of WIS regulatory documents, 4) implementation of WIS Part A, 5) implementation of WIS Part B, and 6) coordination with other major projects. It should be noted that each of these activities will entail some amount of capacity building and training investments as well. These activities are shown in Figure 2 "WIS Milestone Activities" and described in the following paragraphs.

Task Name	2007	2008	2009	2010	2011	2012	2013	2014	2015
+ Consolidate WIS Plan	70%								
+ Establish WMO Metadata	50%								
+ Develop Regulatory Docs	10%								
- Implementation Part A									
IMTN	Ongoing								
Operations & Implementation	Ongoing								
- Implementation Part B									
Implement first Operational GISC	60%								
Implement other GISCs	5%								
Implement DCPCs	10%								
- Coordination									
IGDDS		10%							
WIGOS	1%								
GEO	20%								

Figure 2 WIS Milestone Activities

10. The first activity, the WIS Project Plan, commenced in March 2007, was reviewed by ICG/WIS in September 2007 and updated prior to this first EC WG WIGOS-WIS. This draft plan is to be finalised for CBS and the EC in 2008. The plan provides a project management framework and an implementation plan for WIS and is already being used to identify priority issues that need to be addressed if WIS is to be delivered in a timely manner. The latest version of the project plan is online at <http://www.wmo.int/pages/prog/www/WIS-Web/RefDocuments.html>

11. The second activity concerns the WMO metadata, a profile of the ISO 19115 standard. Version 1 has been approved, though it has yet to be documented in full and an appropriate metadata entry tool is under development. The need for metadata entry tools is included along with a capacity building requirement to ensure Members can benefit from the new facilities.

12. The third activity, development of WIS regulatory documents, will be closely aligned with WIGOS and will include revision of the Technical Regulations related to information management and associated manuals. Other deliverables will be the guidelines for metadata entry and management, and a guideline on WIS, which will lead to a Manual on WIS. Interim governance documents for designation of GISCs and DCPCs have been approved. This task extends out to

beyond 2015 in order to accommodate the consultative processes necessary, especially as it is expected the Technical Regulation 49 will need to be extensively restructured to properly incorporate WIGOS. These timelines will be refined as WIGOS implementation plans are consolidated.

13. The fourth activity, implementation of WIS Part A, is being accomplished in the Improved Main Telecommunication Network project and in the improvement of regional GTS parts. A crucial requirement in managing Part A is that there will be no interruption to GTS functionality in exchanging time-critical and operational-critical information.

14. The fifth activity, implementation of WIS Part B, is to deliver the new functionality of WIS, including the creation and hosting of metadata catalogues and the use of the internet to facilitate authorized users to find and retrieve any information available within WIS. This process, referred to as Discovery, Access and Retrieval (DAR), is a key to opening access to all WMO Members to all WMO Programme's information.

15. The sixth activity is coordination with related major projects. Among the major concerns are assuring that: IGDDS is integrated as a core component of WIS; WIGOS interdependencies with WIS are addressed; and WIS is viewed as an exemplar operational system in the context of GEOSS. The metadata catalogue, DAR and use of the internet will enable interoperability with external information systems.

16. At present, the WIS project is on track for success. However, the overall project is complex and may be perceived as a steep climb with regard to implementing information and communication technologies. It is critical that the evolution to WIS not be disruptive to the present systems as these already have the necessary qualities of high availability, robustness and performance. This is especially the case where WMO systems support high profile or life-critical activities such as the preparation and distribution of natural hazard warnings.

WIGOS and WIS

17. As well as being a mechanism for collecting and distributing data under WIGOS, WIS is also dependant on some key components of WIGOS. Volume A exemplifies this through providing a catalogue of observation stations that includes critical information such as location, elevation, observation program and so on essential for users of WIGOS data. By keeping such information in accessible catalogues, WIS can be far more efficient in collecting and distributing data by only sending those elements of the data that are regularly changing. This information can be recombined by users, or by the DAR services through which WIGOS data is made available.

18. As noted in paragraph 7, Congress has highlighted a number of centres outside of WMO through international agreements provide data or products to WMO Programmes. As such it is crucial for the proper integration of observations systems in WIGOS that specialized data collection systems be interfaced with WIS and the associated data collection centres (eg. GAW, ARGOS) be designated as DCPCs.

19. Similarly, WIS is reliant on WIGOS to provide DAR metadata for WIGOS data and products. This metadata is necessary for aiding DAR and for informing WIS on how to handle WIGOS messages and files. The metadata will tell WIS what the WIGOS files are and link them to the Volume A catalogues. It will also link them to WIS distribution catalogues. To facilitate the linking of files to metadata and to avoid having to open each file or message to understand its content, WIS developers have recommended a file naming convention that ensures data and product families have unique file names. This filename convention is based on the present GTS message headers and has incorporated the needs of all WMO Programmes.

20. As with the GTS and the use of Table Driven Code Forms, all Programmes are encouraged to utilise WIS conventions to ensure they also benefit. However, the minimum requirement of WIS on WIGOS is for WIGOS to provide information as uniquely named files, and associated metadata files compliant with the WMO profile for ISO 19115 for those files. These files, as with changes to the present Volume A, should precede the message files, and only need to be sent when there is a change to the metadata. In order to facilitate implementation of WIS, Meteo-France has developed a system for creating these metadata files for information already circulating on the GTS as a part of the European VGISC project. Also EUMETSAT is investigating the adaptation of their file naming conventions to the recommended practices as a part of the IGDDS implementation plan. Similar pilot work would be necessary in other WIGOS themes.

21. A common area of confusion with WIS and WIGOS is the use of the word metadata. For the sake of clarity in the technical specifications under preparation for WIS, the metadata that is used to identify messages and files is referred to as DAR metadata. Metadata that describes the distribution of information is referred to as dissemination metadata, and the metadata such as Volume A is referred to reference information. Of these three forms of metadata, it is only the DAR that needs to be compliant with the WMO profile of ISO19115.

22. Because of the reliance of WIS on DAR metadata, a part of WIGOS implementation should ensure that metadata will be generated by observation systems and centres using appropriate tools.

23. Another form of metadata which is especially important to users of WIGOS information will be the station history metadata. This is not a part of WIS, however, CBS-Ext.(06) has identified a desire to be able to access this information along with the data. In particular 6.2.56 states "Version 1.0 of the WMO Core Metadata Profile uses simple catalogues for its information: in addition to those required by the relevant ISO standard, a thesaurus for keywords, a list of the CCCC country codes and a gazetteer to allow the translation of station names, station identifiers and station numbers into their geographical positions. The Commission invited the OPAG-ISS, in consultation with the OPAG-IOS, to further develop with a high priority methods of representing comprehensive information related to observing stations using the metadata, such as the catalogue of variables measured by a standard observing station or the catalogue of instruments used for variables measured by standard observing station, in particular:

- Using unambiguous and standard terminology for key words/key phrases based on International Meteorological Vocabulary (WMO-No. 182), Technical Regulations (WMO No. 49);
- Keeping the station history for different reasons, an example being the homogeneity of data times series for the monitoring of climate changes;
- Tracking changes of station data (i.e. metadata of the station) that can be done any day;
- Not having this capability could negatively influence results.

24. As noted in figure 2, Milestone Activities, and highlighted in paragraph 12 above, the development of regulatory documentation will need to be coordinated in WIGOS and WIS implementation schedules. Similarly, it can be seen that the bulk of implementation of WIS will have been completed by 2011 which is when the WIGOS implementation plan will be place before Congress. Thus, as has happened with the WIS project and implementation plan, WIGOS development and implementation plan will need to ensure certain non controversial activities necessary to support WIS are identified and addressed well ahead of the WIGOS plan's final approval in 2011.

Special issues for consideration

25. WIS will provide new capabilities that could create opportunities for Members to run their operations more efficiently. However, some aspects of WIS may be sensitive from a data policy perspective, such as the compliance to WMO Resolutions 25 and 40.

26. It is very important to note that Members' strategic and system replacement processes must begin to anticipate the requirements of WIS interfaces as well as meeting local and regional requirements. After all, like other WMO undertakings, WIS depends fundamentally on its uptake by WMO Members.

27. Programmes that utilise external observation collections systems should consider placing a priority on establishing a pilot project in collaboration with at least one of their data suppliers to designate the associated data collection system or centre as a DCPC.

28. This WIS Project Plan highlights the need for a central coordinating role within the Secretariat. Along with the commitment of WMO Members, such coordination is essential to realize the successful implementation of WIS as prescribed in Expected Result 5 of the WMO Strategic Plan. This need was recognised early by CBS and endorsed by Congress; however, the WIS Project Manager was not put in place until 2007. Clearly, a similar need is evident for WIGOS as Expected Result 4 and if WIGOS is to move forward in a timely manner, this need should be addressed as early as possible.

29. As reflected in the terms of reference for the EC WG WIGOS-WIS, WIGOS and WIS have several interdependencies. WIS is a key mechanism in the collection and distribution of WIGOS data. Also, as with the present GTS and its role in support of the GOS and GDPFS, undertakes several quality control and filtering functions that will still need to be done
