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| **World Meteorological Organization** | **CBS-Ext.(2014)/Doc. 3.2(1)** |
| **COMMISSION FOR BASIC SYSTEMS** | Submitted by: | President of CBS |
| Date: | 10.IX.2014 |
| **EXTRAORDINARY SESSION**Asunción, Paraguay, 8 to 12 September 2014 | Original Language:  | English |
| Status: | **APPROVED** |

# EXPECTED RESULT 4

## Agenda Item 3.2: WMO INFORMATION SYSTEM

# Decisions and technical regulations supporting the WMO information System

# SUMMARY

**NON-CONTROVERSIAL DOCUMENT FOR ADOPTION**

### DECISIONS/ACTIONS REQUIRED:

(a) Adopt draft Resolution [3.2(1)/1](#_Draft_RESOLUTION_3.2/1);

(b) Adopt draft Recommendations [3.2(1)/1](#_Draft_Recommendation_3.2(1)/1); [3.2(1)/2](#_Draft_Recommendation_3.2(1)/2); [3.2(1)/3](#_Draft_Recommendation_3.2(1)/3);

(c) Adopt draft text (Appendix A) for inclusion in the general summary;

(d) Financial implication: None.

### CONTENT OF DOCUMENT:

The Table of Contents is available only electronically as a Document Map[[1]](#footnote-1)\*.

# APPENDIX A: DRAFT TEXT FOR INCLUSION IN THE GENERAL SUMMARY

### 3.2 WMO Information System (agenda item 3.2)

Progress with implementing the WMO Information System

WIS Core Network

3.2(1).1 The Commission noted the successful migration of the Regional Meteorological Data Communications Network (RMDCN) and WIS Core Network to the next generation RMDCN (RMDCN NG). It expressed its appreciation to ECMWF for managing the migration and for continuing its support of this important component of WIS. It noted however, that the Global Information System Centre (GISC) Brasilia and GISC Iran were still not connected to the WIS Core Network. In particular, the supplier of the RMDCN NG for reasons that are beyond the ability of CBS to influence. Noting the importance of a fully connected WIS Core Network for the free and unrestricted exchange of information to all National Meteorological and Hydrological Services (NMHSs) basic services, the Commission adopted recommendation 3.2(1)/1 (CBS-Ext.(2014)) – Critical Role of WIS Networks.

3.2(1).1bis The Commission requests ICT-ISS, in collaboration with GISC Tehran, to assist them in the design and implementation of an affordable, interim solution to allow Iran to connect to the WIS Core Network as fully as possible.

3.2(1).2 The Commission noted the progress with piloting IPv6. It noted that the requirement for IPv6 will most likely be driven by Members’ user communities rather than to support information exchange between NMHSs. It encouraged Members with the appropriate capability to participate in the IPv6 Pilot.

3.2(1).3 The Commission noted Members’ concern that the present full exchange of all data between all GISCs may not be scalable. It noted that current work has revealed that multicast is not a viable solution at this time, although it encouraged those centres with a need for multicast on fixed networks to continue with their investigations. It also noted the proposed pilot by some centres to trial cloud-based solutions for GISC to GISC exchange and highlighted that any pilot should consider potential national policy issues on use of cloud-based solutions.

WIS Centres

3.2(1).4 The Commission reviewed the progress in the identification of WIS centres noting that 363 centres have been registered. These include 223 National Centres (NCs), 125 (Data Collection or Production Centres (DCPCs) and 15 GISCs. It noted that 14 of the 15 GISCs had now been successfully audited by CBS and are either operational or in the process of becoming operational. GISC Casablanca is scheduled to be audited before the end of 2014. The Commission noted for DCPCs and GISCs, only those centres that have demonstrated to CBS their compliance with the standards described in the Manual on the WMO Information System can be entered into the Manual as registered WIS centres. It noted that the current status of WIS centre identification and certification by CBS was available online for individual countries or graphically on the WMO Country Profile Database[[2]](#footnote-2) or on the WIS web pages[[3]](#footnote-3). The Commission expressed its appreciation to those centres that have committed to contribute through WIS and encouraged those centres that have not yet done so, to complete the demonstration process so they can be recorded in WMO‑No. 1060 - Manual on the WMO Information System.

3.2(1).5 The Commission emphasized the importance of centres maintaining their compliance with the agreed standards and practices for ensuring the ongoing functionality of WIS. It stated that the review should occur at least once every eight years for all centres, with half interval reviews for GISCs. It thanked the experts in the Expert Team on WMO Information System Centres’ Task Team on WIS Centre Audit and Certification (ET-WISC/TT-CAC) for their efforts and support to centres in demonstrating their WIS functionality to CBS and highlighted that such expertise will continue to be needed in the certification of WIS compliance in new centres and for the periodic assessment of compliance in existing centres.

3.2(1).6 The Commission highlighted the importance of Regional oversight of the implementation of WIS and was pleased that Regions II, V and VI had WIS implementation plans (WIS IP) in place and that Regions I and III were to consider their WIS IP at the upcoming sessions this year. It noted with satisfaction that all regional WIS IP include the need to monitor WIS implementation.

3.2(1).7 The Commission noted that effective technical solutions for the implementation of WIS functionality have been through upgrading a Member’s current information management and message switching systems or by making use of the remote WIS services offered at the GISCs based on Internet connectivity. It thanked the industry through the Hydro-Meteorological Equipment Industry (HMEI) and the OpenWIS consortium for making this possible. It noted that regardless of which technical solution is used, the principal component of WIS implementation lies with the capacity development of staff to enable them to create and manage discovery metadata. It recognized the importance of including capacity development in Regional WIS IPs and of ensuring all NCs have sufficient expertise in WIS through regional monitoring of national progress and taking targeted actions to assist those NMHSs that are lagging in the required competencies.

3.2(1).8 The Commission emphasized the critical role of GISCs in capacity development and, noting many GISCs had already undertaken initial training for their users, emphasized the need to provide further training. It also identified the need to establish WIS specific online training modules that will assist in local training and in maintenance of the required WIS competencies. It invited Regional Training Centres to work with GISCs and HMEI to address this important need.

Clarifying operating practices for the WMO Information System

3.2(1).9 The Commission noted the collaboration mechanisms being established by the GISCs to create a multilateral decision process for making operational decisions. It noted that some decisions, such as prioritizing of data streams across the WIS Core Network, or making data or product streams available or not in the cache, may extend beyond in the scope of GISCs decision making authority. The Commission adopted [Resolution 3.2(1)/1 – Establishment of an Inter‑commission Task Team to review processes for prioritizing of data streams and cache content](#_Draft_RESOLUTION_3.2/1).

3.2(1).10 The Commission noted that the reference technical specifications for WIS and the WIS Functional Architecture were stable and should be reflected in the WIS Manuals and Guides. Similarly, the Use Cases associated with the TechSpecs and the Test Cases associated with demonstrating compliance should also be reflected in WMO-No. 1061 - Guide to the WIS.

3.2(1).11 The Commission noted that in addition to the agreed practices and procedures recommended for inclusion in the WIS Manual and Guide, WIS centres were developing online guides in order to assist other WIS centres in establishing and maintaining WIS functionality. It encouraged expert teams to continue this development making use of the Web for ease of access and maintenance, and to migrate practices that are likely to be long term and stable into numbered WMO publications or the WIS Manual and Guide as appropriate.

WIS Monitoring

3.2(1).12 Monitoring is a key component of the WIS that contributes to managing day‑to‑day operations, long‑term planning and identification and resolution of problems. The Commission welcomed the interim guidance on WIS monitoring (at <http://wis.wmo.int/wis-monitor>) that specifies near-real time and quarterly monitoring practices, and encouraged the Implementation Coordination Team on Information Systems and Services (ICT-ISS) to proceed with a pilot implementation with volunteer GISCs so that the interim guidance can be tested and updated with the aim of producing a standard practice for inclusion in WMO-No. 1061 - *Guide to the WMO Information System* at CBS‑16.

3.2(1).13 WIS monitoring will concentrate on the effectiveness of flow of information between centres. It will concentrate on the exchange of packages containing information, such as the bulletins that currently circulate on the Global Telecommunications System, rather than on the contents of those bulletins. Numerical Weather Prediction centres, for example, are better placed than telecommunications centres at recording which observations were available and the quality of those observations. The Commission asked each of its Open Programme Area Groups (OPAGs) to consider how their regional and global centres could contribute to monitoring the quantity and quality of information exchanged by the programmes to which the centres contribute, so that this could be used to complement the monitoring information gathered by the WIS. The Commission also recognized that gathering monitoring information was not sufficient to ensure improvements in quality or quantity of information being exchanged, and it asked OPAG-ISS to recommend a process for collating the information from the different monitoring systems and providing feedback to information providers and the operators of WIS centres.

Registering of WMO Technical Regulations and information resources in WIS

3.2(1).14 A significant omission from the WIS metadata catalogue is that it does not include entries for the WMO Manuals, Guides or other information services that the WMO Secretariat provides to support Members. To allow such metadata to be published, the Commission endorsed the WMO Secretariat as a Data Collection or Production Centre with GISC Toulouse as its principal GISC.

Cooperation with OGC

3.2(1).15 Standards for web services offer the potential to simplify how information from different sources can be combined, but without guidance on best practice suppliers are likely to make different, incompatible choices in how they present their information. WMO’s agreement with the Open Geospatial Consortium (OGC) has resulted in several WMO experts participating in OGC domain working groups that are seeking to provide guidance on best practice. The Commission asked OPAG-ISS to nominate a rapporteur to report on and coordinate the activities of these experts.

Cooperation with CAeM

3.2(1).16 The Conjoint CAeM/ICAO Meteorology Divisional Meeting in July 2014, decided that meteorological information would form a critical component of the System-Wide Information Management (SWIM) environment that is being planned by ICAO that is the planned future for the Air Traffic Management system. SWIM is expected to use technologies such as web services. Given that many Members are also responsible for providing information for international civil aviation, it is important that WIS and SWIM are interoperable to reduce costs and complexity for Members. The Commission asked OPAG-ISS to coordinate its work with the CAeM Expert Team on Information and Services for Aviation.

WIS Discovery Metadata

3.2(1).17 The Commission noted that four changes had been implemented to the WMO Core Metadata Profile of ISO 19115 using the fast track procedure. It further noted that the International Organization for Standardization (ISO) had issued a new version of the standard for geographic metadata (ISO 19115-1:2014) and that the WMO Core Profile is not compliant with this new standard, but that ISO had not yet completed the specifications for the associated representation of this standard in extensible markup language (XML). The Commission agreed that the Inter‑Programme Expert Team on Metadata and Data Representation Development (IPET-MDRD) should provide an updated specification of the WMO Core Metadata Profile (version 2) that is compliant with both ISO 19115-1 and 19115-2 (extensions for imagery and gridded data) following publication by ISO of the XML representation of ISO 19115-1:2014. The ISO publication is currently expected mid-2016, too late for the new WMO Core Metadata Profile to be approved by the CBS-16 session. The Commission noted that as a consequence the Commission may need to approve WMO Core Metadata Profile version 2 by correspondence.

3.2(1).18 The Commission welcomed the draft *Guidance on WIS Discovery Metadata* ([http://wis.wmo.int/page=IndexForMetadataGuidance](http://wis.wmo.int/page%3DIndexForMetadataGuidance)) and stressed the importance of providing this information in languages other than English. The Commission also noted that the guidance may need to be updated whenever a change to the WMO Core Metadata Profile was implemented and that development of further guidance was still needed. The Commission therefore asked OPAG-ISS to introduce a formal Guide to WIS Discovery Metadata at CBS-16, and to make sure that the definition of WMO Core Metadata Profile version 2 is accompanied by an update to that Guide. It asked OPAG-ISS to maintain web-based guidance in the interim.

3.2(1).19 The Commission noted that Members may have national or regional obligations to provide discovery metadata compliant with standards other than the WMO Core Metadata Profile and that maintaining separate metadata records to comply with different standards is inefficient and prone to error. It therefore recommended that Members in this situation work with IPET-MDRD to create appropriate guidance, practices or recommendations for changes to the WMO Core Metadata Profile.

3.2(1).20 The Commission noted that the development of XML representations of information in support of international civil aviation had introduced a “codes register” (<http://codes.wmo.int>) to provide web-based definitions of the entries in code tables and thanked the United Kingdom for hosting this service. It asked OPAG-ISS to use the codes register as an additional method of publishing other approved code tables.

3.2(1).21 The Commission noted that WMO-No. 1060 - *Manual on the WMO Information System* and WMO-No.1061 - *Guide to the WMO Information System* needed to be updated to reflect changes to the structure of Technical Regulations and to clarify items in response to feedback. Recommendations 3.2(1)/2 (CBS-Ext.(2014)) and 3.2(1)/3 (CBS-Ext.(2014)) address these issues.

Capacity development to support operation of the WMO Information System

3.2(1).22 The Commission noted with pleasure that a workshop on WIS training had produced both a set of competences needed to support WIS and also recommendations on types of training and learning activity that might help individuals develop the competences. These are listed in Annexes [5](#_Annex_E_to) and [6](#_Annex_F_to) of draft Recommendation **3.2(1)/3 (CBS-Ext.(2014))** - Update to WMO-No.1061 Guide to the WMO Information System. It emphasized that not every individual working with WIS would need all the competences, but that most WIS centres would need access to people able to apply the competences. The competences are specific to WIS, but individuals who are able to demonstrate that they can apply the competences will also need to be competent in generic information technology competences, training for which is widely available through both government and commercial training activities.

3.2(1).23 The Commission adopted draft Recommendation 3.2(1)/2 (CBS-Ext.(2014)) – Update to WMO-No. 1060 Manual on the WMO Information System and draft Recommendation 3.2(1)/3 (CBS-Ext.(2014)) – Update to WMO-No.1061 Guide to the WMO Information System.

Future development of the WIS

3.2(1).24 The Commission recognized the importance of creating and delivering a long‑term vision for the evolution of the WIS. It tasked ICT-ISS to create and maintain a strategy for the development of the WIS, and added an item to the Terms of Reference of ICT-ISS as in the [Annex to this paragraph.](#_Annex_to_paragraph)

## Annex to paragraph 3.2(1).24 of the general summary

Add the following item to the Terms of Reference of ICT-ISS

(g) To develop and maintain a strategic plan for the development of the WIS over a ten year forward looking period.

# APPENDIX B: DRAFT RESOLUTION AND DRAFT RECOMMENDATIONS

## Draft Resolution 3.2(1)/1 (CBS-Ext.(2014))

**Establishment of an Inter-commission Task Team to review processes for prioritizing of data streams and cache content**

THE COMMISSION FOR BASIC SYSTEMS,

**Noting**:

(1)Resolution 1 (Cg-XVI) - World Weather Watch Programme for 2012–2015,

(2) WMO-No.1060 - The Manual on the WMO Information System,

**Noting further:**

(1) The capacity of the WIS Core Network is a limited resource,

(2) The requirement for GISCs to ensure the effective operation of the communication systems and services,

**Recognizing:**

(1) The increasing requirement for the global exchange of all types of environmental data in addition to the established on-going exchange of meteorological data and products under the auspices of the WWW and other WMO Programmes, including GFCS,

(2) That the addition of new data or products to the WIS Core Network impacts on all GISCs who have to ensure their capacity is sufficient to handle data and product exchange,

(3) GISCs have already established a multi-lateral collaboration forum through ET‑WISC/TT‑GISC,

(4) That although GISCs are responsible for their access to and capacity management of the WIS Core Network, the WMO constituent bodies are ultimately responsible for the content and capacity requirements for WIS,

(5) Information that is required to be exchanged between all GISCs is flagged in the discovery metadata by the keyword GlobalExchange,

**Decides** that there is a need for a formal mechanism for deciding what should be designated for Global Exchange, and thus held in the cache and for determining the transmission priority;

**Requests ICT-ISS** to establish an ad hoc Inter-commission Task Team to work with GISCs to recommend a process for making decisions affecting the capacity management of WIS networks, in particular the WIS Core Network and the GISC cache. The Task Team should also consider the need for this decision‑making process to resolve issues that the collaborative mechanisms established by GISCs are unable to resolve;

**Requests the Secretary‑General** to make available the necessary resources to support the work of this ad hoc Inter-commission Task Team.

**Draft Recommendation 3.2(1)/1 (CBS-Ext.(2014))**

**Critical Role of WIS Networks**

THE COMMISSION FOR BASIC SYSTEMS,

**Noting:**

(1) Resolution 1 (Cg-XVI) - World Weather Watch Programme for 2012–2015,

(2) WMO-No.1060 - Manual on the WMO Information System,

**Recognizing:**

(1) The increasing requirement for the global exchange of all types of environmental data in addition to the established on-going exchange of meteorological data and products under the auspices of the WWW and other WMO Programmes, including GFCS,

(2) The basic responsibility of Members and their NMHSs to provide universal services in support of safety, security and economic benefits for the peoples of their countries,

(3) The dependence of Members and their NMHSs on the stable, cooperative international exchange of meteorological and related data and products for discharging their responsibilities,

(4) The continuing requirement for Governments to provide for the meteorological infrastructure of their countries,

(5) The continuing need for, and benefits from, strengthening the capabilities of NMHSs, in particular in developing countries, to improve the provision of services,

(6) The dependence of the research and education communities on access to meteorological and related data and products,

**Recommends** Cg-17 consider the important role of information exchange between NMHS with an aim to having inter NMHS information exchange recognized within the United Nations as a critical component of ensuring public and economic safety and well-being.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Draft Recommendation** **3.2(1)/2 (CBS-Ext.(2014))**

**Updates to the Manual on the WMO Information System**

THE COMMISSION FOR BASIC SYSTEMS,

**Noting:**

(1) Resolution 1 (Cg-XVI) – World Weather Watch Programme for 2012-2013,

(2) Resolution 4 (Cg-XVI) – Report of the extraordinary session (2010) of the Commission for Basic Systems relevant to Technical Regulations concerning the Global Telecommunication System, data management and the WMO Information System,

(3) Resolution 51 (Cg-XVI) – Designation of Centres of the WMO Information System,

(4) Resolution 12 (EC-64) – Amendments to the Manual on the WMO Information System (WMO‑No. 1060),

(5) Resolution 13 (EC-65) – Amendments to the Manual on the WMO Information System (WMO‑No. 1060),

(6) [WMO‑No. 1060 *Manual on the WMO Information System*](http://library.wmo.int/opac/index.php?lvl=notice_display&id=9254#.U8Y_mPmSxxA),

**Noting further:**

(1) That WIS Implementation Plans are underway in Regions II, III, V and VI and are being developed for Regions I and IV,

(2) That many candidate WMO Information System centres have now successfully undergone technical assessment,

**Considering** the recommendations from the Implementation Coordination Team on Information Systems and Services reflecting the experience of making the WMO Information System operational,

**Recommends** the following modifications to [WMO‑No. 1060 *Manual on the WMO Information System*, to take effect from 1 July 2015](http://library.wmo.int/opac/index.php?lvl=notice_display&id=9254#.U8Y_mPmSxxA):

(1) To improve the clarity and consistency of that Manual as described in Annex 1 to this Recommendation;

(2) To remove the conditional reference to centres’ designations as described in Annex 2, Table 1 to this Recommendation;

(3) To remove the conditional reference to centres’ designations and to add designated centres as described in Annex 2, Table 2 to this Recommendation;

(4) To remove centres, other than GISC Casablanca, with conditional designation from Appendix B of the Manual that have not demonstrated their WIS compliance to CBS;

(5) To amend Parts II and IV of the Manual as indicated in Annex 3 to this Recommendation,

**Encourages** those centres listed in Annex 2, Table 2 to this Recommendation that have not been “Endorsed” by CBS to complete the WIS Demonstration Process as soon as possible;

**Requests** the Secretary-General to make the amendments to the Manual as given in Annexes 2 and 3 to the present Recommendation;

**Authorizes** the Secretary-General:

(1) To update this recommendation to incorporate written notifications from CBS, regional associations and GISCs;

(2) To make any consequent editorial amendments.

\_\_\_\_\_\_\_\_\_\_

**Annex 1 to Draft Recommendation 3.2(1)/2 (CBS-Ext.(2014))**

**Consistency and Clarification of WMO-No. 1060**

Changes resulting from changes to WMO Technical Regulations

**1. Make the following changes in Part I**

1.1.1 In keeping with the Technical Regulations (WMO-No. 49), Volume I, ~~A.3~~Part I, 3.3.2, centres operated by WMO Members …

1.5 Discovery, access and retrieval function

As required per the Technical Regulations (WMO-No. 49), Volume I, ~~A.3~~Part I, 3.3.5, WIS shall be based on catalogues that …

**2. Make the following changes in Part II**

2.1.2 As required per the Technical Regulations (WMO-No. 49), Volume I, ~~A.3~~Part I, 3.3.3, Congress …

2.4.1 Background

As required per the Technical Regulations (WMO-No. 49), Volume I, ~~A.3~~Part I, 3.3.8, each NC shall use WIS …

3.7.1.1 As required per the Technical Regulations (WMO-No. 49), Volume I, ~~A.3~~Part I, 3.3.8, each NC shall use WIS …

3.7.5.1 As required per the Technical Regulations (WMO-No. 49), Volume I, ~~A.3~~Part I, 3.3.9, each NC shall …

**3. Make the following changes in Appendix C, Part 1. WMO Core Metadata Profile Version 1.3 Specification: Conformance Requirements**

2.1 Conformance requirements

The WMO Technical Regulations (WMO-No. 49) paragraph ~~A.3.3~~Part I, 3.3.5 states:

~~A.3.3.4 WIS functions and operation shall be based on catalogues that contain metadata describing data and products available across WMO, plus metadata describing dissemination and access options. […]~~

3.3.5 The WMO Information System functions and operation shall be based on catalogues that contain metadata for data and products available across WMO, and metadata describing dissemination and access options. These catalogues shall be maintained by WMO Information System Centres.

**4. Make the following changes in Appendix A, Selected WMO documents relevant to WIS**

**Policy documents**

WMO-No. 15 Basic Documents No. 1 ~~(2011 edition)~~

**Guides**

…

WMO-No. 1061 Guide to the WMO Information System

WMO-No. 1116 Guide on VPN via the Internet between GTS centres

WMO-No. 1115 Guide on IT Security

…

~~Miscellaneous (GTS)~~

~~Guide on VPN via the Internet between GTS centres~~

~~Guide on IT Security~~

**5. Make the following changes to clarify meaning and readability**

3.5.6.2 See also 4.9, WIS-TechSpec-8 (DAR catalogue search and retrieval) and 4.10, WIS-TechSpec-9 (Consolidated view of distributed DAR metadata (WIS Discovery Metadata) catalogues).

3.6.8.2 See also 4.9, WIS-TechSpec-8 (DAR catalogue search and retrieval) and 4.10, WIS-TechSpec-9 (Consolidated view of distributed DAR metadata (WIS Discovery Metadata) catalogues).

In the list in paragraph 4.1.1, **change** item 9 to:

9. Consolidated view of distributed DAR metadata (WIS Discovery Metadata) catalogues;

4.2.2 Uploading shall use methods prescribed by the receiver, which is typically the host of a WIS DAR metadata (WIS Discovery Metadata) catalogue.

4.2.4 For updating the DAR metadata (WIS Discovery Metadata) catalogue, GISCs should support two kinds of maintenance facilities: a file-upload facility for batch updating (add, replace or delete metadata records treated as separate files) and an online form for changing metadata entries in the DAR metadata (WIS Discovery Metadata) catalogue (add, change or delete elements in a record, as well as whole records).

4.2.5 GISCs shall maintain the updated DAR metadata (WIS Discovery Metadata) catalogue as a searchable resource (see WIS-TechSpec-8).

4.9 WIS-TechSpec-8: Discovery, access and retrieval metadata (WIS Discovery Metadata) catalogue search and retrieval

4.10.2 The exchange of metadata catalogue updates should satisfy the requirement for

distributed instances of DAR metadata (WIS Discovery Metadata) not …

**6. Make the following Changes to Appendix C to address confusion between Parts I and II of the Manual and Parts 1 and 2 of Appendix C**

In Appendix C, change the label for Part 1 to Part C1, and that for Part 2 to Part C2, and modify all cross-references within the Manual accordingly.

**7. Make the following change to clarify how information intended for global exchange is identified**

Add a note to paragraph 3.5.5.1

Note: The method used in WIS Discovery Metadata records to identify information intended for global exchange is defined in Appendix C, Part C1, requirement 9.1.1.

**8. Updates to improve the consistency and clarity of WMO-No. 1061 The Guide to the WMO Information System**

1 Make the following change in Part I

1.5.1 As required by Technical Regulations, Vol. I, Part I, ~~3~~3.3.5, and the Manual on WIS, 1.5, WIS is based on metadata catalogues describing data and products available across WMO, …

2 Make the following change in Part II in paragraph 2.2

2.2 Procedures for designating a Global Information System Centre (GISC) are given in the Manual on WIS, 2.2, in keeping with Technical Regulations, Volume I, Part I, ~~3~~3.3.3.

3 Make the following change in Part II in paragraph 2.3

2.3 Procedures for designating a DCPC are given in the Manual on WIS, 2.3, in keeping with Technical Regulations, Volume I, Part I, ~~3~~3.3.4.

**Annex 2 to Draft Recommendation 3.2(1)/2 (CBS-Ext.(2014))**

**WMO Information System Centres**

**Table 1 DCPCs to have conditional marker removed from Manual on WIS**

| **Member State or Org** | **Centre** | **ID no.** | **CBS Endorsement** | **Principal GISC** | **WIS Manual action.**1) Remove conditional marker (\*) from Manual on WIS2) Add to Manual on WIS |
| --- | --- | --- | --- | --- | --- |
| Croatia | Croatia MMC | 9 | Endorsed | Offenbach | 1) Remove conditional marker (\*) from Manual on WIS |
| Czech Republic | RTH Prague | 125 | Endorsed | Offenbach | 1) Remove conditional marker (\*) from Manual on WIS |
| Italy | RTH Rome | 97 | Endorsed | Offenbach | 1) Remove conditional marker (\*) from Manual on WIS |
| Saudi Arabia | RTH Jeddah | 13 | Endorsed | Jeddah | 1) Remove conditional marker (\*) from Manual on WIS |
| Serbia | RCC Belgrade | 147 | Endorsed | Offenbach | 1) Remove conditional marker (\*) from Manual on WIS |
| Sweden | RTH Norrkoping | 11 | Endorsed | Offenbach | 1) Remove conditional marker (\*) from Manual on WIS |
| USA | WMC Washington (RTH) | G7 | Endorsed | Washington | 1) Remove conditional marker (\*) from Manual on WIS |

**Table 2 DCPCs under review by CBS**

| **Member State or Organization** | **Centre** | **ID no.** | **CBS Endorsement** | **Principal GISC** | **Recommendation.** |
| --- | --- | --- | --- | --- | --- |
| ACMAD | RCC | 135 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| ACMAD | RSMC | 134 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Algeria | RTH Algiers | 20 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Argentina | RTH Buenos Aires | 107 | Under review | Brasilia | 3) Encouraged to complete certification |
| Argentina | RSMC Buenos Aires | 108 | Under review | Brasilia | ~~]~~ [3) Encouraged to complete certification |
| Argentina | VAAC Buenos Aires | 109 | Under review | Brasilia | 3) Encouraged to complete certification |
| Argentina | Regional Ozone Centre | 110 | Awaiting information | Brasilia | 3) Encouraged to complete certification |
| Argentina | Regional Instrument Centre | 111 | Awaiting information | Brasilia | 3) Encouraged to complete certification (Also needs CIMO endorsement) |
| Austria | RTH Vienna | 166 | Under review | Offenbach | 3) Encouraged to complete certification |
| Brazil | Marine Meteorological Center | 117 | Awaiting information | Brasilia | 3) Encouraged to complete certification (also needs JCOMM endorsement) |
| Egypt | RTH Cairo | 2 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Egypt | RSMC Cairo | 101 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Egypt | RIC Cairo | 102 | Awaiting information | Casablanca | 3) Encouraged to complete certification (Also needs CIMO endorsement) |
| Egypt | Regional Ozone Centre | 103 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Egypt | Regional Training Centre | 104 | Awaiting information | Casablanca | 3) Encouraged to complete certification  |
| Egypt | Regional Radiation Centre | 105 | Awaiting information | Casablanca | 3) Encouraged to complete certification  |
| Fiji | RSMC - TC | 106 | Awaiting information | Melbourne | 3) Encouraged to complete certification  |
| Finland | FMI-ARC | 16 | Awaiting information | Offenbach | 3) Encouraged to complete certification |
| France | ODC Toulouse | 124 | Endorsed | Toulouse | 2) Add to Manual on WIS |
| Germany | GRDC | 47 | Under review | Offenbach | 3) Encouraged to complete certification |
| India | RSMC-TC | 100 | Awaiting information | New Delhi | 3) Encouraged to complete certification |
| Indonesia | TCWC | - | Awaiting information | Melbourne | 3) Encouraged to complete certification |
| Indonesia | NWP ATM SE ASIA | - | Awaiting information | Melbourne | 3) Encouraged to complete certification |
| Indonesia | TRANSBOUNDARY FOREST FIRES | - | Awaiting information | Melbourne | 3) Encouraged to complete certification |
| Indonesia | IO Tsunami Warning Centre | - | Awaiting information | Melbourne | 3) Encouraged to complete certification |
| IODE | IODE Ocean Data Portal | 119 | Awaiting information | Exeter | 3) Encouraged to complete certification |
| Italy | RSMC Rome | 98 | Under review | Offenbach | 3) Encouraged to complete certification |
| JRC | GDACS | 169 | Under review | Offenbach | 3) Encouraged to complete certification |
| Japan | NICT (Space Weather) | 160 | Endorsed | Tokyo | 2) Add to Manual on WIS |
| Kenya | RTH Nairobi | 6 | Awaiting information | Offenbach | 3) Encouraged to complete certification |
| Kenya | RSMC Nairobi | 95 | Awaiting information | Offenbach | 3) Encouraged to complete certification |
| Kenya | RIC Nairobi | 95 | Awaiting information | Offenbach | 3) Encouraged to complete certification (Also needs CIMO endorsement) |
| Morocco | RSMC | 130 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Morocco | RIC/RMIC | 131 | Awaiting information | Casablanca | 3) Encouraged to complete certification (Needs CIMO and JCOMM endorsement) |
| Morocco | RSMC | 132 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Netherlands | RCC De Bilt | 21 | Awaiting information | Exeter | 3) Encouraged to complete certification |
| Netherlands | Satellite Centre De Bilt | 78 | Awaiting information | Exeter | 3) Encouraged to complete certification |
| New Zealand | RSMC Wellington | 13 | Under review | Melbourne | 3) Encouraged to complete certification |
| New Zealand | RTH Wellington | 79 | Under review | Melbourne | 3) Encouraged to complete certification |
| New Zealand | VAAC Wellington | 140 | Under review | Melbourne | 3) Encouraged to complete certification |
| Niger | RTH Niamey | 26 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Niger | AGRHYMET Niamey | 27 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Norway | Norwegian Institute for Air Research (NILU) | 115 | Awaiting information | Offenbach | 3) Encouraged to complete certification |
| Qatar | Gulf Marine Center | 146 | Endorsed | Jeddah | 2) Add to Manual on WIS |
| Russian Federation | Ocean Data Portal - Obninsk node | 130 | Awaiting information  | Moscow | 3) Encouraged to complete certification |
| Saudi Arabia | RSMC Jeddah | 80 | Awaiting information | Jeddah | 3) Encouraged to complete certification |
| Saudi Arabia | RDMEC (Drought) | 81 | Awaiting information | Jeddah | 3) Encouraged to complete certification |
| Senegal | RSMC Dakar | 94 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Senegal | RTH Dakar | 4 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Senegal | Dakar Aviation Data Centre | 93 | Awaiting information | Casablanca | 3) Encouraged to complete certification |
| Spain | MEDARE | 139 | Endorsed | Toulouse | 2) Add to Manual on WIS |
| Sweden | Baltrad  | 83 | Awaiting information | Offenbach | 3) Encouraged to complete certification |
| Sweden | IPY data repository | 82 | Withdrawn | Offenbach | Remove from Manual on WIS |
| Switzerland | GAWSIS (Switzerland) | 145 | Under review | Offenbach | 3) Encouraged to complete certification |
| Thailand | RTH Bangkok | 5 | Under review | Tokyo | 3) Encouraged to complete certification |
| Turkey | RCC Turkey (EEMC)  | 162 | Under review | Offenbach | 3) Encouraged to complete certification |
| United Kingdom of Great Britain and Northern Ireland | ODC Exeter | 123 | Awaiting information | Exeter | 3) Encouraged to complete certification |
| United Kingdom of Great Britain and Northern Ireland | BAS Cambridge | 142 | Under review | Exeter | 3) Encouraged to complete certification |
| United Kingdom of Great Britain and Northern Ireland | VAAC London | 137 | Awaiting information | Exeter | 3) Encouraged to complete certification |
| United Kingdom of Great Britain and Northern Ireland | WAFC London | 136 | Awaiting information | Exeter | 3) Encouraged to complete certification |
| USA | COMET | 144 | Under review | Washington | 3) Encouraged to complete certification |
| USA | NCAR | 3 | Under review  | Washington | 3) Encouraged to complete certification |
| USA | WAFC Washington | 28 | Awaiting information | Washington | 3) Encouraged to complete certification |
| USA | RSMC Miami  | 29 | Awaiting information | Washington | 3) Encouraged to complete certification |
| USA | RSMC Honolulu | 30 | Awaiting information | Washington | 3) Encouraged to complete certification |
| USA | NCEP | 31 | Awaiting information | Washington | 3) Encouraged to complete certification |
| USA | ARL | 32 | Awaiting information | Washington | 3) Encouraged to complete certification |
|  |  |  |  |  |  |
| USA | GOSIC | 33 | Awaiting information | Washington | 3) Encouraged to complete certification |
| USA | NODC | 34 | Awaiting information | Washington | 3) Encouraged to complete certification |
| USA | NGDC | 35 | Awaiting information | Washington | 3) Encouraged to complete certification |
| USA | NESDIS | 36 | Awaiting information | Washington | 3) Encouraged to complete certification |
| Uzbekistan | RTH Tashkent | 18 | Awaiting information | Seoul | 3) Encouraged to complete certification |

**Annex 3 to Draft Recommendation 3.2(1)/2 (CBS-Ext.(2014))**

**WMO Information System Compliance**

 Additions to WMO-No. 1060 - Manual on WIS

**1. Insert the following text into Part II of WMO-No. 1060 Manual on the WMO Information System relating to WIS Centres’ compliance**

2.5 Rolling review of WIS Centres

2.5.1 Background

The on-going performance of WIS relies on the continued compliance of WIS centres to agreed standards and practices. In order to ensure GISCs, DCPCs and NCs maintain their WIS compliance, centres should maintain a rolling review of their compliance with WIS standards and practices.

2.5.2 Responsibility

Members are responsible for maintaining compliance of centres with WIS standards and practices. CBS will oversee and support the rolling review processes with an aim to confirming a centre’s compliance every eight years for NCs and DCPCs and every four years for GISCs.

2.5.3 Procedure

CBS will maintain guidelines for the rolling review of WIS centres in the Guide to the WMO Information System (WMO No 1061).

**2. Modify the following text to Part IV of the WMO-No. 1060 Manual on the WMO Information System relating to WIS technical specifications**

4.1 General

4.1.1 There are 15 technical specifications (WIS TechSpecs) that define the interfaces to the major WIS functions. The specifications for these interfaces are described in more detail in Appendix D and are named and numbered as follows:

…

4.1.6 The GTS file-naming convention shall be used for files and the associated metadata record whenever necessary. The GTS file-naming convention is documented in the Manual on the Global Telecommunication System (WMO-No. 386), Volume 1, Part II, Attachment II-15.

~~Note: The Guide to the WMO Information System (WMO-No. 1061), 4.1, references “WIS compliance specifications for GISCs, DCPCs and NCs”, provided as supplementary guidance for WIS centres.~~

**3. Insert the following text to introduce Appendix D, WMO-No. 1060 Manual on the WMO Information System relating to WIS technical specifications**

**APPENDIX D. WIS TECHNICAL SPECIFICATIONS**

***WIS-TechSpec-1, Uploading of Metadata for Data and Products***

|  |  |
| --- | --- |
| Applicable Standards | content: ISO 19115, WMO Core Metadata Profilefile naming convention (associates file to its metadata): documented in GTS Manual, Vol. 1, Part II, Attachment II-15 communication: TBD by host of DAR Metadata Catalogue (typical communication types are listed below) |
| Communication Types | terminal-host; store-and-forward or file transferclient-server; request-response (e.g., HTTP Post) |
| Service Level Required | mix of dedicated and public services |
| Network Transports and Supporting Services | various transports, which may include encryption (TBD as needed for connection to host server) |
| Performance MetricsDAR Metadata | must be transmitted prior to the file associated with the metadata |
| Use Cases | WIS Technical Specification Appendix E Use Cases: B.1, Provide Metadata for Data or Product |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | provide metadata catalogue across all GISCs of data, products, and services; assure catalogue interoperability using ISO 23950 search and geospatial services; catalogue WIS contributions in GEOSS Clearinghouse; use ISO 19115 and the WMO core metadata profile; standardize practices for electronic archival of metadata; provide metadata with quality indications to enable search, retrieval, and archiving; use ISO standards for references to specific places on the Earth; draw on existing Spatial Data Infrastructure (SDI) components as institutional and technical precedents; [each DCPC] implements backup and recovery of essential services; use dedicated telecommunications and public Internet for timely delivery; [each GISC] receives from NCs and DCPCs within its area of responsibility the data and products intended for global exchange |
| Notes: | This interface builds on existing GTS practice, adding the particular standard format for WIS metadata about data, products, and services.For updating the DAR Metadata Catalogue, WIS Centres should support two kinds of maintenance facilities: a file upload facility for "batch" updating (add, replace, or delete metadata records treated as separate files); and an online form for changing metadata entries in the DAR Metadata Catalogue (add, change, or delete of elements in a record as well as whole records).WIS Centres need to maintain the updated DAR Metadata Catalogue as a searchable resource offered to all authorized searchers (see WIS‑TechSpec‑8). WIS Centres are required to communicate all changes to each physically distributed part of the logically centralized DAR Metadata Catalogue (see WIS‑TechSpec‑9). |

***WIS-TechSpec-2, Uploading of Data and Products***

|  |  |
| --- | --- |
| Applicable Standards | GTS Manual, A.II-2 and other WMO manual(s), specific to programmes file naming convention (associates file to its metadata):documented in GTS Manual, Vol. 1, Part II, Attachment II-15 |
| Communication Types | terminal-host; store-and-forward or file transferclient-server; request-response  |
| Service Level Required | dedicated bandwidth and high reliability |
| Network Transports and Supporting Services | GTSpublic or private Internet using TCP/IP with encryption |
| Performance Metricsproducts and data | must be handled as specified in Part I, 1.3 Design Principles of the GTS [GTS‑Manual], and other WMO manual(s), specific to programmes  |
| Use Cases | WIS Technical Specification Appendix E Use Cases: B.2, Upload Data or Product to DCPC or GISC |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | make WMO Resolution 40 data available through GEOSS interoperable arrangements; use ISO standards for references to specific places on the Earth; harmonize data formats, transmission, archiving and distribution across disciplines; [each DCPC] implements backup and recovery of essential services; use WWW communication links for high priority real-time data; use dedicated telecommunications for the collection and dissemination of time-critical and operation-critical data and products; support rapid access and integration of real-time and non real-time (archive) data sets; identify and use a variety of data types across WMO programmes; [each NC] collects national data; [each NC] generates and disseminates products for national use; [each NC] uploads data and products intended for global exchange to its associated GISC (and DCPC where applicable); [each DCPC] collects programme-specific data and products; [each DCPC] collects the data and products intended for dissemination to NCs within its area of responsibility; [each DCPC] uploads data and products intended for global exchange to its associated GISC; [each GISC] receives from NCs and DCPCs within its area of responsibility the data and products intended for global exchange |
| Notes | This interface builds on existing GTS practice, supplemented with other file transfer mechanisms such as the Internet.Although it is required that data arrives only after its associated metadata, a grace period of two minutes is allowed before the data file is regarded as erroneous. |

***WIS-TechSpec-3, Centralization of Globally Distributed Data***

|  |  |
| --- | --- |
| Applicable Standards | GTS Manual, Attachment I-3 |
| Communication Types | terminal-host; store-and-forward or file transfer |
| Service Level Required | dedicated bandwidth and high reliability |
| Network Transports and Supporting Services | GTS  |
| Performance Metricsglobal information | some of the operation-critical data intended for global distribution is to be transmitted end-to-end within two minutes  |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.4, Manage Cache of Data across GISCs |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | standardize practices for electronic archival of metadata; harmonize data formats, transmission, archiving and distribution across disciplines; [each GISC] exchanges with other GISCs the data and products intended for global exchange; [each GISC] provides coordination and mutual backup with other GISCs; [each GISC] holds the data and products intended for global exchange for at least 24 hours; use dedicated telecommunications for the collection and dissemination of time-critical and operation-critical data and products; support rapid access and integration of real-time and non real-time (archive) data sets; identify and use a variety of data types across WMO programmes; [each GISC] receives from NCs and DCPCs within its area of responsibility the data and products intended for global exchange; [each GISC] disseminates the data and products intended for global exchange within its area of responsibility. |
| Notes | The set of WMO data and products required to be cached for 24 hours at the GISCs is that designated as "intended for global dissemination". This does not encompass all of the material handled by IGDDS.Although the cache of data and products intended for global distribution generally is required to be current across all GISCs to within 15 minutes, operation-critical data such as hazard warnings must be current to within two minutes. The cache size is expected to grow from one gigabyte per day. The cache needs to be highly accurate and the system for logical centralization needs to be affordable and robust; single points of failure and complex procedures are not acceptable.At this point in WIS system design, multiple methods can be envisioned for centralizing the distributed cache. One approach is that all of the GISCs would be subscribed to receive all message traffic. For performance efficiency with adequate redundancy among up to ten GISCs, GISC subscriptions would be arranged in up to three tiers.  |

***WIS-TechSpec-4, Maintenance of User Identification and Role Information***

|  |  |
| --- | --- |
| Applicable Standards | standards for content and communications are TBD by host of identification and role information database |
| Communication Types | terminal-host; store-and-forward or file transfer (e.g., FTP, HTTP)client-server; request-response (e.g., HTTP with CGI Web form) |
| Service Level Required | non-dedicated shared network may be used, provided there is privacy protection for identified individuals as required by national laws |
| Network Transports and Supporting Services | public or private Internet using TCP/IP with encryption;typically HTTP with GET or POST methods, and may include SOAP |
| Performance Metricsidentification and role information | the timeliness of changes to user identification and role information is application-specific and subject to NC or DCPC procedures |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.5, Maintain Identification and Role Information for WIS Users |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | use ISO standards for references to specific places on the Earth; harmonize data formats, transmission, archiving and distribution across disciplines; [each NC] authorizes its national users to access WIS; [each  DCPC] supports access to data and products via Internet request/reply; [each DCPC] implements backup and recovery of essential services; use dedicated telecommunications and public Internet for timely delivery; identify and use a variety of data types across WMO programmes |
| Notes | For updating the identification and role information concerning candidate or current users of WIS, WIS Centres should support two kinds of maintenance facilities: a file upload facility for "batch" updating (add, replace, or delete identification and role records treated as separate files); and an online form for changing individual identification and role entries (add, change, or delete of elements in a record as well as whole records). |

***WIS-TechSpec-5, Consolidated View of Distributed Identification and Role Information***

|  |  |
| --- | --- |
| Applicable Standards | TBD by host of particular identification and role information collection(typical communication types are listed below) |
| Communication Types | terminal-host; store-and-forward or file transferclient-server; request-response (e.g., HTTP Post) |
| Service Level Required | mix of dedicated and public services, provided there is privacy protection for identified individuals as required by national laws |
| Network Transports and Supporting Services | various transports, which may include encryption (TBD as needed for connection to host server) |
| Performance Metricscurrency | collections of user identification and role information should be current to intervals no more than half the currency required by the affected WIS Centres (see WIS‑TechSpec‑4) |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.5, Maintain Identification and Role Information for WIS Users |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | use ISO standards for references to specific places on the Earth; harmonize data formats, transmission, archiving and distribution across disciplines; draw on existing Spatial Data Infrastructure (SDI) components as institutional and technical precedents; [each NC] authorizes its national users to access WIS; [each DCPC] implements backup and recovery of essential services; [each GISC] provides coordination and mutual backup with other GISCs; use dedicated telecommunications and public Internet for timely delivery; identify and use a variety of data types across WMO programmes |
| Notes | Administrators of authentication and authorization at WIS Centres need to share updated identification and role information as a resource available across WIS Centres. Yet, it is necessary to prevent the inappropriate disclosure of any personally identifiable information. This aspect is complicated by the requirement for international data access to make use of authentication mechanisms at the level of national organizations. At this point in WIS system design, mechanisms have not been decided for handling identification and role information as needed across WIS centres.  |

***WIS-TechSpec-6, Authentication of a User***

|  |  |
| --- | --- |
| Applicable Standards | standards used by commercial, off-the-shelf authentication software; may include PKI (public key infrastructure) |
| Communication Types | client-server; request-response; stateless transaction |
| Service Level Required | dedicated bandwidth and high reliability, including privacy protection for identified individuals as required by national laws |
| Network Transports and Supporting Services | public or private Internet using TCP/IP with encryption |
| Performance MetricsResponse TimeRequest RateConcurrency | maximum: 2 seconds per authentication requestminimum: 40 authentication requests per secondminimum: 20 active sessions |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.5, Maintain Identification and Role Information for WIS Users |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | harmonize data formats, transmission, archiving and distribution across disciplines; [each NC] authorizes its national users to access WIS; [each DCPC] implements backup and recovery of essential services; [each GISC] provides coordination and mutual backup with other GISCs; use WWW communication links for high priority real-time data; use dedicated telecommunications and public Internet for timely delivery |
| Notes | The client sends to the authentication server an authentication request for a particular user whose identification and credentials are included in the request. The authentication server references the consolidated identification and role information resource for WIS and returns an authentication response. That response either confirms or denies that the identified user has provided sufficient credentials. |

***WIS-TechSpec-7, Authorization of a User Role***

|  |  |
| --- | --- |
| Applicable Standards | standards used by governments for user authorization software |
| Communication Types | client-server; request-response; stateless transaction |
| Service Level Required | dedicated bandwidth and high reliability |
| Network Transports and Supporting Services | public or private Internet using TCP/IP with encryption |
| Performance MetricsResponse TimeRequest RateConcurrency | maximum: 2 seconds per authorization requestminimum: 40 authorization requests per secondminimum: 20 active sessions |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.5, Maintain Identification and Role Information for WIS Users |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | harmonize data formats, transmission, archiving and distribution across disciplines; [each NC] authorizes its national users to access WIS; [each DCPC] implements backup and recovery of essential services; [each GISC] provides coordination and mutual backup with other GISCs; use WWW communication links for high priority real-time data; use dedicated telecommunications and public Internet for timely delivery |
| Notes | The client sends to the authorization server an authorization request for a particular user whose identification is included in the request. The authorization server references the consolidated identification and role information resource for WIS and returns an authorization response. That response either contains a list of the authorised roles for the user or denies that the identified user has any authorised roles. |

***WIS-TechSpec-8, DAR Catalogue Search and Retrieval***

|  |  |
| --- | --- |
| Applicable Standards | ISO 23950 Information Search and Retrieval Protocol [ISO-23950] including GEO Profile and SRU (Search and Retrieve via URL) Profile WMO Core Profile of the ISO Metadata Standard [IPET-MI(07)] |
| Communication Types | client-server; request-response |
| Service Level Required | non-dedicated shared network |
| Network Transports and Supporting Services | public or private Internet using TCP/IP which may include encryption; typically HTTP with GET or POST methods, and may include SOAP |
| Performance MetricsResponse TimeSearch Request RateConcurrency | maximum: 2 seconds per requestminimum: 40 keyword and bounding box searches per secondminimum: 20 active sessions |
| Applicable Use Cases | WIS Technical Specification Appendix B, Use Case: B.6, Discover Data or Products |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | provide metadata catalogue across all GISCs of data, products, and services; assure catalogue interoperability using ISO 23950 search and geospatial services; catalogue WIS contributions in GEOSS Clearinghouse; use ISO 19115 and the WMO core metadata profile; standardize practices for electronic archival of metadata; provide metadata with quality indications to enable search, retrieval, and archiving; make WMO Resolution 40 data available through GEOSS interoperable arrangements; use ISO standards for references to specific places on the Earth; harmonize data formats, transmission, archiving and distribution across disciplines; draw on existing Spatial Data  Infrastructure (SDI) components as institutional and technical precedents; [each DCPC] supports access to data and products via Internet request/reply; [each DCPC] implements backup and recovery of essential services; [each GISC] provides coordination and mutual backup with other GISCs; use public Internet for Data Discovery, Access and Retrieval; support rapid access and integration of real-time and non real-time (archive) data sets; identify and use a variety of data types across WMO programmes; support WIS as a GEOSS component with a core role |
| Notes | The procedures for designation of a GISC or DCPC require that both type of WIS centre maintain data, product and service catalogues in the WMO-agreed standard format and facilitate access to these catalogues. Therefore, network services should be treated as a type of WIS product that can be discovered through the DAR catalogue.  |

***WIS-TechSpec-9, Consolidated View of Distributed DAR Metadata Catalogues***

|  |  |
| --- | --- |
| Applicable Standards | TBD by host of particular DAR Metadata Catalogue instance(typical communication types are listed below) |
| Communication Types | terminal-host; store-and-forward or file transferclient-server; request-response (e.g., HTTP Post) |
| Service Level Required | mix of dedicated and public services |
| Network Transports and Supporting Services | various transports, which may include encryption (TBD as needed for connection to host server) |
| Performance Metricscurrency | distributed instances of DAR Metadata should not diverge in content by more than one day |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.6, Discover Data or Products |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | provide metadata catalogue across all GISCs of data, products, and services; assure catalogue interoperability using ISO 23950 search and geospatial services; catalogue WIS contributions in GEOSS Clearinghouse; use ISO 19115 and the WMO core metadata profile; standardize practices for electronic archival of metadata; provide metadata with quality indications to enable search, retrieval, and archiving; make WMO Resolution 40 data available through GEOSS interoperable arrangements; use ISO standards for references to specific places on the Earth; harmonize data formats, transmission, archiving and distribution across disciplines; draw on existing Spatial Data Infrastructure (SDI) components as institutional and technical precedents; [each DCPC] supports access to data and products via Internet request/reply; [each DCPC] implements backup and recovery of essential services; [each GISC] provides coordination and mutual backup with other GISCs; use public Internet for Data Discovery, Access and Retrieval; support WIS as a GEOSS component with a core role |
| Notes | At this point in WIS system design, multiple methods can be envisioned for logically centralizing the physically distributed DAR Metadata Catalogue. At a meeting of the ET-WISC (Geneva,2010), the first set of GISCs decided to use OAI-PMH version 2.0 initially.  |

***WIS-TechSpec-10, Downloading Files via Dedicated Networks***

|  |  |
| --- | --- |
| Applicable Standards | GTS Manual, A.II-2 and other WMO manual(s), specific to programmes  |
| Communication Types | terminal-host; file transferbroadcast or multicastclient-server; publish-subscribe or request-response |
| Service Level Required | dedicated bandwidth and high reliability |
| Network Transports and Supporting Services | GTSIGDDS satellite broadcast (radio or television frequencies) public or private Internet using TCP/IP with encryption |
| Performance Metricsoperation-critical data | must be handled as specified in Part I, 1.3 Design Principles of the GTS [GTS‑Manual], and other WMO manual(s), specific to programmes  |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.7, Ad Hoc Request for Data or Product ("Pull")B.8, Subscribe to Data or Product ("Push")B.9, Download Data or Product from WIS Centre |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | harmonize data formats, transmission, archiving and distribution across disciplines; draw on existing Spatial Data Infrastructure (SDI) components as institutional and technical precedents; [each DCPC] supports access to data and products via Internet request/reply; [each GISC] provides coordination and mutual backup with other GISCs; [each GISC] holds the data and products intended for global exchange for at least 24 hours; use WWW communication links for high priority real-time data; use dedicated telecommunications for the collection and dissemination of time-critical and operation-critical data and products; support rapid access and integration of real-time and non real-time (archive) data sets; identify and use a variety of data types across WMO programmes; [each NC] generates and disseminates products for national use; [each DCPC] disseminates data and products intended for regional exchange; [each GISC] disseminates the data and products intended for global exchange within its area of responsibility |
| Notes |  |

***WIS-TechSpec-11, Downloading Files via Non-dedicated Networks***

|  |  |
| --- | --- |
| Applicable Standards | WMO manual(s), specific to programmes  |
| Communication Types | terminal-host; file transferbroadcast or multicastclient-server; publish-subscribe or request-response |
| Service Level Required | non-dedicated shared network |
| Network Transports and Supporting Services | IGDDS satellite broadcast (radio or television frequencies) public or private Internet using TCP/IP which may include encryption |
| Performance Metrics | GTS Manual, Vol. 1, Part II, Attachment II-15, or as otherwise specified in WMO manual(s), specific to programmes (non-dedicated network should not be used for operation-critical data) |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.7, Ad Hoc Request for Data or Product ("Pull")B.8, Subscribe to Data or Product ("Push")B.9, Download Data or Product from WIS Centre |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | harmonize data formats, transmission, archiving and distribution across disciplines; [each DCPC] supports access to data and products via Internet request/reply; [each GISC] provides coordination and mutual backup with other GISCs; [each GISC] holds the data and products intended for global exchange for at least 24 hours; use dedicated telecommunications and public Internet for timely delivery; use public Internet for Data Discovery, Access and Retrieval; support rapid access and integration of real-time and non real-time (archive) data sets; identify and use a variety of data types across WMO programmes; [each NC] generates and disseminates products for national use; [each DCPC] disseminates data and products intended for regional exchange; [each GISC] disseminates the data and products intended for global exchange within its area of responsibility |
| Notes |  |

***WIS-TechSpec-12, Downloading Files via Other Methods***

|  |  |
| --- | --- |
| Applicable Standards | WMO manual(s), specific to programmes  |
| Communication Types | facsimile, shipping of physical media, etc. |
| Service Level Required | priority delivery for operation-critical data |
| Network Transports and Supporting Services | various |
| Performance Metricsoperation-critical dataother data/products | must be handled as specified in Part I, 1.3 Design Principles of the GTS [GTS‑Manual], and other WMO manual(s), specific to programmes as specified in WMO manual(s), specific to programmes  |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.7, Ad Hoc Request for Data or Product ("Pull")B.8, Subscribe to Data or Product ("Push")B.9, Download Data or Product from WIS Centre |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | provide metadata with quality indications to enable search, retrieval, and archiving; harmonize data formats, transmission, archiving and distribution across disciplines; draw on existing Spatial Data Infrastructure (SDI) components as institutional and technical precedents; [each DCPC] supports access to data and products via Internet request/reply; [each DCPC] implements backup and recovery of essential services; [each GISC] provides coordination and mutual backup with other GISCs; [each GISC] holds the data and products intended for global exchange for at least 24 hours; identify and use a variety of data types across WMO programmes; [each NC] generates and disseminates products for national use; [each DCPC] disseminates data and products intended for regional exchange; [each GISC] disseminates the data and products intended for global exchange within its area of responsibility |
| Notes |  |

***WIS-TechSpec-13, Maintenance of Dissemination Metadata***

|  |  |
| --- | --- |
| Applicable Standards | standards for content and communications are TBD by host of Dissemination Metadata database |
| Communication Types | terminal-host; store-and-forward or file transferclient-server; request-response (e.g., HTTP with CGI Web form) |
| Service Level Required | mix of dedicated and public services |
| Network Transports and Supporting Services | public or private Internet using TCP/IP which may include encryption; typically HTTP with GET or POST methods, and may include SOAP |
| Performance Metricsdissemination metadata changes | GTS has required that requests for changes to dissemination metadata are submitted 2 months before delivery is to begin |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.10, Provide Dissemination Metadata |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | provide metadata with quality indications to enable search, retrieval, and archiving; use ISO standards for references to specific places on the Earth; harmonize data formats, transmission, archiving and distribution across disciplines; [each DCPC] implements backup and recovery of essential services; [each GISC] provides coordination and mutual backup with other GISCs; use WWW communication links for high priority real-time data; use dedicated telecommunications for the collection and dissemination of time-critical and operation-critical data and products; use dedicated telecommunications and public Internet for timely delivery; support rapid access and integration of real-time and non real-time (archive) data sets; [each NC] generates and disseminates products for national use; [each NC] uploads data and products intended for global exchange to its associated GISC (and DCPC where applicable); [each DCPC] disseminates data and products intended for regional exchange; [each DCPC] uploads data and products intended for global exchange to its associated GISC; [each GISC] disseminates the data and products intended for global exchange within its area of responsibility |
| Notes | For updating the Dissemination Metadata, WIS Centres should support two kinds of maintenance facilities: a file upload facility for "batch" updating (add, replace, or delete metadata records treated as separate files); and an online form for changing individual entries (add, change, or delete of elements in a record as well as whole records).WIS Centres are required to communicate all changes to each physically distributed part of the logically centralized Dissemination Metadata (see WIS‑TechSpec‑14). The plan is for population of the DAR Metadata to be accomplished centrally, based on an offer from Meteo France to generate DAR metadata from Volume C1 of WMO Publication No. 9. Because full transition of WMO centres to the new metadata will occur over some time, procedures are required to assure that changes to either set of metadata are reflected in both. |

***WIS-TechSpec-14, Consolidated View of Distributed Dissemination Metadata Catalogues***

|  |  |
| --- | --- |
| Applicable Standards | TBD by host of particular dissemination metadata collection(typical communication types are listed below) |
| Communication Types | terminal-host; store-and-forward or file transferclient-server; request-response (e.g., HTTP Post) |
| Service Level Required | mix of dedicated and public services |
| Network Transports and Supporting Services | various transports, which may include encryption (TBD as needed for connection to host server) |
| Performance Metricscurrency | distributed instances of dissemination metadata should not diverge in content by more than one week |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.10, Provide Dissemination Metadata |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | provide metadata catalogue across all GISCs of data, products, and services; provide metadata with quality indications to enable search, retrieval, and archiving; harmonize data formats, transmission, archiving and distribution across disciplines; [each DCPC] implements backup and recovery of essential services; [each GISC] provides coordination and mutual backup with other GISCs; use WWW communication links for high priority real-time data; use dedicated telecommunications for the collection and dissemination of time-critical and operation-critical data and products; use dedicated telecommunications and public Internet for timely delivery; support rapid access and integration of real‑time and non real-time (archive) data sets; identify and use a variety of data types across WMO programmes; [each NC] uploads data and products intended for global exchange to its associated GISC (and DCPC where applicable); [each DCPC] disseminates data and products intended for regional exchange; [each DCPC] uploads data and products intended for global exchange to its associated GISC; [each GISC] disseminates the data and products intended for global exchange within its area of responsibility |
| Notes | Dissemination Metadata as updated at WIS Centres must be available across WIS Centres. At this point in WIS system design, mechanisms have not been decided for how this sharing will be accomplished.  |

***WIS-TechSpec-15, Reporting of Quality of Service***

|  |  |
| --- | --- |
| Applicable Standards | standards for content and communications are TBD by host of centralized reporting database |
| Communication Types | terminal-host; store-and-forward or file transfer (e.g., FTP, HTTP)client-server; request-response (e.g., HTTP with CGI Web form) |
| Service Level Required | non-dedicated shared network |
| Network Transports | public or private Internet using TCP/IP which may include encryption; typically HTTP with GET or POST methods, and may include SOAP |
| Performance Metricsreports | sent on a schedule determined by the centralized reporting manager based on the needs of WIS Centres |
| Use Cases | WIS Technical Specification Appendix B Use Cases: B.11, Report Quality of Service across WIS Centres |
| WIS Requirements(in addition to requirements applicable to all interfaces)  | use ISO standards for references to specific places on the Earth |
| Notes | As noted in Use Case B.11, agreements on service levels can be anticipated eventually for WIS operations. These should include data and network security as well as performance and reliability.Although not yet addressed in WIS system design, performance reports can be generated efficiently by having each WIS Centre upload its reports to a single analysis site within a fixed time window. |

**Draft Recommendation** **3.2(1)/3 (CBS-Ext.(2014)) -**

**Updates to WMO‑No. 1061 - Guide to the WMO Information System**

THE COMMISSION FOR BASIC SYSTEMS,

**Noting:**

(1) Resolution 14 (EC-65) on Quality Management and Infrastructure Development of the WMO Information System,

(2) WMO-No. 1060 - Manual on the WMO Information System,

(3) WMO-No. 1061 - Guide to the WMO Information System,

(4) WMO-No.49, Volume I, Part II, Section 5 “Competence of Meteorological, Hydrological and Climatological Personnel”,

**Recommends** the following modifications to WMO-No.1061 *Guide to the WMO Information System*:

(1) To add Part VI on Operational Guidance as described in Annex 1 to this Recommendation;

(2) To add an appendix to the Guide containing annexes to paragraphs within the guide as described in Annex 2 to this Recommendation;

(3) To add an appendix to the Guide containing Use Cases supporting the WIS Technical Specifications provided in The Manual on the WMO Information System (WMO-No. 1060) as described in Annex 3 to this Recommendation;

(4) To add an appendix to the Guide containing Demonstration Test Cases supporting the WIS centre demonstration process for GISCs, DCPCs and NCs as described in Annex 4 to this Recommendation;

(5) To add the WIS Competencies (Annex 5 to this Recommendation) and WIS Training and Learning Guide (Annex 6 to this Recommendation) to WMO-No.49 Volume I, Part II, Section 5 “Competence of Meteorological, Hydrological and Climatological Personnel” and its associated;

**Encourages Members** to, in the interim, use of the WIS Competencies and WIS Training and Learning Guide described in Annexes 5 and 6 to this Recommendation;

**Requests the Secretary‑General** to prepare appropriate text for inclusion in WMO-No. 1060 - Manual on the WMO Information System and WMO-No. 1061 - Guide to the WMO Information System linking the WIS Competencies and WIS Training and Learning Guide to WMO-No. 49, Volume I, Part II, section on competencies.

\_\_\_\_\_\_\_\_\_\_

**Annex 1 to Draft Recommendation 3.2(1)/3 (CBS-Ext.(2014)) -**

**WMO Information System Operational Guidance - New Part VI**

**1. Insert the following text to introduce Part VI of the Guide to the WMO Information System (WMO No 1061) relating to WIS operational practices**

**PART VI. OPERATIONAL GUIDANCE**

**6.1 General**

The Manual on the WMO Information System defines practices and procedures based on specific standards defined in Part IV of the Manual that are to be used by centres contributing to WIS. Part VI of this Guide to the WMO Information System is being developed and will contain information on the agreed operational practices that are considered to be stable and slow changing. Other guidance on agreed or recommended practices for WIS centres may be found at <http://wis.wmo.int/WIS_Operations>.

**6.2 GISC support to NCs and DCPCs**

6.2.1 A GISC is expected to provide the following support activities to the centres (NCs and DCPCs) in its area of responsibility.

***Operation coordination***

6.2.2 Each GISC should organize regular meetings with the WIS National and WIS Centre Focal Points for those centres belonging to its AMDCN to coordinate the implementation, operation and improvement of the AMDCN to ensure it meets WIS requirements.

6.2.3 Each GISC should maintain business continuity plans and handover arrangements to ensure continued service to the NCs and DCPCs in its area of responsibility, especially for the collection and distribution of data and products.

***Technical support***

6.2.4 Each GISC should provide technical consultation on implementing and improving WIS functionality, such as search and management of metadata, to the centres in its area of responsibility.

6.2.5 Each GISC should support the centres in its area of responsibility in creating and maintaining WIS discovery metadata, in adopting recommended data formats as well as in monitoring activities.

***Capacity-building support***

6.2.6 Each GISC should develop and provide training courses with reference to the WIS Competencies and the WIS Training and Learning Guide to meet the capacity-development requirements of the centres in its area of responsibility.

**6.3 GISC back-up procedures**

6.3.1 Paragraph 3.5.9.2 of WMO No. 1060 Manual on WIS requires GISCs to maintain arrangements with one or more back-up GISCs that include, as a minimum, the collection and dissemination of information to/from its AMDCN to be taken up by another GISC in case of an incapacitating system failure.

Note: *Responsibilities of the backup GISC are limited to those centres allocated to it in the backup agreement between the GISC and its backup GISC*.

***Backup Services***

6.3.2 Data collection and distribution must continue without interruption to and from centres in the GISC area being backed up. Where a centre's routine receipt of data is through subscription (e.g. GTS push), the backup GISC must have a current list of data to be sent to each centre or provide a place for the centres to come and get the data (e.g. GISC Cache).

6.3.3 Centres may be unable to change their GTS subscriptions during a period of back up operation, and any changes to subscriptions might not be maintained when normal operations resume.

6.3.4 Changes to metadata will not be possible during a back-up period

6.3.5 Any ad hoc changes made during a back-up period may need to be redone after return to normal operations.

***User Information***

6.3.6 If there is a need to exchange user information between GISCs in support of back-up, proper security measures should be taken based on the agreement on the two GISCs. However, the centres should ensure that the backup GISC has sufficient information for sending and collecting data from centres being supported during a back-up period.

 6.3.7 Ad hoc changes to subscriptions, including additions or deletions of subscribers should be avoided while in backup mode. Any ad hoc changes made during a backup period may need to be redone after return to normal operations.

***Networks***

6.3.8 GISCs need to ensure network connectivity to centres in the AMDCN of the GISC it is backing up. This may be through dedicated links, such as GTS, or over the Internet. Such connectivity should be in line with the Guide to IT Security (WMO No 1115) and Guide on VPN via the Internet (WMO No 1116) as applicable.

**6.4 Procedures for changing principal GISC**

6.4.1 The principal GISC for each centre is listed in Appendix B of WMO No. 1060 Manual on WIS. The recommended procedure for NCs and DCPCs changing their principal GISC is provided in the [Annex to this Paragraph](#_6.4.1_/_Annex) (See [Appendix A](#_APPENDIX_A._ANNEXES)).

6.4.2 Once notified that the new principal GISC is ready, the centre shall start using the WIS services of the new principal GISC, in particular the service of uploading and managing the WIS discovery metadata for its data and products.

**6.5 Guidelines for migrating WIS discovery metadata records from one GISC to another GISC**

6.5.1 A side effect of Section 4.10 of WMO No. 1060 Manual on WIS that defines how GISCs should exchange metadata is that any NC or DCPC can upload its metadata records only to its principal GISC. Not applying this rule will lead unnecessary duplication of WIS discovery metadata. The [annex to this paragraph](#_6.5.1_/_Annex) (see [Appendix A](#_APPENDIX_A._ANNEXES)) describes the agreed procedures that a centre and affected GISCs should follow in the cases of a centre changing its principal GISC.

6.5.2 The principles defined in the [Annex to paragraph 6.5.1](#_6.5.1_/_Annex) can also apply to a GISC providing temporary back-up metadata management services to a centre’s principal GISC.

**6.6 Procedure on rolling review of WIS centres**

6.6.1 Sections 2.2.4 and 2.3.4 of WMO No. 1060 Manual on WIS define how GISCs and DCPCs are required to demonstrate to CBS their capability to provide WIS services in compliance with the GISC or DCPC functions and responsibilities.

6.6.2 CBS, recognizing that for WIS to remain fully functional, requires regular reviews of each NC, DCPC and GISC ensuring their on-going compliance with the Manual on WIS. Recommended practices for this rolling review process are provided in the [Annex to this paragraph](#_6.6.2/_Annex_1) (see [Appendix A](#_APPENDIX_A._ANNEXES)).

**Annex 2 to Draft Recommendation 3.2(1)/3 (CBS-Ext.(2014)) -**

**WMO Information System Operational Guidance – New Appendix A**

**1. Insert the following Appendix A of the Guide to the WMO Information System (WMO No 1061) containing annexes to paragraphs in the Guide**

**APPENDIX A. ANNEXES TO PARAGRAPHS IN THE GUIDE TO THE WMO INFORMATION SYSTEM**

Note: *The following annexes to paragraphs in the Guide to WIS are labelled in the form of Paragraph Number/Annex number.*

**6.4.1 / Annex 1 - Procedures for changing of principal GISC**

1. The centre (NC/DCPC) wishing to change its principal GISC should consult with its present and proposed principal GISCs and receive the agreement of the new principal GISC.
2. The centre should liaise with the chosen GISC to check the communication network connectivity to the chosen GISC and ensure that the bandwidth is sufficient to send and receive all data without undue delays.
3. The centre should send a letter endorsed by its Permanent Representative to the WMO Secretary-General, with a copy to its existing GISC. The letter should state the centre’s choice of new principal GISC and include endorsement of the arrangement by the new principal GISC. The letter should also ask the Secretary-General to inform the regional association responsible for the centre (and those of the GISCs concerned where they are not in the same region as the centre).
4. The WMO secretariat shall inform CBS, with copy to the original and new principal GISC of the change to prepare an update to WMO No. 1060 Manual on WIS Appendix B.
5. WMO secretariat should update the WIS centres Database (<http://wis.wmo.int/wiscentresdb>) and the WMO Country Profile Database (http://www.wmo.int/cpdb).
6. The new principal GISC should coordinate with the associated GISC (s) for the centre to arrange and setup the backup service.
7. The new Principal GISC should coordinate with the original principal GISC to take over responsibility for discovery metadata records describing the data and products of the centre as recommended in section 6.5 of this Guide to the WIS.
8. The new principal GISC should notify all operational GISCs of the change to its area of responsibility.

**6.5.1 / Annex 1 - Guidelines for migrating metadata records from one GISC to another GISC**

***1. Scenario and use case***

1.1 Consider the migration of metadata between two GISCs: GISC A and GISC B. GISC B is becoming newly operational and starting metadata management for National Centre X as its principal GISC. Accordingly, GISC A, which has been providing the WIS Interim Metadata Management Service (WIMMS) for National Centre X, is ending the service. Practically, a set of metadata records owned by National Centre X needs to be moved from the OAI set that is provided by GISC A (labelled in what follows as WIS-GISC-A) to that of provided by GISC B (WIS-GISC-B).

***2. Operational guidelines***

*2.1. Give notice to other GISCs*

GISC A and B jointly give one-week prior notice to other operational GISCs that they will transfer the metadata management from GISC A to B, with the list of location identifiers CCCC, in case of metadata records that are associated with GTS messages. This notification is necessary because other GISCs need to make configuration changes so that each CCCC belongs to specific OAI sets, before they start harvesting new records.

*2.2. Delete and add records at GISC A and B*

*A) GISC A - delete records from WIS-GISC-A*

This should be done using the “deleted records” procedures in OAI-PMH, not the simple deletion of records from the database, so that harvesters of other GISCs can harvest the deletion information through the ordinary incremental harvesting. The specifications for deleted records are described in section 2.5.1 of The Open Archives Initiative Protocol for Metadata Harvesting (<http://wis.wmo.int/oaiprotocol>).

In the case that GISC A needs to delete these records completely from its database, GISC A must only do so after it makes sure that other GISCs have completed harvesting the deletion.

*B) GISC B - add records to WIS-GISC-B set*

This should be done with an accurate datestamp, which allows harvesters of other GISCs to gain the added records through the ordinary incremental harvesting.

*2.3. Track harvesting by other GISC*

GISC A and B make sure that other GISCs harvest the change correctly, and if not they need to give notice and ask for manual adjustments.

***3. References***

* OAI metadata harvesting protocol: <http://wis.wmo.int/oaiprotocol>

**6.6.2/ Annex 1 - Procedure for rolling review of WIS centres**

Note: in the event that the structure of CBS changes, all references to Open Area Programme Group (OPAG), Implementation Coordination Team (ICT), Expert Team (ET) or Task Team (TT) are intended to apply to successors of the named bodies.

***1. Requirement: WIS Centres must comply with WMO No. 1060 Manual on WIS***

* 1. a) The Commission for Basic Systems (CBS) is responsible for certification of WIS Centres’ compliance with WIS specifications. CBS will maintain, within its OPAG ISS (or its successor) structure, a task team to coordinate WIS centre audits and certifications. For the purpose of this Guide, this task team or its equivalent group of experts is referred to in the following guidelines as the TT-CAC.
		1. GISCs
			1. TT-CAC, on behalf of CBS, is responsible for audit and certification of GISCs
		2. DCPCs
			1. DCPCs are to be certified by the TT-CAC
			2. Where a DCPC is not using the infrastructure of its principal GISC, and its principal GISC is operational, then it can be certified by TT CAC once the principal GISC has performed the tests; however, if the principal GISC is not operational, TT-CAC will arrange for a suitable GISC to perform the tests;
			3. If a DCPC uses the infrastructure of its principal GISC then it is certified as a part of the GISC audit certification.
		3. NCs
			1. Compliance of NCs is the responsibility of the PR
			2. Testing of compliance of an NC should be done by its principal GISC.
			3. TT-CAC will monitor the NC compliance process in consultation with NCs and GISCs
	2. WIS technical specifications are recorded in Appendix C of WMO-No. 1060 Manual on WIS.

***2. Audits and certification***

* 1. Auditors and certifiers shall be or shall become members of TT-CAC. New members:
		1. must have relevant technical or audit experience (the nomination form is at [http://wis.wmo.int/file=1117](http://wis.wmo.int/file%3D1117));
		2. must be a member (core or associate) of an OPAG-ISS expert team or have written commitment of the PR for the participation of the expert as a member of the TT-CAC,

Note that regional diversity of members of TT-CAC is necessary

* 1. GISC auditors should continue to be from a different region to the GISC
	2. A GISC should be audited by two experts.
		1. One of the two experts must have been involved in previous GISC audit
	3. DCPCs require only one TT-CAC coordinator
		1. New members will be mentored
		2. The coordinator will ask a GISC to undertake tests with the DCPC
		3. It is expected that the centre’s principal GISC will undertake the tests
	4. TT-CAC workspace and online databases are restricted to access only by TT­CAC (and Secretariat)

***3. GISC audits***

* 1. In a similar way to an ISO 9001:2008 audit process, the audit will follow the principle of alternating full and intermediate audits aligned with CBS/EC cycle of four years.
	2. CBS endorsement is based on continued successful audit outcomes
		1. Validity, intermediate audit (interim four years)
			1. A mid-cycle review of performance and compliance to provide, if necessary, opportunities to introduce corrective actions well in advance of a full audit.
			2. Full audit (every second audit – i.e. every eight years)
				1. Will result in recommendation for affirmation or cancellation of endorsement
	3. Recurring audit will check that WIS Centres have implemented any new requirements or agreed practices due, and corresponding tests will be identified and undertaken.
		1. These changes to audit procedure will be included in the guidelines on centre audit and demonstration process.
	4. Travel and per diem should be at the GISC’s expense and arranged through WMO.

***4. Public notification of type of CBS endorsement***

* 1. Centre endorsements are published only as “CBS endorsed” with no public declaration of whether endorsement was with “qualifications”.
	2. Details of centres review audits are confidential
	3. Auditors will have access to the centre’s previous reports in order to perform their role.

***5. Review of audits with qualification.***

* 1. GISCs that have received an “endorsed with qualifications” have two years from the day of the audit to demonstrate that they have taken remedial action on the points of qualification.
	2. TT-CAC will investigate GISCs that have received an “endorsed with qualifications” and have not demonstrated that they have taken remedial action on the points of qualification within 2 years from the day of audit. TT-CAC should report to CBS on the progress in addressing the aspects that incurred the “Qualification.” TT-CAC can recommend to CBS that it revoke its endorsement.

***6. Recurring audits.***

* 1. GISCs should be audited at least once every four years.
	2. Review cycle should start from date of “CBS endorsement”, or for centres endorsed before 1 Jan 2012 (the date WIS became operational) the cycle will be based on 1 Jan 2012.
		1. Audit timings will need to be coordinated with the availability of experts to undertake the audit, but should take place within the calendar year of the anniversary
		2. The CBS endorsement date should be recorded in the WIS centre database.
		3. The date the centre became operational should be recorded if known.

***7. DCPCs reviews***

* 1. The DCPC review cycle will be eight years.
	2. Reviews will cover all aspects of WIS compliance.

***8. NCs reviews***

* 1. Review of NCs compliance is the responsibility of the Permanent Representative in liaison with the NC and its Principal GISC.

***9. Ad hoc audits or reviews***

* 1. An ad hoc audit or review can be requested by the president of CBS
		1. For example due to non-conformance causing problems with WIS operations.

***10. Full audits of GISCs***

* 1. Shall include site visit using practices in line with those of the ISO 9000 series standards.

***11. Audit process for GISCs***

* 1. Scope of audits
		1. “Full” audits will cover all aspects of WIS compliance
		2. “Interim” audits will focus on a particular subset of topics
			1. Actual elements to be focused on will be determined by ICT-ISS or its delegated expert team in coordination with ICT-ISS members
			2. Centres will be told in advance of which subset of topics
			3. Possible focus areas for reviews in interim audits include:
				1. GISC to GISC back up
				2. Security
				3. Monitoring
				4. Quality of service provided by the WIS
				5. WIS core network (e.g. in 2014 this was the RMDCN NG)

connectivity and management

Cache “Globally distributed data” content

* + - * 1. Management of area of responsibility

Capacity development

AMDCN (connects GISC to NCs and DCPCs in its area)

Cache “Area of responsibility” content

Participation in WIS coordination and planning mechanisms (eg CBS IPETs, ETs and TTs)

***12. Audit or review outcome***

* 1. Format of report
		1. TT-CAC will use a template for final reports, although the content will reflect the topics audited.
	2. Will be categorized into Endorsed, Endorsed with Qualification or Not Endorsed
	3. Audit or review recommendation will be provided to the President of CBS and to the Director of WIS

**Annex 3 to Draft Recommendation 3.2(1)/3 (CBS-Ext.(2014)) -**

**WMO Information System – Use cases**

**1. Insert the following Appendix B of the Guide to the WMO Information System (WMO No 1061) containing Use Cases for WIS Technical Specifications**

**APPENDIX B. WIS Technical Specifications – Use cases.**

**General**

1. This appendix provides the Use Cases for major WIS Functions relating to the WIS Technical Specifications as described in Part IV of WMO-No. 1060 Manual on the WMO Information System. Use cases are designed to help system developers understand how the system is supposed to operate given certain pre conditions, and reactions to decisions during processing.

2. The content of most of the Use Cases given in this Appendix follows closely the work of the SIMDAT project led by the European Centre for Medium-Range Weather Forecasting (ECMWF). The form of the Use Cases follows the general guidance of Unified Modelling Language [UML]. It also uses a specific template derived from an example published by Karl E. Wiegers (with permission granted to use, modify, and distribute the template).

3. The following table provides a key to the elements of the Use Case template as used herein.

|  |
| --- |
| **Use Case Goal** - Brief description of the reason for and outcome of this Use Case, or a high-level description of the sequence of actions and the outcome of executing the Use Case. |
| **Actors** - An actor is a person or other entity, external to the system being specified, who interacts with the system (includes the actor that will be initiating this Use Case and any other actors who will participate in completing the Use Case). Different actors often correspond to different user classes, or roles, identified from the customer community that will use the product. |
| **Trigger** - Event that initiates the Use Case (an external business event, a system event, or the first step in the normal flow. |
| **Pre-conditions** - Activities that must take place, or any conditions that must be true, before the Use Case can be started. |
| **Post-conditions** - The state of the system at the conclusion of the Use Case execution. |
| **Normal Flow** - Detailed description of the user actions and system responses that will take place during execution of the Use Case under normal, expected conditions. This dialog sequence will ultimately lead to accomplishing the goal stated in the Use Case name and description. |
| **Alternative Flows** - Other, legitimate usage scenarios that can take place within this Use Case. |
| **Exceptions** - Anticipated error conditions that could occur during execution of the Use Case, and how the system is to respond to those conditions, or the Use Case execution fails for some reason. |
| **Includes** - Other Use Cases that are included (“called”) by this Use Case (common functionality appearing in multiple Use Cases can be described in a separate Use Case included by the ones that need that common functionality). |
| **Notes and Issues** - Additional comments about this Use Case and any remaining open issues that must be resolved. (It is useful to Identify who will resolve each such issue and by what date.) |

**Table B1. Key to Elements in the Use Case Template**

Note: The DAR Metadata Catalogue holds WIS Discovery Metadata records.

**Use Case B.1, Provide Metadata for Data or Product**

|  |  |
| --- | --- |
| Use Case Goal | Metadata for any data or product file to be available from the DCPC or GISC is created or updated in the DAR Metadata Catalogue of the DCPC or GISC |
| Actors | Metadata Originator (NC or DCPC)Metadata Catalogue Publisher (DCPC or GISC) |
| Pre-Conditions | (1) The Metadata Originator is authorized to update the DAR Metadata Catalogue for the associated file(s)(2) The Metadata Originator has the necessary information and the ability to update the DAR Metadata Catalogue for the associated file(s)(3) The Metadata Catalogue Publisher supports facilities for authorized Metadata Originators to update the metadata for the associated file(s) |
| Post-Conditions | The DAR Metadata Catalogue has changes made by the Metadata Originator |
| Normal Flow | The authorized Metadata Originator uses a facility supported by the Metadata Catalogue Publisher to update the DAR Metadata Catalogue for the associated file. Typically, two kinds of maintenance facilities are supported. One is a file upload facility for "batch" updating (add, replace, or delete metadata records treated as separate files). The other is an online form for changing metadata records treated as entries in the DAR Metadata Catalogue (add, change, or delete of elements in a record as well as whole records). The Metadata Catalogue Publisher maintains the updated DAR Metadata Catalogue as a searchable resource offered to all authorized searchers (see Use Case B.6). The Metadata Catalogue Publisher also shares the metadata as a part of the logically centralized but physically distributed catalogue across WIS centres. |
| Notes and Issues | This set of actions is a simple extrapolation from existing GTS practice, adding the particular standard format for WIS metadata. |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.2, Upload Data or Product to DCPC or GISC**

|  |  |
| --- | --- |
| Use Case Goal | Data or product is sent as a file to a DCPC or GISC |
| Actors | Data Sender (NC or DCPC)Data Receiver (DCPC or GISC)  |
| Pre-Conditions | (1) Appropriate metadata to be associated with the file is already available in the DAR Metadata Catalogue of the DCPC or GISC (if not, see Use Case B.3) (2) The Data Sender is authorized to send the file to the Data Receiver(3) The Data Receiver supports a method for uploading the file, which the Data Sender is able to use  |
| Post-Conditions | The data or product uploaded by the Data Sender is received and stored by the Data Receiver. |
| Normal Flow | The Data Sender uses his authorized access to send the file using an appropriate transmission method supported by the Data Receiver. Typically, the transmission is accomplished using GTS or a file transfer method available over the Internet. A file naming convention or other agreed mechanism is used to make an association between the file and its metadata |
| Notes and Issues | This set of actions builds on existing GTS practice, supplemented with other file transfer mechanisms such as the Internet. |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.3, Control Metadata Association to Data or Product**

|  |  |
| --- | --- |
| Use Case Goal | Confirm that metadata for a data or product file at the DCPC or GISC already exists in the DAR Metadata Catalogue before the data or product is available  |
| Actors | Data Sender (NC or DCPC)Data Receiver (DCPC or GISC)  |
| Pre-Conditions | (1) Data or product has been sent as a file from a Data Sender (Use Case B.1) (2) DAR Metadata Catalogue is current with all updates (Use Case B.2) |
| Post-Conditions | An error is communicated when there is not confirmation that a given file is associated appropriately with metadata in the DAR Metadata Catalogue  |
| Normal Flow | On receipt of a file containing a data or product, the Data Receiver checks the current DAR Metadata Catalogue to confirm that the file has an associated metadata record. If such a record is not found within two minutes after receipt of the file, an error message is sent to the Data Sender. |
| Notes and Issues | This control action addresses the condition wherein data arrives before its associated metadata. Rather than rejecting the file immediately, a grace period of two minutes is allowed before the data file is regarded as erroneous. |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.4, Manage Cache of Data across GISCs**

|  |  |
| --- | --- |
| Use Case Goal | GISCs manage a logically centralized collection containing at least a 24 hour cache of data and products agreed by WMO for routine global exchange |
| Actors | Data Administrators at each of the GISCs  |
| Pre-Conditions | (1) At each GISC, the cache of data and products received from NCs and DCPCs in its area of responsibility is current (2) Transmission and control mechanisms across GISCs are available(3) All Data Administrators are authenticated and authorized as needed  |
| Post-Conditions | The cache of data and products is accessible as a logically centralized collection that includes current data and products at each GISC |
| Normal Flow | A Data Administrator monitors the transmission methods and control mechanisms that enable a logically centralised view of the physically distributed cache of data and products. Depending on the methods in place, a Data Administrator takes various corrective actions whenever the cache is not available as required. |
| Notes and Issues | At this point in WIS system design, it has not been decided how the GISCs will accomplish centralization of the cache. |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.5, Maintain Identification and Role Information for WIS Users**

|  |  |
| --- | --- |
| Use Case Goal | Internal and external users of WIS are able to be identified as needed for their authentication, and their role information is maintained as needed for their authorizations to perform specific functions |
| Actors | Users of WIS (internal and external)Administrators of authentication and authorization at WIS Centres |
| Pre-Conditions | (1) Administrators have agreed authentication policies delineating the credentials required to establish identity of a WIS user(2) Administrators have agreed authorization policies delineating which roles are authorized to perform each WIS action(3) Administrators have mechanisms to create and maintain identification information needed for authentication of users of WIS(4) Administrators have mechanisms to create and maintain role information needed for authorization of authenticated users of WIS  |
| Post-Conditions | WIS Centres collectively have the ability to authenticate each user of WIS and authorize him to perform all of the functions appropriate to his role, and only those functions appropriate to his role  |
| Normal Flow | Identification and role information about candidate or current users of WIS are to be recorded through facilities controlled by WIS Centres. Typically, two kinds of facilities should be supported. One is a file upload facility for "batch" updating (add, replace, or delete the identification and role records as separate files). The other is an online form for changing identification and role records (add, change, or delete elements in a record as well as whole records). Administrators of authentication and authorization at WIS Centres share the updated identification and role information as a resource available as needed across WIS Centres. |
| Notes and Issues | At this point in WIS system design, mechanisms have not been decided for handling identification and role information as needed across WIS centres. |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.6, Discover Data or Products**

|  |  |
| --- | --- |
| Use Case Goal | A user of WIS finds available WMO data or products that he wants to receive. |
| Actors | Data Searcher |
| Pre-Conditions | (1) The DAR Metadata Catalogue is accessible for browsing or searching (2) The GISC infrastructure provides a unified catalogue view to the user (i.e., the catalogue is logically centralized although physically distributed)  |
| Post-Conditions | The Data Searcher has information needed to select relevant data or products. |
| Normal Flow | The Data Searcher discovers available WMO data and products by browsing the DAR Metadata Catalogue or by searching the DAR Metadata Catalogue using discovery concepts such as subject keywords, geographic extent, and temporal range. As a result of his browsing or searching, the Data Searcher gets a relevance-ordered list of data and products including "data or product metadata" such as data origin, data type, generation date, availability, and use constraints, among other characteristics. |
| Notes and Issues | At this point in WIS system design, multiple methods can be envisioned for logically centralizing the physically distributed DAR Metadata Catalogue. |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.7, Ad Hoc Request for Data or Product ("Pull")**

|  |  |
| --- | --- |
| Use Case Goal | A user of WIS requests WMO data or product on an ad hoc basis |
| Actors | User of WISWIS Centre |
| Pre-Conditions | (1) The desired data or product has been identified by the user of WIS(2) The user of WIS has been authenticated and authorized to retrieve the desired data or product from the WIS centre(3) Delivery is achievable through one of the supported mechanisms for the transmission of the desired data or product, and within the published service level commitment of the WIS centre |
| Post-Conditions | Data or product is readied for delivery to the user of WIS according to the service level commitment of the WIS centre |
| Normal Flow | Once the user has identified the desired data or product, he requests delivery on a one-time basis. (Use Case B.8 covers the alternate choice, recurring delivery.) The WIS Centre authenticates the user and checks authorization for delivery of the product according to the user's role. The WIS centre then sets up delivery through any of a broad range of online and offline options (delivery options are described in Use Case B.9). |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.8, Subscribe to Data or Product ("Push")**

|  |  |
| --- | --- |
| Use Case Goal | A user of WIS can subscribe to receive data or products on a recurring basis |
| Actors | User of WISWIS Centre |
| Pre-Conditions | (1) The desired data or product has been identified by the user of WIS(2) The user of WIS has been authenticated and authorized to retrieve the desired data or product from the WIS centre(3) Delivery is achievable through one of the supported mechanisms for the transmission of the desired data or product, and within the published service level commitment of the WIS centre |
| Post-Conditions | Data or product is readied for delivery to the user of WIS according to the service level commitment of the WIS centre |
| Normal Flow | Once the user has identified the desired data or product, he requests to subscribe to receive the data or products on a recurring basis. (Use Case B.7 covers the alternate choice, one-time delivery.) The WIS Centre authenticates the user, checks authorization for delivery of the product according to the user's role. The WIS centre then sets up delivery through any of a broad range of online and offline options (described in Use Case B.9). As necessary, the WIS Centre updates the Dissemination Metadata associated with the subscription (Use Case B.10). |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.9, Download Data or Product from WIS Centre**

|  |  |
| --- | --- |
| Use Case Goal | A user of WIS receives from a WIS Centre, on an ad hoc or subscription basis, data or products transmitted as files |
| Actors | User of WISWIS Centre |
| Pre-Conditions | (1) Data or product is ready for delivery to the authenticated and authorized user, as requested through one of the supported transmission mechanisms and according to the service level commitment of the WIS centre(2) For subscription delivery, the WIS Centre has access to subscription information in the Dissemination Metadata Catalogue (see Use Case B.10) |
| Post-Conditions | Selected data or products are received by the user of WIS |
| Normal Flow | The WIS Centre sends files containing the requested data or products, using an appropriate transmission method as indicated in the associated subscription information accessible through the Dissemination Metadata Catalogue. Typically, the transmission is accomplished using GTS or a file transfer method available over the Internet, such as HTTP, OpenDap, FTP, SFTP, GFTP, email, etc). In any case, transmission must be efficient and reliable (checksum and error recovery mechanisms are required at minimum). |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.10, Provide Dissemination Metadata**

|  |  |
| --- | --- |
| Use Case Goal | Metadata concerning delivery specifics of subscription(s) to data and products from a DCPC or GISC are created or updated in the Dissemination Metadata Catalogue |
| Actors | Subscription Registrar (NC or DCPC)Dissemination Catalogue Publisher (DCPC or GISC) |
| Pre-Conditions | (1) The Subscription Registrar is authorized to update the Dissemination Metadata Catalogue for the given subscription(s)(2) The Subscription Registrar has the necessary information and the ability to update the Dissemination Metadata Catalogue for the given subscription(s)(3) The Dissemination Catalogue Publisher supports facilities for authorized Subscription Registrars to update the metadata for the given subscription(s) |
| Post-Conditions | The Dissemination Metadata Catalogue has changes made by the Subscription Registrar |
| Normal Flow | The authorized Subscription Registrar uses a facility supported by the Dissemination Metadata Catalogue Publisher to update the Dissemination Metadata Catalogue for the given subscription(s). Typically, two kinds of maintenance facilities are supported. One is a file upload facility for "batch" updating (add, replace, or delete metadata records treated as separate files). The other is an online form for changing metadata records treated as entries in the Dissemination Metadata Catalogue (add, change, or delete of elements in a record as well as whole records). The Dissemination Metadata Catalogue Publisher maintains the updated Dissemination Metadata Catalogue as a reference resource accessible as part of a logically centralized but physically distributed catalogue across WIS centres. |
| Notes and Issues | At this point in WIS system design, it is has yet to be defined how each Dissemination Metadata Catalogue Publisher will communicate changes to each physically distributed part of the logically centralized Dissemination Metadata Catalogue. |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Use Case B.11, Report Quality of Service across WIS Centres**

|  |  |
| --- | --- |
| Use Case Goal | Managers of WIS Centres receive performance reports of operations against agreed quality of service indicators |
| Actors | WIS Centre Managers |
| Pre-Conditions | (1) Measurable quality of service indicators are agreed (2) Schedule of reporting and specifics of reporting formats are agreed |
| Post-Conditions | WIS Centre managers have performance information needed to manage WIS operations across the range of GISC, DCPC and NC services |
| Normal Flow | On a schedule as mutually agreed, all WIS Centre managers send performance reports of operations against agreed quality of service indicators.  |
| Notes and Issues | It can be anticipated that WIS will eventually have agreements that address quality of service requirements. These should include data and network security as well as performance and reliability.CBS is investigating monitoring processes, including reviewing established processes for the World Weather Watch.The current status can be monitored under [http://wis.wmo.int/folder=63](http://wis.wmo.int/folder%3D63) |
| Last Updated | 30 Jun 2014 |
| Last Updated By | WMO Secretariat |

**Annex 4 to Draft Recommendation 3.2(1)/3 (CBS-Ext.(2014)) -**

**WMO Information System – Demonstration test cases**

**1. Insert the following Appendix C of WMO-No. 1061 - Guide to the WMO Information System containing WIS Demonstration Test Cases**

**APPENDIX C. WIS Demonstration Test Cases.**

**General**

1. This appendix provides the test cases for major WIS Functions relating to the WIS technical specifications (TechSpecs) as describe in Part IV of the Manual on the WMO Information System. WIS demonstration test cases differ from Use Cases in that they test a process behaves correctly by looking at the particular input and test to see if the result is as expected.

2. The guidelines for DCPCs and GISCs on how to demonstrate their compliance to CBS is online at <http://www-db.wmo.int/WIS/centres/guidance.doc>.

3. Guidance for NCs on how to work with their Principal GISC to demonstrate their compliance is included in Regional WIS Implementation Plans available at: [http://wis.wmo.int/folder=75](http://wis.wmo.int/folder%3D75).

4. In order to be WIS compliant, all centres should be able to complete those demonstration test cases that are applicable to the services a centre is running. Demonstration test cases are based on the WIS Technical Specifications and Use Cases defined in WMO-No. 1060 - Manual on the WMO Information System and in Appendix B of this Guide to WIS respectively.

5. There are six Test Cases for GISCs, labelled WIS-TC1 to WIS-TC6. All, except for WIS-TC4 are also relevant to DCPCs where they are applicable. The six Test Cases are list under Part 1 of this Appendix.

6. There are three test cases for NCs, labelled as NC-TC1, NC-TC2 and NC-TC3

**Part 1 – WIS Demonstration Test Cases for GISCs and DCPCs**

|  |
| --- |
| Test Case Name: WIS Demonstration Test Case 1 |
| Uploading of Metadata for Data and Products into DAR catalogue |
| Test Case ID | WIS-TC1 |
| Component | Metadata Management |
| Purpose of test |
| Validate the function of adding, updating and deleting metadata records from other WIS centres. All metadata records must be checked against the relevant schemas. (e.g. The record should be rejected if not fitting the schema)Note 1: The term “upload” refers to the movement of metadata records between the WIS centre that provides the metadata and the WIS centre that manages the DAR catalogue. It can actually be implemented as a “pull” initiated from the DAR catalogue site, or as a “push” initiated by the metadata provider. Note 2: this functionalities can be implemented as:* A web interface allowing registered users to manage their metadata interactively
* A machine-to-machine interface allowing automated batch processing of metadata.

It is necessary that GISCs implement both methods.  |
| Relevant technical specifications |
| * Tech specs 1 (Uploading of metadata)
* Tech specs 8 (DAR Catalogue Search and Retrieval)
 |
| Precondition  |
| 1. Have network connection (dedicated and/or public connection) with other WIS centre(s)
2. Have a file upload facility for collecting metadata from other WIS centre(s)
3. Have a fully functional DAR catalogue
4. Have a registered user/process that is authorized to manage metadata of a given WIS centre
5. Have a web interface to the DAR catalogue that allow searches (see TC6)
 |
| Test Steps |
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|  |  |  |  |
| --- | --- | --- | --- |
|  | Description | Expected Results | Actual Results |
| 1 | A user/process adds a valid metadata record to the DAR catalogue  | The metadata record must be found when browsing/searching the DAR catalogue |  |
| 2 | A user/process modifies a record from the DAR catalogue,  | The modification should be immediately visible when browsing/searching the DAR catalogue |  |
| 3 | A user/process deletes a record from the DAR catalogue,  | The deleted record should not be found when browsing/searching the DAR catalogue |  |
| … | A authorized user/process attempts to upload an invalid metadata record | The user/process must be notified of the fact that the metadata record is invalid. The addition/update operation is aborted. The DAR catalogue is unchanged. |  |
| … | A authorized user/process attempts to upload a record with a unique identifier that is already in the DAR catalogue | The DAR catalogue should not contain record with duplicate identifiers. Either:1. The new metadata record replaces the old metadata record. The old metadata record should not be present in the catalogue. The new metadata record must be found when browsing/searching the catalogue2. The user/process must be notified of the fact that the record is a duplicate. The addition/update operation is aborted. The DAR catalogue is unchanged.Note: it is essential to ensure an update is an edit and not an accidental duplication |  |
| … | Access control - No unauthorized addition 1 | A non-authorized user/process should not be able to add a metadata record to the DAR catalogue |  |
| … | Access control - No unauthorized addition 2 | A user/process should not be able to add a metadata record to the DAR catalogue representing data from another WIS centre |  |
| … | Access control - No unauthorized modification 1 | A non-authorized user/process should not be able to modify a metadata record from the DAR catalogue |  |
| … | Access control - No unauthorized modification 2 | A user/process should not be able to modify a metadata record from the DAR catalogue that belongs to another WIS centre |  |
| … | Access control - No unauthorized deletion 1 | A non-authorized user/process should not be able to delete a metadata record to the DAR catalogue |  |
| … | Access control - No unauthorized deletion 2 | A user/process should not be able to delete a metadata record from the DAR catalogue that belongs to another WIS centre |  |

 |
| Centre |  | Organization |  | Country |  |
| Test Date |  |

|  |
| --- |
| Test Case Name: WIS Demonstration Test Case 2 |
| Synchronizing DAR catalogues between GISC nodes  |
| Test Case ID | WIS-TC2 |
| Component | Metadata management |
| Purpose of test |
| GISC should have a global view of metadata. Validate the synchronization of the DAR metadata catalogue between GISCs node via a synchronization protocolGISC to GISC synchronization (between separate centres) * + Timeliness of synchronization, accuracy

Test should complement the “add, change and delete mechanisms for metadata demonstrated in test 1. |
| Requirements Covered |
| * Tech specs 1 (Uploading of metadata)
* Tech specs  8 (DAR Catalogue Search and Retrieval)
* Tech specs 9 (Consolidated View of Distributed DAR Metadata Catalogues)
 |
| Precondition  |
| 1. Have network connection (dedicated and/or public connection) with other GISC(s).
2. Have DAR catalogue already populated at each GISC participating to the test
3. Have a synchronization facility for synchronizing metadata with other GISC(s)
 |
| Test Steps |
|

|  |  |  |  |
| --- | --- | --- | --- |
|  | Description | Expected Results | Actual Results |
| 1 | Synchronize the DAR metadata catalogue  | Identical content of the DAR metadata catalogue of the GISC(s) participating to the test:* Number of records should be identical
* The list of unique identifier should identical
* A random selection of records should be identical
 |  |
| 2 | Add new metadata record at GISC 1 | The uploaded metadata record is added into the DAR Metadata Catalogue of the other GISC(s) participating to the test. |  |
| 3 | update metadata record at GISC 1 | The updated metadata record is added into the DAR Metadata Catalogue of the other GISC(s) participating to the test. |  |
| 4 | Delete metadata file record belonging to GISC1 at GISC 1 | The concerned metadata recorder is deleted in the DAR Metadata Catalogue of the other GISC(s) participating to the test. |  |
| 5 | Delete metadata file record that doesn’t belong to GISC1 at GISC 1 | The concerned metadata recorder is uploaded in the DAR Metadata Catalogue of GISC1 from DAR Metadata Catalogue of the other GISC(s) participating to the test. |  |
| … | Re-play 2-5 from GISC2 … |  |  |

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| Centre  |  | Organization |  | Country |  |
| Test Date |  |

|  |
| --- |
| Test Case Name: WIS Demonstration Test Case 3 |
| Uploading and downloading of data between WIS centres |
| Test Case ID | WIS-TC3 |
| Component |   |
| Purpose of test |
| Validate the upload and download of data and products and association with metadata  |
| Requirements Covered |
| * Tech specs 2 (Uploading of data and products)
* Tech specs  10 (Downloading file via dedicated network)
* Tech specs 11 (Downloading file via non-dedicated network)
* Tech specs  12 (Downloading file via other methods)
 |
| Precondition  |
| 1. Have network connection (dedicated and/or public connection) with other WIS centre
2. Have file upload and download facilities (FTP, mail, HTTP, …)
3. Have data available for upload or download
4. Have DAR facilities available at GISC.
 |
| Test Steps |
|

|  |  |  |  |
| --- | --- | --- | --- |
|  | Description | Expected Results | Actual Results |
| 1 | a. upload a file which is associated with a metadata record in the DAR catalogue of the GISC to a GISC centreb. use DAR facilities to search the metadata then retrieve the file | a. The uploaded file has been delivered to the GISC and match with the corresponding metadata b. The file can be downloaded |  |
| 2 | GISC Onlya. Upload a file which is not associated with a metadata record in the DAR catalogue of the GISC to a GISC centre b. later upload the metadata record associated to the file to a GISC centre. c. use DAR facilities to search the metadata en retrieve the file | a. The uploaded file has been delivered to the GISC b. the DAR catalogue is updated with new record. Previously received file is associated with the metadatac. The file can be downloaded  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| … |  |  |  |

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| Centre  |  | Organization |  | Country |  |
| Test Date |  |

|  |
| --- |
| Test Case Name: WIS Demonstration Test Case 4 |
| Centralization of Globally Distributed Data (Applies only to GISCs)  |
| Test Case ID | WIS-TC4 |
| Component | 24 hours cache at GISC |
| Purpose of test |
| Validate the completeness of the 24h cache * Finding a current data or product originating from another centre via the GISC DAR search mechanism, and retrieve that item from the GISC cache.

An attached document describing the process how the GISC will ensure it holds a complete cache for 24 hours, including performance metrics |
| Requirements Covered |
| * Tech specs 3 (Centralization of Globally Distributed Data)
* Tech specs 8 (DAR …)
 |
| Precondition  |
| 1. Have network connection (dedicated and/or public connection)
2. Have DAR catalogue already populated with metadata of the 24h data for global exchange
3. Have DAR facilities available through a portal
4. Have a cache with at least the last 24 h data for global exchange
 |
| Test Steps |
|

|  |  |  |  |
| --- | --- | --- | --- |
|  | Description | Expected Results | Actual Results |
| 1 | Search in catalogue for data/products from other centre and other program in other area and retrieve selected data or products | The selected data/products can be retrieved from GISC |  |
| 2 | Search in catalogue for data/products 6h old and retrieve selected data or products | The selected data/products can be retrieved from GISC |  |
| 3 | Search in catalogue for data/products12h old and retrieve selected data or products | The selected data/products can be retrieved from GISC |  |
| 4 | Search in catalogue for data/products 18h old and retrieve selected data or products | The selected data/products can be retrieved from GISC |  |
| 5 | Search in catalogue for data/products 24h old and retrieve selected data or products | The selected data/products can be retrieved from GISC |  |

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| Centre  |  | Organization |  | Country |  |

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| --- |
| Test Case Name: WIS Demonstration Test Case 5 |
| Maintenance of users, roles, authorization and authentication |
| Test Case ID | WIS-TC5 |
|  |  |
| Component | Management of users and access |
| Purpose of test |
| Create and exercise a variety of user types |
| Relevant Technical Specifications  |
| • Tech specs 4 (Maintenance of User Identification and Role Information)• Tech specs 6 (Authentication of a User) • Tech specs 7 (Authorization of a User Role)• Tech specs 13 (Maintenance of Dissemination Metadata) |
| Precondition  |
| 1. The Centre has authority to provide access to user (i.e. PR approval from users country)
2. The user interface is via the internet (i.e. web page)
 |
| Test Steps |
|

|  |  |  |  |
| --- | --- | --- | --- |
|  | Description | Expected Results | Actual Results |
| 1 | Provide access for an external user to search metadata | Temporary user can search metadata, but not access data from the GISC or cache, or subscribe to data. |  |
|  | 1. User goes to search web page
2. User makes metadata search
3. Tries to access data
 | 1. User has access to search page
2. User finds metadata
3. User tries to access data and is referred to authorization page at data source. Cannot access data without validating in an authorized user role
 |  |
| 2 | Create accounts with access to WIS metadata and data for a WMO centre authorized user | Two users are created. One with access to metadata only, the other with the ability to access the Centre subscription service or ad hoc request from the cache |  |
|  | 1. User goes to registered user web page
2. User is required to login or create account
3. User registers account and selects role of valid WMO member with authority to access WIS data (eg is from WMO NC)
4. User enters login details
5. User makes metadata search
6. Tries to access WMO globally available data from the centre
7. User tries to access additional data at centre that he is not authorized to access
8. Tries to access data or product at another site
9. User subscribes to data for future delivery from centre
10. User returns on another session and reuses login to search or subscribe
11. User edits subscription details
12. User cancels a subscription
13. User logs out or leaves centre’s site and tries to return to a bookmarked page at a later date and access data
 | 1. User has access to login page
2. New user, so has to create an account
3. User account is validated as a WMO NC member and account is created. The user receives a user login (eg code via email or encrypted symbol)
4. User is logged in. As user us validated as WMO NC member, he is allocated access to search and access to download data from cache and to subscription services
5. User finds metadata
6. User successfully accesses data from centre
7. User receives advice that he is not authorized to access this data and referred to access page where he can request change in user role or re-login as another user
8. User is referred to authorization page at other site.
9. User receives scheduled data via agreed method at agreed time
10. User maintains successful access with same access rights
11. Users subscription details are updated and reflected in subsequent deliveries
12. Users subscription details are updated and receives no further deliveries
13. Attempting to use a bookmarked page from earlier session to access data, directs the user to the registered user login page.
 |  |
| 4 | User checks status of account and subscriptions | User can view his account and subscription details, including historic and future transactions, and the status of current transactions |  |
| … |  |  |  |

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| Centre  |  | Organization |  | Country |  |
| Test Date |  |

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| --- |
| Test Case Name: WIS Demonstration Test Case 6 |
| DAR Catalogue Search and Retrieval |
| Test Case ID | WIS-TC6 |
| Component | DAR Catalogue |
| Purpose of test |
| The purpose of the test case is to assess the functionality of the DAR catalogue. |
| Relevant technical specifications |
| Tech specs 8 (DAR Catalogue Search and Retrieval) |
| Precondition  |
| 1. The DAR catalogue is loaded with representative number of WMO Core metadata records that represent a variety of data and products, in particular, the records should represent several time ranges (climate and real-time), several geographical extents (from point to global coverage) and records from several discipline (meteorology, hydrology,…) , when applicable for the function of the candidate centre (e.g. GISC, DCPC, …)
2. A web based user interface is made available on the open Internet to provide access to the DAR catalogue
3. There exists a registered user that is allow to retrieve some data and/or product
4. The number of records returned may be subject to size limits of system e.g. 1000 record limit
 |
| Test Steps |
|

|  |  |  |  |
| --- | --- | --- | --- |
|  | Description | Expected Results | Actual Results |
| 1 | Browsing | Any record in the DAR must be reachable by browsing the catalogue |  |
| 2 | Free text search - The user input one or more words in a web form and submit the request | All records that contain the required words. If the user is allowed to select a Boolean operation between the results (i.e. and/or, …), the result should fulfil this operation. |  |
| 3 | Geographic search - The user input a rectangular geographical area (using a form of a map). | All records that are contained in the area or that overlap with the area, depending on the implementation (the user should be aware of the matching algorithm used). The system should handle the poles and the date line properly. |  |
| … | Time search - The user input either a time interval or a point in time in a web form | All records that represent a time interval or point in time that are contained in or overlap with the requested interval or point in time, depending on the implementation (the user should be aware of the matching algorithm used).  |  |
| … | Combination of the above - A user can select a combination of any two or all of the above simultaneously. | All records that matches all the selected criteria. |  |
|  | Invalid search made | User receives a meaningful message informing of error |  |
|  | ISO23950 Search by URL (SRU)  | The above tests will test successfully via SRU interface. |  |
| … | Visualization of a metadata  | The user should be able to select a metadata record when browsing or from a search result list. The record must be render in a human readable form. |  |
|  | Selection and retrieval of data | The user should be able to select data and/product products either when browsing or from a search result list or when visualizing a meta record. The user is presented with a mean to select instances that are associated with the chosen record. The system must provide a retrieval/referral mechanism that will allow the user to receive the data noting the data may be available from another site. |  |
| … |  |  |  |

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| Centre  |  | Organization |  | Country |  |
| Test Date |  |

**Part 2 – WIS Demonstration Test Cases for NCs**

|  |
| --- |
| Test Case Name: NC Demonstration Test Case 1 |
| Uploading of Discovery Metadata for Data and Products into DAR catalogue |
| Test Case ID | NC-TC1 |
| Component | Metadata Management |
| Purpose of test |
| Validate the function of adding, updating and deleting metadata records from NC to the Principal GISC. All metadata records must be checked against the relevant schemas. (e.g. The record should be rejected if not fitting the schema)Note 1: The term “upload” refers to the movement of metadata records between the National Centre that provides the metadata and the WIS centre that manages the DAR catalogue hosted by the Principal GISC. It can actually be implemented as a “pull” initiated from the DAR catalogue site, or as a “push” initiated by the metadata provider. Note 2: this functionalities can be implemented as:* A web interface allowing registered users to manage their metadata interactively
* A machine-to-machine interface allowing automated batch processing of metadata.

All GISCs support both methods. The NC may choose one or both methods |
| Relevant technical specifications |
| * Tech specs 1 (Uploading of metadata)
* Tech specs 8 (DAR Catalogue Search and Retrieval)
 |
| Precondition  |
| 1. Network connection (dedicated and/or public connection) exists between the NC and GISC
2. GISC has a file upload facility for collecting metadata from other WIS centre(s)
3. GISC has a fully functional DAR catalogue
4. GISC has a registered user/process that is authorized to manage metadata of a given WIS centre
5. GISC has a web interface to the DAR catalogue that allow searches (see WIS-TC6[[4]](#footnote-4))
 |
| Test Steps |
|

|  |  |  |  |
| --- | --- | --- | --- |
|  | Description | Expected Results | Actual Results |
| 1 | A user/process adds a valid metadata record to the DAR catalogue  | The metadata record must be found when browsing/searching the DAR catalogue |  |
| 2 | A user/process modifies a record from the DAR catalogue,  | The modification should be immediately visible when browsing/searching the DAR catalogue |  |
| 3 | A user/process deletes a record from the DAR catalogue,  | The deleted record should not be found when browsing/searching the DAR catalogue |  |
| … | A authorized user/process attempts to upload an invalid metadata record | The user/process must be notified of the fact that the metadata record is invalid. The addition/update operation is aborted. The DAR catalogue is unchanged. |  |
| … | A authorized user/process attempts to upload a record with a unique identifier that is already in the DAR catalogue | The DAR catalogue should not contain record with duplicate identifiers. Either:1. The new metadata record replaces the old metadata record. The old metadata record should not be present in the catalogue. The new metadata record must be found when browsing/searching the catalogue2. The user/process must be notified of the fact that the record is a duplicate. The addition/update operation is aborted. The DAR catalogue is unchanged.Note: it is essential to ensure an update is an edit and not an accidental duplication |  |
| … | Access control No unauthorized addition 1 | A non-authorized user/process should not be able to add a metadata record to the DAR catalogue |  |
| … | Access control – No unauthorized addition 2 | A user/process should not be able to add a metadata record to the DAR catalogue representing data from another WIS centre |  |
| … | Access control No unauthorized modification 1 | A non-authorized user/process should not be able to modify a metadata record from the DAR catalogue |  |
| … | Access control No unauthorized modification 2 | A user/process should not be able to modify a metadata record from the DAR catalogue that belongs to another WIS centre |  |
| … | Access control No unauthorized deletion 1 | A non-authorized user/process should not be able to delete a metadata record to the DAR catalogue |  |
| … | Access control No unauthorized deletion 2 | A user/process should not be able to delete a metadata record from the DAR catalogue that belongs to another WIS centre |  |

 |
| Centre  |  | Organization |  | Country |  |
| Test Date |  |

|  |
| --- |
| Test Case Name: NC Demonstration Test Case 2 |
| Uploading and downloading of data between WIS centres |
| Test Case ID | NC-TC2 |
| Component |   |
| Purpose of test |
| Validate the upload and download of data and products and association with metadata  |
| Requirements Covered |
| * Tech specs 2 (Uploading of data and products)
* Tech specs 10 (Downloading file via dedicated network)
* Tech specs 11 (Downloading file via non-dedicated network)
* Tech specs 12 (Downloading file via other methods)
 |
| Precondition  |
| 1. Network connection (dedicated and/or public connection) between the NC and GISC (includes via RTH where relevant
2. Have file upload and download facilities (FTP, mail, HTTP, …)
3. Have data available for upload or download
4. Have DAR facilities available at GISC.
 |
| Test Steps |
|

|  |  |  |  |
| --- | --- | --- | --- |
|  | Description | Expected Results | Actual Results |
| 1 | a. upload a file which is associated with a metadata record in the DAR catalogue of the GISC to a GISC centreb. use DAR facilities to search the metadata then retrieve the file | a. The uploaded file has been delivered to the GISC and match with the corresponding metadata b. The file can be downloaded |  |

 |
| Centre  |  | Organization |  | Country |  |
| Test Date |  |

|  |
| --- |
| Test Case Name: NC Demonstration Test Case 3  |
| Maintenance of users, roles, authorization and authentication |
| Test Case ID | NC-TC3 |
|  |  |
| Component | Management of users and access |
| Purpose of test |
| Create and exercise a variety of user types.Note: A centre may use the GISC user control interface |
| Relevant Technical Specifications  |
| * Tech specs 4 (Maintenance of User Identification and Role Information)
* Tech specs 6 (Authentication of a User)
* Tech specs 7 (Authorization of a User Role)
* Tech specs 13 (Maintenance of Dissemination Metadata)
 |
| Precondition  |
| 1. The Centre has authority to provide access to users (i.e. PR approval)
2. A process is in place between the NC and GISC for the Centre to authorize its users to use the GISC with appropriate access levels.
3. The user interface is via the internet (i.e. web page)
 |
| Test Steps |
|

|  |  |  |  |
| --- | --- | --- | --- |
|  | Description | Expected Results | Actual Results |
| 1 | Provide access for an external user to search metadata | Temporary user can search metadata, but not access data from the GISC or cache, or subscribe to data. |  |
|  | 1. User goes to search web page
2. User makes metadata search
3. Tries to access data
 | 1. User has access to search page
2. User finds metadata
3. User tries to access data and is referred to authorisation page at data source. Cannot access data without validating in an authorized user role
 |  |
| 2 | Create accounts with access to WIS metadata and data for a WMO centre authorized user | Two users are created. One with access to metadata only, the other with the ability to access the Centre subscription service or ad hoc request from the cache |  |
|  | 1. User goes to registered user web page
2. User is required to login or create account
3. User registers account and selects role of valid WMO member with authority to access WIS data (eg is from WMO NC)
4. User enters login details
5. User makes metadata search
6. Tries to access WMO globally available data from the centre
7. User tries to access additional data at centre that he is not authorized to access
8. Tries to access data or product at another site
9. User subscribes to data for future delivery from centre
10. User returns on another session and reuses login to search or subscribe
11. User edits subscription details
12. User cancels a subscription
13. User logs out or leaves centre’s site and tries to return to a bookmarked page at a later date and access data
 | 1. User has access to login page
2. New user, so has to create an account
3. User account is validated as a WMO NC member and account is created. The user receives a user login (eg code via email or encrypted symbol)
4. User is logged in. As user us validated as WMO NC member, he is allocated access to search and access to download data from cache and to subscription services
5. User finds metadata
6. User successfully accesses data from centre
7. User receives advice that he is not authorized to access this data and referred to access page where he can request change in user role or re-login as another user
8. User is referred to authorisation page at other site.
9. User receives scheduled data via agreed method at agreed time
10. User maintains successful access with same access rights
11. Users subscription details are updated and reflected in subsequent deliveries
12. Users subscription details are updated and receives no further deliveries
13. Attempting to use a bookmarked page from earlier session to access data, directs the user to the registered user login page.
 |  |
| 4 | User checks status of account and subscriptions | User can view his account and subscription details, including historic and future transactions, and the status of current transactions |  |
| … |  |  |  |

 |
| Centre  |  | Organization |  | Country |  |
| Test Date |  |

**Annex 5 to Draft Recommendation 3.2(1)/3 (CBS-Ext.(2014)) -**

**WMO Information System Competencies**

The provision of World Meteorological Organisation Information System (WIS) services within a National Meteorological and Hydrological Service (NMHS) or related services might be accomplished by a variety of skilled personnel, including project managers, engineers, technicians, and IT personnel. Personnel in third party organizations (e.g. universities, international and regional institutions and centres, and private sector companies) and other providers might also supply data, products and information for the WIS service(s).

This document sets out a competency framework for personnel involved in the provision of WIS services, but it is not necessary that each person has the full set of competencies. However, within specific application conditions (see below), which will be different for each organization, it is expected that any institution providing WIS services will have staff members somewhere within the organization who together demonstrate all the competencies at the institution's infrastructural capacity level. The Performance and Knowledge Requirements that support the competencies should be customized based on the particular context of an organization. However the general criteria and requirements provided here will apply in most circumstances.

**Application conditions**

1. The organizational context, priorities and stakeholder requirements
2. The way in which internal and external personnel are used to provide WIS services
3. The available resources and capabilities (financial, human, technological, and facilities), and organizational structures, policies and procedures
4. National and institutional legislation, rules and procedures

**Competencies**

**Infrastructure**

1 Manage the physical infrastructure

2 Manage the operational applications

**Data**

3 Manage the data flow

4 Manage the data discovery

**External Interactions**

5 Manage WIS centre-centre interactions

6 Manage external user interactions

**Overall service**

7 Manage the operational service

**Competency 1: Manage the physical infrastructure**

**Competency description**

Prepare, plan, design, procure, implement and operate the physical infrastructure, networks and applications required to support the WIS centre

**Performance components**

***IT operations control***

1. Maintain the system in optimal operational condition by setting and meeting service levels, including:
* configuration
* preventative and corrective maintenance and servicing
* equipment replacement or upgrade
* networking and processing capacity
* systems monitoring and reporting on and corrective actions
1. Contingency planning, operations backup and operations restore

**Facilities management**

1. Manage physical site security
2. Manage physical site environmental control

**Knowledge and skill requirements**

* General ICT skills
* Operation, configuration and maintenance of equipment and applications
* Recognised IT service management frameworks
* Current technologies and emerging trends
* Service level agreements

**Competency 2: Manage the operational applications**

**Competency description**

Prepare, plan, design, procure, implement and operate the applications required to support the WIS functions

**Performance components**

1. Meet service levels by maintaining applications in optimal operational condition, through:

* configuration of applications
* monitoring and responding to applications’ behaviour
* preventative and corrective maintenance
* replacement or upgrade of applications

2. Contingency planning and application backup and application restore

3. Ensure data integrity and completeness in the event of system failure

4. Ensure system security

**Knowledge and skill requirements**

* General ICT skills
* Operation, configuration and maintenance of applications
* Recognised IT service management frameworks
* Current technologies and emerging trends
* WIS functions and requirements
* WIS security policies

**Competency 3: Manage the data flow**

**Competency description**

Manage the collection, processing and distribution of data and products through scheduled and on-demand services

**Performance components**

1 Ensure collection and distribution of data and products as per data policy

2 Publish data and products

3 Subscribe to data and products

4 Encode, decode, validate and package data and products

5 Create, update and maintain data flow catalogues

6 Manage connectivity between centres

7 Control the data flow to meet service levels

**Knowledge and skill requirements**

* System and network monitoring and viewing tools
* Data formats and protocols
* Licensing and data policies
* Message and file switching systems

**Competency 4: Manage the data discovery**

**Competency description**

Create and maintain discovery metadata records describing services and information and upload to the WIS DAR catalogue

**Performance components**

1 Create and maintain discovery metadata records describing products and services

2 Add, replace or delete metadata records within the catalogue

3 Ensure that all information and service offerings from a WIS centre have complete, valid and meaningful discovery metadata records uploaded to the catalogue

**Knowledge and skill requirements**

* WMO and/or ISO docs e.g., complete and valid records
* Metadata entry and management tools
* Policies
* Discovery metadata concepts and formats
* Written English

**Competency 5: Manage WIS centre-centre interactions**

**Competency description**

Manage relationships and compliance between your centre and other WIS centres

**Performance components**

1 Exchange information with other centres on operational matters

2 Facilitate registration of new WIS centres

3 Facilitate registration of new data and products by other WIS centres

4 Create and respond to WIS service messages, including GTS

**Knowledge and skill requirements**

* Knowledge of current exchanges and requirements for notification of operational changes
* Procedures and practices for registration of other centres and their data and products
* Service level agreements
* Written English

**Competency 6: Manage external user interactions**

**Competency description**

Ensure users, including data providers and subscribers, can publish and access data and products through WIS

**Performance components**

1 Register data providers and subscribers and maintain a service agreement

2 Set and register access criteria

3 Provide systems and support for users to publish and access data and products

4 Manage user relations to ensure a high satisfaction level

**Knowledge and skill requirements**

* Data policies
* External WIS interface
* WIS registration and monitoring tools and policies
* User support documentation and help files
* Written English

**Competency 7: Manage the operational service**

**Competency description**

 Ensure the quality and continuity of the service

**Performance components**

1 Coordinate all WIS functions and activities of the centre

2 Ensure and demonstrate compliance with regulations and policies

3 Monitor and meet quality and service performance standards

4 Ensure service continuity through risk management, planning and implementation of service contingency service backup and service restore, and ensure data continuity in the event of system failure

5 Plan and coordinate the delivery of new functionality

**Knowledge and skill requirements**

* General management skills
* Overview of local and external WIS operations and associated service agreements
* WIS regulations and policies
* Functional specification
* Written English

**Annex 6 to Draft Recommendation 3.2(1)/3 (CBS-Ext.(2014)) -**

**WMO Information System (WIS) Training and Learning Guide**

This guide is to assist trainers in the development and running of training courses for WIS personnel and to guide learners in what is expected of them. As this is a guide, it is not mandatory that you precisely follow its directions. You may find more appropriate ways for you to teach or learn something. However, it is essential that the learning outcomes are met.

This guide is not a syllabus. A syllabus is essentially a list of topics without indications of learning outcomes or how the learning is to be demonstrated. With a competency based approach, the focus is on learners acquiring and demonstrating the required competencies, rather than things that are “nice for them to know”.

This guide covers the whole gamut of competencies required for people working with WIS. It is important to note that these are the competencies required in a large WIS centre where they would normally be shared across a number of personnel. Although different WIS Centres may have the same competencies, the components and complexity and depth of each may vary. Further, an individual competency or component may not be required at a particular centre (if that work is not performed there) or by individuals within the centre.

Thus, the training should be tailored to each individual’s needs. These learning needs will depend on what is required to perform their work and what competencies and skills they already possess (recognition of prior competence). Training should be to fill these gaps, not to cover all of the possible content.

In a small centre, not all of the competencies are likely to be required. In any case, each individual working with WIS needs to be able to show that they are competent to perform those tasks which they are required to do. Where they already possess skills and are able to demonstrate competence against the assessment criteria (recognition of prior competence) they will be exempt from those sections of the training.

**Competencies**

**Infrastructure**

1 Manage the physical infrastructure

2 Manage the operational applications

**Data**

3 Manage the data flow

4 Manage the data discovery

**External Interactions**

5 Manage WIS centre-centre interactions

6 Manage external user interactions

**Overall service**

7 Manage the operational service

**In and out of scope**

Staff are expected to have standard professional skills and capabilities. The emphasis here is on WIS specific skills. Training in generic skills such as ICT systems and standard applications, networking, maintenance, database skills, project management, etc. would normally be outsourced or part of a person’s training prior to working in the centre. The same applies to team-working and generic management skills.

**Assessment**

It is essential to ensure learning is transferred from the learning environment into operations. Assessment should thus simulate the operational conditions as closely as practicable. The emphasis is on what people are able to do, under the conditions in which they are required to do it, and with the tools they would normally use, rather than on what they know.

Examples of suitable assessment types include:

* Demonstrated performance
* Portfolio of examples of work they have done
* Recognition of prior competence
* Supervisor assessment certifying their competency – based on evidence of prior performance or working under supervision

As competency needs to be maintained on an ongoing basis continuing assessment may be required. This would normally be on a periodic basis at a frequency appropriate for the particular competency.

Competency based assessment means that staff are deemed capable of performing the job, not that they receive a pass mark of say 60%.

**Types of training**

This document is not meant to be prescriptive in how training should be performed but offers some suggestions. Any mode of training is acceptable, as long as it is effective and the outcomes can be assessed against the competencies. It will depend on the competency to be assessed, the size of the WIS centre, available resources, and other factors.

Some forms of training that would be appropriate include:

* Working under supervision (on the job)
* Mentoring
* Self-directed study
* Internal or external courses (online or classroom), especially for generic skills
* Scenario based activities, including use cases
* Role plays, especially for external interactions

**Key learning resources**

* The key documents, along with their references, explaining the operation of WIS are:
* [WMO‑No. 1060](http://wis.wmo.int/wis-manual) *[Manual on the WMO Information System](http://wis.wmo.int/wis-manual)*
* [WMO‑No. 1061](http://wis.wmo.int/wis-guide) *[Guide to the WMO Information System](http://wis.wmo.int/wis-guide)*
* Use cases – for learning and for assessment – still need to reference these

**Updates**

As the training for WIS evolves it is expected that so, too, will this guide. Suggestions of ways to improve the document and ideas about how the training can be conducted are always welcome and should be sent to: WIS-help@wmo.int

**Competency 1: Manage the physical infrastructure**

Prepare, plan, design, procure, implement and operate the physical infrastructure, networks and applications required to support the WIS centre.

Many of these skills are generic ITC skills and will have already been attained as part of prior education and training or will be provided by hardware and systems suppliers.

**Competencies components**

IT operations control

1 Maintain the system in optimal operational condition by setting and meeting service levels, including:

* configuration
* preventative and corrective maintenance and servicing
* equipment replacement or upgrade
* networking and processing capacity
* systems monitoring, reporting and corrective actions

2 Contingency planning, operations backup and operations restore

3 Facilities management

* Manage physical site security
* Manage physical site environmental control

**Learning outcomes**

You will be able to:

* Maintain the system in optimal operational condition
* Plan for upgrades, operations backups and operations restores
* Maintain site security and environmental control

***You will learn:***

* WIS specific systems
* WIS site security policies
* Service level agreements for your centre

***Learning activities***

To learn how to perform these job tasks you may:

* Attend training by systems and other outside providers
* Respond to typical monitoring reports
* Apply WIS site security measures and respond to typical incidents
* Apply WIS site environmental control measures and respond to typical incidents

***Assessment***

You must be able to:

* Configure and maintain system components
* Respond to monitoring reports
* Apply WIS site security measures and respond to typical incidents
* Apply WIS site environmental control measures and respond to typical incidents

***Underpinning knowledge and skills***

* General ICT skills
* Current technologies and emerging trends
* Recognised IT service management frameworks
* Service level agreements for your centre

***Key learning resources***

* Manufacturers’ handbooks and guides
* Documentation of centre’s facilities
* WIS/GTS manuals and guides
* Tools to monitor system security
* WIS security policies
* WIS environmental control policies

**COMPETENCY 2: MANAGE THE OPERATIONAL APPLICATIONS**

Prepare, plan, design, procure, implement and operate the applications required to support the WIS functions.

Many of these skills are generic ITC skills and will have already been attained as part of prior education and training or will be provided by applications suppliers.

**Competencies components**

1 Meet service levels by maintaining applications in optimal operational condition, through:

* configuration of applications
* monitoring and responding to applications’ behaviour
* preventative and corrective maintenance
* replacement or upgrade of applications

2 Contingency planning, application backup and application restore

3 Ensure data integrity and completeness in the event of system failure

4 Ensure system security

**Learning outcomes**

You will be able to:

* Operate, configure and maintain applications
* Monitor applications and take corrective action
* Apply and test WIS security protocols

**You will learn:**

* WIS applications specific to your centre
* WIS system security policies and procedures

**Learning activities**

To learn how to perform these job tasks you may:

* Attend training by systems and other outside providers
* Initiate monitoring and reporting procedures and respond to typical monitoring reports
* Apply WIS site security measures and respond to typical incidents

**Assessment**

You must be able to:

* Configure and maintain system components
* Respond to monitoring reports
* Apply site security measures and respond to typical incidents

**Underpinning knowledge and skills**

* Current technologies and emerging trends
* WIS functions and requirements
* Recognised IT service management frameworks
* Service level agreements for your centre

**Key learning resources**

* Documentation of centre’s applications
* WIS/GTS manuals and guides
* Tools to monitor system security
* WIS security policies

**Competency 3: Manage the data flow**

Manage the collection, processing and distribution of data and products through scheduled and on-demand services.

**Competencies components**

1 Ensure collection and distribution of data and products as per data policy

2 Publish data and products

3 Subscribe to data and products

4 Encode, decode, validate and package data and products

5 Create, update and maintain data flow catalogues

6 Manage connectivity between centres

7 Control the data flow to meet service levels

**Learning outcomes**

You will be able to:

* Transfer data and products between your centre, other WIS centres, and external users
* Request data and respond to data requests using *ad hoc* and routine delivery mechanisms
* Maintain quality standards (service levels) by monitoring, and responding to, traffic flow, missing data and products, errors and service messages
* Apply relevant data policies to data and products
* Identify appropriate formats for data and product exchange
* Write and read data in WIS formats using your centre’s tools

**You will learn:**

* Data representations used in WIS and when they are applicable
* WMO data policies and how data are associated with these in WIS
* The structure of the WIS and GTS and how to use reference documents to identify and interpret the routeing plans and protocols you will need to use
* The interfaces of your centre’s WIS applications, the information they use to modify their behaviour, and the tools available to control the operation of the applications to achieve service levels
* How to use a WIS centre interface to find and request data for delivery by *ad hoc* request and by subscription
* How WIS handles back-up and how the GTS handles alternative routeings to maintain continuity of data flows

**Learning activities**

 To learn how to perform these job tasks you may:

* Connect to a WIS centre to search for information, select a dataset, download a copy from the cache
* Using a WIS centre interface, create, modify and delete a subscription for routine delivery of a dataset
* Use the software tools used by your centre’s WIS application to exchange information between computers
* Assess data flows by analysing monitoring reports from your applications
* Investigate how data policy (including WMO Resolutions 25 and 40) is applied to data published by your centre
* Use tools provided at your centre to view information in different formats and convert data between these formats

**Assessment**

 You must be able to:

* Go to a WIS centre, find data, download it immediately, subscribe for regular delivery and cancel the subscription
* GTS component: Use a switch to move data between training computers and control the flow

**Underpinning knowledge and skills**

* Internet protocols
* Networking principles (local area networks and wide area networks) and associated monitoring and control technologies

**Key learning resources**

***Data policies***

* WMO Resolution 25 ([Resolution 25 (Cg XIII)](http://www.wmo.int/pages/about/Resolution25_en.html)— Exchange of Hydrological Data and Products)
* WMO Resolution 40 ([Resolution 40 (Cg-XII)](http://www.wmo.int/pages/about/Resolution40_en.html) — WMO policy and practice for the exchange of meteorological and related data and products including guidelines on the relationships in commercial meteorological activities
* Centre’s data policies

***GTS data exchange***

* [WMO‑No. 386](http://wis.wmo.int/gts-manual) *[Manual on the Global Telecommunications System](http://wis.wmo.int/gts-manual)*
	+ Attachment II-5 of the Manual on the Global Telecommunications System (data designators)
	+ Attachment II-6 of the Manual on the Global Telecommunications System (format of addressed messages)
	+ Attachment II-7 of the Manual on the Global Telecommunications System (routing catalogues)
	+ Attachment II-15 of the Manual on the Global Telecommunications System (section on *FTP procedures and file naming convention*)
	+ Attachment II-16 of the Manual on the Global Telecommunications System (procedures for transmitting and collecting meteorological bulletins using e-mail and web)

***Data representations***

* [WMO-No. 306](http://library.wmo.int/opac/index.php?lvl=notice_display&id=13617" \l ".U8Y-8_mSxxA) *[Manual on Codes - International Codes,](http://library.wmo.int/opac/index.php?lvl=notice_display&id=13617" \l ".U8Y-8_mSxxA)* [Volume I.1:](http://library.wmo.int/opac/index.php?lvl=notice_display&id=13617" \l ".U8Y-8_mSxxA) *[Part A- Alphanumeric Codes](http://library.wmo.int/opac/index.php?lvl=notice_display&id=13617" \l ".U8Y-8_mSxxA)*
* [WMO-No. 306](http://library.wmo.int/opac/index.php?lvl=notice_display&id=10684" \l ".U8Y-TPmSxxA) *[Manual on Codes - International Codes,](http://library.wmo.int/opac/index.php?lvl=notice_display&id=10684" \l ".U8Y-TPmSxxA)* [Volume I.2:](http://library.wmo.int/opac/index.php?lvl=notice_display&id=10684" \l ".U8Y-TPmSxxA) *[Part B and Part C](http://library.wmo.int/opac/index.php?lvl=notice_display&id=10684" \l ".U8Y-TPmSxxA)*
* Guidance on migration to table driven code forms ([http://www.wmo.int/pages/prog/www/WMOCodes.html#Codes](http://www.wmo.int/pages/prog/www/WMOCodes.html%22%20%5Cl%20%22Codes))
* Tools used at centre to read, write, convert, validate and display information in Table Driven Code Forms
* Sample data for reading and writing in Table Driven Code Forms

***WIS discovery, access and retrieval***

* [WMO‑No. 1060](http://wis.wmo.int/wis-manual) *[Manual on the WMO Information System](http://wis.wmo.int/wis-manual)*
	+ Man on WIS (WMO-No 1060/Annex VII to WMO-No 49) Part 2 para 2.4.1, Part 3 para 3.4, Part 4 para 4.3, 4.11, 4.12, 4.13, Part 1 para 1.7), and the corresponding sections of the Guide to WIS.
	+ [WIS compliance specification Part 2 para 2.4](http://www.wmo.int/pages/prog/www/WIS/documents/TechnicalSpecification1-2.doc).
* [WMO‑No. 1061](http://wis.wmo.int/wis-guide) *[Guide to the WMO Information System](http://wis.wmo.int/wis-guide)*
* User account at a GISC and PC with internet connection

***Managing GTS data exchange***

* [WMO‑No. 386](http://wis.wmo.int/gts-manual) *[Manual on the Global Telecommunications System](http://wis.wmo.int/gts-manual)*
* [WMO‑No. 9](http://www.wmo.int/pages/prog/www/ois/Operational_Information/VolC1_en.html) *[Weather Reporting](http://www.wmo.int/pages/prog/www/ois/Operational_Information/VolC1_en.html)*[, Volume C1:](http://www.wmo.int/pages/prog/www/ois/Operational_Information/VolC1_en.html) *[Catalogue of Meteorological Bulletins](http://www.wmo.int/pages/prog/www/ois/Operational_Information/VolC1_en.html)*
* [Global Telecommunications System routeing tables](http://www.wmo.int/pages/prog/www/ois/Operational_Information/RtngCat_en.html)
* Training environment on message and file switch
* [World Weather Watch quantity monitoring statistics](http://www.wmo.int/pages/prog/www/ois/monitor/index_en.html)

***Security of data exchange***

* *WMO‑No. 1116 Guide to Virtual Private Networks (VPN) via the Internet between GTS centres*
* [WMO‑No. 1115](http://wis.wmo.int/gts-security) *[Guide to Information Technology Security](http://wis.wmo.int/gts-security)*

***Network management***

* Network Management tool and associated documentation
* System error reports and event viewing tools

**Competency 4: Manage the Data Discovery**

Create and maintain discovery metadata records describing services and information and upload to the WIS DAR catalogue

Each data and product record held within WIS must have metadata associated with it in order to be able to discover it and to know what it means. These metadata records are held in a catalogue for discovery, access and retrieval (DAR).

**Competencies components**

1 Create and maintain discovery metadata records describing products and services.

2 Add, replace or delete metadata records within the catalogue

3 Ensure that all information and service offerings from a WIS centre have complete, valid and meaningful discovery metadata records uploaded to the catalogue

**Learning outcomes**

You will be able to:

* Create discovery metadata from user supplied descriptions using standard WIS tools
* Add, replace or delete metadata records within the catalogue

**You will learn:**

* The role of discovery metadata in discovery, access and retrieval of data and products
* Approved metadata formats
* How to discriminate content that is mandatory, acceptable or inapplicable
* Use of metadata creation tools
* How to access and modify a catalogue
* How data flows within and to and from your centre
* Tools to allow users to input descriptions

**Learning activities**

To learn how to perform these job tasks you may:

* Create metadata records based on sample descriptions for a range of data and products typical for your WIS Centre
* Insert these into a catalogue, replace them with records which have been changed, and delete them

**Assessment**

You must be able to:

* Demonstrate successful creation of metadata records for typical products
* Demonstrate competence in publishing and deleting metadata catalogue records

**Resources**

* WIS Technical Specifications: WIS-TechSpec-9: Consolidated view of distributed Discovery, Access and Retrieval metadata catalogues
* [WMO‑No. 1060](http://wis.wmo.int/wis-manual) *[Manual on the WMO Information System](http://wis.wmo.int/wis-manual)*, Part 5, Core Metadata Profile
* [WIS metadata guidance](http://wis.wmo.int/md_index)
* Metadata entry and management tools
* Samples of how to complete typical examples
* Metadata policies and WIS metadata guidelines
* ISO 191xx series: ISO standards on Geographic Information

**Competency 5: Manage WIS centre-centre interactions**

Manage relationships and compliance between your centre and other WIS centres

**Competencies components**

1 Exchange information with other centres on operational matters

2 Facilitate registration of new WIS centres

3 Facilitate registration of new data and products by other WIS centres

4 Create and respond to WIS service messages, including GTS

**Learning outcomes**

You will be able to:

* Facilitate registration of new WIS centres and their data and products
* Keep other WIS centres informed of the status of services, incidents and requests
* Monitor and respond to service levels reports
* Manage subscriptions

**You will learn:**

* Knowledge of current exchanges and requirements for notification of operational changes
* What type of data, products and services are available at your centre
* Procedures and practices for registration of other centres and their data and products
* Procedures and practices for notifying other centres about operational changes and service availability

**Learning activities**

To learn how to perform these job tasks you may:

* Perform the above activities using software, tools and guidance as used in your operational environment, either in a classroom environment or under supervision on-the-job

**Assessment**

You must be able to:

* Respond to a request to register a new centre and its data and products
* Prepare notifications of typical operational scenarios
* Respond to typical notifications from other WIS centres

**Resources**

***WMO***

* Manual on GTS (WMO no 386)
* Manual on WIS (WMO No 1060)
* Part II, Centre Nomination Procedures
* Part IV, WIS Techspecs 4, 6, 7, 8 & 13
* Guide to the WIS (WMO 1061)
* Weather reporting (WMO No 9)
* Exchange of Meteorological Data (WMO No 837) (Resolution 25 & 40)

***Local***

* Service Level Agreements (as used by your centre)
* FAQ Documents (User centric)
* WIS software user guides
* Guidelines for services available at WIS centre
* Data policy and associated guidance material
* First line support procedures and guides
* User database (for contact information)
* Tools (could be whiteboard)
* Case tracking and customer management
* WIS user management
* WIS subscription management
* WIS components monitoring dashboard

**Competency 6: Manage external user interactions**

Ensure users, including other centres, data providers and subscribers, can publish and access data and products through WIS

**Competencies components**

1 Register data providers and subscribers and maintain a service agreement

2 Set and register access criteria

3 Provide systems and support for users to publish and access data and products

4 Manage user relations to ensure a high satisfaction level

**Learning outcomes**

You will be able to:

* Register new WIS users and providers, setting roles, access authorisations and levels
* Create and amend WIS users subscriptions
* Use WIS tools to assist users and providers to resolve problems
* Create and respond to WIS service messages, including GTS
* Undertake first-line investigation and diagnosis
* Manage incidents and requests: log them, categorize and prioritize them, escalate as appropriate and close them when the user is satisfied
* Keep users informed of the status of services, incidents and requests.
* Gather and report on user and provider satisfaction
* Assist users to upload and access data
* Identify potential problems in services and implement improvements

**You will learn:**

* What type of data, products and services are available at your centre
* How WIS applications are intended to be used, including discovery, access and retrieval (DAR)
* How to apply data policies
* How to interact effectively with users and providers

**Learning activities**

To learn how to perform these job tasks you may:

* Register users (data providers and subscribers) and set access authorisations and levels using software, tools and guidance as used in your operational environment
* Role play user interactions

**Assessment**

You must be able to:

* Register typical data providers and users
* Ensure users are able to upload and access data
* Respond to typical incidents

**Resources**

***WMO***

* Manual on GTS (WMO no 386)
* Manual on WIS (WMO No 1060)
* Part II, Centre Nomination Procedures
* Part IV, WIS Techspecs 4, 6, 7, 8 & 13
* Guide to the WIS (WMO 1061)
* Weather reporting (WMO No 9)
* Exchange of Meteorological Data (WMO No 837) (Resolution 25 & 40)

***Local***

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* FAQ Documents (User centric)
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* Guidelines for services available at WIS centre
* Data policy and associated guidance material
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* Tools (could be whiteboard)
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* WIS user management
* WIS subscription management
* WIS components monitoring dashboard

**Competency 7: Manage quality, risk and operational service**

Ensure the quality and continuity of the service

This is essentially a management role, ensuring that the WIS system operates as it is required to do, now and into the future. Some of these skills are generic management skills, rather than WIS specific, and would be taught or learnt elsewhere.

**Competency components**

1 Coordinate all WIS functions and activities of the centre

2 Set and monitor Centre regulations, policies and procedures to meet quality and service performance standards

3 Ensure service continuity through risk management, planning and implementation of service contingency, service backup and service restore, and ensure data continuity in the event of system failure

4 Plan and coordinate the delivery of new functionality and improvements

5 Ensure budgets are set and met

**Learning outcomes**

You will be able to:

* Ensure the WIS centre meets quality and service performance standards
* Identify the challenges and issues to address
* Foster compliance with WIS framework

**You will learn:**

* Functions and responsibilities of WIS centre
* WIS quality and service performance standards
* Methods to manage quality, risk and operational service
* How to monitor quality and service performance standards
* How to analyze quality and service performance in the WIS centre
* How to report quality and service performance
* How to demonstrate quality and service performance
* How to maintain troubleshooting and backup and restore procedures
* How to plan and coordinate the delivery of new functionality and improvements
* How to integrate new technologies and developments
* How to update the regulatory documents
* How to maintain service agreements
* How to plan monitoring resources
* How to align budget restrictions with human resources demands

**Learning activities**

To learn how to perform these job tasks you may:

* Monitor quality and service performance standards
* Analyse quality and service performance in the WIS centre
* Report quality and service performance
* Demonstrate quality and service performance
* Maintain troubleshooting and backup and restore procedures
* Plan and coordinate the delivery of new functionality
* Keep timely records, as required

**Assessment**

You must be able to:

* Demonstrate successful WIS service
* Plan successful procurement of replacement and upgrade of equipment and applications to meet new functionality and requirements

**Resources**

* Technical Regulations (WMO-No.49), Volume I
* Resolution 25 (Cg-XIII)
* Resolution 40 (Cg-XII)
* [WMO‑No. 386](http://wis.wmo.int/gts-manual) *[Manual on the Global Telecommunications System](http://wis.wmo.int/gts-manual)*
* [WMO‑No. 1060](http://wis.wmo.int/wis-manual) *[Manual on the WMO Information System](http://wis.wmo.int/wis-manual)*, WIS-TECHSPEC-15 (Reporting of quality of service)
* [WMO‑No. 1061](http://wis.wmo.int/wis-guide) *[Guide to the WMO Information System](http://wis.wmo.int/wis-guide)*
* WIS demonstration process procedures and guidelines
* Monitoring reports
* Audit reports

##

1. \* In MS Word 2007 or 2003, go to “View” > “Document Map”. In MS Word 2010, go to “View” > “Navigation Pane”.
In MS Word on a Mac, go to “View” > “Navigation Pane”, select “Document Map” in the drop-down list on the left. [↑](#footnote-ref-1)
2. Country Profile Data base - <https://www.wmo.int/cpdb/> or for graphical representation directly, see <https://www.wmo.int/cpdb/pages/map/regions/wiscentres> [↑](#footnote-ref-2)
3. Status on WIS centre certification by CBS - <http://www.wmo.int/pages/prog/www/WIS/centres/> [↑](#footnote-ref-3)
4. WIS Demonstration Process - http://www-db.wmo.int/WIS/centres/guidance.doc [↑](#footnote-ref-4)