**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 *Manual on the WMO Information System*](http://wis.wmo.int/wis-manual)
* [WMO‑No. 1061 *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](mailto: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 *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 *Manual on Codes - International Codes,* Volume I.1: *Part A- Alphanumeric Codes*](http://library.wmo.int/opac/index.php?lvl=notice_display&id=13617#.U8Y-8_mSxxA)
* [WMO-No. 306 *Manual on Codes - International Codes,* Volume I.2: *Part B and Part C*](http://library.wmo.int/opac/index.php?lvl=notice_display&id=10684#.U8Y-TPmSxxA)
* Guidance on migration to table driven code forms (<http://www.wmo.int/pages/prog/www/WMOCodes.html#Codes>)
* 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 *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 *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 *Manual on the Global Telecommunications System*](http://wis.wmo.int/gts-manual)
* [WMO‑No. 9 *Weather Reporting*, Volume C1: *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*](htttp://wis.wmo.int/1215)
* [WMO‑No. 1115 *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](htp://wis.wmo.int/wis-techspec): WIS-TechSpec-9: Consolidated view of distributed Discovery, Access and Retrieval metadata catalogues
* [WMO‑No. 1060 *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***

* 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 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 *Manual on the Global Telecommunications System*](http://wis.wmo.int/gts-manual)
* [WMO‑No. 1060 *Manual on the WMO Information System*](http://wis.wmo.int/wis-manual), WIS-TECHSPEC-15 (Reporting of quality of service)
* [WMO‑No. 1061 *Guide to the WMO Information System*](http://wis.wmo.int/wis-guide)
* WIS demonstration process procedures and guidelines
* Monitoring reports
* Audit reports