

WORLD METEOROLOGICAL ORGANIZATION

**INTER-COMMISSION COORDINATION GROUP
ON THE WMO INTEGRATED GLOBAL OBSERVING SYSTEM**

TASK TEAM ON WIGOS REGULATORY MATERIAL

First Session

Geneva, Switzerland, 19-23 November 2012

FINAL REPORT



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EXECUTIVE SUMMARY

The first session of the Task Team on WIGOS Regulatory Material (TT-WRM-1) of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) was held at WMO headquarters in Geneva, Switzerland, from 19 to 23 November 2012. The session was chaired by Mr R. Stringer (Australia), Chair, TT-WRM.

Based on the decisions by Cg-XVI, EC-LXIII and EC-LXIV, and in accordance with the Terms of Reference, TT-WRM carefully addressed one of the key components of the WIGOS implementation which is an update of the WMO Technical Regulations (WMO-NO. 49) (TR), Volume I. In this regard, the session considered and agreed on the draft structure of WIGOS sections in WMO TR, Volume I (see [Appendix II](#)).

TT-WRM developed its Future Work Programme and Action Plan of TT-WRM (see [Appendix III](#)). Also, TT-WRM reviewed its Terms of Reference and agreed on a draft to be submitted to ICG-WIGOS-2 for consideration and approval (see [Appendix IV](#)).

GENERAL SUMMARY

1. ORGANIZATION OF THE SESSION

1.1 Opening of the meeting

1.1.1 The first session of the Task Team on WIGOS Regulatory Material (TT-WRM-1) of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System (ICG-WIGOS) was opened by its Chair, Mr R. Stringer, at 09:00 hours on Monday, 19 November 2012, at the WMO Headquarters in Geneva, Switzerland.

1.1.2 Dr W. Zhang, the Director, Observing and Information Systems Department welcomed the participants to Geneva in his opening remarks. He recalled the role and responsibilities of TT-WRM in accordance with the decisions by Cg-XVI, EC-LXIII and EC-LXIV. He underlined that WIGOS is essential for the Global Framework for Climate Services (GFCS).

1.1.3 Dr S. Barrell, as the delegated Chair, ICG-WIGOS, welcomed the participants to the meeting. She underlined the technical role of CBS and CIMO in the WIGOS implementation and the need for close coordination and collaboration with other technical commissions and WMO programmes.

1.1.4 The list of participants is given in [Appendix I](#).

1.2 Adoption of the agenda

TT-WRM adopted the [Agenda](#) for the meeting, which is reproduced at the beginning of this report.

1.3 Working arrangements

1.3.1 TT-WRM agreed on its working hours and adopted a tentative work plan for consideration of the individual Agenda Items.

2. REPORT OF THE CHAIRMAN

2.1. In his report, the Chair noted that WIGOS provides a collective identity for all WMO observing systems, and a framework for collaboration across these component observing systems in the pursuit of synergies. He underlined a need for a clear and common understanding of the WIGOS concept/framework (what WIGOS is about) and the WMO Technical Regulations and Regulatory Material¹ in order to work together as a team and complete the tasks specified by the Terms of Reference.

2.2. The Chair noted that TT-WRM is to propose an update to the WMO Regulatory Material as part of the implementation of WIGOS and to further develop the high level WIGOS Functional Architecture. He noted that, thanks to the active support of the Secretariat, some progress had been made on both of those topics.

2.3. The Chair mentioned that the Terms of Reference would need to be reviewed during the meeting based on the outcomes of the discussion.

2.4. The Chair invited Dr W. Zhang and Dr S. Barrell to deliver presentations on WIGOS (the concept, implementation, roles of key stakeholders, what WIGOS brings to Members, regions, and partners; etc.) with an aim to set the scene for a productive meeting. Both presentations are available at the WIGOS web page (<http://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings/TT-WRM-1/TT-WRM-1.html>).

3. REVIEW OF RECOMMENDATIONS OF EC-LXIV AND ICG-WIGOS-1

3.1. TT-WRM was informed on the guidance and recommendations by EC-LXIV and ICG-WIGOS-

¹ WMO Regulatory Material consists of the WMO Technical Regulations (WMO-No. 49) including annexes (mostly named as Manuals), various WMO guides and other WMO technical material/documentation.

1 on the implementation of WIGOS relevant to the work of the Task Team.

4. WIGOS FRAMEWORK IMPLEMENTATION PLAN

4.1. The Secretariat delivered a presentation on the WIGOS Framework and its implementation, to allow for a clear and common understanding of the WIGOS concept/framework, and to help set the stage for the development of the WIGOS Regulatory Material.

4.2. The WIGOS Framework Implementation Plan (WIP), adopted by the EC- LXIV (2012), which defines the ten key activity areas for WIGOS implementation was presented. Special attention was given to those WIGOS implementation activities that are relevant to the work to be done by this Task Team for the development of the WIGOS related Regulatory Material. Whilst this is primarily the WIP activity 1.1.1, it is also included in the activities 3.1.1; 4.1.1-2; 5.1.1; 6.1.1 and 8.1.1.

5. THE TT-WRM ROLE AND TOR

5.1. The Terms of Reference (TOR) for this TT, approved by the Chair of ICG-WIGOS, were presented by the Chair. The session agreed to review the TOR again under agenda item 8 (Future Work Programme and Action Plan) based on the outcomes of the agenda items 6 and 7.

6. WIGOS FUNCTIONAL ARCHITECTURE

6.1. TT-WRM was briefed on the progress made so far on the development of a High Level WIGOS Functional Architecture (FA) since the first session of ICG-WIGOS. The Secretariat presented further ideas on how the WIGOS FA could be summarised and represented graphically.

6.2. TT-WRM agreed that the new graphical representation of the WIGOS Framework presented by the Secretariat could be adapted taking into account the comments of the meeting. TT-WRM agreed that simplicity, brevity and clarity are essential and that ideally a single graphic illustration should represent the WIGOS concept/framework. The meeting responded favourably to a suggestion that instead of the "functional architecture", the term "framework architecture" should be proposed to ICG-WIGOS-2 for approval. It was decided that an updated version of the WIGOS Functional Architecture document would be drafted by the Chair taking into account these discussions.

7. WMO REGULATORY MATERIAL

(a) Development of the WIGOS sections in the WMO Technical Regulations (TR) (WMO-No. 49)

7.1. Two comprehensive presentations were delivered by the Secretariat on the WMO Technical Regulations (WMO-No. 49), including a description of the strict formalities associated with the TR. The Technical Regulations (whether in the basic document or one of the annexes which are normally called Manuals) are approved by Congress (or in some cases through delegated authority by EC). Standard practices are mandatory for Member countries to follow and are identified by the word "shall", while recommended practices are identified by the word "should" and Member countries are urged to follow them. Other reference documents (guides, technical documents, etc.) that might be referred to more generally as "regulatory material" are not subject to Congress approval. They contain practices, procedures and specifications which don't have the force of Regulations even if the words "shall" or "should" are used there.

7.2. A list of the existing WMO Regulatory Material relevant to WIGOS was provided. In addition, TT members provided lists of existing regulatory material/documentation, in their areas of responsibility, which might contain relevant material for the development of WIGOS Technical Regulations and other WIGOS regulatory material.

7.3. TT-WRM noted that for WMO it is important to use the Technical Regulations to define requirements that imply obligations applicable to its Members. This is where WMO fulfils its role as an intergovernmental organization, for example like ICAO, in contrast with non-legally binding groups.

7.4. The current version of WMO TR (WMO-No. 49), Vol. I refers in many cases to Meteorology

and Hydrology only. However, the other disciplines must be mentioned when appropriate.

7.5. In the TR, the recommended practices and procedures are explained as the practices and procedures which it is desirable that Members follow or implement. An appropriate definition/explanation of the term “desirable” is needed, to stress that Members are urged to follow these practices and procedures and not simply to be treat them as optional.

7.6. Some requirements may be agreed in principle as a target for global implementation but it may take several years until they are achievable by all Members. The use of “should” in the TR can be a way to express such a requirement between the time when it is agreed in principle as a target, until the time when it is achievable and agreed by all Members. In such a case there should be an understanding that when all Members are ready to comply with this requirement the word “should” will ultimately be replaced by the word “shall” in an updated version of the TR.

7.7. TT-WRM expressed the opinion that the Reference Guide for Permanent Representatives of Members with the World Meteorological Organization on Relevant Procedures and Practices of the Organization (WMO-No. 939) should be updated in due course to emphasize that the implementation of WIGOS as an operational system includes all WMO component observing systems².

7.8. TT-WRM agreed that the requirements for the international exchange of observational data and products should be listed in the WIGOS sections of the TR.

(b) Zero draft of WIGOS sections in the WMO Technical Regulations (TR) (WMO-No. 49)

7.9. TT-WRM then commenced its work to review and develop updates for regulatory material relevant to WIGOS. It considered in detail and developed an outline Zero draft of the WIGOS sections in the new WMO Technical Regulations, building on the material provided by the Secretariat. It identified responsibilities within the team for the development of each section, and the key existing documents from which to adapt the content. The outline together with the responsibilities within the task team is provided in [Appendix II](#).

7.10. The most significant matter considered by TT-WRM was the overall model for the various WIGOS related regulatory material documents. Ad hoc discussions in the months before this meeting had explored different options. The Secretariat described a model that had been considered in May 2012 comprising updates to the TR and the Manual on the GOS together with the introduction of new manuals on WIGOS, GAW, GCW and WHYCOS. Another model developed in October 2012 was described comprising a more substantial update and expansion of the TR, combined with the anticipated phasing out of the Manual on the GOS and avoidance of separately published Manuals on WIGOS, GAW, GCW, WHYCOS or CIMO. TT-WRM decided to pursue the latter model as it appeared to encourage simplification and to be more readily achievable, as well as avoiding a significant increase in complexity and duplication.

7.11. Noting that the TORs specifically call for a Manual on WIGOS, TT-WRM decided that it would describe and seek approval of the model for WIGOS regulatory material from ICG-WIGOS. It agreed to proceed with this model in the meantime on the basis that changing to another model would not require a significant amount of adjustment in its drafting arrangements.

7.12. TT-WRM noted that WHYCOS is only an element of WMO's Hydrological Observing System for which the WMO regulatory material applies. Also noting that WIGOS refers to all WMO observing systems, it concluded that it should use this broader terminology in the WIGOS regulatory material. It was encouraged in this approach by the Chair, ICG-WIGOS and by representatives of the Climate and Water Department of the WMO Secretariat.

7.13. TT-WRM found that the term "data management" served to confuse its discussions and decided to avoid using it in WIGOS regulatory material, instead aiming to use more specific and precise references to any given activities. Some other terms also risked causing confusion and it was concluded that definitions for such terms would need to be included in the TRs.

7.14. It was noted that ICG-WIGOS has established a Task Team on WIGOS Metadata (TT-WMD) that has not yet met. TT-WRM considered that its references to metadata in WIGOS regulatory material would need to be well-considered and would in due course be reviewed and further enhanced by TT-

² This concern will be reported to the ICG-WIGOS-2 for consideration and guidance

WMD.

7.15. TT-WRM gave consideration to the absence of a WIGOS Manual as well as the fact that it had not discussed a WIGOS Guide yet. Noting a risk that excessive material might be drafted into the TRs simply because good ideas would need a home, it was decided to open a WIGOS guidance "parking bay" to provide a destination for such material during drafting.

7.16. TT-WRM agreed on the following basic principles to be applied in developing the WIGOS sections in the TR:

- TR must be relevant to WMO Members as a primary audience;
- TR should specify what shall and should be provided to ensure and allow for WIGOS as an operational system;
- The language used must be clear, plain and unambiguous (succinct writing designed to ensure that the reader understands as quickly and completely as possible without any ambiguity).
- The structure of the TR must include all WMO component observing systems;
- Noting the anticipated phasing out of the Manual on the GOS, attention needs to be given to finding a new location for all material that is genuinely "regulatory", while other material should not be lost but directed into other reference documents such as the Guide to the GOS or a Guide on WIGOS;
- Sections on Quality Management will include the application of the WMO QMF (WMO-No. 49), Vol. IV to the WIGOS domain, while specific standards and procedures will be covered in other sections of the WIGOS TR;
- Good ideas that emerge during drafting and need to be captured, yet might not be suitable for TRs, will be safeguarded by delivering them to the WIGOS guidance "parking bay";
- Definitions for terms used are to be drafted by the leaders for their individual sections; further harmonization will be undertaken by WIGOS-PO;
- Repetition of any statement should be avoided;
- "Shall" should be used predominantly;

7.17. TT-WRM recognized two different groups of WIGOS relevant regulatory material already developed by respective TCs, which should both be available in the WIGOS Operational Information Resource (WIR) when it is operational:

- Resource documents to be used for developing WIGOS sections in the TR; and
- Other reference documents providing additional WIGOS relevant guidance but not contributing to TRs.

7.18. TT-WRM discussed a future Guide on WIGOS only very briefly, noting its inclusion in the TORs and agreed it would need consideration at the next meeting.

8. FUTURE WORK PROGRAMME AND ACTION PLAN OF TT-WRM; REVIEW OF TORs

8.1. TT-WRM considered the steps and tasks to be undertaken in completing its work; in this regard, it developed its Future Work Programme and Action Plan that is reproduced in [Appendix III](#).

8.2. TT-WRM agreed tentatively on the dates for further meetings in 2013, as follows: 17-21 June and 18-22 November.

8.3. TT-WRM noted the need to change the wording of its TORs for consistency with the proposed model for the WMO TR (see [Appendix IV](#)), and asked the Chair to propose an appropriate change to ICG-WIGOS-2.

9. ANY OTHER BUSINESS

9.1. No Other Business was submitted for consideration; a comment was made that the International Cloud Atlas (WMO-No. 407) is not referenced in the WMO TR except in the Contents. The meeting agreed that it would be desirable to find an appropriate spot to make a reference to the Cloud Atlas.

10. CLOSURE OF THE SESSION

10.1. The session closed on Friday, 23 November 2012, at 13:30 hours.

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DRAFT STRUCTURE OF WIGOS SECTIONS IN WMO TR**WMO Technical Regulations (WMO-No. 49), Volume I.****PART I. WMO Integrated Global Observing System (WIGOS)**

Version	Date	Comments
0.4	29 October 2012	Zero draft outline, developed by WMO OBS Dept. and presented to TT-WRM-1 (19-23 November 2012)
0.6	23 November 2012	Zero draft further developed by TT-WRM-1

Lead Compiler – Tim Oakley

Note:

It was agreed that each responsible lead for the different sections will provide to Tim:

- *a list of terms used in their section of the Technical Regulations which need to be given a definition in the opening section of the Technical Regulations; and*
- *the draft definition for each of those terms*

DEFINITIONS:

Interoperability	Interoperability is a property referring to the ability of diverse systems to work together (inter-operate) ³
Observational data	(... A simple note to explain that we're not talking about raw data on the one hand or highly processed data or products on the other hand ...)
Observational metadata	
Observing System	(... This term is used in two contexts, the CIMO Guide context and the high level GOS context. Further definition and explanation is required to avoid confusion...)
Quality Assurance	all planned and systematic actions necessary to provide adequate confidence that a product, process or service will satisfy given requirements for quality (GAW reference ISO 8402, 1994) Part of Quality Management focused on providing confidence that quality requirements will be fulfilled (ISO 9000, 2005)
Quality Control	operational techniques and activities that are used to fulfil given requirements for quality (GAW reference ISO 8402, 1994) Part of Quality Management focused on fulfilling quality requirements (ISO 9000, 2005)
Quality Management	Coordinated activity to direct and control an organisation with regards to quality (ISO 9000, 2005)
.....	
.....	
.....	

Note – Existing requirements tables at the front of Technical Regulations proposed to be deleted.

³ As defined in the WIP

1. INTRODUCTION [Lead Compiler R.Stringer / M.Ondras]

1.1 Purpose of WIGOS

(... include a reference to "Data Compatibility")

1.2 WIGOS component observing systems

1.2.1 Global Observing System (GOS)

1.2.2 Global Atmosphere Watch (observing component of GAW)

1.2.3 WMO Hydrological Observations

1.2.4 Global Cryosphere Watch (observing component of GCW)

1.3 Collaboration with co-sponsored and non-WMO observing system

(... include a reference to "Interoperability")

1.4 Governance and management

2. COMMON ATTRIBUTES OF COMPONENT SYSTEMS

2.1 Requirements [Lead Compiler R.Stringer / E.Charpentier]

2.2 Design, planning and evolution [Lead Compiler R.Stringer / E.Charpentier]

(... Consider inserting a section "Composition of WIGOS")

2.2.1 Review of observational user requirements

2.2.2 Review of current and planned observing systems capabilities

2.2.3 Impact and design studies, and critical review

2.2.3.1 Impact studies, OSEs, and OSSEs

2.2.3.2 Critical review and gap analysis

2.2.3.3 Design studies

2.2.4 Vision for the WIGOS

2.2.5 Implementation Plan for the Evolution of WIGOS

2.2.6 Monitoring observing systems implementation

2.3 Instrumentation and Methods of Observation [Lead Compiler V.Kurz / R.Atkinson]

2.3.1 General Requirements of Instruments/Sensor

2.3.2 **General Requirements of (Observing Systems)** – see "Definitions" section, use of this term needs to be clarified

2.3.3 **Calibration and Traceability**

2.3.4 **Data and Metadata Representation and Format**

2.3.5 **General Requirements of a Meteorological Station/Platform**

2.3.6 **Methods of Observation**

2.4 Operations [Lead Compiler P.Blouch / T.Oakley]

- 2.4.1 **Observing Practices**
- 2.4.2 **Quality Assurance/Control/Monitoring/Evaluation**
- 2.4.3 **Data and Metadata Reporting**
- 2.4.4 **Incident Management (Control)**
- 2.4.5 **Change Management** – need a cross reference to 2.6.2.2
- 2.4.6 **Maintenance (Preventative, Corrective and Adaptive)**
- 2.4.7 **Calibration procedures**

2.5 Observational Metadata [Lead Compiler J.van der Meulen / S.Foreman & R.Atkinson]

(... the first seven sub-headings here represent an initial brainstorming from TT-WRM-1. The list needs to be rationalised, then later refined based on the work of TT-WMD)

(... Include the keeping of Historical metadata where appropriate)

- 2.5.1 **Instrument metadata**
- 2.5.2 **Site/Station/Platform metadata**
- 2.5.3 **Network metadata**
- 2.5.4 **Quality metadata**
- 2.5.5 **Interpretation metadata**
- 2.5.6 **Static/Dynamic metadata**
- 2.5.7 **Maintenance metadata**
- 2.5.8 **WIGOS Operational Information Resource**
 - 2.5.8.1 Input to WIR
 - 2.5.8.2 Use of WIR

(... These two subheadings simply flag two aspects of the topic, more subheadings may be needed)
- 2.5.9 **Enabling Discovery, Access and Retrieval (via WIS)**
- 2.5.10 **WIS Discovery metadata**

2.6 Quality Management

[Lead Compiler G.Mitternast / D.Lockett]

(... Other members who could collaborate on this topic, or take the lead if Greg unable, are Pierre Bessemoulin, Jitze van der Meulen, Volker Kurz)

2.6.1 WMO Quality Management Framework

2.6.2 Development and Implementation of Quality Management Systems

2.6.2.1 Performance Monitoring and Continuous Improvement

2.6.2.2 Management of Change – need a cross reference to 2.4.5

2.6.3 Documentation

(... Note: see TR Vol. IV on the WMO QMF, especially the description of hierarchy of docs in 4 levels)

2.7 Capacity Development

[Lead Compiler R.Stringer / I.Zahumensky]

3. COMMON ATTRIBUTES SPECIFIC TO THE SURFACE-BASED SUB-SYSTEM OF WIGOS

3.1 **Requirements** [Lead Compiler R.Stringer / E.Charpentier]

3.2 **Design, planning and evolution** [Lead Compiler R.Stringer / E.Charpentier]

(... Consider inserting a section "Composition of the surface-based sub-system of WIGOS")

3.2.1 **Review of observational user requirements**

3.2.2 **Review of current and planned observing systems capabilities**

3.2.3 **Impact and design studies, and critical review**

3.2.3.1 Impact studies, OSEs, and OSSEs

3.2.3.2 Critical review and gap analysis

3.2.3.3 Design studies

3.2.4 **Vision for the WIGOS**

3.2.5 **Implementation Plan for the Evolution of WIGOS**

3.2.6 **Monitoring observing systems implementation**

3.3 **Instrumentation and Methods of Observation** [Lead Compiler V.Kurz / R.Atkinson]

3.3.1 **General Requirements of Instruments/Sensor**

3.3.2 **General Requirements of (Observing Systems)** – see "Definitions" section, use of this term needs to be clarified

3.3.3 **Calibration and Traceability**

3.3.4 **Data and Metadata Representation and Format**

3.3.5 **General Requirements of a Meteorological Station/Platform**

3.3.6 **Methods of Observation**

3.4 **Operations** [Lead Compiler P.Blouch / T.Oakley]

3.4.1 **Observing Practices**

3.4.2 **Quality Assurance/Control/Monitoring/Evaluation**

3.4.3 **Data and Metadata Reporting**

3.4.4 **Incident Management (Control)**

3.4.5 **Change Management** – need a cross reference to 3.6.2.2

3.4.6 **Maintenance (Preventative, Corrective and Adaptive)**

3.4.7 **Calibration procedures**

3.5 **Observational Metadata** [Lead Compiler J.van der Meulen / S.Foreman & R.Atkinson]

(... the first seven sub-headings here represent an initial brainstorming from TT-WRM-1. The list needs to be rationalised, then later refined based on the work of TT-WMD)

(... Include the keeping of Historical metadata where appropriate)

3.5.1 **Instrument metadata**

3.5.2 **Site/Station/Platform metadata**

3.5.3 **Network metadata**

3.5.4 **Quality metadata**

3.5.5 **Interpretation metadata**

3.5.6 **Static/Dynamic metadata**

3.5.7 **Maintenance metadata**

3.5.8 **WIGOS Operational Information Resource**

3.5.8.1 Input to WIR

3.5.8.2 Use of WIR

(... These two subheadings simply flag two aspects of the topic, more subheadings may be needed)

3.5.9 **Enabling Discovery, Access and Retrieval (via WIS)**

3.5.10 **WIS Discovery metadata**

3.6 **Quality Management** [Lead Compiler G.Mitternast / D.Lockett]

(... Other members who could collaborate on this topic, or take the lead if Greg unable, are Pierre Bessemoulin, Jitze van der Meulen, Volker Kurz)

3.6.1 **WMO Quality Management Framework**

3.6.2 **Development and Implementation of Quality Management Systems**

3.6.2.1 Performance Monitoring and Continuous Improvement

3.6.2.2 Management of Change – need a cross reference to 3.4.5

3.6.3 **Documentation**

(... Note: see TR Vol. IV on the WMO QMF, especially the description of hierarchy of docs in 4 levels)

3.7 Capacity Development

[Lead Compiler R.Stringer / I.Zahumensky]

4. COMMON ATTRIBUTES SPECIFIC TO THE SPACE-BASED SUB-SYSTEM OF WIGOS

[Lead Compiler J.van der Meulen / J.Lafeuille]

4.1 Requirements

4.1.1 **Observed Variables**

4.1.2 **Overarching requirements**

4.2 *Design, planning and evolution*

4.2.1 ***Composition of the space-based sub-system***

4.2.2 **Space programme life cycles**

4.3 *Instruments and Methods of Observation*

4.3.1 **General features of space-based sensors**

4.3.2 **Calibration and Traceability**

4.4 *Space Segment Implementation*

4.4.1 **Operational satellites on Geostationary Earth Orbit**

4.4.2 **Operational spacecraft on distributed sun-synchronous Low Earth Orbits**

4.4.3 **Other operational/sustained spacecraft on appropriate Low Earth Orbits**

4.4.4 **Research and Development satellites**

4.5 *Ground Segment Implementation*

4.5.1 **General**

4.5.2 **Data dissemination**

4.5.3 **Data Stewardship**

4.5.4 **Data collection systems**

4.5.5 **User Segment**

4.6 *Quality Management*

4.6.1 **Quality Indicators**

4.7 *Capacity Development*

5. OBSERVING COMPONENT OF THE GLOBAL ATMOSPHERE WATCH (GAW)

[Lead Compiler Ann Webb / L.Jalkanen and team]

(... The following headings provide a starting point, with an aim of consistency with other chapters, however adjustments can be made if necessary to cover this specific component observing system)

5.1 Requirements

5.2 Design, planning and evolution

(... Consider inserting a section "Composition of the GAW component of WIGOS")

5.2.1 Review of observational user requirements

5.2.2 Review of current and planned observing systems capabilities

5.2.3 Impact and design studies, and critical review

5.2.3.1 Impact studies, OSEs, and OSSEs

5.2.3.2 Critical review and gap analysis

5.2.3.3 Design studies

5.2.4 Vision for the WIGOS

5.2.5 Implementation Plan for the Evolution of WIGOS

5.2.6 Monitoring observing systems implementation

5.3 Instrumentation and Methods of Observation

5.3.1 General Requirements of Instruments/Sensor

5.3.2 General Requirements of (Observing Systems) – see "Definitions" section, use of this term needs to be clarified

5.3.3 Calibration and Traceability

5.3.4 Data and Metadata Representation and Format

5.3.5 General Requirements of a Meteorological Station/Platform

5.3.6 Methods of Observation

5.4 Operations

5.4.1 Observing Practices

5.4.2 Quality Assurance/Control/Monitoring/Evaluation

- 5.4.3 **Data and Metadata Reporting**
- 5.4.4 **Incident Management (Control)**
- 5.4.5 **Change Management** – need a cross reference to 5.6.2.2
- 5.4.6 **Maintenance (Preventative, Corrective and Adaptive)**
- 5.4.7 **Calibration procedures**

5.5 **Observational Metadata**

(... the first seven sub-headings here represent an initial brainstorming from TT-WRM-1. The list needs to be rationalised, then later refined based on the work of TT-WMD)

(... Include the keeping of Historical metadata where appropriate)

- 5.5.1 **Instrument metadata**
- 5.5.2 **Site/Station/Platform metadata**
- 5.5.3 **Network metadata**
- 5.5.4 **Quality metadata**
- 5.5.5 **Interpretation metadata**
- 5.5.6 **Static/Dynamic metadata**
- 5.5.7 **Maintenance metadata**
- 5.5.8 **WIGOS Operational Information Resource**
 - 5.5.8.1 Input to WIR
 - 5.5.8.2 Use of WIR

(... These two subheadings simply flag two aspects of the topic, more subheadings may be needed)

- 5.5.9 **Enabling Discovery, Access and Retrieval (via WIS)**
- 5.5.10 **WIS Discovery metadata**

5.6 **Quality Management**

- 5.6.1 **WMO Quality Management Framework**
- 5.6.2 **Development and Implementation of Quality Management Systems**
 - 5.6.2.1 Performance Monitoring and Continuous Improvement
 - 5.6.2.2 Management of Change – need a cross reference to 5.4.5
- 5.6.3 **Documentation**

(... Note: see TR Vol. IV on the WMO QMF, especially the description of hierarchy of docs in 4 levels)

5.7 Capacity Development

6. OBSERVING COMPONENT OF THE GLOBAL CRYOSPHERE WATCH (GCW)

[Lead Compiler Jeff Key / Barry Goodison with backup by M.Ondras]

(... The following headings provide a starting point, with an aim of consistency with other chapters, however adjustments can be made if necessary to cover this specific component observing system)

6.1 Requirements

6.2 Design, planning and evolution

(... Consider inserting a section "Composition of the GCW component of WIGOS")

6.2.1 Review of observational user requirements

6.2.2 Review of current and planned observing systems capabilities

6.2.3 Impact and design studies, and critical review

6.2.3.1 Impact studies, OSEs, and OSSEs

6.2.3.2 Critical review and gap analysis

6.2.3.3 Design studies

6.2.4 Vision for the WIGOS

6.2.5 Implementation Plan for the Evolution of WIGOS

6.2.6 Monitoring observing systems implementation

6.3 Instrumentation and Methods of Observation

6.3.1 General Requirements of Instruments/Sensor

6.3.2 General Requirements of (Observing Systems) – see "Definitions" section, use of this term needs to be clarified

6.3.3 Calibration and Traceability

6.3.4 Data and Metadata Representation and Format

6.3.5 General Requirements of a Meteorological Station/Platform

6.3.6 Methods of Observation

6.4 Operations

6.4.1 Observing Practices

6.4.2 Quality Assurance/Control/Monitoring/Evaluation

6.4.3 Data and Metadata Reporting

- 6.4.4 **Incident Management (Control)**
- 6.4.5 **Change Management** – need a cross reference to 6.6.2.2
- 6.4.6 **Maintenance (Preventative, Corrective and Adaptive)**
- 6.4.7 **Calibration procedures**

6.5 **Observational Metadata**

(.... the first seven sub-headings here represent an initial brainstorming from TT-WRM-1. The list needs to be rationalised, then later refined based on the work of TT-WMD)

(.... Include the keeping of Historical metadata where appropriate)

- 6.5.1 **Instrument metadata**
- 6.5.2 **Site/Station/Platform metadata**
- 6.5.3 **Network metadata**
- 6.5.4 **Quality metadata**
- 6.5.5 **Interpretation metadata**
- 6.5.6 **Static/Dynamic metadata**
- 6.5.7 **Maintenance metadata**
- 6.5.8 **WIGOS Operational Information Resource**
 - 6.5.8.1 Input to WIR
 - 6.5.8.2 Use of WIR

(.... These two subheadings simply flag two aspects of the topic, more subheadings may be needed)

- 6.5.9 **Enabling Discovery, Access and Retrieval (via WIS)**
- 6.5.10 **WIS Discovery metadata**

6.6 **Quality Management**

- 6.6.1 **WMO Quality Management Framework**
- 6.6.2 **Development and Implementation of Quality Management Systems**
 - 6.6.2.1 Performance Monitoring and Continuous Improvement
 - 6.6.2.2 Management of Change – need a cross reference to 6.4.5
- 6.6.3 **Documentation**

(.... Note: see TR Vol. IV on the WMO QMF, especially the description of hierarchy of docs in 4 levels)

6.7 Capacity Development

7. GLOBAL OBSERVING SYSTEM (GOS) OF WWW

[Lead Compiler Russell Stringer / Roger Atkinson in consultation with CBS IPET-WIFI]

(.... The following headings provide a starting point, with an aim of consistency with other chapters, however adjustments can be made if necessary to cover this specific component observing system)

7.1 Requirements

7.2 Design, planning and evolution

(... Consider inserting a section "Composition of the GOS component of WIGOS")

7.2.1 Review of observational user requirements

7.2.2 Review of current and planned observing systems capabilities

7.2.3 Impact and design studies, and critical review

7.2.3.1 Impact studies, OSEs, and OSSEs

7.2.3.2 Critical review and gap analysis

7.2.3.3 Design studies

7.2.4 Vision for the WIGOS

7.2.5 Implementation Plan for the Evolution of WIGOS

7.2.6 Monitoring observing systems implementation

7.3 Instrumentation and Methods of Observation

7.3.1 General Requirements of Instruments/Sensor

7.3.2 General Requirements of (Observing Systems) – see "Definitions" section, use of this term needs to be clarified

7.3.3 Calibration and Traceability

7.3.4 Data and Metadata Representation and Format

7.3.5 General Requirements of a Meteorological Station/Platform

7.3.6 Methods of Observation

7.4 Operations

7.4.1 Observing Practices

7.4.2 Quality Assurance/Control/Monitoring/Evaluation

7.4.3 Data and Metadata Reporting

7.4.4 Incident Management (Control)

7.4.5 Change Management – need a cross reference to 7.6.2.2

7.4.6 **Maintenance (Preventative, Corrective and Adaptive)**

7.4.7 **Calibration procedures**

7.5 **Observational Metadata**

(.... the first seven sub-headings here represent an initial brainstorming from TT-WRM-1. The list needs to be rationalised, then later refined based on the work of TT-WMD)

(.... Include the keeping of Historical metadata where appropriate)

7.5.1 **Instrument metadata**

7.5.2 **Site/Station/Platform metadata**

7.5.3 **Network metadata**

7.5.4 **Quality metadata**

7.5.5 **Interpretation metadata**

7.5.6 **Static/Dynamic metadata**

7.5.7 **Maintenance metadata**

7.5.8 **WIGOS Operational Information Resource**

7.5.8.1 Input to WIR

7.5.8.2 Use of WIR

(.... These two subheadings simply flag two aspects of the topic, more subheadings may be needed)

7.5.9 **Enabling Discovery, Access and Retrieval (via WIS)**

7.5.10 **WIS Discovery metadata**

7.6 **Quality Management**

7.6.1 **WMO Quality Management Framework**

7.6.2 **Development and Implementation of Quality Management Systems**

7.6.2.1 Performance Monitoring and Continuous Improvement

7.6.2.2 Management of Change – need a cross reference to 7.4.5

7.6.3 **Documentation**

(.... Note: see TR Vol. IV on the WMO QMF, especially the description of hierarchy of docs in 4 levels)

7.7 **Capacity Development**

8. WMO HYDROLOGICAL OBSERVING SYSTEM

[Lead Compiler Hydrology expert, with R.Stringer and J.van der Meulen / Hydrology secretariat]

(.... The following headings provide a starting point, with an aim of consistency with other chapters, however adjustments can be made if necessary to cover this specific component observing system)

8.1 Requirements

8.2 Design, planning and evolution

(.... Consider inserting a section "Composition of the Hydrological observing component of WIGOS")

8.2.1 Review of observational user requirements

8.2.2 Review of current and planned observing systems capabilities

8.2.3 Impact and design studies, and critical review

8.2.3.1 Impact studies, OSEs, and OSSEs

8.2.3.2 Critical review and gap analysis

8.2.3.3 Design studies

8.2.4 Vision for the WIGOS

8.2.5 Implementation Plan for the Evolution of WIGOS

8.2.6 Monitoring observing systems implementation

8.3 Instrumentation and Methods of Observation

8.3.1 General Requirements of Instruments/Sensor

8.3.2 General Requirements of (Observing Systems) – see "Definitions" section, use of this term needs to be clarified

8.3.3 Calibration and Traceability

8.3.4 Data and Metadata Representation and Format

8.3.5 General Requirements of a Meteorological Station/Platform

8.4 Operations

8.4.1 Observing Practices

8.4.2 Quality Assurance/Control/Monitoring/Evaluation

8.4.3 Data and Metadata Reporting

8.4.4 Incident Management (Control)

8.4.5 Change Management – need a cross reference to 8.6.2.2

8.4.6 Maintenance (Preventative, Corrective and Adaptive)

8.4.7 **Calibration procedures**

(... include reference to the concept of "Rating" for Hydrology)

8.5 **Observational Metadata**

(.... the first seven sub-headings here represent an initial brainstorming from TT-WRM-1. The list needs to be rationalised, then later refined based on the work of TT-WMD)

(.... Include the keeping of Historical metadata where appropriate)

8.5.1 **Instrument metadata**

8.5.2 **Site/Station/Platform metadata**

8.5.3 **Network metadata**

8.5.4 **Quality metadata**

8.5.5 **Interpretation metadata**

8.5.6 **Static/Dynamic metadata**

8.5.7 **Maintenance metadata**

8.5.8 **WIGOS Operational Information Resource**

8.5.8.1 Input to WIR

8.5.8.2 Use of WIR

(.... These two subheadings simply flag two aspects of the topic, more subheadings may be needed)

8.5.9 **Enabling Discovery, Access and Retrieval (via WIS)**

8.5.10 **WIS Discovery metadata**

8.6 **Quality Management**

8.6.1 **WMO Quality Management Framework**

8.6.2 **Development and Implementation of Quality Management Systems**

8.6.2.1 Performance Monitoring and Continuous Improvement

8.6.2.2 Management of Change – need a cross reference to 8.4.5

8.6.3 **Documentation**

(.... Note: see TR Vol. IV on the WMO QMF, especially the description of hierarchy of docs in 4 levels)

8.7 **Capacity Development**

TT-WRM ACTION PLAN FOR THE PERIOD XI.2012 TO VI.2015

Version	Date	Comments
1	23/11/2012	Action plan developed at TT-WRM-01

No.	Task	Deliverable/Activity	Deadline (if not stated end of month)	Responsible	Status*	Comment
1	Membership of TT-WRM	Complete formalities for nomination by President CHy of expert for inclusion as a member of TT-WRM	December 2012	Secretariat / WIGOS PO	On-Track	
2	List of documents for reference in drafting WIGOS Regulatory Material	Updated list of reference documents based on TT-WRM-01 list plus further inputs from members. Additional detail from hydrology (and GCW?) is needed.	January 2013	Secretariat / WIGOS PO	On-Track	
3	Develop WIGOS Framework Architecture	New draft based on version 0.4, Secretariat presentation and discussion	January 2013	Chair	On-Track	
4	Matters to raise with ICG-WIGOS at its next meeting	<ul style="list-style-type: none"> (1) Confirm with ICG-WIGOS the delivery date for TT-WRM tasks (within the overall timeframe before Congress 2015). (2) Request ICG-WIGOS approval of the TT-WRM approach to WIGOS regulatory material, in particular to the Technical Regulations. (3) Request ICG-WIGOS approval on generalised representation of hydrological observations in WIGOS TRs (4) Request ICG-WIGOS approval for update to the Terms of Reference for TT-WRM. (5) Request ICG-WIGOS approval for change WIGOS Functional Architecture to WIGOS Framework Architecture. 	22 March 2013	Chair	On-Track	Proposed dates for ICG-WIGOS are 18-22 March 2013

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5	TT-WRM virtual conference (phone or Webex)	Report on progress of drafting activities, discuss any issues encountered	1 Feb 2013	All TT-WRM (I. Zahumensky)	On-Track	1 Feb proposed date
6.0	Compile first draft WIGOS TRs chapters:	Gather up components, including "definitions"	Feb 2013 (as progressed), Apr 2013 (full draft)	Secretariat/ WIGOS PO (T. Oakley)	On-Track	
6.1		Chapter 1	Feb 2013 (as progressed), Apr 2013 (full draft)	R. Stringer (M. Ondras)	On-Track	
6.2		Chapter 2.1, 2.2, 3.1, 3.2	Feb 2013 (as progressed), Apr 2013 (full draft)	R. Stringer (M. Ondras)	On-Track	
6.3		Chapter 2.3, 3.3	Feb 2013 (as progressed), Apr 2013 (full draft)	V. Kurz (R. Atkinson)	On-Track	
6.4		Chapter 2.4, 3.4	Feb 2013 (as progressed), Apr 2013 (full draft)	P. Blouch (T. Oakley)	On-Track	
6.5		Chapter 2.5, 3.5	Feb 2013 (as progressed), Apr 2013 (full draft)	J. van der Meulen (S. Foreman & R. Atkinson)	On-Track	
6.6		Chapter 2.6, 3.6	Feb 2013 (as progressed), Apr 2013 (full draft)	G. Mitternast (D. Lockett)	On-Track	
6.7		Chapter 2.7, 3.7	Feb 2013 (as progressed), Apr 2013 (full draft)	R. Stringer (I. Zahumensky)	On-Track	
6.8		Chapter 4	Feb 2013 (as progressed), Apr 2013 (full draft)	J. van der Meulen (J. Lafeuille)	On-Track	
6.9		Chapter 5	Feb 2013 (as progressed), Apr 2013 (full draft)	A. Webb (L. Jalkanen)	On-Track	
6.10		Chapter 6	Feb 2013 (as progressed), Apr 2013 (full draft)	J. Key (B. Goodison)	On-Track	
6.11		Chapter 7	Feb 2013 (as progressed), Apr 2013 (full draft)	R. Stringer (R. Atkinson)	On-Track	Consult with CBS IPET-WIFI
6.12		Chapter 8	Feb 2013 (as progressed), Apr 2013 (full draft)	Hydrology expert, R. Stringer and J. van der Meulen (Hydrology sec.)	On-Track	

7	Progress Report	Report on progress to ICG-WIGOS	22 March 2013	Chair	On-Track	Proposed dates for ICG-WIGOS are 18-22 March 2013
8	TT-WRM meeting	Review full draft WIGOS TRs, respond to guidance from ICG-WIGOS, plan further work	17-21 June 2013	TT-WRM members (I. Zahumensky)	On-Track	17-21 June proposed date
9	Consultation with stakeholders, commissions etc.	Agree plans for consultation on draft of WIGOS Technical Regulations	June 2013	TT-WRM members	On-Track	Discuss at June meeting
10	Advanced draft WIGOS TRs chapters.	Complete advanced draft WIGOS TRs chapters	October 2013 (mid)	All TT-WRM	On-Track	
11	TT-WRM meeting	Review advanced draft, revise and complete near-final draft WIGOS TRs, ready for final guidance from ICG-WIGOS (II.-III. 2014) and EC (V.-VI. 2014)	18-22 November 2013	All TT-WRM (I. Zahumensky)	On-Track	18-22 Nov proposed date

* STATUS column entries will be one of the following descriptors, as determined by the Chair TT-WRM based on consultation with the responsible party (in each case, elaborative comments can be added after the standard descriptor or in the "Comment" column):

On-Track Under-Stress Overdue

REVIEWED THE TT-WRM TERMS OF REFERENCE

- a) To develop a high-level ***WIGOS Framework Architecture***;
 - b) To review the relevant parts of ***WMO Technical Regulations (WMO-No. 49)*** and other relevant regulatory material and make a proposal for WIGOS related regulatory material;
 - c) To develop the WIGOS regulatory material;
 - d) To propose mechanism for the update and maintenance of the WIGOS regulatory material;
 - e) To submit the draft WIGOS regulatory material to the ICG-WIGOS for its coordination with and reporting to EC and for its eventual recommendation for approval by Cg-XVII;
 - f) To coordinate regularly with ICG-WIGOS as needed and report at least annually to ICG-WIGOS on progress;
 - g) To complete its tasks by July 2015.
-