W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N

COMMISSION FOR BASIC SYSTEMS

OPEN PROGRAMME AREA GROUP ON INTEGRATED OBSERVING SYSTEMS

INTER PROGRAMME EXPERT TEAM ON WIGOS FRAMEWORK IMPLEMENTATION (IPET-WIFI)
(First Session)

Geneva, Switzerland

10-14 June 2013

FINAL REPORT

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EXECUTIVE SUMMARY

The first session of the CBS Inter Programme Expert Team on WIGOS Framework Implementation (IPET-WIFI) was held at WMO headquarters in Geneva, Switzerland between 10 and 14 June 2013.

The session was very successful. Although its main focus was on refining and agreeing on a detailed Work Plan for the IPET, and on assigning key tasks to particular members of the IPET, it also enabled the detailed work to commence on those of the Key Activities Areas (KAAs) from the WMO Integrated Global Observing System (WIGOS) Framework Implementation Plan (WIP) that have been assigned to IPET-WIFI for provision of input related to the Global Observing System (GOS).

To set the initial context for the work of the IPET, several presentations were first provided on the broader scope of WIGOS: the current status of its overall implementation, the decisions and recommendations from WMO Congress and Executive Council in regard to WIGOS Framework Implementation, and the recent progress achieved by the Inter-Commission Coordination Group on WIGOS (ICG WIGOS) and its Task Teams in implementing particular aspects of the WIGOS Framework. The relationship between the broader work of the ICG and its Task Teams and the more detailed GOS-related work of the IPET and its Sub Groups was then discussed and made clear to the IPET members, to avoid any duplication of tasks between the two groups.

The session then heard of the WIGOS-related work being performed by CBS IPET for Observing System Design, Planning and Evolution. The importance was stressed of ensuring complimentary contributions from the two teams to WIGOS Planning using the Rolling Review of Requirements (RRR) process, and to the development of the WIGOS Operational Information Resource (WIR), since each team has a contribution to provide in the corresponding WIGOS KAA.

The session then heard sequentially from those assigned to lead the work under each Task identified in the IPET-WIFI Work Plan. Each of those Tasks corresponds with a particular WIP KAA.

The work of IPET-WIFI comprises taking a lead role in WIGOS Framework Implementation by providing detailed GOS-related input to ICG-WIGOS (via CBS Management Group or the respective ICG Task Team, as appropriate) in seven of the ten WIP KAAs, and by playing a support role in the other three KAAs.

Those KAAs for which IPET-WIFI will take a lead role are:

- KAA 1: Management of WIGOS Implementation (WIGOS Regulatory Material)
- KAA 2: Collaboration with co-sponsored and external organizations
- KAA 4: Observing System Operation and Maintenance
- KAA 5: Quality Management
- KAA 6: Standardization, System Interoperability and Data Compatibility
- KAA 8: Data Discovery, Delivery and Archival
- KAA 9: Capacity Development

Those KAAs for which IPET-WIFI will play a support role are:

- KAA 3: Design, planning and optimized evolution of WIGOS component observing systems (supporting IPET-OSDE)
- KAA 7: The WIGOS Operational Information Resource (supporting ICG-WIGOS)
- KAA 10: Communications and Outreach (supporting WIGOS-PO)

After discussing and agreeing on the details of the work required under each Work Plan Task in a number of breakout sessions, the IPET further developed the Work Plan, allocated time-lines to sub-tasks and assigned IPET members to work on each. In acknowledgement of a decision of CBS-14 and in recognition of the likelihood that KAAs 1, 5 and 6 will require more input than the

others, sub-groups were formed and their Terms of Reference developed, for each of the respective Tasks. The Chairs of these sub-groups are:

- Sub-Group on Regulatory Material: Mr Russell Stringer (Australia)
- Sub-Group on MetaData: Mr Karl Monnik (Australia)
- Sub-Group on Quality Management: Mr Kevin Schrab (USA)

During the deliberations on those Tasks corresponding to KAAs 1, 6 and 8, it was noted that some IPET members had had difficulty interpreting the relevant sections of the WIP, so the IPET proposed rewording those sections to more clearly describe the work required to implement the WIGOS Framework under each of those Key Activity Areas. The proposed reworded text is to be submitted to the vice-President of CBS and Chair of ICG-WIGOS for consideration for the next update to the WIP.

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[1] KAA = Key Activity Area
[2] Ten KAAs are identified in the WIGOS framework Implementation Plan - WIP

GENERAL SUMMARY

1. ORGANIZATION OF THE SESSION

1.1 Opening of the session

1.1.1 The First Session of the CBS OPAG IOS Inter Programme Expert Team on WIGOS Framework Implementation (IPET-WIFI) was held in Geneva, Switzerland from 10 to 14 June 2013. The meeting was opened by Mr Jochen Dibbern, Chair of IPET-WIFI. Mr Dibbern welcomed all participants (listed at Annex I); both those attending in Geneva and those participating remotely by electronic conferencing. Mr Dibbern then invited Dr Wenjian Zhang, Director of the WMO Observations and Information Systems Department (D/OBS), to welcome the participants on behalf of the Secretary General of WMO.

1.1.2 Dr Zhang welcomed the participants and stressed the importance of IPET-WIFI in taking a lead role for CBS in implementing the WIGOS Framework. He noted his pleasure to see that so many members of the IPET are also members of other ETs, both within CBS and in other technical commissions, ensuring that the work of IPET-WIFI will be well-informed and representative, not only of CBS but also of these other technical commissions.

1.1.3 Dr Zhang advised the meeting that progress on WIGOS framework implementation has primarily occurred during the last two years through the work of ICG-WIGOS and its Task Teams, and that ICG-WIGOS contains broad representation from across the technical commissions and regional associations. He noted that all six regional associations now have Regional WIGOS Implementation Plans approved or in an advanced state of preparation and that a number of sub-regional and national plans are also in preparation. In addition, the other technical commissions have each incorporated WIGOS into their working structure. So overall, WIGOS is progressing very well.

1.1.4 Dr Zhang noted that the meeting agenda is very ambitious and the team will have a big task ahead of it. He noted that CBS is looking to IPET-WIFI to take a leading role in WIGOS Framework Implementation. In closing, Dr Zhang wished the participants every success for this important first session of IPET-WIFI.

1.2 Adoption of the agenda

1.2.1 The Session adopted the modified Agenda for the meeting.

1.3 Working arrangements

1.3.1 The tentative working hours for the meeting were agreed upon.

2. REPORT OF THE CHAIRMAN

2.1 Mr Dibbern noted that his report would be brief, since this first session marks the effective commencement of the work of the IPET. He summarized the developments that had led to the formation of IPET-WIFI, informing the session that after Congress-16 established, and EC-63 developed terms of reference for, ICG-WIGOS to implement the WIGOS Framework, with joint leadership on technical aspects by CBS and CIMO, CBS-XV had reconfigured OPAG-IOS to include IPET WIFI and an Inter Programme Expert Team on Observing System Design and Evolution (IPET-OSDE). While IPET-OSDE's primary task is to implement the EGOS-IP and coordinate Rolling Review of Requirements (RRR) activities as part of WIGOS Framework Implementation, the bulk of the work of WIGOS Framework Implementation, with respect to the Global Observing System (GOS) requirements, would fall to IPET-WIFI.

2.2 Mr Dibbern noted that it is the work of ICG-WIGOS that will provide the primary guidance for IPET-WIFI, in particular the WIGOS framework Implementation Plan (WIP) with its ten Key Activity Areas and detailed table containing about 37 implementation activities. More detailed and specific draft Action Plans for each of these implementation activities have been developed within the WMO Secretariat over the last year. More focused guidance with respect to the WIGOS-wide needs for Regulatory Material, Metadata and Quality Management will come from the respective Task Teams of ICG-WIGOS. Mr Dibbern explained that at each of its first two sessions, ICG-WIGOS had discussed the relationship between and respective roles of the ICG and IPET-WIFI. While the ICG and its Task Teams would provide overall guidance for WIGOS Framework Implementation, it would look to IPET-WIFI to provide the detail with respect to the GOS. Dr Zhang noted that the small number of GOS experts contributing to the ICG-WIGOS Task Teams will depend on IPET-WIFI for a bigger group of experts to help them to provide their contribution.

2.3 Mr Dibbern went on to say that the goals of the present session are to ensure that each IPET member is well-briefed on what is required of the IPET, which tasks are of highest priority, when each deliverable will need to be provided in order to see the successful implementation of the WIGOS Framework prior to Cg-17, and how each task will be approached (i.e., what will be possible within the time and resources available). He informed the meeting that particular tasks to be accomplished during the present session would be the formation and refinement of the IPET's Sub-Groups, on Regulatory Material (SG-RM), Metadata (SG-MD) and Quality Management (SG-QM), and refinement of the IPET-WIFI Work Plan, with key tasks identified and their details, participants and time lines determined.

2.4 In responding to a request for comment, Dr Zhang stressed the importance of IPET-WIFI working together with other Expert Teams in delivering its outputs.

3 WIGOS FRAMEWORK IMPLEMENTATION

3.1 Status of WIGOS Framework Implementation

3.1.1 Dr Igor Zahumensky, WIGOS Project Office, delivered a brief presentation on the WIGOS concept and on progress towards implementing the WIGOS Framework, according to the WIGOS Framework Implementation Plan (WIP), v.2.0, which was approved by EC-65.

3.1.2 Dr Zahumensky described WIGOS as an over-arching framework for the coordination and evolution of WMO observing systems, including the contributions of WMO to co-sponsored observing systems. He stressed that it is about doing more and better with what we have now, to enable more efficient and effective service delivery, and that the WIGOS Vision is a system providing reliable & trusted observations for WMO in a coordinated, comprehensive and sustainable manner, with enhanced coordination with partner and external organizations.

3.1.3 Dr Zahumensky went on to describe some recent developments in implementation of the WIGOS Framework: two important staffing actions underway in the WIGOS Project Office, approval by EC-65 of the latest version of an updated version of the WIP, the actions underway by all regional associations to develop their Regional WIPs, progress in the development of the WIGOS Operational Information Resource, and the latest activities of the ICG-WIGOS Task Teams on WIGOS Regulatory Material and Metadata.

3.2 Relevant Recommendations of EC and ICG-WIGOS

3.2.1 The IPET-WIFI-1 was briefed on the relevant recommendations and guidance of the Executive Council (EC-65) and ICG-WIGOS-2 that should be taken into account by IPET-WIFI for its working plan and activities. More detailed discussion followed under Agenda Items 3.3 and 6.

3.3 Status of ICG Task Teams relevant to IPET-WIFI

3.3.1 Mr R. Stringer (Chair Task Team on WIGOS Regulatory Material, TT-WRM) informed IPET-WIFI of the role of the TT-WRM. Its Terms of Reference call on it, in particular, to develop for ICG-WIGOS the WIGOS Regulatory Material including updates for the Technical Regulations (WMO-No. 49) and development of a WIGOS Manual and a WIGOS Guide. Some important background was presented to the meeting:

- The three level "pyramid" description of the WMO regulatory material in which the top level comprises the Technical Regulations (WMO-No. 9, Volumes I to IV), the second level comprises the eight Annexes to the TRs, mostly named as Manuals, then the broad third level at the base of the pyramid comprising guidance material (in a range of documents named as Guides, Manuals, and other things) in which the words "shall" and "should" are used only with their dictionary meanings (not regulatory);
- WIGOS provides a collective identity for all WMO component observing systems and a framework for collaboration to achieve synergies.

3.3.2 The first meeting of TT-WRM (November 2012) proposed to include all WIGOS regulatory material in the top level Technical Regulations without a separate WIGOS Manual. However later review by ICG-WIGOS returned to the three level approach, including a WIGOS Manual (and the eventual phasing out of the GOS Manual).

3.3.3 TT-WRM also developed a document structure for the WIGOS regulatory material having eight sections, aiming to the greatest extent possible in the early sections to state regulations in a manner common to all component observing systems. Later sections will contain those regulations specific to a component system. The various sections are being developed by members of TT-WRM with support by contacts in the Secretariat. A number of teleconferences have been held since the first meeting and the second meeting is scheduled during the week following this IPET-WIFI meeting.

3.3.4 In discussion it was noted that the timeline for development of the first edition of the WIGOS regulatory material is short and will not provide the opportunity to include all the new standards and recommended practices being developed by many other WIGOS activities. These will need to be included in later updates. Hence the edition of the WIGOS Manual that is likely to be available for Cg-17 will be simple and brief in some respects, having some reliance on references to existing regulatory material that contains the detail.

3.3.5 There was some discussion about the characteristics of WIGOS as a framework, or a system, or a system of component systems. This point has been causing some confusion within the regional associations. Mr Stringer reassured the session that the regulatory material being drafted by TT-WRM refers to WIGOS as an observing system and details all the standards and recommended practices for operation of the system including component systems. This is one dimension of WIGOS, which is more broadly a "framework" for system operation and other aspects of governance and management, consultation, planning and design, capacity development, and information resources.

3.3.6 There followed further discussion on how regulatory material developed with partners or required by outside organizations, for example the GCOS GRUAN Manual and Guide, might be incorporated into the WIGOS regulatory material. The session was assured that this is in principle being taken into account within the TT-WRM, by direct representation from a broad range of stakeholders in the TT-WRM and on ICG-WIGOS.

3.3.7 Mr Stringer closed by stressing that TT-WRM will benefit from input from IPET-WIFI, particularly drawing on its relevant technical knowledge of the GOS.

3.3.8 Mr Monnik then briefed the session on recent activities of the ICG-WIGOS Task Team on WIGOS MetaData (TT-WMD). He advised that, at its first meeting, held in Geneva from 11 to 15 March 2013, TT-WMD developed an initial specification of a WIGOS Core Metadata Standard. TT-WMD consists of representatives of most technical commissions including CBS, CIMO, JComm, CHy, CCl, CAeM and CAS. TT-WMD has defined WIGOS metadata as information which allows users to make adequate use of observational data.

3.3.9 Ten categories of metadata have been identified, each of which consists of several elements. The list is likely to consist of mandatory, conditional and optional fields to take account of the possibility that for one technical commission, a particular metadatum might be required, whereas for another it may only be desirable or not required at all. Over the coming months the list will be reviewed by the technical commissions and further definition and clarification will be made before a final list is submitted for approval by EC. Following this, procedures and practices will be developed to allow the metadata to be populated and maintained.

3.3.10 The session emphasised the importance of the historical dimension for metadata and the need to keep metadata updated. When considering the large amount of historical metadata which may be required, TT-WMD has considered identifying some metadata for routine international exchange, and other metadata which will be accessible directly from NHMSs. There was also some discussion about the historical dimension of observations data itself, noting that it is the archival of data that drives the requirement for archival of metadata. It was noted that WIP Key Activity Area 8 for the implementation of WIGOS mentions "archival" without identifying any activities to address this topic. The scope of WIGOS in this regard needs to be clarified.

3.3.11 Mr Barber asked the Chair when the Task Team on Quality Management is likely to commence its work. Mr Dibbern indicated that formation of the team is currently underway, and that ICG-WIGOS is looking to the Chair and Co-chair of IPET-WIFI to provide a proposal regarding its Terms of Reference. Mr Dibbern stressed that we need, as an output of this Key Activity Area of WIGOS, to provide guidance to assist NMHSs to improve Quality Management practices and procedures within their organizations.

3.4 Coordination of IPET-WIFI with ICG-WIGOS and its Task Teams

3.4.1 Mr Dibbern briefly recapitulated the advice he provided during his Chair’s Report regarding the respective roles of IPET-WIFI and its Sub-Groups, and ICG-WIGOS and its Task Teams, in implementation of the WIGOS Framework. In essence, while ICG-WIGOS is responsible for the broader issues and perspective, the IPET will be responsible for the providing the (primarily) GOS-related detail.

4. STATUS REPORT: IPET-OSDE

4.1 WIGOS Design, Planning and Evolution (WIP KAA[3] 3)

4.1.1 Mr Charpentier provided a presentation to the session on the future activities of the Inter Programme Expert Team on Observing System Design and Evolution (IPET-OSDE). Mr Charpentier advised the session that the responsibilities of IPET-OSDE are:

- Monitoring the Implementation Plan for the Evolution of the Global Observing System (EGOS-IP), the latest version of which was recently approved by EC-65. EGOS-IP responds to the Vision for the GOS in 2025, so considers planning of the GOS component of WIGOS on a somewhat longer timeframe than does the WIP;
- Further development of the Rolling Review of Requirements process, and its associated database (which is considered separately under Agenda Item 4.2);
- Development of guidance for Members on observing system design by utilizing the RRR process and the WIGOS Operational Information Resource (WIR).

4.1.2 With regard to the development of guidance for Members on observing system design, Mr Charpentier informed the session that a workshop involving a broad range of experts will be held in Geneva from 12 to 14 November 2013 to progress this activity and the first meeting of IPET-OSDE is planned for 2014.

4.2 WIGOS Operational Information Resource (WIP KAA 7)

4.2.1 Mr Charpentier described the activity underway under WIP Key Activity Area 7: development of the WIGOS Operational Information Resource (WIR). The goal of the WIR is to provide a single access point for WIGOS stakeholders that contains all relevant information on the status of WIGOS and its evolution. The WIR was formally launched during EC-65 and is intended to be fully operational from 2015.

4.2.2 The WIR is accessible via a WIGOS Web Portal, which, as well as containing a host of general information on WIGOS and its implementation, also provides access to some important WIGOS tools. The first of these is the “Standardization of Observations” Reference Tool (SORT) which will provide easy access to WIGOS regulatory and guidance material. The second major tool is the Observing System Capabilities, Analysis and Review Tool (OSCAR) which can be used for RRR analysis, design and planning of WIGOS. OSCAR itself is composed of several modules: a requirements database, space- and surface-based capabilities databases, and a ‘distributed database’ of details observational metadata sets made accessible by members and partners.

4.2.3 Mr Charpentier noted that ICG-WIGOS has overall responsibility for the development of the WIR and will oversee the development of the Portal. IPET-OSDE has responsibility for OSCAR, and the involvement of both TT-WMD and IPET-WIFI is desirable for the development of SORT. IPET-WIFI will also be expected to provide feedback on the content and functionality of the WIR.

5. REVIEW OF THE INTERNAL STRUCTURE AND TERMS OF REFERENCE OF IPET-WIFI

5.1 Mr Dibbern briefly described the Tasks that have been specified in the IPET-WIFI Draft Work Plan, and how each of these corresponds to a Key Activity Area of the WIGOS Framework Implementation Plan (WIP), hence how the Work Plan aligns very closely with the WIP. He notes that only three KAAs from the WIP are not explicitly covered under the initial draft Work Plan for IPET-WIFI:

- KAA 3, which is concerned with WIGOS Design, Planning and Optimized Evolution, a major focus of IPET-OSDE;
- KAA 7, which is concerned with development of the WIR, primary responsibility for which lies with ICG-WIGOS; and

[3] KAA = Key Activity Area. Ten KAAs are identified in the WIGOS framework Implementation Plan – WIP.

- KAA 10, which is concerned with Communications and Outreach for WIGOS and for which primary responsibility lies with ICG-WIGOS and the WIGOS Project Office.

Although IPET-WIFI may provide small contributions to each of these three KAAs, it is seen as important for the IPET to focus its efforts on the other KAAs, for each of which it has a greater contribution to make. However, it was agreed that there would be benefit in providing some guidance in the Work Plan on the contribution expected of IPET-WIFI for each of these three KAAs.

5.2 Mr Dibbern appraised the session of structure of IPET-WIFI, which comprises three Sub-Groups that are to be formed to tackle the more demanding of the Tasks in the Work Plan. These are:

- Sub-Group on WIGOS Regulatory Material (S-RM), to be chaired by Mr Russell Stringer, who also chairs the ICG-WIGOS TT-WRM;
- Sub-Group on WIGOS MetaData (SG-MD), to be chaired by Mr Karl Monnik, who is a member of the ICG-WIGOS TT-WMD; and
- Sub-Group on WIGOS Quality Management (SG-QM), to be chaired by Mr Kevin Schrab, and which will be expected to lead the way for the ICG-WIGOS TT-WQM, which is yet to commence its work.

Mr Dibbern advised that one of the objectives of the current session is to propose additional members for each of these Sub-Groups, and to draft Terms of Reference and detailed working plans. In discussion, the lack of attending representatives for the space programme was noted.

6. PROGRESS ON WIP KAAs AND PLANNING IPET-WIFI TASKS IN THOSE AREAS

6.1 Task 1: WIGOS Regulatory Material (WIP KAA 1)

6.1.1 Mr R. Stringer drew attention to Figure 1 in Document 6.1 (reproduced here as Annex 2), showing a schematic representation of the WIGOS component observing systems. This illustrates the need for WIGOS to include regulatory material spanning the GOS, the observing component of the GAW, the WMO Hydrological Observing System (including the WHYCOS), and the observing component of the GCW. Such regulatory material will include surface and space-based components, will include all WMO contributions to cosponsored systems (GCOS, GOOS, GTOS) as well as WMO observations contributions to GFCS and GEOSS.

6.1.2 Technical experts for each of the four component observing systems are needed to develop and define the standards, recommended practices and guidance information that constitutes the regulatory material. The GOS component has the most diverse and complex communities of technical experts, including all the sub-groups of the CBS OPAG-IOS and CIMO, as well as observations aspects of several other technical commissions.

6.1.3 TT-WRM will benefit from the contribution of CBS, CIMO and other TCs, via IPET-WIFI, to both the GOS-related regulatory material and also to the material common to all component systems (noting the leadership role of CBS and CIMO in the implementation of WIGOS). More specifically, IPET-WIFI can assist TT-WRM with:

- Assisting or reviewing the transcription of material from the Manual on the GOS into the WIGOS regulatory material, particularly for section 2, 3 and 7;
- Planning the transition and eventual phase out of the Manual on the GOS and planning the structure and content of the WIGOS Guide;
- Reviewing and updating the technical regulations related to the GOS and those applicable to all component systems, as WIGOS regulatory material is developed and subsequently updated through ongoing processes.

In discussion there was concern about the potential size and complexity of this task. WIGOS-PO explained the strategies to find resources and prioritise this work.

6.1.4 These ideas were developed further in a breakout group, leading to proposed terms of reference for the Sub-Group on Regulatory Material (see the Terms of Reference and proposed

membership of the three IPET-WIFI Sub-Groups at Annex III) and a working plan for Task 1 (see the draft IPET-WIFI Work Plan at Annex IV).

6.1.5 To help guide and focus the work of this Sub-Group the WIP section 2.1 was reviewed. However it was found that the WIP section 2.1 doesn't contain any direct explanation of the need for and importance of developing WIGOS regulatory material. The session agreed to compose, in a breakout group, some words that could be proposed to rectify this.

6.2 Task 2: Internal and External Collaboration (WIP KAA 2)

6.2.1 Mr Arimatea de Sousa Brito described his initial thoughts on how IPET-WIFI could best contribute to WIP KAA 2: Internal and External Collaboration. He stressed the importance of collaboration for the implementation of national and regional WIGOS components and provided some examples of ongoing RA III collaboration initiatives under the WIGOS umbrella. He proposed the development of strategic approaches or guidelines for Members to encourage partner organizations to establish and maintain sustained operational relationships with WMO. Some discussion followed on whether this topic was of specific relevance for IPET-WIFI, or whether it might be better handled at a higher level, such as by ICG-WIGOS. The session concluded that IPET-WIFI has a valuable role to play in providing its advice to ICG-WIGOS on such strategies for improved collaboration with external and partner organizations.

6.2.2 Mr Arimatea de Sousa Brito agreed to refine the specification of this Task in the draft Work Plan in a breakout group on this topic.

6.3 Task 4: Observing System Operation and Maintenance (WIP KAA 4)

6.3.1 Mr Ngamini highlighted the integration of observational systems and sharing of operational experiences, expertise and guidance of 17 African countries in Western and Central Africa and Madagascar in a network of around 80 synoptic meteorological stations and 23 radiosonde stations, suggesting this model may have more general applicability in other regions. The expertise gained by ASECNA in RA I was used during the AMMA project and continues to be used by non ASECNA member countries to purchase meteorological consumables, maintain and calibrate their meteorological instruments. The cooperation between ASECNA and the Regional Instrumentation Centre of Casablanca in Morocco has helped, too, in the training of meteorological staff in ASECNA and a number of NMHSs in Western Africa in 2012 and 2013.

6.3.2 Mr Dibbern supported the suggestions of Mr Ngamini, noting that these were all examples of good regional cooperation, and cited several similar examples from Regional Association VI. He suggested that a possible way for IPET-WIFI to contribute significantly to sharing or operational experience and expertise at the regional level might be for the IPET to draft a document on good examples of regional cooperation drawn from across the regions, making suggestions for future possibilities. Mr Arimatea de Sousa Brito added that another key candidate for regional cooperation from the Regional Association III perspective is procurement of observing system infrastructure and Mr Merrouchi suggested networking of, e.g., lightning detection sensors or weather radars as yet another area for development of guidance material addressing regional cooperation.

6.3.2 Mr Ngamini noted that a breakout session during the meeting would be useful to further develop such ideas on how best to address this KAA from a more GOS-wide perspective.

6.4 Task 5: Quality Management (WIP KAA 5)

6.4.1 Mr Schrab noted that the key requirements for IPET-WIFI contribution to the WIP KAA concerned with WIGOS Quality Management are to:

- Review current QM practices currently used within the GOS;

- Develop close familiarity with the WMO Quality Management Framework so that this can be used to guide the development of a WIGOS QM approach;
- Apply the WMO QMF (Technical Regulations WMO-No 49, part 4) to WIGOS observing components, focusing on the GOS; and
- Coordinate with ICG-WIGOS the content of an overall WIGOS-QMS Implementation Plan.

6.4.2 IPET-WIFI SG-QM will need to work with the ICG-WIGOS TT-WQM on determining how to allocate the overall work in the QM area to avoid duplication, though it is anticipated that SG-QM will draw on its knowledge and experience of GOS QM processes and procedures to provide its advice to TT-WQM on possible approaches that might be taken for WIGOS QM as a whole. The Secretariat has drafted Action Plans for the 2 Actions under WIP KAA 5 and these provide a useful framework to guide the work of SG-QM. The Action Plans include the need to develop a proposal for a Fault Management System.

6.4.3 There was much discussion on whether to make QM guidance/regulations recommendations or resolutions ("should" versus "shall") in the early stages. This is important since the capabilities of member countries vary greatly as will their ability to comply with rigorous QM requirements. Examples from members with established QM procedures could be used as best practices to assist in developing guidance. Also, initial input will probably be at the conceptual level and avoid specification of too many technical details.

6.4.4 The session agreed to further develop the ideas discussed during the scheduled breakout session on this item and to reflect the outcomes of that discussion in a refined description of this Task in the IPET Work Plan.

6.5 Task 6: Standardization, Interoperability, Data Compatibility (WIP KAA 6)

6.5.1 Dr Kurz noted that his interpretation of this WIP KAA is that it is largely an overarching activity which is likely to benefit from the work of several other KAAs, so close coordination with the other Work Plan Task participants will be beneficial. Dr Kurz also noted that, while the WIP identified three key areas for WIGOS standardization, only one of these (Instruments and Methods of Observation) should be central to WIGOS, while the other two tend to be more in the domain of WIS (WIS Information Management and Discovery, Access and Retrieval (DAR) services, and Data Management). He suggested, therefore, that the work of IPET-WIFI under this KAA should focus on the first of these three.

6.5.2 Dr Kurz indicated that he intended to refine the details of the work under this Task during a breakout group later during the session, and would welcome the participation in discussions of other interested IPET members.

6.5.3 There followed considerable discussion on potential ambiguity in interpretation of the text of Section 2.6 of the WIP concerned with Standardization, Interoperability and Data Compatibility. To start the section with a reference to WIS is distracting and weakens the key point of the section. It was suggested that the IPET might usefully propose to CBS alternative text for this section of the WIP that resolves this ambiguity and clarifies what is required to be addressed under this KAA. Dr Kurz suggested that the breakout groups that would be developing the IPET-WIFI Work Plan could take this on as a side-task.

6.6 Task 8: Interpretation Metadata (WIP KAA 8)

6.6.1 Mr Monnik referred to his earlier presentation on the status of the work of ICG-WIGOS TT-WMD under Agenda Item 3.3 and advised that the main contribution required of the IPET-WIFI Sub-Group that will address this task should be to contribute as requested to the work of the TT-WMD. He advised that the SG-MD could best commence its work by providing feedback to TT-WMD on the suitability and completeness of the draft Core Metadata Specification that has been proposed by the Task Team, and on the proposed definitions of terms, and that SG-MD should suggest to TT-WMD any additional metadata or different definitions that are required from a GOS

perspective. Given the limited capacity of some Members to provide extensive amounts of metadata with their data it may also be useful for SG-MD to provide advice to TT-WMD on what constitutes a reasonable volume of metadata to be included in the Core Metadata Specification.

6.6.2 Mr Monnik expressed similar concern with regard to Section 2.8 of the WIP as Dr Kurz had expressed in regard to Section 2.6 and suggested that if the IPET was to consider proposing changes to the text of 2.6 it might also do so for 2.8. Also, there was extensive discussion on the topic of archiving observations data. Although mentioned in the WIP section 2.8, it is not clear whether this is intended to be in scope for WIGOS. The session agreed that this should be raised with ICG-WIGOS for clarification, framed in a proposition that archival is out of scope for WIGOS as it is already included in the WWW/GDPFS. The session agreed to address these matters in a breakout group.

6.7 Task 9: Capacity Development (WIP KAA 9)

6.7.1 Mr Zhao referred to the draft WIGOS Capacity Development Strategy (WCDS, see Annex V) developed within the WIGOS Project Office. The session agreed that IPET-WIFI should in the first instance contribute to the refinement of the strategy document by providing comments and suggestions to the WIGOS Project Office to assist with finalization of the document. The IPET would then need to turn its consideration to more specific ideas regarding ways to promote and advance capacity development, particularly at regional and national levels, as input to a WIGOS Capacity Development Plan. In doing so, it should focus on the three priority areas identified within the WCDS:

- Providing assistance to Members to introduce or improve institutional mandates and policies that enable effective implementation, operation and management of observing systems;
- Filling the existing gaps in the design, operation and maintenance of WIGOS observing systems, including both the infrastructure and human capacities development;
- Technological innovation, technology transfer, technical assistance and decision-support tools.

7. REVIEW AND REFINEMENT OF WORK PLAN

7.1 The session broke into three groups to discuss and refine the individual task descriptions in the draft Work Plan and to draft proposed changes to the text of Section 2 of the WIP to better describe WIGOS requirements under KAAs 1, 6 and 8. The Work Plan tasks to be addressed by the breakout groups were:

- Group 1: Regulatory Material, Metadata, Standardization (Chair: Mr Stringer)
- Group 2: Collaboration, System Operation and Maintenance, Quality Management, Capacity Development (Chair: Mr Arimatea de Sousa Brito)
- Group 3: Contribute to the work of Groups 1 and 2, propose minor task descriptions to contribute to KAAs 3, 7 and 10, and propose changes to Sections 2.1, 2.6 and 2.8 of the WIP (Chair: Mr Dibbern)

7.2 The result of the breakout group work can be seen in the revised Work Plan at Annex IV, and the modified excerpt from the WIP (Sections 2.1, 2.6 and 2.8) at Annex VI.

7.3 Some important aspects of the discussions during the break out work were:

- The SG-RM will need input from other OPAG-IOS ETs and rapporteurs
- The SG-MD should also coordinate requirements for Core Metadata with the satellite community
- The SG-QM will develop a proposal for a Fault Management System
- As part of the WIGOS capacity development, IPET-WIFI proposes to assist in the organization of a WMO workshop on the benefits of regional cooperation.

- The revised work plan will be submitted to OPAG-IOS and the proposed updates to the WIP (sections 2.1, 2.6 and 2.8) will be submitted to the vice President of CBS and Chair of ICG-WIGOS for consideration.

7.3 The WMO secretariat agreed to contact all IPET members not present at the session and request them to volunteer to contribute to one or more Work Plan tasks.

8. ANY OTHER BUSINESS

8.1 After some discussion the session agreed that the preferred timing for the next face-to-face meeting of the IPET would be late March 2014 (possibly 17 to 21 March). This would maximize the time available for the team to carry out those actions required to be completed before CIMO and CBS sessions. It was acknowledged, though, that significant input would be required to be provided to TT-WRM, TT-WMD and possibly TT-WQM by November 2013 to enable them to provide their respective input to the WIGOS technical regulations and to ICG-WIGOS-3 (scheduled for 10-14 February 2014), so a number of teleconferences of the IPET or its Sub-Groups during the remainder of 2013 may be warranted. These will be organized as required.

9. CLOSURE OF THE SESSION

9.1 The session was closed on 14 June 2013 at 1600h.

ANNEX I

LIST OF PARTICIPANTS

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ANNEX II

TASK 1: WIGOS REGULATORY MATERIAL

WIGOS component observing systems

WIGOS primarily comprises four component observing systems. However, as illustrated schematically in Figure 1, these components each include surface- and space-based elements, and provide the WMO contributions to cosponsored systems (GCOS, GOOS, GTOS) as well as to the GFCS and GEOSS.

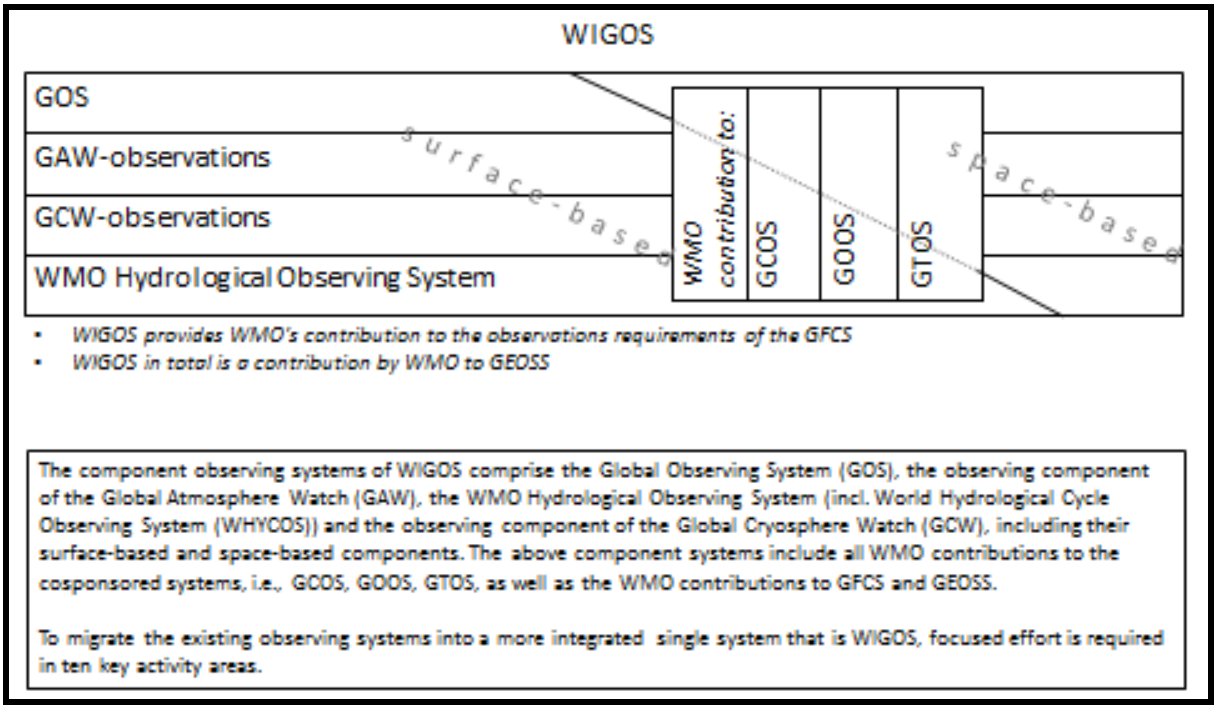


Figure 1: schematic representation of the component observing systems that together make up WIGOS, the WMO Integrated Global Observing System.

WIGOS Regulatory Material, in common for all components and specific to each component

As a general concept, WMO technical regulatory material follows a three-level hierarchy (see **ATTACHMENT 1**). Previously, the TT-WRM aimed to condense WIGOS regulatory material into two levels, having all the regulatory "shalls" and "shoulds" in the top level (Volume I of the Technical Regulations) then other guidance material in one or more Guides (including a WIGOS Guide). However, following consideration at the ICG-WIGOS-2 meeting, the three levels will now be used for WIGOS regulatory material (including the preparation of a WIGOS Manual and WIGOS Guide).

The structure of the WIGOS regulatory material aims as far as possible to describe provisions common to all component systems before then describing the provisions applicable solely to each component system. The section headings used in the draft WIGOS regulatory material are shown in **ATTACHMENT 2**.

Technical experts for each of the four component observing systems develop and define the provisions (practices and guidance information) that constitute the regulatory material.

The GOS component has the most diverse and complex communities of technical experts, including:

- all the sub-groups within the CBS OPAG-IOS (IPET-WIFI, IPET-OSDE, ET-SBO, ET-SAT, ET-SUP, ET-ABO, SG-RFC plus R-SEIS and R-MAR);
- CIMO technical experts;
- JCOMM technical experts related to observations;
- CCl technical experts related to observations;
- CAgM technical experts related to observations;
- CAeM technical experts related to observations.

The contribution of IPET-WIFI to WIGOS Regulatory Material

TT-WRM will benefit from the contribution of CBS and CIMO, via IPET-WIFI, to both the GOS related material and also to the provisions common to all component systems (consistent with the leadership role of CBS and CIMO in the implementation of WIGOS).

In providing this contribution, IPET-WIFI could play a valuable role in coordinating and consolidating input from the technical experts across the many relevant CBS and CIMO groups (the other technical commissions relevant to WWW/GOS noted above are represented in TT-WRM, however it would also be useful for IPET-WIFI to consult with them).

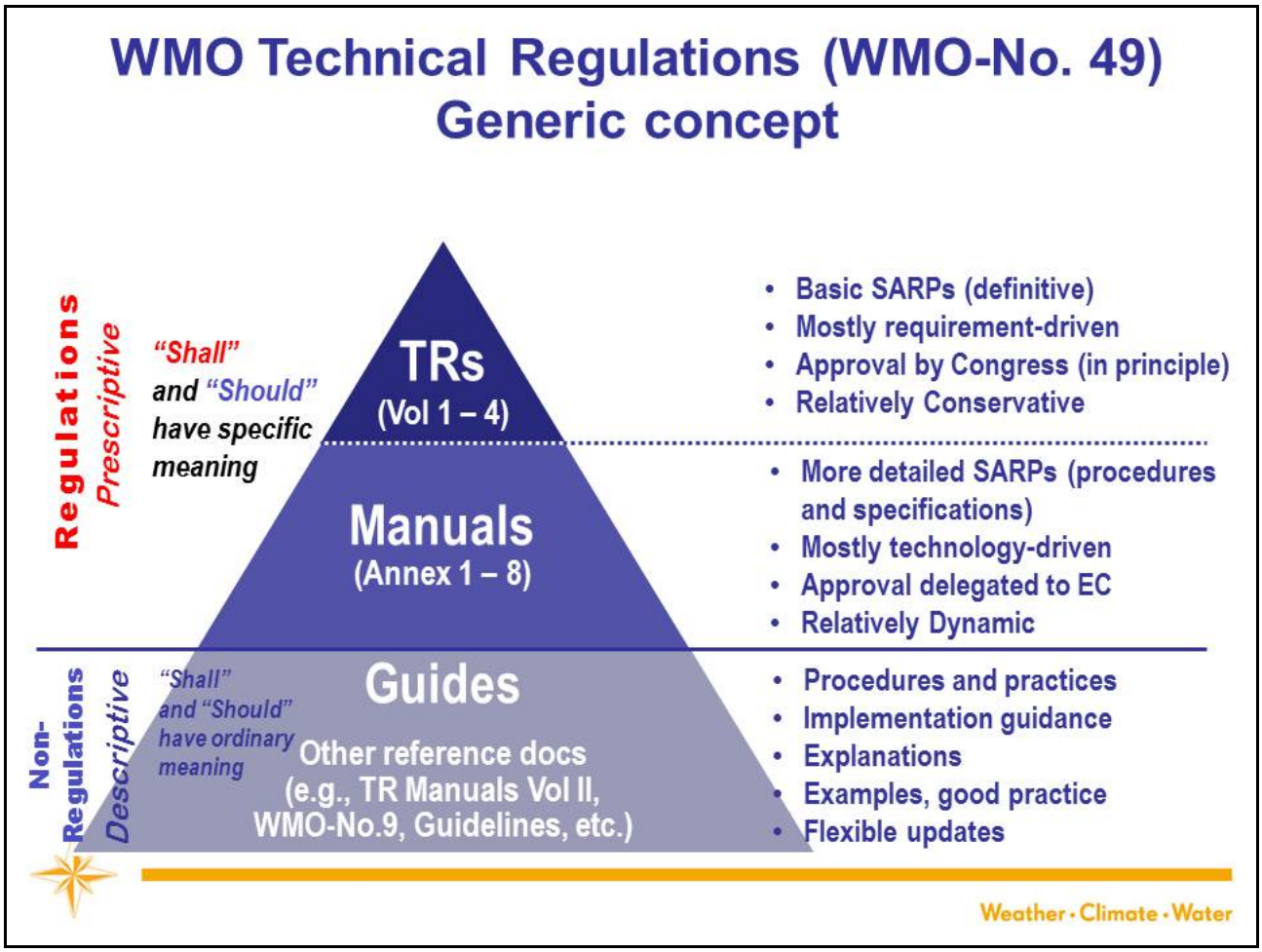
Noting the IPET-WIFI plan to tackle its work in a series of tasks, the contribution of regulatory material will be the role of Task 1 however there will need to be close collaboration with the other tasks which can be expected to generate some regulatory and guidance material, particularly tasks 4, 5, 6 and 8 but also possibly tasks 2 and 9.

More specifically, IPET-WIFI can assist TT-WRM by:

- assisting or reviewing the transcription of material from the Manual on the GOS into the WIGOS regulatory material, particularly for sections 2, 3 and 7;
- Planning the structure and content of the WIGOS Guide and transcribing material from the Guide to the GOS;
- Planning the transition and eventual phase out of the Manual and Guide to the GOS; and
- Review and update of the technical regulations related to GOS and those applicable to all component systems, as they are transcribed into WIGOS material and through subsequent ongoing processes.

_____

ATTACHMENT 1



Three level hierarchy of WMO technical regulatory material.

ATTACHMENT 2

Draft structure for the WIGOS technical regulations:

1 Introduction

2 Common attributes of component systems

3 Common attributes specific to the surface-based sub-system of WIGOS

4 Common attributes specific to the space-based sub-system of WIGOS

5 Observing component of the Global Atmosphere Watch (GAW)

6 Observing component of the Global Cryosphere Watch (GCW)

7 Global Observing System (GOS) of WWW

8 WMO Hydrological Observing System

Note: a series of sub-headings have also been drafted but these are subject to change as drafting proceeds.

ANNEX III

TERMS OF REFERENCE AND MEMBERSHIP OF THE IPET-WIFI SUB-GROUPS

1. SUB-GROUP ON REGULATORY MATERIAL (SG-RM)

Terms of Reference:

Contribute to the development and maintenance of WIGOS regulatory material, both GOS-related material and provisions common to all component systems, as follows:

1. Coordinate with ICG-WIGOS TT WRM regarding requirements for GOS-related provisions and provisions common to all component systems for the WIGOS Regulatory Material

2. Make proposals to ICG-WIGOS TT-WRM for GOS-related provisions and provisions common to all component systems for the WIGOS Regulatory Material

3. Review Manual and Guides on GOS and make proposals to IPET-WIFI for updates

4. Collaborate with TT-WRM on the transition and eventual phasing out of the GOS Manual

5. Collaborate with TT-WRM on development of the WIGOS Guide

6. In close cooperation with ICG-WIGOS TT-WRM, contribute to the creation of mechanisms for the future ongoing review and update of the Regulatory Material

In tackling the above activities, compile input from:

- technical experts across all areas of OPAG IOS;
- the other task areas of IPET-WIFI.

Provisional Membership:

Russell Stringer, Australia (Chair)
Adam Barber, UK
Volker Kurz, Germany
JaeGwang Won (Republic of Korea) (subject to confirmation)
Rabia Merrouchi (Morocco)

NOTES:

1. Will require active collaboration of other OPAG-IOS ETs and Rapporteurs.
2. Representation in the work of those TCs not directly represented on IPET-WIFI will be via ICG-WIGOS TT-WRM

2. SUB-GROUP ON METADATA[4] (SG-MD)

Terms of Reference:

1. Coordinate with ICG-WIGOS TT-WMD on requirements for a WIGOS Core Metadata Standard

2. Contribute to the TT-WMD development of specifications for WIGOS metadata by provision of input on GOS sub-systems

3. Develop proposals, in collaboration with TT-WMD, for GOS-related practices and procedures for implementation of WIGOS metadata standards and for maintenance of WIGOS Metadata

4. Through IPET-WIFI contribute to WIGOS capacity development initiatives in regard to gathering, storing and exchanging GOS-related metadata, consistent with overall WIGOS metadata practices.

Provisional Membership:

Karl Monnik, Australia (Chair)
Rainer März, Germany
Aziz Mounir, Morocco, (subject to PR agreement)
Ernest Rudel, Austria (subject to confirmation)
Ulrich Looser, Germany (subject to confirmation)
ET-SUP representative (TBA)

NOTE:

1. Will require active collaboration of other OPAG-IOS ETs and Rapporteurs.
2. Representation in the work of those TCs not directly represented on IPET-WIFI will be via ICG-WIGOS TT-WMD

[4] WIGOS Metadata is interpretation metadata, as distinct from discovery metadata, which is dealt with under WIS.

3. SUB-GROUP ON QUALITY MANAGEMENT (SG-QM)

Terms of Reference:

1. Review current QM practices used within the GOS
2. Review material from the WMO Quality Management Framework
3. Coordinate with ICG-WIGOS TT WQM the content of a WIGOS-QMS Implementation Plan
4. Compile GOS-related QM practices, including a proposal for a Fault Management System, to be included in the WIGOS Regulatory Material
5. Submit contributions to the IPET-WIFI for coordination

Provisional Membership:

Kevin Schrab, USA (Chair)
Branislav Chvila, Slovakia
Federica Rossi, Italy
Mario Garcia, Argentina (subject to confirmation)
Nish Devanunthan, South Africa (subject to confirmation)

NOTE:

1. Will require active collaboration of other OPAG-IOS ETs and Rapporteurs.
2. Representation in the work of those TCs not directly represented on IPET-WIFI will be via ICG-WIGOS TT-WQM

ANNEX IV

DRAFT WORK PLAN FOR IPET-WIFI FOR THE PERIOD 2013 – 2016

Updated 13 June 2013

No[5]	Task	Deliverable/Activity	Due	Responsible	Impacted ETs	Status	Comment
1.	Contribute to the development and maintenance of WIGOS regulatory material, both GOS-related material and provisions common to all component systems.	1) input to TT-WRM, to assist and review the inclusion of material from GOS Manual and TRs into the WIGOS Manual and TRs (particularly for sections 2, 3 and 7) 2) proposals for updated or new regulatory material to the TRs, WIGOS Manual and/or GOS Manual (as appropriate) 3.1) clear plans (with TT-WRM) for the transition and eventual phasing out of the GOS Manual 3.2) completed transition from GOS Manual to WIGOS Manual 4) Collaboration with TT-WRM on development of the WIGOS Guide	1) Oct 2013 2) 2016 (for next edition of WIGOS Manual), and ongoing. 3.1) Nov 2014 3.2) Nov 2017 4) Jun 2013 and ongoing	**Stringer** SG-RM Members	TT-WRM ICT-IOS	5% 0% 0% 0% 0%	
2.	Contribute to the development of guidance, mechanisms and procedures for engagement, coordination and collaboration with partner organizations.	1. Contribute GOS-related input to, and review, ICG-WIGOS-developed document on strategy for WIGOS engagement with partner organizations[a]. 2. Document listing GOS partner organizations incl description of what each does and what each contributes to WIGOS (via GOS)	Dec 2014? Dec 2013	**Arimatea**, All IPET members **Arimatea** All IPET Members	ICT-IOS N/A	0% 0%	[a] Partners will need to ensure compliance, to some extent, with WMO Technical Regulations in relation to data provision, quality, etc.

[5] Corresponds with WIGOS Activity Area Number

No[5]	Task	Deliverable/Activity	Due	Responsible	Impacted ETs	Status	Comment
3.	Contribute to the development of a framework for network planning using the RRR process	Feedback provided to IPET-OSDE when required/requested.	Ongoing	**Dibbern** Stringer	IPET-OSDE	0%	
4.	Develop guidance on: 1) mechanisms and procedures for improved integration of GOS observational data and products, 2) process of sharing, between GOS and other component observing systems, operational experiences, sharing of expertise and guidance for resourcing joint activities	1) Guidance document[b] on observing system performance monitoring, maintenance and fault rectification (excluding data or quality monitoring[c]) 2) Document listing issues that need to be addressed[d] by regional cooperation, suggesting solutions (e.g., distributed Regional WIGOS Centre), and providing examples of best practice.	1) Jun 2015 2) Mar 2014	**Ngamini** All IPET Members **Ngamini** All IPET Members	ICT-IOS ET-WISC-OM ICT-IOS	0% 0%	[b] guidance to be included in WIGOS Guide [c] Quality monitoring, as distinct from operational performance monitoring, is part of Task 5 [d] procurement, instrument maintenance, spectrum management, etc
5.	Provide advice to ICG-WIGOS via CBS on GOS Quality Management practices and procedures.	1. Request TCs to nominate QM focal points for WIGOS sub-systems. 2 Review the status of WMO and Regional quality monitoring systems with a view to identifying areas for improvement and efficiency[e]: a) Review existing regulatory material related to QM for GOS sub-systems. b) Prepare recommendations on new or improved QM procedures in relation to GOS sub-systems. 3. a) Review the outcomes of the ECMWF Workshop on NWP data monitoring requirements	Aug 2013 Oct 2013 Jun 2014 Sep 2013	**Secretariat** **Schrab** Members of SG-QM **Schrab** Members of SG-QM	ICT-IOS SG-RM	0% 0% 0% 0%	[e] include consideration of the possibility of combining the roles of global quality and quantity monitoring. [f] to improve the feedback mechanisms and process so as to

No[5]	Task	Deliverable/Activity	Due	Responsible	Impacted ETs	Status	Comment
		(Jul 2013) b) Assist in the process of integrating the procedures into the Manual or Guide on WIGOS. 4. Develop and document the concept of extending the Global Quality Monitoring System to a "Fault Management System"[f]. 5. Contribute to the drafting work of TT-WRM[g] in collaboration with SG-RM and provide GOS-related feedback through SG-RM on TT-WRM documentation[h].	Jun 2014 Aug 2014 Oct 2013	**Schrab** Members of SG-QM **Schrab** Members of SG-QM	ICT-IOS SG-RM	0% 0% 20%	better ensure the identification and rectification of missing data, station outages and specific quality issues. [g] Take the lead in drafting QM material on GOS for Tech Regs (incl Common Elements of Surface.Based Obs Systems) and WIGOS Manual. [h] Task 5 leader will participate in TT-WRM teleconferences.
6.	1) describe the standard practices and recommended practices for collecting observations, applicable to instruments and methods of observation with a focus on the GOS 2) provide guidance to Members on how to implement those standard and recommended practices	1.1) existing standard practices and recommended practices, described in a manner suitable for inclusion in WIGOS regulatory material (TRs or Manual on WIGOS) 1.2) proposed new standard practices and recommended practices, described in a manner suitable for inclusion in WIGOS regulatory material (TRs or Manual on WIGOS) 2.1) identify and if necessary further develop guidance on how to implement those existing standard and recommended practices, described in a manner suitable for inclusion in a relevant Guide (WIGOS, GOS,	Nov 2013 Dec 2014 Nov 2013	**Kurz** IPET-WIFI Members	CIMO ETs (CIMO Guide Ed Board, Standardization) TT-WRM SG-RM		

No[5]	Task	Deliverable/Activity	Due	Responsible	Impacted ETs	Status	Comment
		CIMO or other guidance material). 2.2) guidance on how to implement the proposed new standard and recommended practices, described in a manner suitable for inclusion in a relevant Guide (WIGOS, GOS, CIMO or other guidance material).	Dec 2014				
7.	Provide technical advice and guidance on the GOS-related content requirements of the WIR with emphasis on SORT.	1 Review overall GOS-related content of the WIR and provide feedback as necessary. 2 Provide input to SORT, with emphasis on GOS-related WIGOS regulatory and guidance material.	Dec 2013 Dec 2013	**Dibbern** Members of IPET-WIFI	ICT-IOS	0% 0%	
8.	1) Compile and provide input to the development of WIGOS (interpretation) metadata, focusing on the GOS component. 2) Compile and provide input to the development of approaches for gathering, storing and exchanging WIGOS metadata, focusing on the GOS component. This should lead to a number of standard practices	1.1 GOS input provided to ICG-WIGOS TT-WMD 1.2 Review and provide feedback on the Core Metadata list developed by TT-WMD, prepare populated examples (e.g. for surface station, radar, etc.) 1.3 Seek feedback on 1.2 from the technical experts across all areas of OPAG IOS. 2.1 drawing on input from the technical experts across all areas of OPAG IOS, present proposals or options to TT-WMD for approaches for gathering, storing and exchanging WIGOS metadata, focusing on the GOS	1.1 Jun 2013 1.2 Nov 2013 1.3 Jun 2014 2.1 Jun 2014	**Monnik** Members of SG-WMD		DONE	

No[5]	Task	Deliverable/Activity	Due	Responsible	Impacted ETs	Status	Comment
	and recommended practices for Members to follow.	component. 2.2 suggest options for standard and recommended practices, and for specific arrangements for (meta)data entry to the WIR.	2.2 Nov 2014				
9.	1) Contribute to the development of a WIGOS capacity development strategy. 2) Contribute to WIGOS capacity development, as required.	1) Review and provide feedback to ICG-WIGOS on draft WIGOS Capacity Development Strategy. 2) Assist in the organization and conduct of WMO seminars/workshops on the benefits of regional cooperation (such as for design, implementation and management of observing systems).	Oct 2013 2014-2015	**Zhao** IPET-WIFI Members	ICT-IOS	0% 0%	
10	1. Contribute to the development of a WIGOS Communications and Outreach Strategy (WCOS) and plan 2. Contribute to WIGOS communication and outreach activities	1. Provide feedback to ICT-IOS on the WIGOS Communications and Outreach Strategy (WCOS) and plan 2. Enhance understanding of WIGOS and its benefits at appropriate WMO meetings.	Jun 2013 Ongoing	**Zhao** All IPET-WIFI Members		5% 20%	

NOTES:

- More work required on Impacted ETs column. Indicate the way in which the impact occurs (e.g. Consult, Inform, Advise, Consider Input from). Action for Task Leaders.
- Secretariat to put together a timeline for WIGOS-related meetings and deadlines.

- Secretariat to email IPET Members with call for volunteers to assist with different tasks/SGs.

ANNEX V

WIGOS CAPACITY DEVELOPMENT STRATEGY (WCDS)

Introduction

Effective and sustainable WIGOS Capacity Development (CD) is an essential component of the WIGOS implementation. It is of paramount importance particularly to developing countries, especially to NMHSs of Least Developed Countries (LDCs) and Small Island Developing States (SIDSs), to enable them to develop, improve and sustain national WIGOS component observing systems.

The WIGOS CD activities[6] at national and regional levels will be focused on:

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

(b) Providing Members with tools to assist them in filling the existing gaps in the design, operation and maintenance of WIGOS observing systems, including both the infrastructure and human capacities development;

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

(d) Continuously assessing and addressing NMHS capacity development needs, including professional/technical training and development, project development; etc.

WIGOS CD activities need to be complemented by, and coordinated with related CD efforts outside of WIGOS. The WIGOS Capacity Development Strategy (WCDS) is consistent with the WMO Capacity Development Strategy (CDS)[7] and closely aligned with other relevant strategies, such as for the Global Framework for Climate Services (GFCS) and other WMO priorities.

WCDS is a living document. It will evolve with implementation of the WIGOS Framework, in line with the WIGOS Framework Implementation Plan. The regular assessment of the implementation progress in all key activity areas will provide valuable feedback for the Strategy to be updated accordingly. The purpose of WCDS is to assure that all key activity areas for WIGOS implementation are adequately supported by appropriate CD actions.

ICG-WIGOS has general oversight of all WIGOS CD activities, and based on its guidance, their organization and coordination is under the responsibility of the WMO OBS Department, specifically WIGOS-PO, with assistance and support of the other relevant technical departments, and DRA Department.

The following ***objectives***, ***tools/methods, key actions/activities, education and training material, and timeline and focus*** set out the initial aspects of WCDS for the early stages of the WIGOS Framework implementation. These will all be reviewed on an on-going basis when appropriate.

Objectives

The objectives of the WCDS are as follows:

- ***Strengthen*** existing capabilities that are needed to enable all countries to implement and operate WIGOS effectively and efficiently. Some of the foundational capabilities and infrastructure already exist in these areas or are being established in the neediest countries, but further improvement is required.
- ***Engage*** WMO Programmes, RAs, TCs in WIGOS CD activities;

[6] For the purpose of WCDS, it also includes building capabilities if they do not exist yet.
[7] WMO CDS: http://www.wmo.int/pages/prog/dra/CDS.html

- ***Engage*** PRs in WIGOS matters; assist them in understanding challenges they face in implementing WIGOS at national level and increase their awareness of the tools available through WIGOS;
- ***Assist*** NMHS managers by supplying tools for building effective communications and outreach with their stakeholders (governments, policy- and decision-makers, development partners; end-data users);
- ***Engage*** WMO Regional Training Centres, WMO Regional Instrument Centres and WMO Regional Marine Instrument Centres in WIGOS CD activities;
- ***Mobilize*** resources for CD activities (engagement of donors, economic groupings, funding organizations);
- ***Initiate*** special CD fast-track projects in selected subregions to assist Members in developing their national WIGOS Implementation Plans and start implementation of WIGOS at a national level;
- ***Establish*** a mechanism/framework for a regional/subregional WIGOS CD twinning programme in each RA that will enable the transfer of capability within the Region, concentrating on those services with greatest need;
- ***Enhance*** coordination and cooperation with WMO co-sponsored programmes and relevant international organizations and other Partners providing WIGOS related CD assistance to Members;
- ***Establish*** sustainable mechanisms that facilitate partnerships for CD activities through co-sponsorship and joint implementation;
- ***Maintain*** support and increase awareness of WIGOS standard and recommended practices and procedures;
- ***Improve*** understanding of the WMO Technical regulations (WMO-No. 49), WIGOS related sections and compliance with them;
- ***Enhance*** relevance of tailored observational data and products for national decision-makers, civil society, general public, and other relevant stakeholders;
- ***Share*** relevant experiences and lessons learned from implementation of WIGOS;

“Tools/Methods”

Various traditional and new tools/methods will be used:

- Fast-track projects where resources permit (to build the necessary capacity of the countries, in accordance with their needs and priorities);
- Twinning (projects, activities) that will enable the transfer of capability within the region/subregion, concentrating on those NMHSs with greatest need;
- Mentoring, coaching, etc., by more advanced/developed Members with support by the WMO Secretariat;
- WIGOS Operational Information Resource (WIR) (easy access to resources for CD (technical guidelines, tools, etc.); at the early stage, the WIGOS web site (www.wmo.int/wigos) will serve for this purpose);
- Technical guidance material;
- Workshops and Training events;

Key Actions (Activities)

1. Identification of needs and requirements for CD in all key activity areas for WIGOS Framework implementation at global, regional/subregional and national levels; and, more broadly, basic requirements for enabling any WIGOS Framework related activities to occur; (see Annex I)

2. Development and implementing effective and sustainable framework and mechanism(s) for delivering WIGOS related CD activities at the regional/subregional and national levels (e.g. through twinning, mentoring, coaching, etc.);
3. Organization of rolling/roving workshops/seminars/courses for:
   a. Regional/subregional needs and priorities, technical infrastructure development, cooperation and partnership through region-wide organizations or sub-regional groupings;
   b. National WIGOS implementation;
   c. WIGOS standardization, WIGOS Operational Information Resource, technical tools;
4. Development and implementation of fast track dedicated projects where resources permit;

Education and Training Material

- Guideline on WIGOS implementation by Members;
- Technical guidance and guidelines on specific subjects[8] (e.g. technical guidance on a design, development and implementation of a national integrated/composite observing system to provide comprehensive observations, etc.);

Timeline and a focus

2013:

- WIGOS integration and Regional WIGOS ***Implementation Plans*** with a special focus on the five RA I Subregions and RA VI;
- WIGOS integration and National WIGOS ***Implementation Plans*** (N-WIP) with a special focus on developing countries (see ***Annex II***: Template for N-WIP, incl. WIGOS Readiness Checklist for Members[9] and Example developed by Australia[10]);
- Building observing capabilities of countries where they do not exist yet or are very limited;
- Resources mobilization in collaboration with WMO Resource Mobilization Office (RMO) (joint activity with communications and outreach);

2014:

- WIGOS integration and National WIGOS ***Implementation Plans*** (N-WIP) with a special focus on developing countries;
- WCD Fast-track Projects (WDC-Ps) (development and initial implementation);
- Technical guidelines and training on management of national WIGOS component observing systems;
- User Manual on the WIGOS Operational Information Resource (WIR);
- WIGOS Regulatory Material;
- Technical guidelines on[11]:
  - Design, management, operation, etc. of national WIGOS component observing systems;
  - Standardization, incl. metadata;
  - RRR and EGOS-IP;
  - WIGOS QM;
  - Traceability;
- Resources mobilization (joint activity with communications and outreach);
- Sharing experiences, lessons learned; success stories & case studies;

2015:

- Training on:

[8] In accordance with WIGOS sections of the WMO Technical Regulations (WMO-No. 49)
[9] See Appendix IV of the Final Report
[10] Under finalization
[11] In accordance with WIGOS sections of the WMO Technical Regulations (WMO-No. 49)

  - WIGOS Regulatory Material;
  - WIR and its Tools;
  - Design, management, operation, etc. of national WIGOS component observing systems;
  - Standardization, incl. metadata;
  - RRR and EGOS-IP;
  - WIGOS QM;
  - Traceability;
- Resources mobilization (joint activity with communications and outreach);
- Sharing experiences, lessons learned; success stories & case studies;

2016-2017:

- Training on:
  - WIGOS Regulatory Material;
  - WIR Tools;
  - Design, management, operation, etc. of national WIGOS component observing systems;
  - Standardization, incl. metadata;
  - RRR and EGOS-IP;
  - WIGOS QM;
  - Traceability;
- Resources mobilization (joint activity with communications and outreach);
- Sharing experiences, lessons learned; success stories & case studies;

2018-2019:

- Sharing experiences, lessons learned; success stories & case studies;

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ANNEX VI

PROPOSED ALTERNATIVE TEXT FOR WIP V1.0.5

1. Section 2.1: Management of WIGOS Implementation

After the first paragraph:

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

Insert:

Members, individually and through their Regional Associations, will implement and manage WIGOS according to practices and procedures developed by Technical Commissions and described in WMO Regulatory Material on WIGOS. Therefore the development of WMO Regulatory Material on WIGOS is a critically important step in WIGOS Framework Implementation.

2. Section 2.6: Standardization, System Interoperability and Data Compatability

Delete the entire section:

~~**2.6: Standardization, System Interoperability and Data Compatability**~~

~~WIS plays an important role in WIGOS implementation, in relation to data exchange and discovery, and the provision of effective standards and practices for data management. It is important that WIGOS and WIS implementation activities are closely coordinated.~~

~~Taking into account the ongoing rapid progress in technology that will continue to provide a basis for further improvements in the capability, reliability, quality and cost-effectiveness of observations, WIGOS must utilize international standards and best practices set by WMO and partner organizations.~~

~~The required key areas of standardization are:~~

~~(a) Instruments and methods of observation across all components including surface-based and space-based elements (observations and their metadata);~~

~~(b) WIS information exchange, as well as discovery, access and retrieval (DAR) services; and~~

~~(c) Data Management (Data Processing, Quality Control, Monitoring and Archival).~~

~~The interoperability (including data compatibility) of WIGOS component observing systems is achieved through utilization and application of the same, internationally accepted standards and best practices (that is, standardization). Data compatibility is also supported through the use of standardized data representation and formats. In this regard, observing system interoperability and data compatibility are key to turning observations into effective data/products that meet real needs of various users.~~

~~All standard practices will be documented in the WMO Technical Regulations through the WIGOS Manual and other relevant Manuals. Recommended practices will be documented in the Guides and other technical documentation under the responsibility of the respective technical commissions.~~

And replace it with:

2.6 Standardization of Observations

A key area for WIGOS standardization relates to instruments and methods of observation. Standardization of observations is required to achieve system interoperability[12] (including data compatability) across all WIGOS component observing systems and these are key to turning observations into effective data/products that meet real needs of all Members.

WIGOS standardization should build on existing WMO and other international standards and best practices, and take into account the ongoing rapid progress in technology that will continue to provide a basis for further improvements in the capability, reliability, quality and cost-effectiveness of observations.

System interoperability and data compatibility also rely on the use of standardized data representation and formats, standardized methods for information exchange, and standardization in data management. Each of these lies in the WIS domain, so it is important that WIGOS and WIS implementation activities are closely coordinated in this respect.

All standard and recommended practices will be documented in the WMO Technical Regulations through the WIGOS Manual and other relevant Manuals. Other guidance material will be documented in the Guides and other technical documentation under the responsibility of the respective technical commissions.

3. Section 2.8: Data Discovery, Delivery and Archival

Delete the entire section:

~~**2.8 Data Discovery, Delivery and Archival**~~

~~Within the WIGOS framework, the WMO Information System (WIS[13]) provides exchange of data and interpretation metadata[14], and management of related discovery metadata[15]. These discovery metadata play an important role in the discovery, access and retrieval of WIGOS observations and products.~~

~~Submission, management and archival of the data themselves is generally the responsibility of observing system owners/data custodians. However, several World Data Centres and a number of regional or specialized data centres exist that collect, manage and archive basic observational data that are relevant to WMO Applications.~~

~~An important aspect of WIGOS implementation is to ensure all participants adopt WIGOS and WIS standards and make their data and metadata available through WIS for delivery or for discovery, access and retrieval services. In this regard, promotion and implementation of DCPCs (Data Collection and Production Centres) as well as National Centres will be supported and encouraged.~~

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

[13] ~~http://www.wmo.int/wis~~

[14] Interpretation metadata is the information required to interpret the data

[15] Discovery metadata is the information describing the data-sets, generally using ISO-19115 standard, and WMO core profile in case of WIS

~~Guidance will be developed and provided through the appropriate WIGOS regulatory and technical documents.~~

And replace it with:

2.8 Data and Metadata Availability

An important aspect of WIGOS implementation is to develop WIGOS (interpretation) metadata and ensure all Members adopt WIGOS standards and make their data and metadata available. Relevant regulations and guidance will be developed and provided through the appropriate WIGOS regulatory and technical documents.

Submission, management and archival of the data and metadata themselves is generally the responsibility of observing system owners/data custodians. However, several World Data Centres and a number of regional or specialized data centres exist that collect, manage and archive basic observational data that are relevant to WMO Applications.

Within the WIGOS framework, the WMO Information System (WIS[16]) currently provides the means for exchange of data and (to a limited extent) interpretation metadata[17], and management of related discovery metadata[18]. These discovery metadata play an important role in the discovery, access and retrieval of WIGOS observations. In this regard, promotion and implementation of WIS will be supported and encouraged, through the operation of GISCs, DCPCs (Data Collection and Production Centres) as well as National Centres.

Notably, data discovery, access and retrieval (DAR), itself falling in the WIS domain, is critically dependent on the archival of data. Data archival is not an aspect dealt with under either WIS or WIGOS, but is described in the WWW/Manual on the GDPFS.

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