



World Meteorological Organization

Weather • Climate • Water

WMO Integrated Global Observing System (WIGOS)

CBS-LC-GCOS-4

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Outline

- **What is WIGOS?**
- **WIGOS Vision**
- **WIGOS Implementation – Global Level**
- **WIGOS Framework Implementation Plan**



What is WIGOS?

- An over-arching **framework** for the **coordination and evolution** of WMO observing systems and the contributions of WMO to co-sponsored observing systems;
- A WMO priority & a key contribution to **GFCS**
- With WIS, a WMO contribution to **GEOSS**;
- It is about **doing more & better** with what we **have now**, to enable more **efficient** and **effective service delivery**;
- It is about **change management** process.



WIGOS Framework



WIGOS Framework: Key activity areas

Management of WIGOS Implementation

Collaboration with co-sponsors and partners

To oversee, guide and coordinate WIGOS

Data discovery, delivery & archival

To ensure supply of and access to WIGOS observations



To plan, implement and evolve WIGOS component systems

Design, planning and optimised evolution

Observing system operation & maintenance

Capacity Development

To facilitate and support the operation of WIGOS

Communications and outreach

Operational Information Resource

Standards, interoperability & compatibility

Quality Management



WIGOS Vision

- Coordinated, comprehensive, reliable & **trusted observations** for WMO;
- Addressing, in a cost-effective and sustained manner, the evolving **observing requirements** of Members in delivering their weather, climate, water and related environmental services;
- Enhanced **coordination & cooperation** at sub-regional and national levels for the benefit of society;
- WIGOS will build on the WWW '**role model**' of integration and international cooperation.

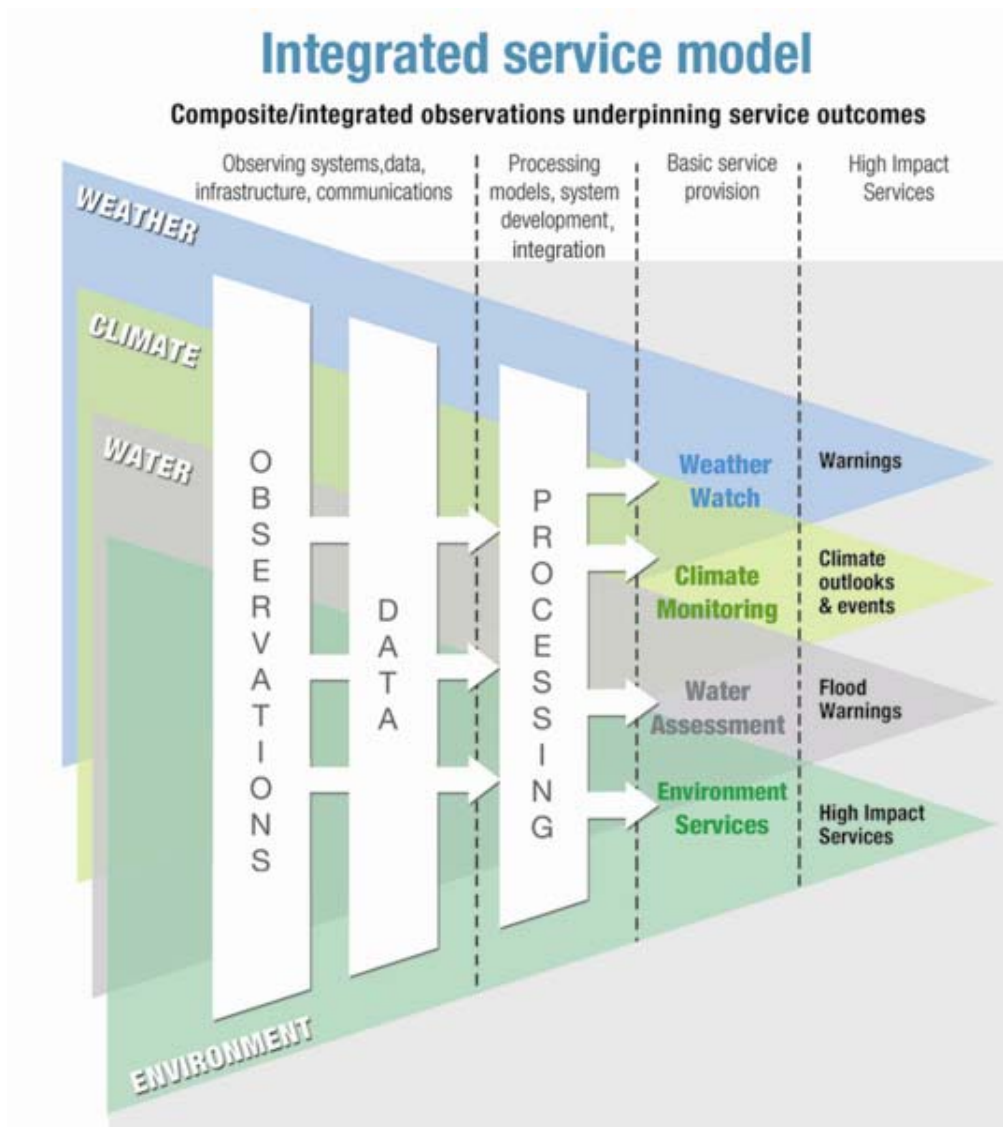


WIGOS Vision

- **To achieve** the WIGOS Vision, the WIGOS framework will be implemented to enable the **integration, interoperability, optimized evolution and best-practice operation** for
 - WMO observing systems, and
 - WMO's contribution to co-sponsored systems.
- WIGOS will use and exploit the WMO Information System (**WIS**) to allow continuous and reliable access to an **expanded set** of environmental data and products, and associated metadata



WIGOS Vision - Integration



- Composite systems
- 'Network of networks'
- **Integration through:**
 - Supporting diverse user needs
 - Systems designed for efficiency & effectiveness
 - NWP data assimilation
 - Partnership & collaboration
 - End-to-end service model
 - Data policy, access and exchange
 - Coordinated network operation & maintenance
 - Practices and procedures
- NOT one-size-fits-all



WIGOS Vision - Interoperability

- Ability to **access, combine or compare** observations **from one source or system with those from another**
- To achieve this, it needs:
 - **Metadata**
 - **Standards**
 - **Regulatory material**
- Interoperability is key to turning observations into effective data, products and services that meet real user needs



Implementation – Global Level

- **Cg-XVI (May-June 2011):**
 - **Decided** to implement WIGOS - Res.50 (Cg-XVI)
 - **Requested** the **regional associations** to develop their regional WIGOS implementation plans;
 - **Requested** the **technical commissions** to Guide technical aspects of WIGOS implementation;
- **EC-LXIII (2011):** Established **ICG-WIGOS**
- **EC-64 (2012):** **Adopted** WIGOS Framework Implementation Plan (**WIP**), version 1.0, and requested:
 - **Members, RAs and TCs** to organize their activities as to **realize WIP**
 - **CBS & CIMO** to provide **technical lead** in WIGOS implementation
- **EC-65 (2013):**
 - **Adopted** the updated version of **WIP** version 2.0
 - **Adopted** Implementation Plan for the evolution of global observing systems (**EGOS-IP**)



Implementation – Global Level

- **EC-LXIII** (2011) established **ICG-WIGOS** to coordinate implementation of WIGOS
- ICG-WIGOS established its **working structure**:
 - TT on WIGOS Implementation Plan (closed)
 - TT on WIGOS Regulatory Material
 - TT on WIGOS Metadata
 - TT on WIGOS Quality Management (just started)
- **Major outcomes**:
 - WIGOS Framework Implementation Plan (**WIP**)
 - Regional WIGOS Implementation Plans (**R-WIPs**)
 - Outreach (TCs, RAs, Members, partners,...)
 - Structure of WIGOS sections in TechRegs and WIGOS Manual
 - Responsibilities of TC and RA
 - Widen scope of WIGOS component OSs (Hydrological OS)
 - Development of the Self-assessment checklist
 - Draft of CD and C&O strategies



ICG-WIGOS - TOR

1. To coordinate WIGOS-related activities **carried out by TCs**;
2. To provide guidance and assistance for the **planning, implementation and further development of GOS, GAW, HOS and GCW**, including interoperability of observing systems, their sustainability, standardization of IMO, information exchange and discovery, and QMF;
3. To advise RAs on the **technical and capacity development aspects** of WIGOS implementation activities;
4. **Guide to Members** on **implementation** of WIGOS;
5. To maintain close **cooperation** with WMO **partners**;
6. To identify and communicate **benefits to partners**;
7. To address major issues identified by EC and provide **technical advice** on implementation of WIGOS;
8. To coordinate **WIGOS and WIS** implementation activities;
9. **To report to EC**;



ICG-WIGOS TT-WIP - TOR

1. **Develop** the **WIGOS Implementation Plan (WIP)**;
2. **Develop** a high–level guidance document for the WIGOS-Functional Architecture (**WIGOS-FA**);
3. **Review EGOS-IP, GCOS-IP, GFCS-IP** (with a major focus on the Observations and Monitoring component), **GCW-IP** and **other relevant implementation plans**, strategic plans and implementation activities of WIGOS core observing system components **to ensure consistency** of the plans and implementation activities;
4. **Submit WIP** through ICG-WIGOS to EC-LXV for approval and further guidance;
5. **Complete** tasks by **July 2013**.



WIGOS Framework Implementation Plan (WIP)

CONTENTS

1. Introduction and Background
 2. **Key Activity Areas for WIGOS Implementation**
 3. Project Management
 4. Implementation
 5. Resources
 6. Risk Assessment / Management
 7. Outlook
- Annexes

KEY ACTIVITY AREAS

- 1) Management of WIGOS implementation
- 2) Collaboration with WMO co-sponsored observing systems & international partners
- 3) Design, planning and optimized evolution
- 4) Observing System operation and maintenance
- 5) Quality Management
- 6) Standardization, system interoperability and data compatibility
- 7) The WIGOS Operational Information Resource
- 8) Data and metadata management, delivery and archival
- 9) Capacity development
- 10) Communications and outreach



WIGOS Framework Implementation Plan v.1.0.5

Key Activity Areas for WIGOS Implementation

1. Management of WIGOS Implementation

ACTIVITY	Target for completion	Responsibility
Develop, revise and update WMO Regulatory Material (TR, WIGOS Manual & Guide)	Cg-17 (2015)	ICG-WIGOS (TT-WRM)
Incorporate WIGOS into structures and procedures of TCs and RAs	2014	TCs RAs ICG-WIGOS
Provide annual reports and recommendations to EC & Cg	EC-65 EC-66 Cg-17	ICG-WIGOS
Develop Regional WIGOS Impl. Plans	2012-2013	RAs
Develop National WIGOS Impl. Plans	From 2013	Members

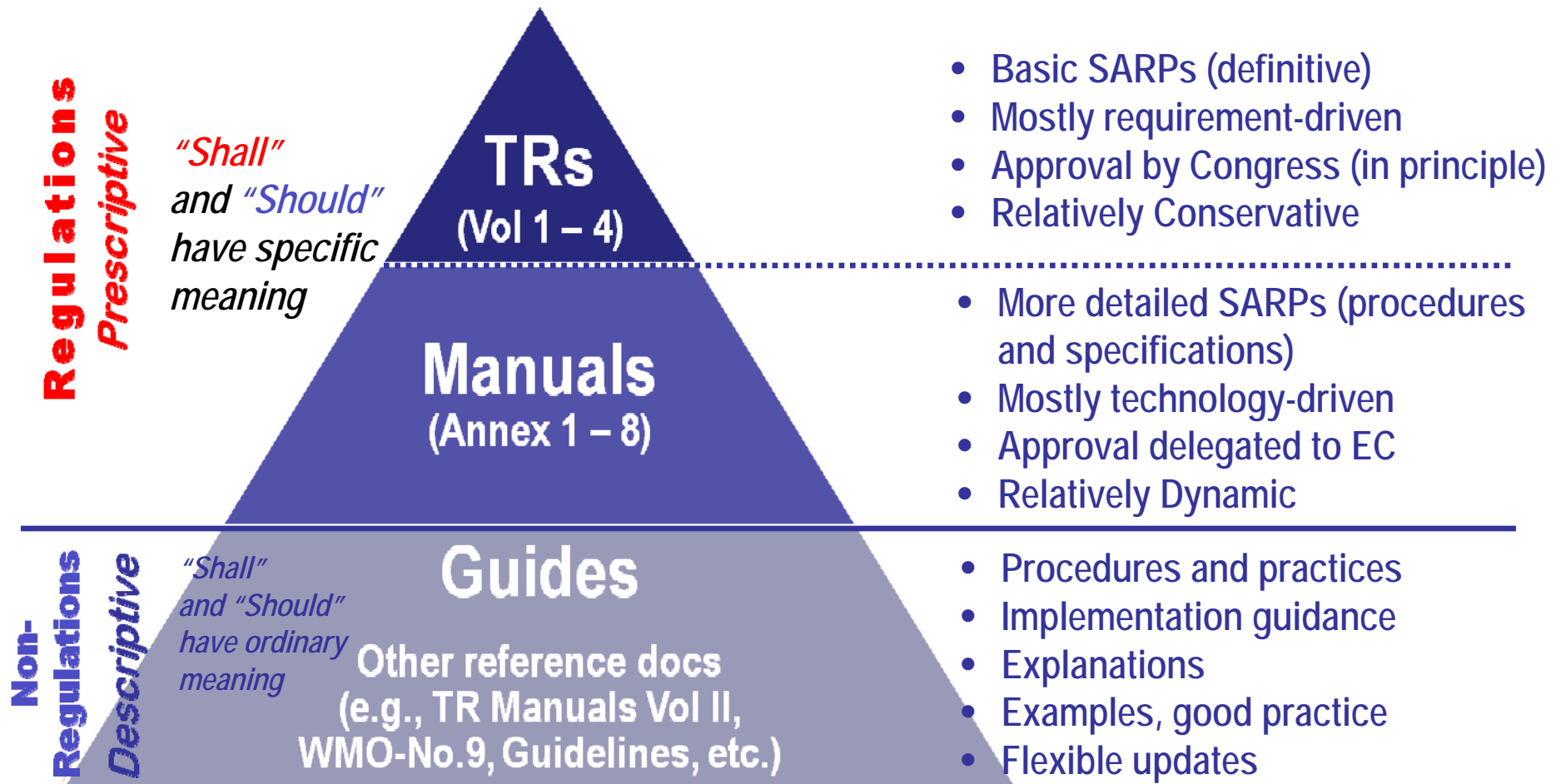


ICG-WIGOS TT-WRM - TOR

1. **To develop** a high-level WIGOS-Functional Architecture;
2. **To review WMO Technical Regulations** (WMO-No. 49), Volume I General Meteorological Standards and Recommended Practices and other relevant regulatory material and make proposal for updates vis-à-vis WIGOS Manual;
3. **To develop** the **WMO Manual and Guide on WIGOS**;
4. **To develop mechanisms for the update and maintenance** of the Manual and Guide on WIGOS and, in order to maintain structural relationships between related documents, develop complementary mechanisms for the update and maintenance of related documents (existing, planned);
5. **To submit** the **WMO Manual and Guide on WIGOS to the ICG-WIGOS** for its coordination with and reporting to EC and for its eventual recommendation **for approval by Cg-XVII**;
6. **To coordinate** regularly with the ICG-WIGOS as needed and report at least annually to the ICG-WIGOS on the progress;
7. **To complete** its tasks by **July 2015**.



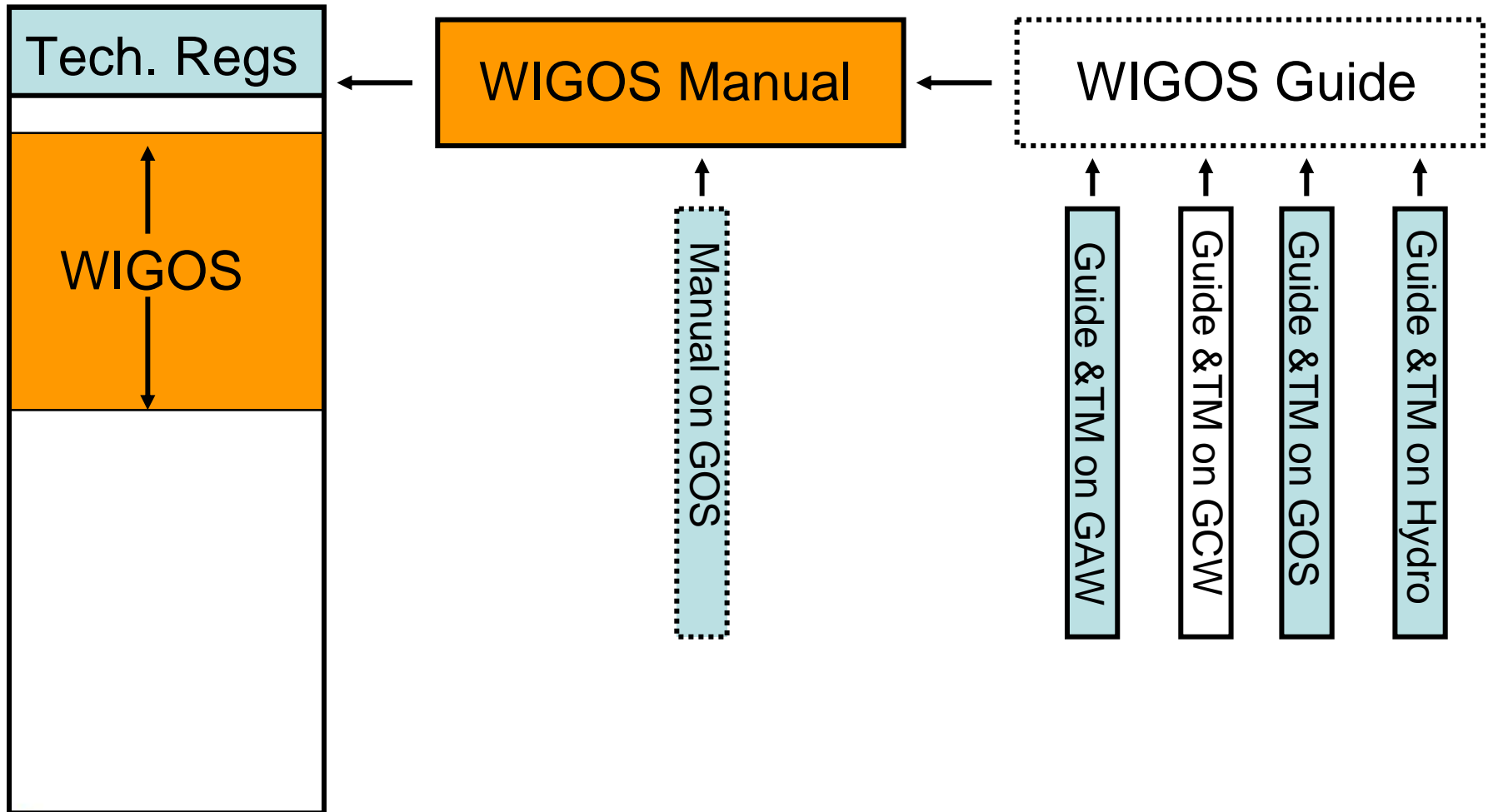
WMO Technical Regulations: Composition & generic concept



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Key Activity Areas for WIGOS Implementation

1. Management of WIGOS Implementation



STRUCTURE OF WIGOS SECTIONS IN WMO TECHNICAL REGULATIONS

- General Provisions
- Definitions
- VOLUME I – General Standards and Recommended Practices
 - PART I. WMO Integrated Global Observing System (WIGOS)
 - I.1 Introduction
 - I.2 Common attributes of component systems
 - I.3 Common attributes specific to the surface-based sub-system of WIGOS
 - I.4 Common attributes specific to the space-based sub-system of WIGOS
 - I.5 Observing component of the Global Atmosphere Watch (GAW)
 - I.6 Observing component of the Global Cryosphere Watch (GCW)
 - I.7 Global Observing System (GOS) of WWW
 - I.8 WMO Hydrological Observing System (ref. Vol. III)



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Key Activity Areas for WIGOS Implementation

1. Management of WIGOS Implementation

- **ICG-WIGOS TT on WRM: Plans 2013-14** for the development of WIGOS sections in WMO TR (WMO-No. 49) & WIGOS Manual:
 - **February 2013:** Zero draft (**slow progress**)
 - **April 2013:** First draft (**not yet available**)
 - **June 2013:** Review of the First draft (TT-WRM-2)
 - **October 2013 :** Completion of the First draft
 - **November 2013 :** **(Near)-final draft** (TT-WRM-3)
(March 2014: Final Draft (ICG-WIGOS-3))



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Key Activity Areas for WIGOS Implementation

2. Collaboration with the WMO co-sponsored Observing Systems and International Partners

ACTIVITY	Target for completion	Responsibility
Develop guidance, mechanisms and procedures for engagement coordination and collaboration with partner organizations	2014	ICG-WIGOS Partners
Develop Collaboration Framework for the Architecture for Climate Monitoring from Space (ACMS)	2015	CGMS, CEOS CBS, SAT
Examine and recommend areas where closer regional cooperation and coordination would be beneficial	2015	RAs
Establish closer collaboration at the national level , NMHS with other government agencies, and with potential external data providers	2015	ICG-WIGOS, Members RAs



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Key Activity Areas for WIGOS Implementation

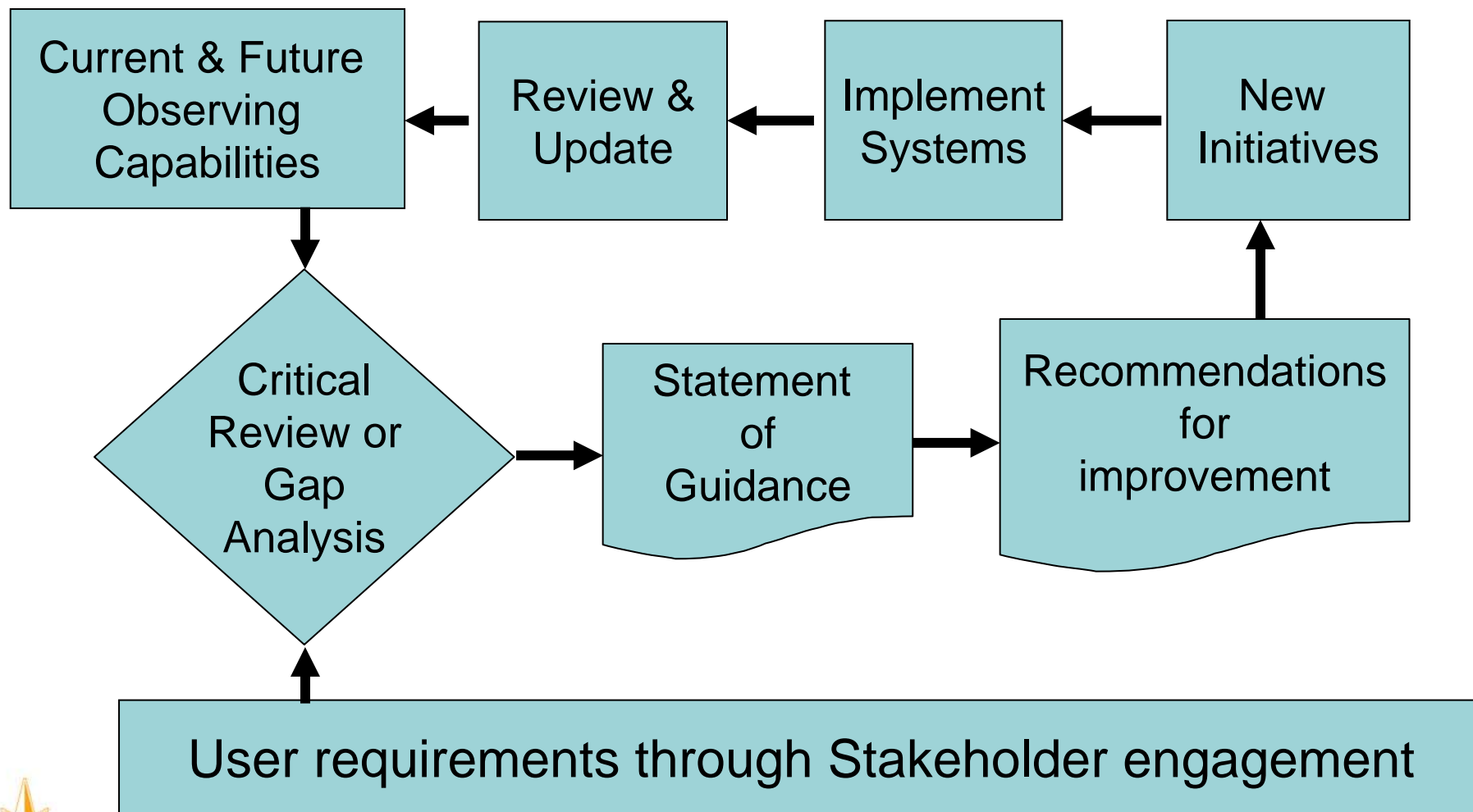
3. Design, Planning and Optimized Evolution of WIGOS Component OSs

Complete RRR practices, procedures, responsibilities and mechanisms for all systems and agreed app. areas	2014	CBS Other TCs
Develop the ACMS focusing on GFCS 4 priorities	2015	CGMS, CEOS, CBS
Using the RRR process, develop guidance regarding observing network design principles	2015	IPET-OSDE ICG-WIGOS, TCs
Develop a concept of RBON to be applied by RAs	2015 onwards	ICG-WIGOS, RAs
Evolve and implement OSs in the Region following the technical guidance of TCs as represented in the EGOS-IP and other observation system implementation plans	2015	RAs
Update the global RRR DB to take into account regional user requirements.	2015	IPET-OSDE, RAs
Migrate from the existing RBSN/RBCN into and integrated RBON	2015 onwards	RAs, Members
Contribute to the collective regional effort to evolve and implement observing systems following the EGOS-IP and other observation system implementation plans	2015	Members
Define sub-Regional UR fro observations	2015	Members



Composite Observing System Plan and Design

National Rolling Review of Requirements



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Key Activity Areas for WIGOS Implementation

4. Observing Systems Operation and Maintenance

ACTIVITY	Target for completion	Responsibility
Develop guidance, mechanisms and procedures for improved integration of observational data and products	2015	ICG-WIGOS
Develop guidance for the process of sharing , between component observing systems, operational experiences, sharing of expertise and guidance for resourcing joint activities	2013	ICG-WIGOS



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Key Activity Areas for WIGOS Implementation

5. Quality Management

ACTIVITY	Target for completion	Responsibility
Develop WIGOS Quality Management guidance, mechanism, practices and procedures	2015	ICG-WIGOS TCs
Examination of current quality management practices being used by WMO observing programmes	2014	ICG-WIGOS



ICG-WIGOS TT-WQM - TOR

1. **Coordinate a review of quality management practices** of WMO programmes in planning, operating and controlling WIGOS component observing systems and subsystems, **identify gaps and make recommendations for improvements.**
2. **Review** the existing WMO arrangements for international **quality and quantity monitoring and fault management** for WIGOS observing systems and **make recommendations for improvements.**
3. **Compile proposals** for improved **guidance, practices and procedures** relating to WIGOS QM.
4. **Contribute** to the review and **compilation of WIGOS regulatory material relating to WIGOS QM** in consultation with TT-WRM and with the assistance of IPET-WIFI SG-QM,
5. **Undertake** other activities related to WIGOS quality management as directed by ICG-WIGOS.
6. **Report** at least annually to the ICG-WIGOS on progress made.



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Key Activity Areas for WIGOS Implementation

6. Standardization, System Interoperability and Data Compatibility

ACTIVITY	Target for completion	Responsibility
Develop guidance for WIGOS standards and document the implemented standards and recommended practices and procedures on instruments, methods of observations, data products, etc.	2015	TCs TT-WRM WIGOS PO



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Key Activity Areas for WIGOS Implementation

7. WIGOS Operational Information Resource (WIR)

ACTIVITY	Target for completion	Responsibility
Design and develop the WGOS Operational Information Resource (WIR)	2015	Secretariat in cooperation with Members
Investigate the need for a database describing the Global Observations Products (Satellite Data, Weather Radar)	2013	CBS, SAT
Survey WMO Members on what they could offer to support development and operations of WIR	2013	WIGOS PO (Members)
Provide information required by WIR	From 2013	Members



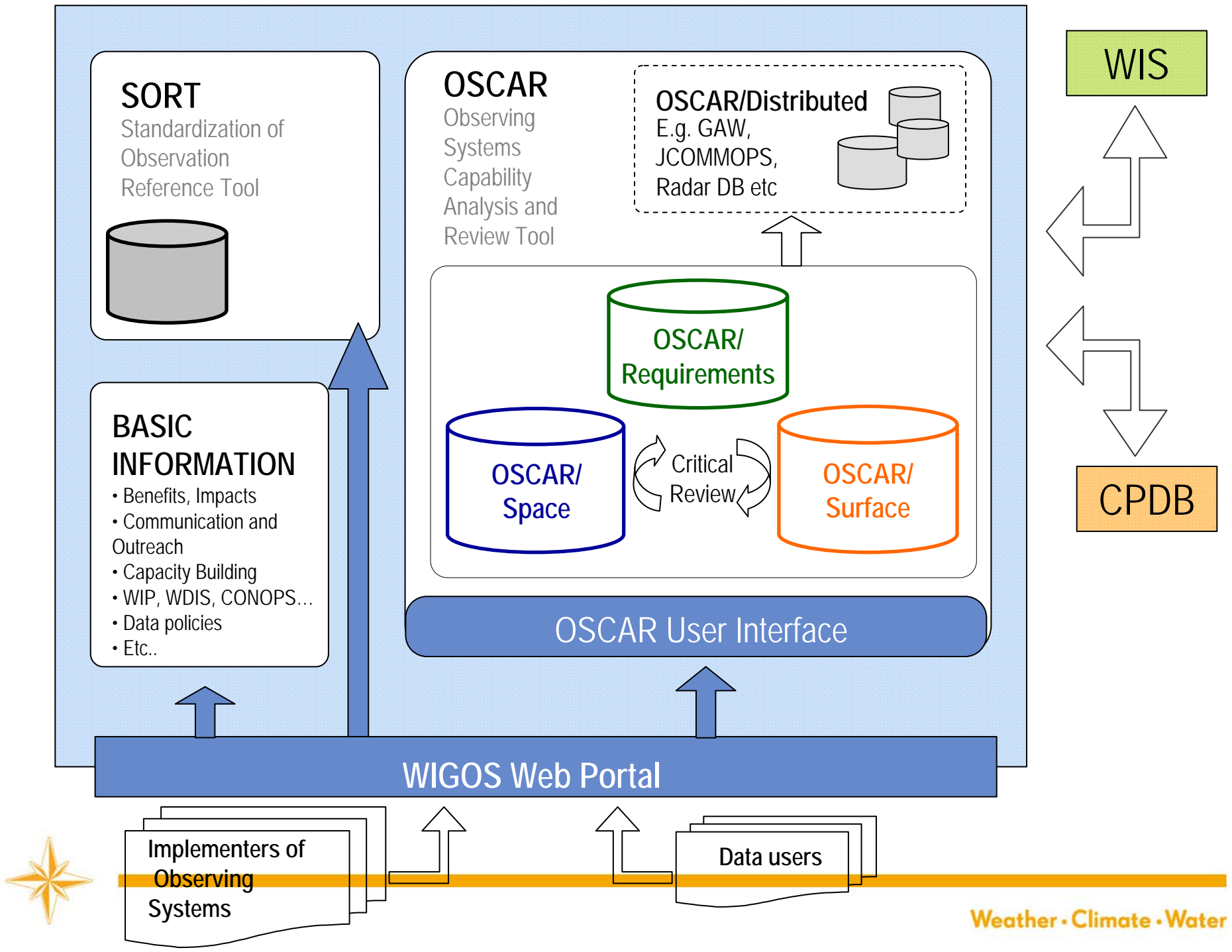
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Key Activity Areas for WIGOS Implementation

7. WIGOS Operational Information Resource (WIR)

- **Goal:**
- Provide single access point to all WIGOS stakeholders (*Network decision makers, Implementation Coordinators, Data users, RAs, TCs, WIGOS Partners, etc.*)
- Shall contain all relevant information on the status and evolution of WIGOS and its components
- **WIR will provide:**
- General info. on WIGOS (benefits, impact, ...)
- Description of existing component observing systems (metadata)
- Access to relevant WIGOS standards and best practices
- A tool to monitor evolution of observing systems capabilities & compare with plans
- Access to existing WIGOS national & regional plans
- **Assistance to Members**, through:
 - Understanding observational user requirements
 - Providing information on the required standards
 - Identifying gaps & potential synergies
 - For data users: Identifying lists of stations & metadata
 - For developing countries: Guidance for implementation & tools
 - Mechanism for matching needs with resources





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Key Activity Areas for WIGOS Implementation

7. WIGOS Operational Information Resource (WIR)

- “WIR Development Plan”: drafted proposing completion of WIR by 2015 ✓
- WIR Development Team: set up ✓
- Status of components
 - WIR functional specifications: ready ✓
 - Portal tree: defined ✓
 - SORT basic requirements: under discussion
 - OSCAR/Requirements: operational ✓
 - OSCAR/Space: operational ✓
 - OSCAR/Surface specifications: ready ✓
 - **Consultations with Météo Suisse on a possible OSCAR operation**
 - Information on WIR available at:

http://www.wmo.int/pages/prog/www/wigos/wir/index_en.html



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Key Activity Areas for WIGOS Implementation

8. Data Discovery, Delivery and Archival

ACTIVITY	Target for completion	Responsibility
Develop WIGOS metadata standards, practices and procedures	2015	TCs ICG-WIGOS
To develop a mechanism to assist Members in implementing WIGOS metadata standards, practices and procedures	2014	ICG-WIGOS



ICG-WIGOS TT-WMD - TOR

1. **To identify** the **information that is needed** to allow the majority of users to use WIGOS observations in appropriate contexts and in a defensible way;
2. **To create** the **WIGOS Core Metadata Standard** that allows the essential information to be exchanged unambiguously, regardless of the format used for the transfer;
3. **To define** a **mechanism for maintaining the WIGOS Core Metadata Standard**, including how metadata might be provided that is additional to the Core and coordinate with the TT-WRM on any appropriate documentation as needed for WIGOS Manual and Guide;
4. **To implement** within the **WIGOS Core Metadata Standard**, and the WMO Core Metadata Profile, **a standard method of providing users with an indication of the quality of the data**, and to do so in a way that distinguishes with the quality management of the data (“quality of the observation”) and ensuring that the user is able to identify which applications the data are suitable for (“classification” of the observation”);
5. **To coordinate** regularly with the ICG-WIGOS as needed and report at least annually to the ICG-WIGOS on the progress;
6. **To complete** its tasks and hand over additional requirements to its successor (if required) in time **for approval by Cg-17**.

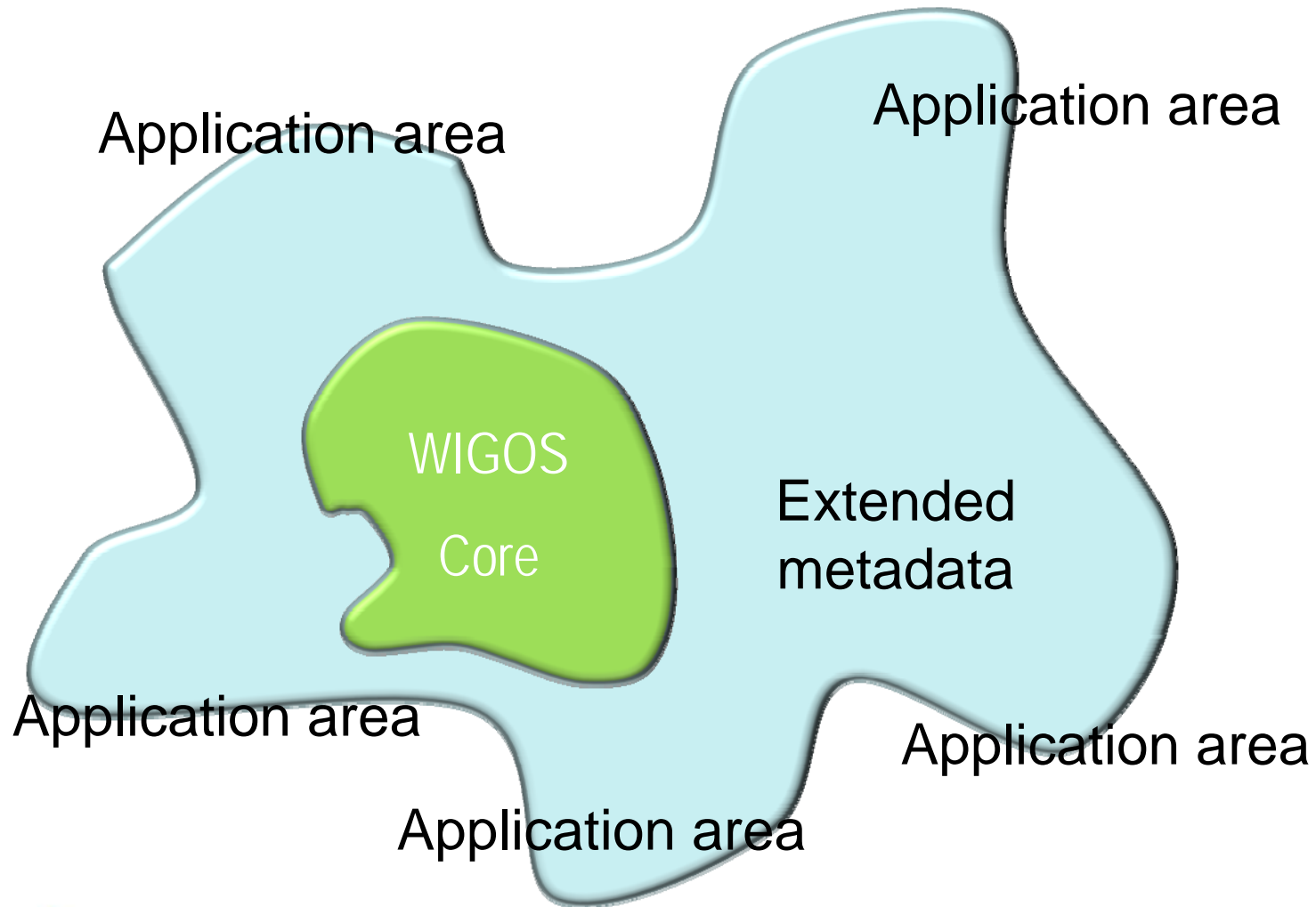


ICG-WIGOS TT-WMD

- **Recommended WIGOS Metadata Principles**
 - Every piece of metadata has a date and time recorded against it
 - All WIGOS metadata identified for international exchange associated with data shall be made available for all users
 - All geographic references must include the Coordinate Reference System
 - Metadata must be updated in a timely manner to support adequate use of data
 - Standard should be applicable to all disciplines
 - Standard should be forward-looking but also respect legacy (eg WMO Pub. 9, Vol A)
 - Standard should be acceptable to all Members
 - Standard should be applicable for all Members
- **WIGOS Core Metadata Contents** (Mandatory, Conditional depending on another element or the observing system, Optional) developed for 10 topics:
 - Provenance & ownership, Data processing, Station/Platform, Instrument, Sampling & analysis, Purpose of observations, Environment, Contact, Observed quantity, Data quality



ICG-WIGOS TT-WMD



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Key Activity Areas for WIGOS Implementation

9. Capacity Development

ACTIVITY	Target for completion	Responsibility
Develop a WIGOS Capacity Development strategy including education and training	2015	ICG-WIGOS ETR, RAs
Assistance provided to WMO Members regarding WIGOS implementation	2015	WMO Secretariat (Members)
Develop WIGOS related guidelines and training materials and other relevant documentation	2015	WIGOS-PO, TCs
Mobilize resource for WIGOS implementation	2015	Members (WMO Secretariat)
Assist Members in using WIR Tools for the design and management of national WIGOS obs. Networks	2014	Members
Assist Members in implementing WIGOS metadata	2014	WMO Secretariat, Members



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Key Activity Areas for WIGOS Implementation

9. Capacity Development

- **WIGOS Capacity Development (WCD) Strategy:**
 - Prepared by Secretariat and considered by ICG-WIGOS-2
 - Available on web
 - **WCD Plan** will be attached to the Strategy
 - Will be built based on R-WIPs & N-WIPs

- **WCD Material and Tools:**
 - Several documents already available on WIGOS website (www.wmo.int/pages/prog/www/wigos/documents.html):
 - [User Manual for OSCAR](#)
 - Basic docs: CONOPS, WDIS, WIP
 - Checklist for Members to assess their preparedness for WIGOS implementation
 - Template for R-WIP,
 - In preparation:
 - Template for N-WIP

 - On going process - all WCD material will be published on the WIGOS web site when available



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Key Activity Areas for WIGOS Implementation

10. Communications and Outreach

ACTIVITY	Target for completion	Responsibility
Develop an effective communication, outreach, capacity development, and education strategy	2012	ICG-WIGOS
Develop communication and outreach materials (see Annex 1 of WIP for suggestions) and make them available via the WIGOS Portal	2012-2013	WIGOS-PO



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Key Activity Areas for WIGOS Implementation

10. Communications and Outreach

- **WIGOS Communication & Outreach (WC&O) Strategy:**
 - Zero draft prepared by Secretariat
 - Considered by ICG-WIGOS-2
 - Engagement of RTCs, Regional Offices, regional/subregional stakeholders/Partners

- **WC&O Material:**
 - Nine documents available on WIGOS website:
www.wmo.int/pages/prog/www/wigos/documents.html
 - On going process

- **Activities:**
 - Regional/subregional/national workshops on regional/national implementation





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Thank you for your attention

www.wmo.int/wigos