WIS2 Introduction

Hassan Haddouch
WIS 2.0 Manager

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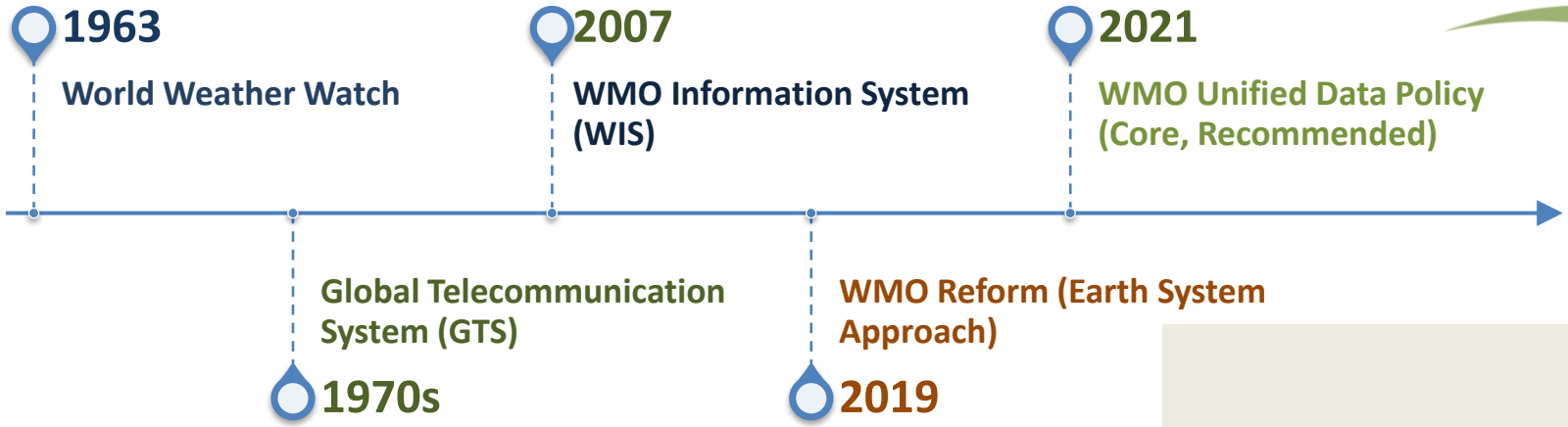
Evolution of WMO data exchange



WIS 2.0

… collaborative system of systems using Web-architecture and open standards to provide simple, timely and seamless sharing of trusted data and information …

- Open Standards (OGC, W3C, IETF, …)
- Free and Open Source tooling
- Data sharing through Web and real-time notifications with publication/subscription (pub/sub) protocols
- Cloud ready (turn-key solutions)
- Web services and APIs (Application Programming Interface)

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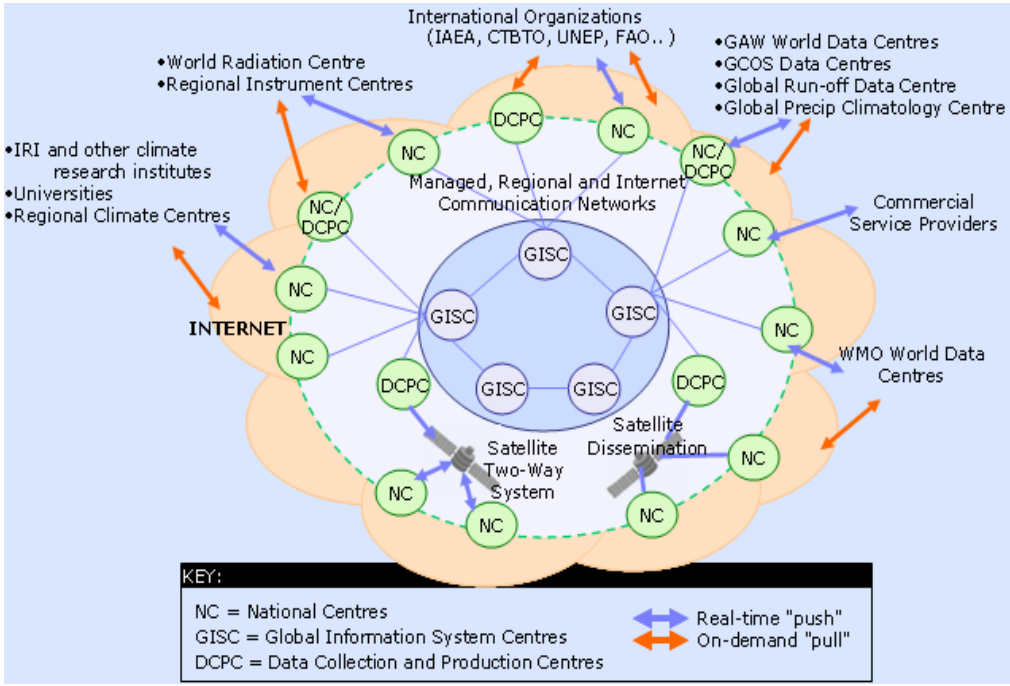
Organization of WIS

- The WMO Information System (WIS) enables the collection, sharing, and access of Earth system data and products globally.
- WIS is structured around three main types of centres:

1. Global Information System Centre (GISC)
2. Data Collection or Production Centre (DCPC)
3. National Centres (NC)



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Global Information System Centre (GISC)

Role:

- GISCs are responsible for supporting WIS centres in their area of responsibility (AoR) and ensuring the effective operation of WIS
- GISCs coordinate data sharing within the area of responsibility of the Global Information System Centre
- GISCs shall support NCs and DCPCs in their area of responsibility to effectively participate in WIS
- GISCs contribute to the Capacity building within the area of responsibility of the Global Information System Centre
- GISC contributes to the monitoring of WIS in their AoR
- Note: GISCs are not required to operate a Global Service component
- List of GISCs:

- GISC Beijing (China)	- GISC Offenbach (Germany)
- GISC Brasilia (Brazil)	- GISC Pretoria (South Africa)
- GISC Casablanca (Morocco)	- GISC Seoul (Kouria)
- GISC Exeter (UK)	- GISC Tehran (Iran)
- GISC Jeddah (Saudi Arabia)	- GISC Toulouse (France)
- GISC Melbourne (Australia)	- GISC Washington (USA)
- GISC Moscow (Russia)	- GISC Tokyo (Japan)
-GISC New Delhi (India)	

Data Collection or Production Centre (DCPC)

- A Data Collection or Production Centre (DCPC) is a WIS centre that is responsible for the collection, generation, and dissemination of regional or specialized meteorological, hydrological, or related environmental data and products.
- A DCPC may be operated by a national meteorological or hydrological service (NMHS), or by an international organization that performs data collection or production functions in support of WMO programmes and activities.

Role:

- As appropriate to its role, a DCPC shall collect, store, and manage data as defined in Resolution 1 (Cg-Ext(2021)).
- A DCPC shall support the production and management of regional or specialized datasets.
- A DCPC shall create discovery metadata about the data it manages and ensure that these discovery metadata remain up to date.

Examples of DCPCs:

- ECMWF (European Centre for Medium-Range Weather Forecasts)
- EUMETSAT (European Organization for the Exploitation of Meteorological Satellites)

Official list of WMO designated DCPCs for WIS2 is in the Manual on WIS (WMO-No 1060) Vol. II

National Centre (NC)

National Centres are responsible for publishing data and discovery metadata using a component referred to as a WIS node

Role:

- NC shall collect, store, and manage data as defined in Resolution 1 (Cg-Ext(2021))
- NC shall support the production and management of datasets
- NC shall create discovery metadata about the data it manages and ensure that these discovery metadata remain up to date

Examples of NCs:

- National Meteorological and Hydrological Services (NMHSs) of WMO Members

(e.g., NWS (USA), Met Office (UK), DWD (Germany), IMD (India), BOM (Australia))

The list of NCs, DCPCs, and GISCs is provided in Volume I of the Manual on the WMO Information System.

WMO Unified data policy

WMO Unified Data Policy, Resolution 1 (Cg-Ext(2021))

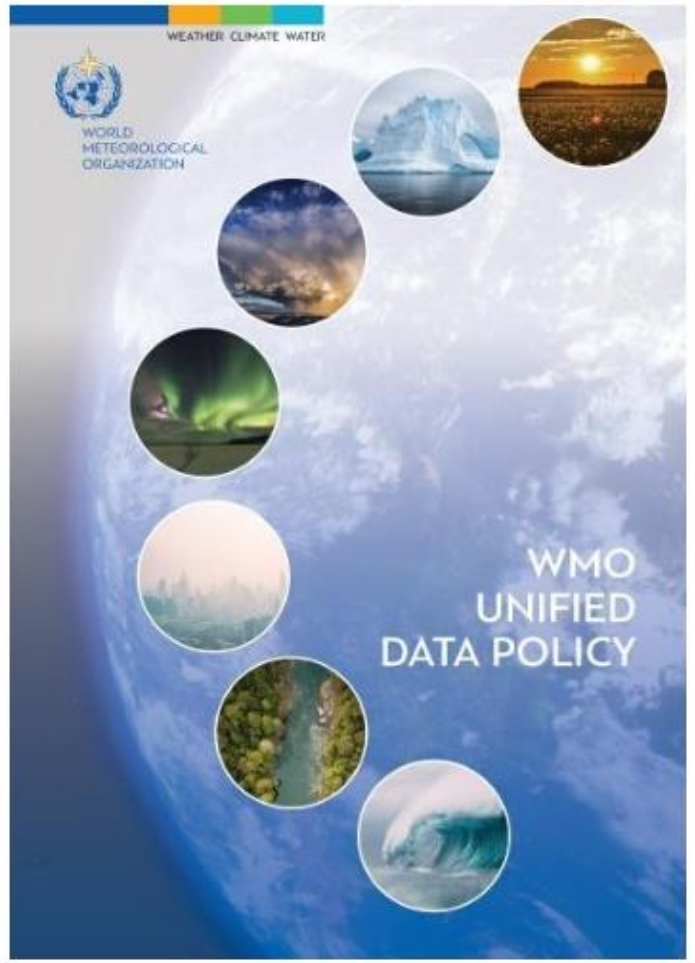
Adopted in 2021, this unified policy for the international exchange of Earth system data reaffirms WMO's commitment to free and unrestricted exchange of Earth system data necessary for the provision of services in support of the protection of life a property and for the well-being of all nations.

International provision and exchange of Earth system data shall follow a 2-tier approac

(1) Members **shall** provide on a free and unrestricted basis **Core** data that is necessary provision of safety critical services
(2) Members **should** provide the **Recommended** data that are required to support Eart system monitoring and prediction

Members **should** provide **Recommended** data without charge to public research and educational communities for non-commercial use

Encourages all users of Earth system data to **attribute** the source of data wherever possible



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WIS2 node and Global Services

- Each WMO Member shall implement at least one WIS2 node to share data in WIS2
- A WIS2 node replaces the GTS Message Switching System
- Data and metadata are shared through a WIS2 node
- A WIS2 Node shares data via an HTTPS service and sends notifications to MQTT subscribers
- A WIS2 node shares notifications with Global Broker

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WIS2 Components: Global Services

Global Services

Global Monitoring

Global Discovery Catalogue

Provides an API to discover datasets and services

Global Broker

Sends notifications of new data to be downloaded from Global Caches or WIS2 nodes

Global Cache

Provides users HTTP download of core data cached from WIS2 nodes

Discovers datasets

Subscribes to topics

Downloads core data

Data users

Downloads recommended data

Downloads recommended data

Downloads recommended data

WIS2 node

WIS2 node

WIS2 node

Scale to highly-available, global data sharing

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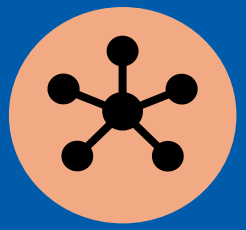
WIS2 Global Service instances

Global Broker



Brazil
France
China
USA

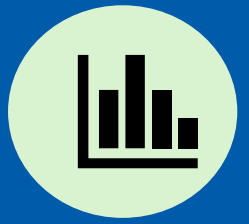
Global Discovery Catalogue

Canada
China
Germany

Global Cache

China
Germany
Japan
Korea
Saudia Arabia
USA/UK

Global Monitoring



China
Morocco

Who can operate a WIS2 Node ?

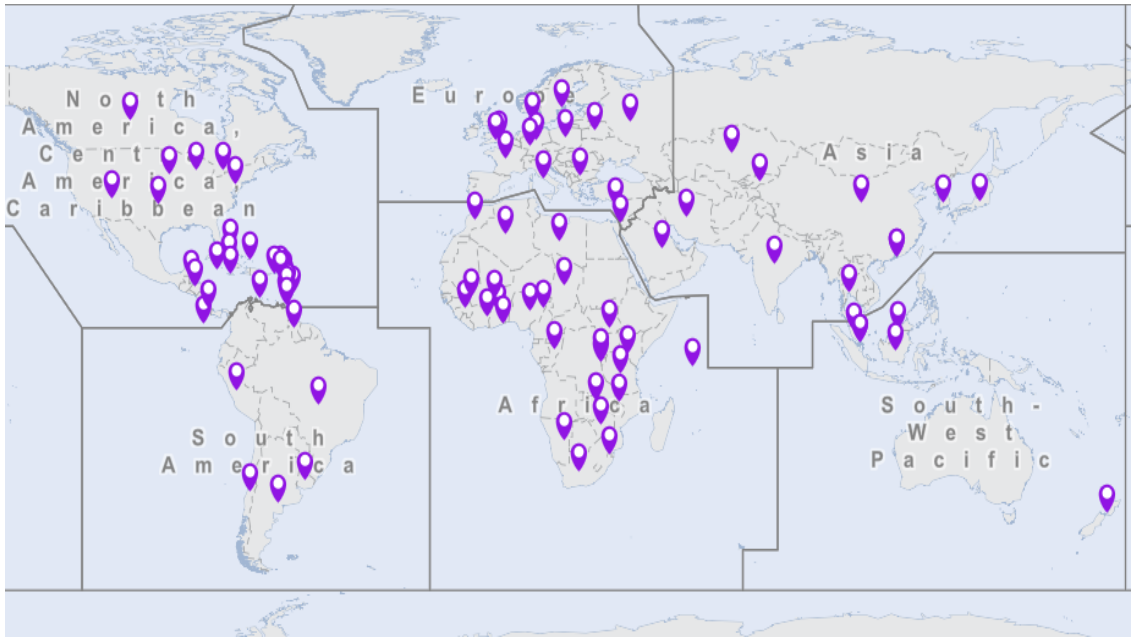
National Center (NC)

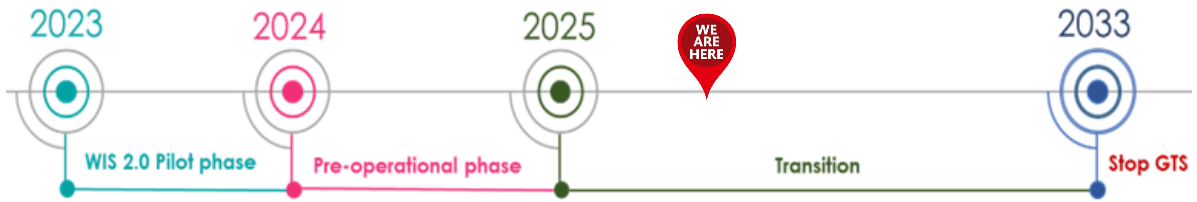
Each WMO Member has a NC with responsibility to share core and recommended data

Data Collection and Production Center (DCPC)

- DCPC has the role of collecting, storing, managing and/or producing programme-related data
- DCPC operates a WIS2 node to share data and metadata through WIS2
- Official list of WMO designated DCPCs for WIS2 is in the Manual on WIS (WMO-No 1060) Vol. II
- Designation of a new DCPC requires a formal process involving INFCOM, please contact the Secretariat to start the process.

WIS2 Nodes





NC	Algeria	I
NC	Benin	I
NC	Burundi	I
NC	Burkina Faso	I
NC	Cameroon	I
NC	Chad	I
NC	Congo	I
NC	Eswatini	I
NC	Ghana	I
NC	Guinea	I
NC	Kenya	I
NC	Libya (State of)	I
NC	Malawi	I
NC	Mali	I
NC	Morocco	I
NC	Namibia	I
NC	Nigeria	I
NC	Rwanda	I
NC	Seychelles	I
NC	South Africa	I
NC	Togo	I
NC	United Republic of Tanzania	I
NC	China	II
NC	Hong Kong, China	II
NC	India	II
NC	Iran (Islamic Republic of)	II
NC	Japan	II
NC	Kazakhstan	II
NC	Kyrgyzstan	II
NC	Republic of Korea	II
NC	Saudi Arabia	II
NC	Thailand	II
NC	Argentina	III
NC	Brazil	III
NC	Chile	III
NC	Colombia	III
NC	Guyana	III
NC	Peru	III

NC	Anguilla	IV
NC	Antigua and Barbuda	IV
NC	Bahamas	IV
NC	Barbados	IV
NC	Belize	IV
NC	British Virgin Islands	IV
NC	Canada	IV
NC	Cayman Islands	IV
NC	Costa Rica	IV
NC	Cuba	IV
NC	Curaçao and Sint Maarten	IV
NC	Dominica	IV
NC	Honduras	IV
NC	Jamaica	IV
NC	Monserrat	IV
NC	Saint Lucia	IV
NC	St. Kitts and Nevis	IV
NC	Trinidad and Tobago	IV
NC	Turks and Caicos Islands	IV
NC	Brunei Darussalam	V
NC	Indonesia	V
NC	Malaysia	V
NC	New Zealand	V
NC	Singapore	V
NC	Belarus	VI
NC	Bulgaria	VI
NC	Cyprus	VI
NC	Denmark	VI
NC	France	VI
NC	Germany	VI
NC	Israel	VI
NC	Italy	VI
NC	Poland	VI
NC	Russian Federation	VI
NC	Sweden	VI
NC	United Kingdom of Great Britain and Northern Ireland	VI

DCPC	Hong Kong, China	II
DCPC	Singapore	V
DCPC	United States of America	IV
DCPC	ECMWF	VI
DCPC	EUMETSAT	VI
DCPC (Pre-approval)	Canada	IV
DCPC (TBC)	United States of America	IV

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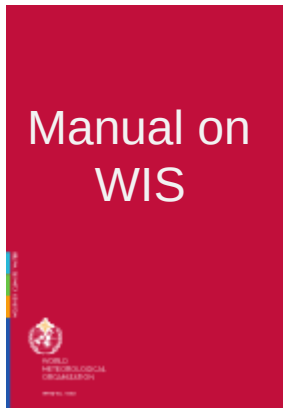
WIS2 regulatory material

June 2023 Cg-19



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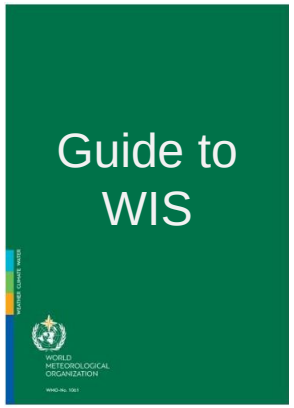
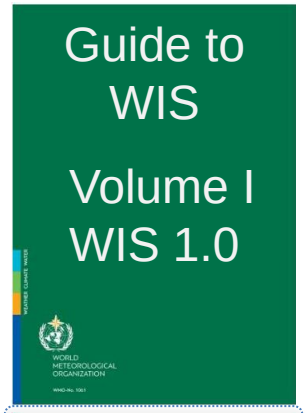
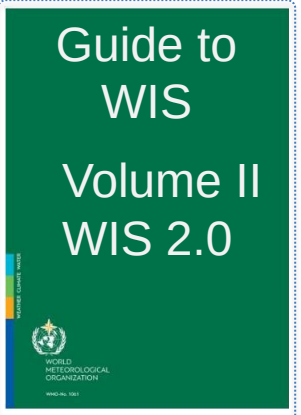
AMENDMENTS TO THE MANUAL ON THE WMO INFORMATION SYSTEM

[Manual on WIS Volume II
WMO Information System 2.0]

April 2024 INFCOM-3







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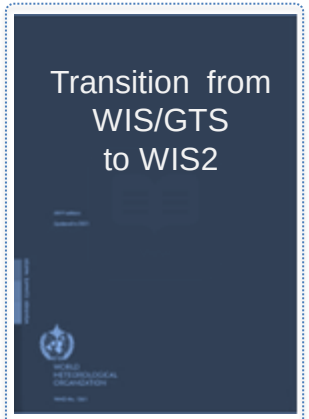
UPDATE OF THE GUIDE TO THE WMO INFORMATION SYSTEM

[Guide to the WMO
Information System, Volume II]



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TRANSITION FROM WIS 1.0 AND GTS TO WIS 2.0, INCLUDING CAPACITY DEVELOPMENT

[Provisions for the Transition from the WMO Information System (WIS) 1.0 and Global Telecommunication System to WIS 2.0]

WMO OMM

[WMO Information System (WIS) | World Meteorological Organization]

MANUAL ON WMO INFORMATION SYSTEM VOLUME II

PART I
Organization and responsibilities

- 1.1 Principles of WIS 2.0
- 1.3 Compliance with required WIS functions
- 1.4 Interaction and collaboration among WIS centres
- 1.5 Robustness and reliability of components
- 1.6 Competencies of personnel
- 1.7 WMO documents relevant to WIS

PART II
Designation procedures and WIS centres

- 2.1 General
- 2.2 Procedure for designating an NC
- 2.3 Procedure for designating a DCPC
- 2.4 Procedure for designating a GISC
- 2.5 Audit of WIS centres

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- 3.2 Functional Architecture of WIS
- 3.3 Functional requirements of an NC
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- 3.6 Functional requirements of a WIS node
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- 4.1 General
- 4.2 WIS-TechSpec-1: Managing discovery metadata
- 4.3 WIS-TechSpec-2: Publishing data and discovery metadata
- 4.4 WIS-TechSpec-3: Operating a Global Broker
- 4.5 WIS-TechSpec-4: Operating a Global Cache
- 4.6 WIS-TechSpec-5: Operating a Global Discovery Catalogue
- 4.7 WIS-TechSpec-6: Managing operations of the WIS

PART V & VI

- WIS discovery metadata
- Information management

APPENDIXES

- Appendix A. WIS 2.0 principles and benefits
- Appendix B. WMO Information System competencies
- Appendix C. Approved WIS 2.0 Centres
- Appendix D. WIS2 Topic Hierarchy
- Appendix E. WIS2 Notification Message
- Appendix F. WMO Core Metadata Profile (version 2)

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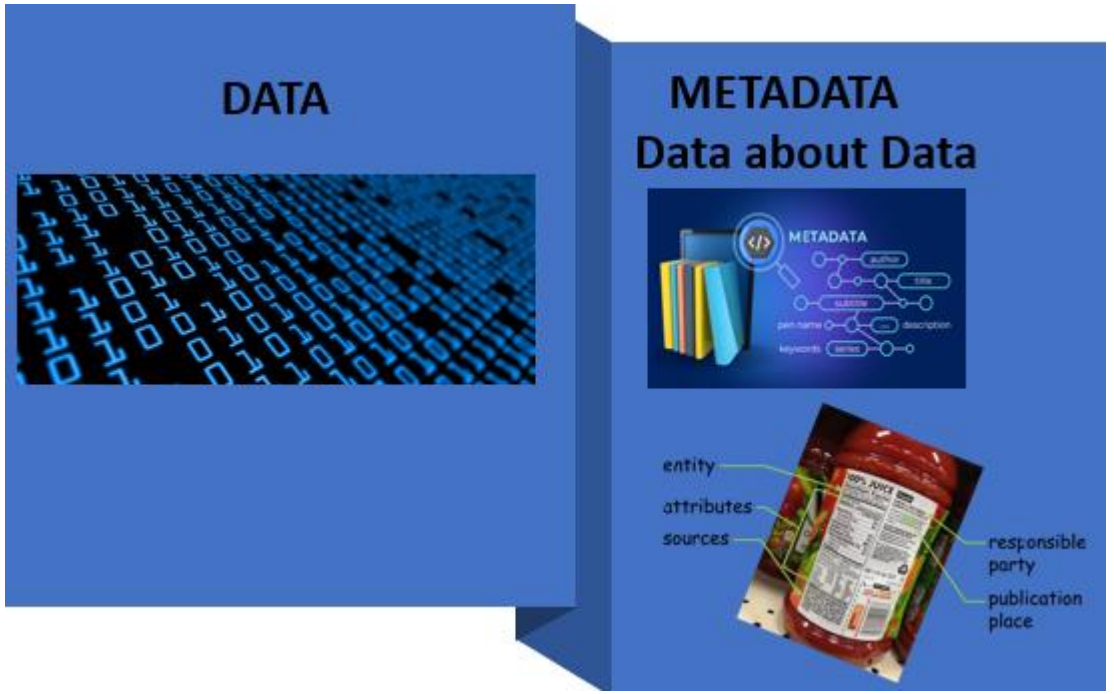
The Manual On The WIS Metadata

Amendments to the Manual on WIS

Addition of

WMO Core Metadata Profile 2.0 (WCMP2)– *New standard for WIS Metadata*

- Discovery metadata describes a given dataset or collection
- Aligning with the WIS 2.0 Principles, discovery metadata will be published to the Global Discovery Catalogue
- WCMP2 is an extension of the International Standard OGC API - Records



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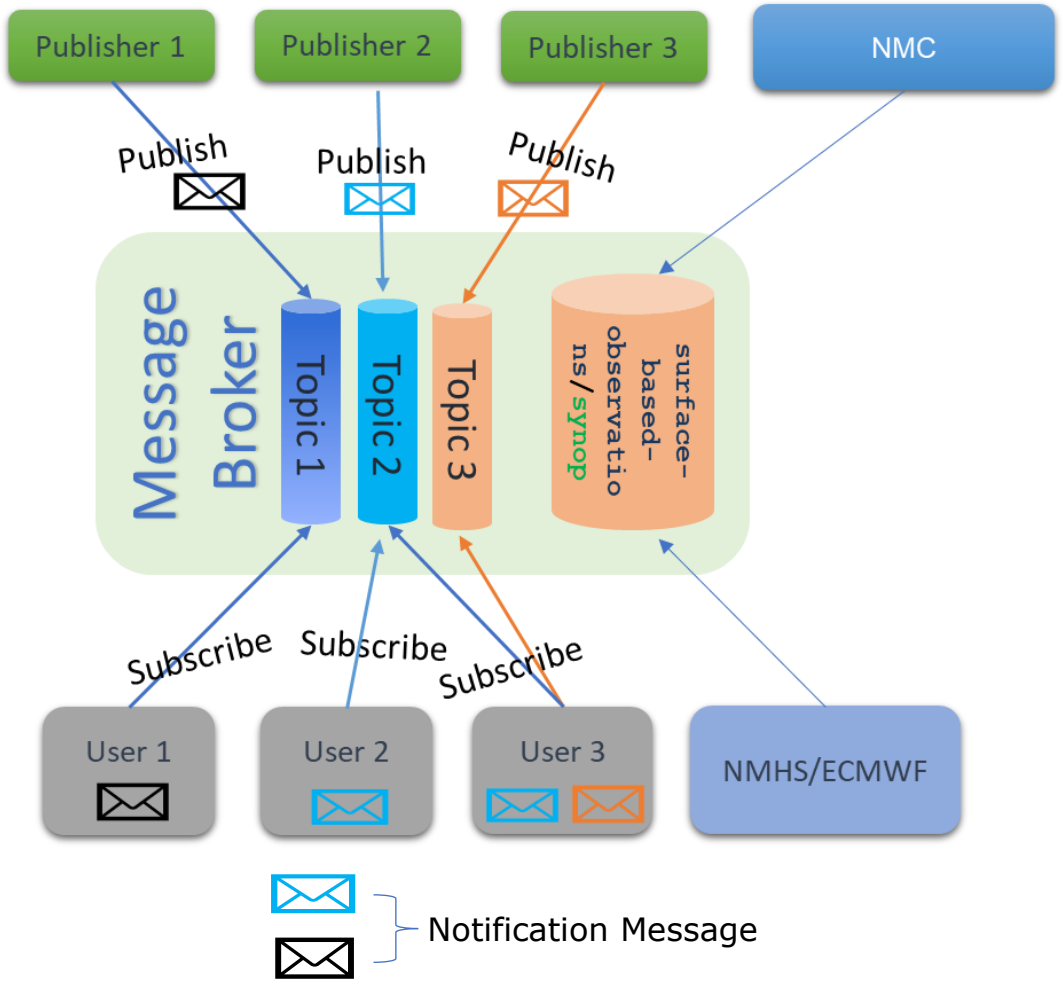
The Manual On The WIS
Topic Hierarchy and Notification Message

WIS2 Topic Hierarchy – *"Backbone" of the notification architecture where the messages will be available*

WIS2 Notification Message – *Format of the Notification Messages*



Example:

origin/a/wis2/ca-eccc-msc/data/core/weather/ surface-based-observations/synop

cache/a/wis2/int-ecmwf/data/core/weather/prediction/forecast/medium-range/deterministic/global

GUIDE TO WMO INFORMATION SYSTEM VOLUME II

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1.1.1. Leveraging open standards
1.1.2. Simpler data exchange
1.1.3. Cloud-ready solutions
1.1.4. Why are datasets so important?
1.2. Data consumer
1.2.1. How to search the Global Discovery Catalogue to find Datasets
1.2.2. How to subscribe to notifications about availability of new data
1.2.3. How to use a notification message to decide whether to download data
1.2.4. How to download data
1.2.5. How to use data
1.2.6. Further reading for data consumers
1.3. Data publisher
1.3.1. How to get started
1.3.2. How to provide discovery metadata to WIS2
1.3.3. How to provide data to WIS2
1.3.4. Further reading for data publishers

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2.1. WIS2 Architecture
2.2. Roles in WIS2
2.2.1. Data Publisher
2.2.2. Global Coordinator
2.2.3. Global Service operator
2.2.4. Data Consumer
2.3. Specifications of WIS2
2.4. Components of WIS2
2.4.1. WIS2 Node
2.4.2. Global Broker
2.4.3. Global Cache
2.4.4. Global Discovery Catalogue
2.4.5. Global Monitor
2.5. Protocols configuration
2.5.1. Publish-Subscribe protocol (MQTT)
2.5.2. Download protocol (HTTP)
2.6. Implementation and operation of a WIS2 Node
2.6.1. Practices and procedures
2.6.2. Performance management
2.6.3. WIS2 Node reference implementation: wis2box
2.7. Implementation and operation of a Global Service
2.7.1. Procedure for registration of a new Global Service
2.7.2. Performance management and monitoring of a Global Service
2.7.3. Global Broker
2.7.4. Global Cache
2.7.5. Global Discovery Catalogue
2.7.6. Global Monitor
2.8. Operations
2.8.1. Interoperability with external systems

PART III

3.1. Information management
3.1.1. Introduction
3.1.2. Principles of information management
3.1.3. The information management lifecycle
3.1.4. Other considerations

PART IV & PAR V

4.1. Security

5.1. Competencies

References

- WIS Community page: WMO Information System (WIS) | World Meteorological Organization
- WIS2 Newsletter: WIS2 Operational Newsletter | World Meteorological Organization
- Wis2box Newsletter: wis2box Newsletter (2025-No.3) | World Meteorological Organization

Thank you

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