Strengthening satellite data exchange with WIS2

CGMS

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WORLD
METEOROLOGICAL
ORGANIZATION

STEP 1 : THE FOUNDATION

Evolution of WMO data exchange

1963 World Weather Watch

1970s Global Telecommunication System (GTS)

2007 WMO Information System (WIS)

2019 WMO Reform (Earth System Approach)

2021 WMO Unified Data Policy (Core, Recommended)

Resolution 34 (EC-76)
Implementation plan update of the WMO Information System 2.0
[WMO-No. 1314, pg. 1147]

Resolution 25 (Cg-19)
Technical Regulations of the WMO Information System 2.0
[WMO-No. 1326, pg. 209]

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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WIS2 Context

WIS2.0 Technical Foundations

| Message Queuing Protocols | OGC Metadata Standard | Provide expandable services-architecture | Unified monitoring approach |

Functional Requirements

| Using open standards | Using Web solutions | Cloud ready solutions | Support Big Data |

Business Requirements

| Emerging Data Issues | Support GBON | Support Unified Data Policy | Support All WMO Programmes | Replace GTS |

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WIS2 Components: WIS2 Nodes

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 using a WIS2 Node

A WIS2 Node shares data via an HTTPS service and sends notifications to MQTT subscribers

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Data users

Publishes real-time notifications about data

Publishes Core and Recommended data

Advertises what data is available (discovery metadata)

WIS2 Nodes

WIS2 Node

WIS2 Node

WIS2 Node
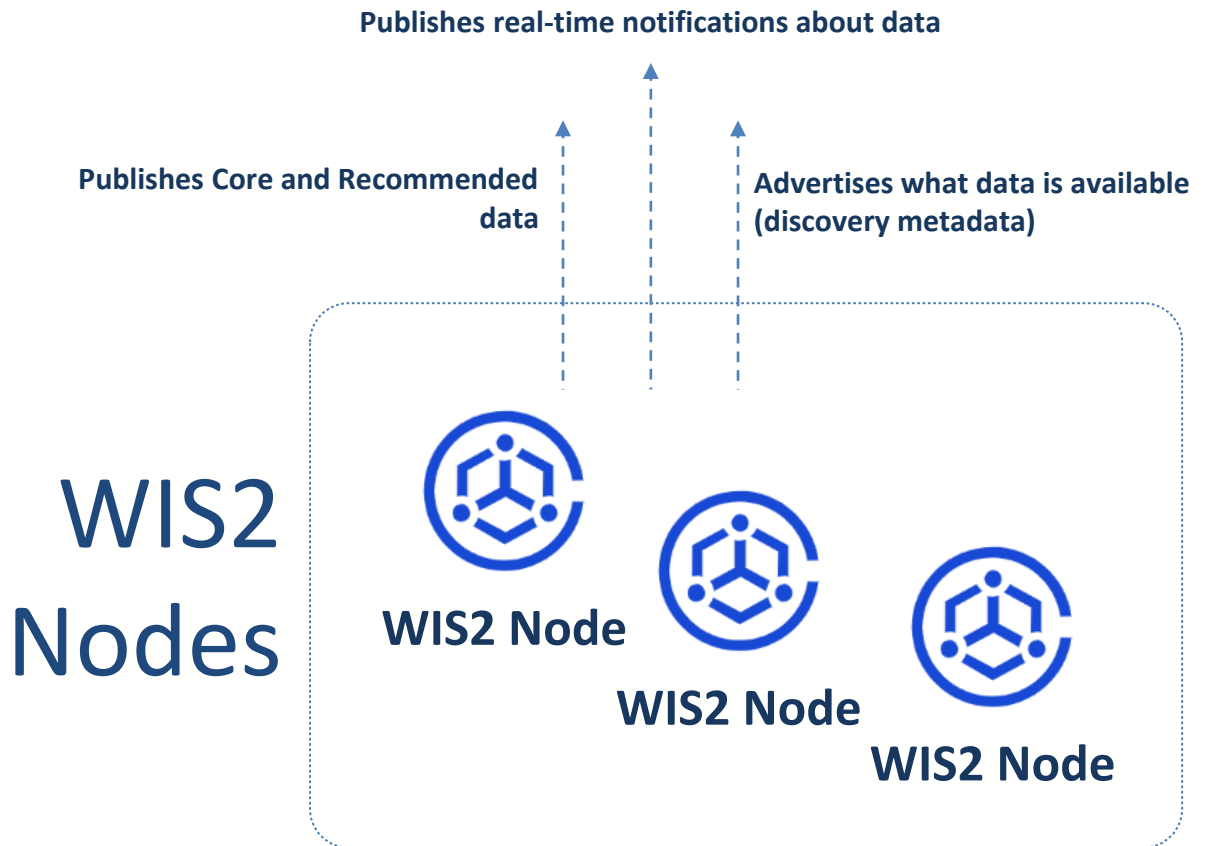
WIS2 Components: Global Services

Global Services

Global Monitoring

Discovers datasets

Subscribes to topics

Downloads core data
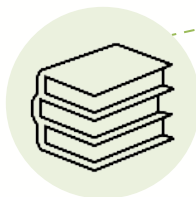
Global Discovery Catalogue

Provides an API to discover datasets and services
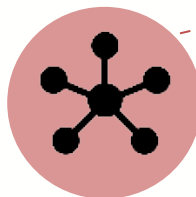
Global Broker

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

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 progress: Pilot Phase complete
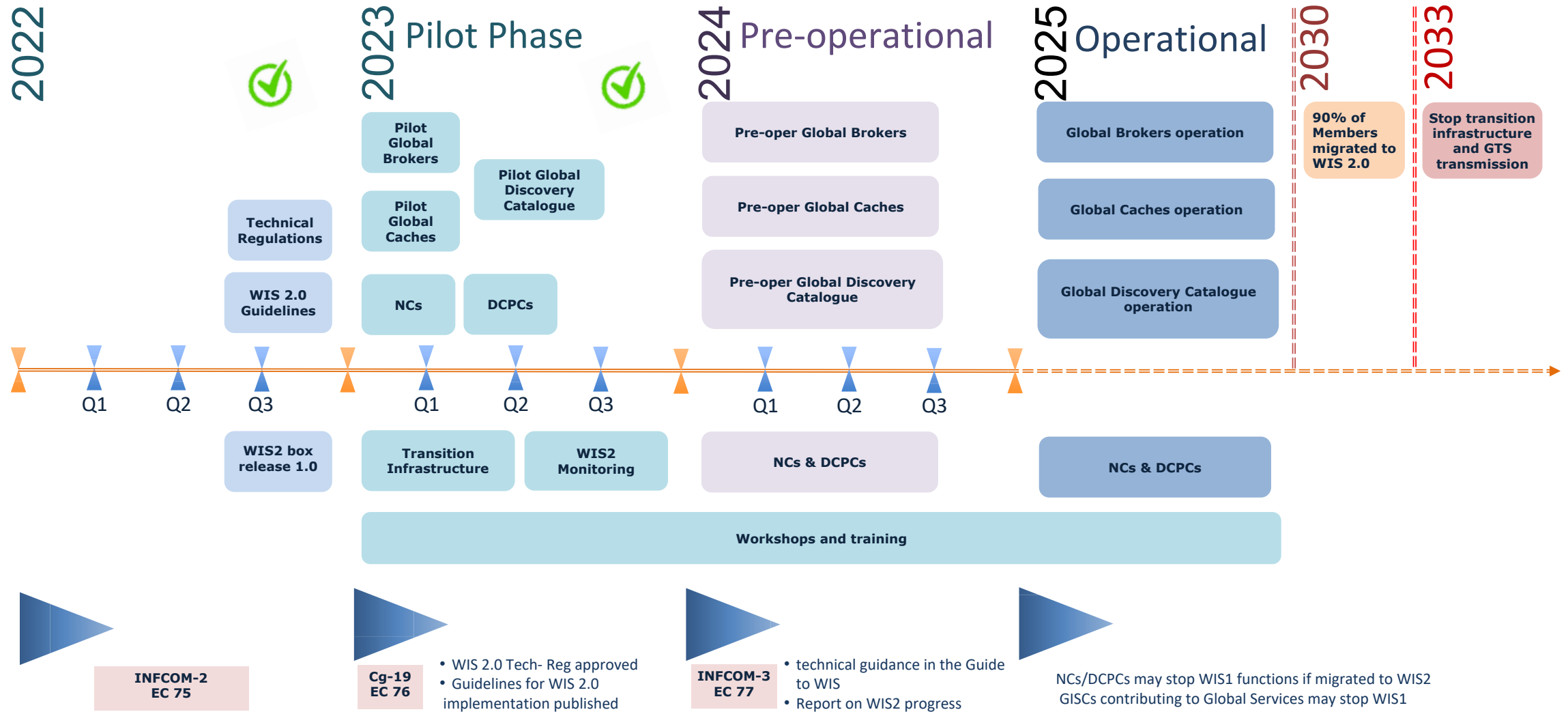
WIS2 Global Service instances
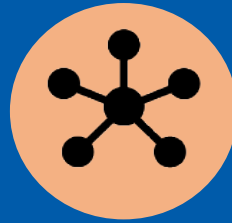
Global Broker — Brazil, France, China, USA
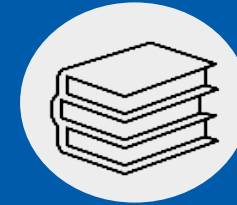
Global Discovery Catalogue — Canada, China, Korea

Global Cache — China, Germany, Japan, Korea, USA/UK
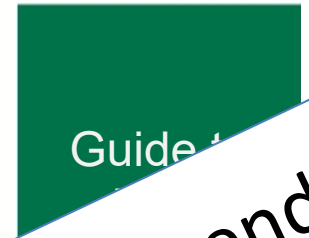
Global Monitoring — China, Morocco

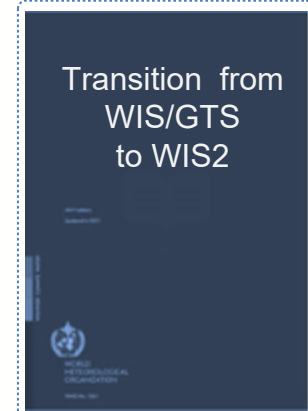WORLD METEOROLOGICAL ORGANIZATION

WIS2 regulatory material

June 2023 Cg-19

Manual on WIS

Manual on WIS Volume I WIS 1.0

Manual on WIS Volume II WIS 2.0
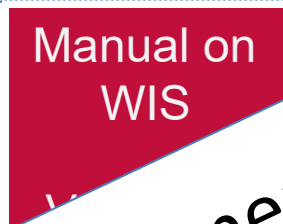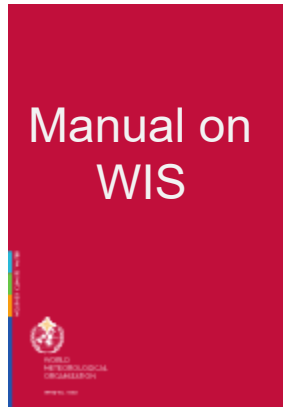
[Manual on WIS Volume II WMO Information System](#)

...MENTS TO ...E MANUAL ON THE WMO INFORMATION SYSTEM

April 2024 INFCOM-3

Guide to WIS

Guide to WIS Volume I WIS 1.0

Guide to WIS Volume II WIS 2.0
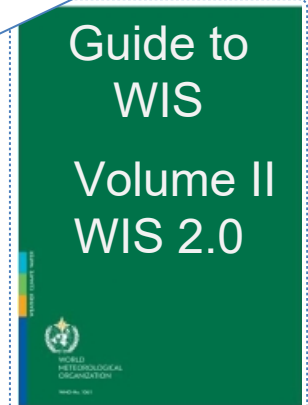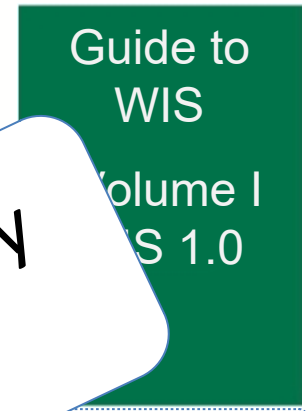
doc 8.3(3) UPDATE OF THE GUIDE TO THE WMO INFORMATION SYSTEM

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Transition from WIS/GTS to WIS2

doc 8.3(2) TRANSITION FROM WIS 1.0 AND GTS TO WIS 2.0, INCLUDING CAPACITY DEVELOPMENT

All documents have been endorsed by INFCOM 3 (April 2024)

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STEP 2 : THE 'SATELLITE FLOOR'

- For each Earth domain, the experts from the domain, with the support of the WIS2 team will:
  - Further define the Topic Hierarchy ~~to enable filtering.~~
    - It must be noted that the Topic Hier~~archy~~ ~~a full description of the data~~
  - Develop the WCM~~P~~ ~~data description~~
    - Each data ~~responsibility to create and then publish the metadata record~~
    - No da~~ta~~ ~~on WIS2, after 01/01/2025, without having a metadata record~~

See Anna Milan's talk

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WIS 2.0 topic hierarchy

Level	Name	Description
1	**channel**	Location of where the data originates from (data providers [origin] or global services [cache])
2	**version**	Alphabetical version of the topic hierarchy (currently a)
3	**system**	Fixed value of wis2 for **WIS2**
4	**centre-id**	Acronym as specified by member and endorsed by the PR of the country and by WMO
5	**resource-type**	WIS2 resources types (data, metadata, report [from monitoring activities])
6	**data-policy**	Data policy as defined by the WMO Unified Data Policy. Notifications for **core** and **recommended** data are available by subscription to Global Brokers. recommended data are downloaded from the original NC/DCPC and may require authentication/authorisation
7	**earth-system-discipline**	As per Annex 1 of resolution 1 Cg-Ext-2021
8	**earth-system-discipline-category**	As proposed by domain experts and further approved by INFCOM
9	**name of the satellite**	
10	**name of the instrument**	

Examples:
`origin`/`a`/`wis2`/`int-eumetsat`/`data`/`core`/`weather`/`space-based-observations`/`meteosat-11`/`seviri` – **To be confirmed**
`cache`/`a`/`wis2`/`ca-eccc-msc`/`data`/`core`/`weather`/`surface-based-observations`/`synop`

WIS 2.0 metadata

Labels on the figure:

- Geometry (extent)
- Identifier
- Title
- Description
- Keywords
- Publisher contact
- Example: KNMI dataset (draft)
- Conforms with OGC API Records - geoJson
- Publisher contact *(cont.)*
- Data policy
- Rights
- Data access (files)
- Data access (API) with security info
- Data access (notifications)
- Additional info (OSCAR/Surface)
- Additional info (Developer docs)
- License
- Citation
- Time (extent) and update frequency

STEP 3 : THE IMPLEMENTATION

WIS2 Node

- A WIS2 Node, for publishing data, will need the following software components:
  - A HTTPS server (NGINX, Apache,…) hosting the data and an MQTT broker (Mosquitto, EMQX, VerneMQ, HiveMQ,…)
    - Both tools being off-the-shelf solutions. Some being opensource, other being commercial software
  - A « glue » to prepare the WIS2 Notification Message to be published on the MQTT broker when new data is available
- As opposed to the GTS, WIS2 is not a *closed club (*)*
- All approved data sources can publish and get data from WIS2 directly:
  - EUMETSAT is publishing data on WIS2 since Autumn 2023

  (*) : Data publishers on WIS2 have to be endorsed by the Permanent Representative (or equivalent) to be allowed to make their data available

- At the moment, DCPs are providing the data through the GTS (eg. Eumetsat) and/or via a website (eg. USA)
  - DCP should consider adding/replacing a WIS2 compliant method to the existing data distribution mechanism
  - Depending on the data policy this could be core (free and unrestricted) or recommended (with access control) – see WMO Res. 1
  - WIS2 supports both
  - According to the WIS terminology DCP would be DCPC (!)
- Users of DBNET data would also benefit from the delivery of data using WIS2
- WMO Secretariat and the WIS2 team will be happy to support CGMS into the transition to WIS2 ensuring an easy and consistent delivery of data to users

Thank you.

World Meteorological Organization

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