

WIS2 overview and status

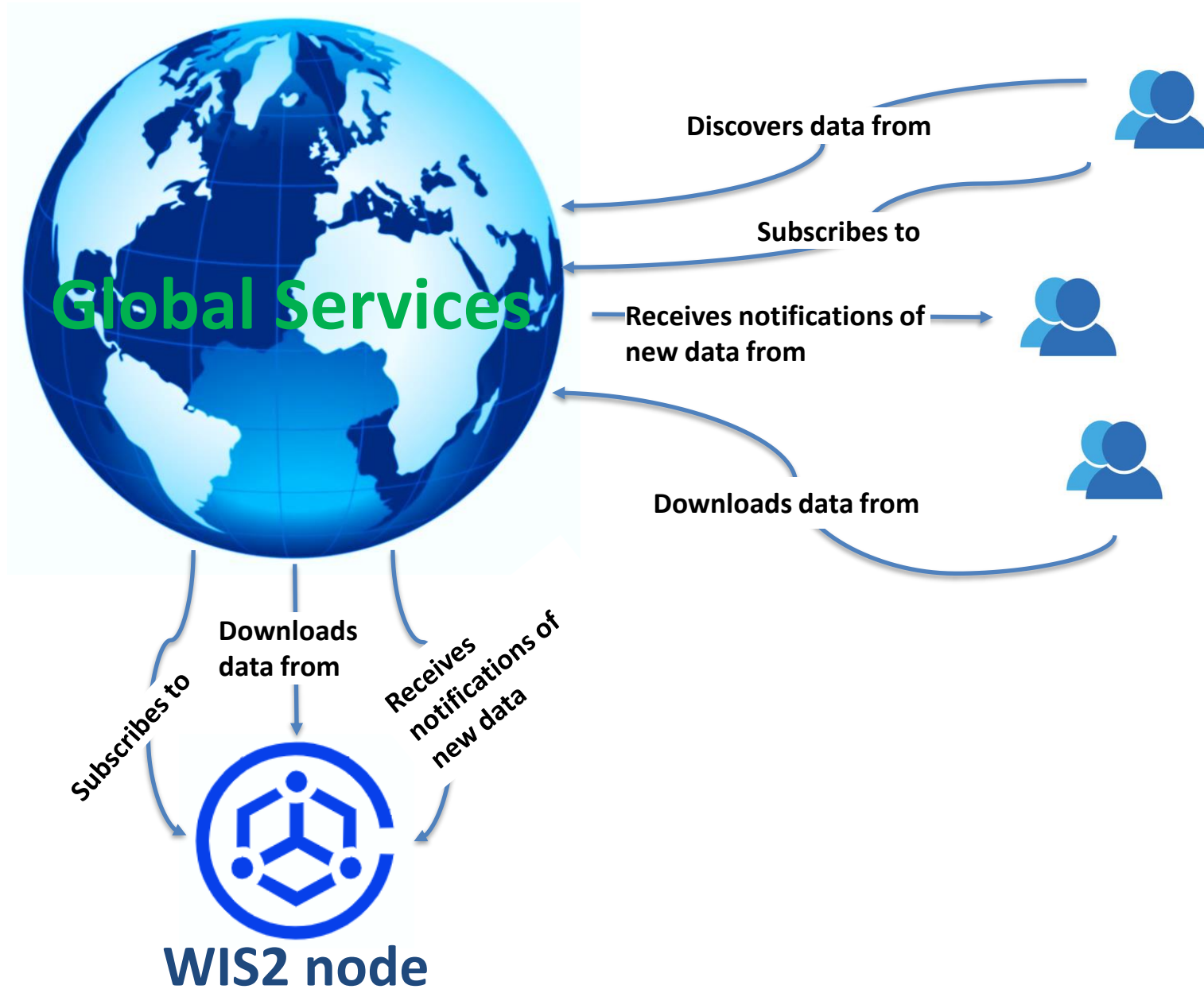
15th Observation Coordination Group (OCG-15)
WIS2.0 workshop

Hassan Haddouch / WIS 2.0 Manager







WORLD
METEOROLOGICAL
ORGANIZATION

WIS Architecture



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



WMO OMM

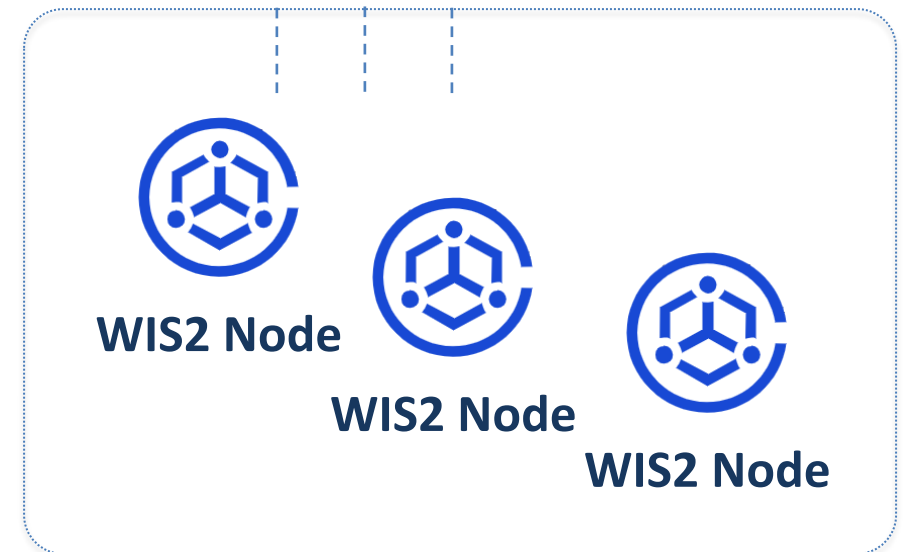


Publishes real-time notifications about data

Publishes Core and Recommended data

Advertises what data is available (discovery metadata)

WIS2
Nodes



WIS2 Components: Global Services



Global Services



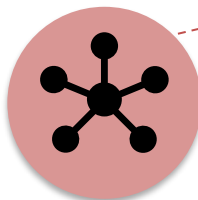
Global Monitoring

Discovers datasets



Global Discovery Catalogue

Provides an API to discover datasets and services



Global Broker



Global Cache

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

Provides users HTTP download of core data cached from WIS2 nodes



Data users

Downloads core data

Downloads recommended data

Downloads recommended data

Downloads recommended data



WIS2 node



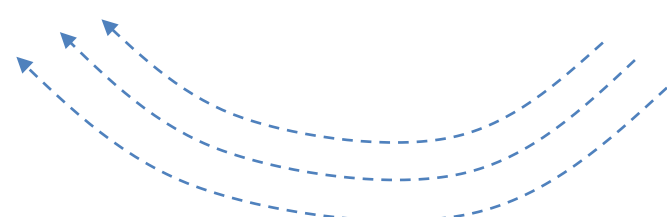
WIS2 node



WIS2 node

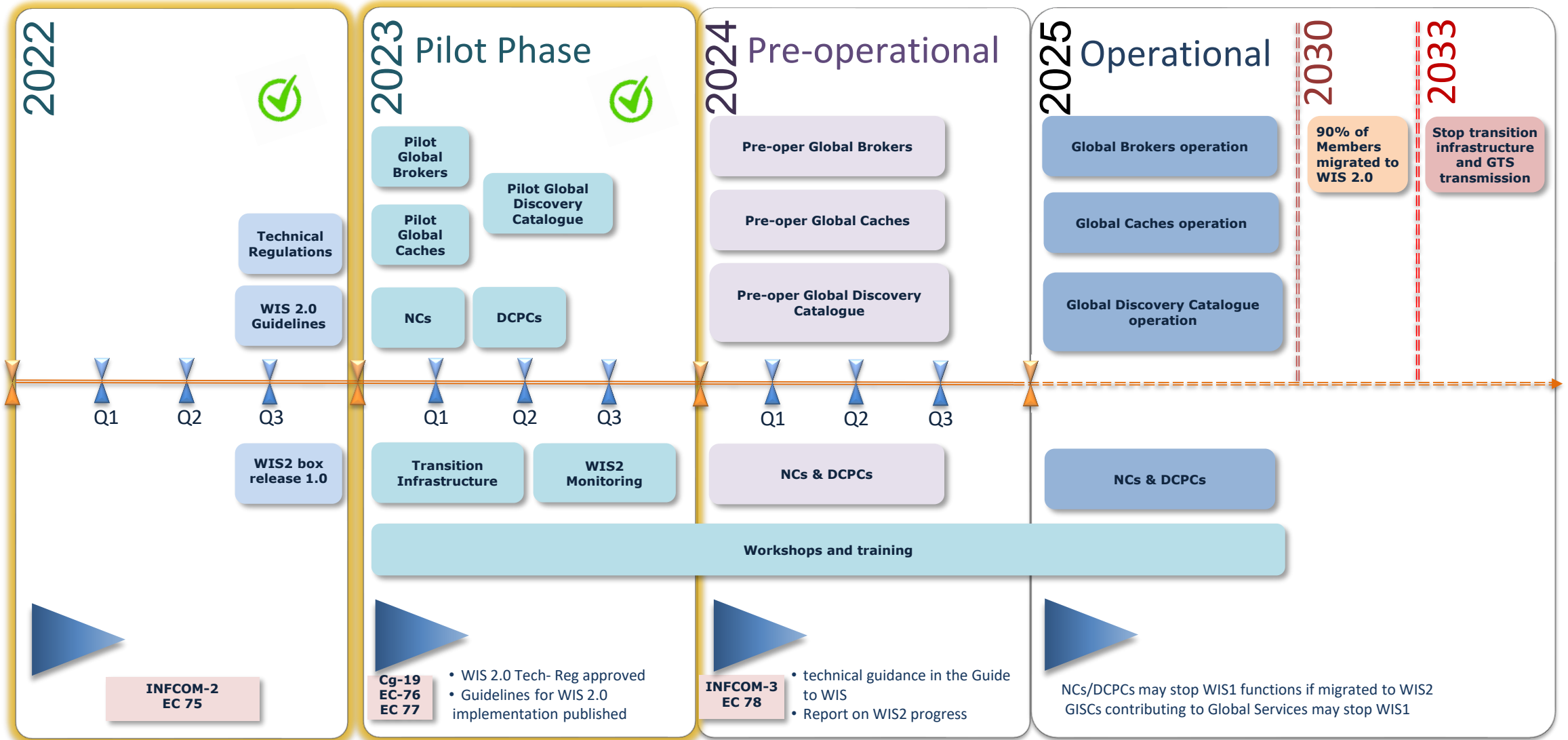


WMO OMM



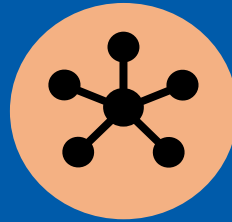
Scale to highly-available, global data sharing

WIS2 progress: Pilot Phase complete



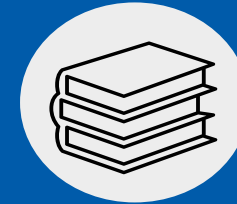
WIS2 Global Service instances

**Global
Broker**



**Brazil
France
China
USA**

**Global
Discovery
Catalogue**



**Canada
China
Korea**

**Global
Cache**



**China
Germany
Japan
Korea
USA/UK**

**Global
Monitoring**



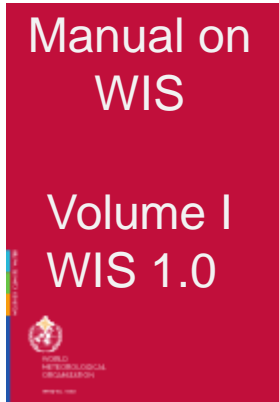
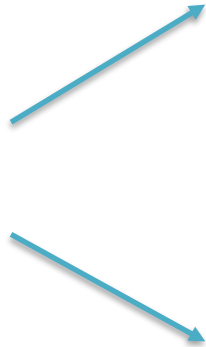
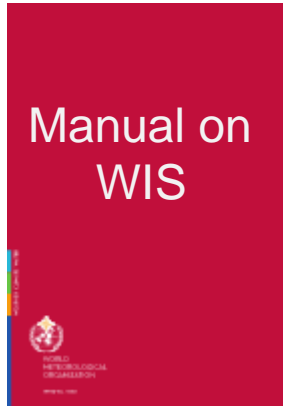
**China
Morocco**



WORLD
METEOROLOGICAL
ORGANIZATION

WIS2 regulatory material

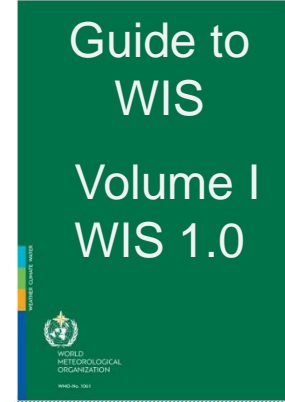
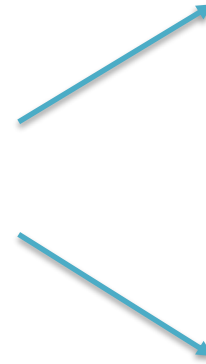
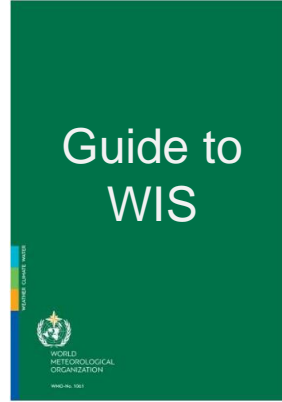
June 2023 Cg-19



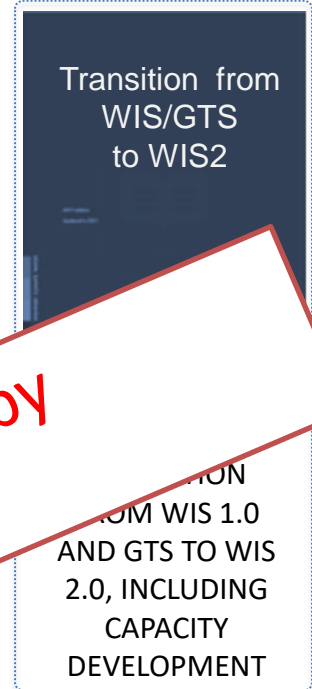
[Manual on WIS Volume II](#)
[WMO Information System 2.0](#)

doc 8.3(1)
AMENDMENTS TO
THE MANUAL ON
THE WMO
INFORMATION
SYSTEM

April 2024 INFCOM-3



doc 8.3(3)
UPDATE OF THE
GUIDE TO THE
WMO
INFORMATION
SYSTEM



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

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



WMO OMM

WMO Core Metadata Profile 2.0 (WCMP2)

The new standard for WIS Metadata

- WCMP2 is an extension of the International Standard OGC API - Records
- 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



Guide to WIS (WMO No. 1061), Vol II, §1.3.2 How to provide discovery metadata to WIS2 [\[draft\]](#)

Manual on WIS (WMO No. 1060), Vol II, Appendix F: WMO Core Metadata Profile 2 [\[draft\]](#)

Description of the Dataset
Identifier
Title
Description
Keywords
Geometry (extent)
Time (extent)
Who to contact
Publisher contact
How to access
Data access (files)
Data access (API)
Data access (notifications)
Conditions of use
Data policy
Rights
License
How to attribute
Citation


```
1 {
2   "id": "urn:wmo:md:nl-knmi-nmc:Actuele10mindataKNMIstations-2",
3   "conformsTo": [
4     "http://wis.wmo.int/spec/wcwp/2/conf/core"
5   ],
6   "type": "Feature",
7   "geometry": {
8     "type": "Polygon",
9     "coordinates": [
10      [
11        [
12          -68.5,
13          12
14        ],
15        [
16          -68.5,
17          55.7
18        ],
19        [
20          7.4,
21          55.7
22        ],
23        [
24          7.4,
25          12
26        ],
27        [
28          -68.5,
29          12
30        ]
31      ]
32    ]
33  },
34  "properties": {
35    "identifier": "urn:wmo:md:nl-knmi-nmc:Actuele10mindataKNMIstations-2",
36    "title": "Meteo data - actual synoptic observations KNMI the Netherlands per 10 minutes",
37    "description": "KNMI collects observations from the automatic weather stations situated in the Netherlands and BES islands on locations such as aerodromes and North Sea platforms. In addition, wind data from KNMI wind poles are included. The weather stations report every 10 minutes meteorological parameters such as temperature, relative humidity, wind, air pressure, visibility, precipitation, and cloud cover. The number of parameters differs per station. The file for the past 10 minutes is available a few minutes later and contains a timestamp denoting the end of the observation period in UTC. It is possible that a station's observations may not be immediately available. Files are updated with missing data up to 4 hours later.",
38    "keywords": [
39      "surface weather",
40      "temperature",
41      "observations",
42      "meteorology"
43    ],
44    "themes": [
45      {
46        "concepts": [
47          {
48            "id": "weather"
49          }
50        ],
51        "scheme": "https://codes.wmo.int/topic-hierarchy/earth-system-discipline"
52      },
53      {
54        "concepts": [
55          {
56            "id": "Surface observations"
57          }
58        ],
59        "scheme": "https://github.com/wmo-im/topic-hierarchy/earth-system-discipline/weather/surface-based-observations/index.csv"
60      },
61      {
62        "concepts": [
63          {
64            "id": "weather"
65          }
66        ],
67        "scheme": "https://github.com/wmo-im/wis2-topic-hierarchy/blob/main/topic-hierarchy/earth-system-discipline/index.csv"
68      },
69      {
70        "concepts": [
71          {
72            "id": "continual"
73          }
74        ],
75        "scheme": "https://standards.iso.org/iso/19139/resources/gmxCodeLists.xml#MD_FrequencyCode"
76      }
77    ],
78    "language": "en",
79    "type": "dataset",
80    "created": "2023-01-01T00:00:00Z",
81    "updated": "2023-12-05T00:00:00Z",
82    "contacts": [
83      {
84        "addresses": [
85          {
86            "deliveryPoint": [
87              "Utrechtseweg 297"
88            ],
89            "city": "De Bilt",
90            "postalCode": "3731 GA",
91            "country": "Netherlands"
92          }
93        ],
94        "roles": [
95          "host"
96        ]
97      }
98    ]
99  }
100 }
```

Geometry (extent)

Identifier

Title

Description

Keywords

Publisher contact

Example: KNMI dataset (draft)

```
85 {
86   "deliveryPoint": [
87     "Utrechtseweg 297"
88   ],
89   "city": "De Bilt",
90   "postalCode": "3731 GA",
91   "country": "Netherlands"
92 },
93 "roles": [
94   "host"
95 ],
96 "organization": "Koninklijk Nederlands Meteorologisch Instituut (KNMI)",
97 "position": "KNMI Data Platform",
98 "hoursOfService": "0800h - 1600h CEST/CET",
99 "phones": [
100  {
101    "value": "+31302206911"
102  }
103 ],
104 "emails": [
105  {
106    "value": "opendata@knmi.nl"
107  }
108 ],
109 "links": [
110  {
111    "rel": "canonical",
112    "type": "text/html",
113    "href": "https://dataplatform.knmi.nl"
114  }
115 ],
116 "wmo:dataPolicy": "core",
117 "rights": "Users are granted free and unrestricted access to this data, without charge and with no conditions on use. Users are requested to attribute the producer of this data. WMO Unified Data Policy (Resolution 1 (G-Ext 2021))"
118 },
119 "links": [
120  {
121    "href": "https://api.dataplatform.knmi.nl/open-data/v1/datasets/Actuele10mindataKNMIstations/versions/2/files",
122    "type": "application/x-bufr",
123    "rel": "canonical, items",
124    "title": "Data access (files in BUFR format)"
125  },
126  {
127    "href": "https://api.dataplatform.knmi.nl/edr/v1/collections/observations",
128    "type": "application/json",
129    "rel": "items",
130    "title": "Data access (OGC-API EDR)",
131    "security": {
132      "default": {
133        "type": "http",
134        "scheme": "basic",
135        "description": "Please request an API key via https://developer.dataplatform.knmi.nl/open-data-api#token"
136      }
137    }
138  },
139  {
140    "href": "https://dataplatform.knmi.nl:8883",
141    "channel": "origin/a/wis2/nl-knmi-nmc/data/core/weather/surface-based-observations/synop",
142    "type": "application/json",
143    "rel": "items",
144    "title": "Data access (notifications)"
145  },
146  {
147    "href": "https://oscar.wmo.int/surface/rest/api/search/station/?operatingStatus=Operational&territoryName=NLD&longitudeMin=-68.5&longitudeMax=7.4&latitudeMax=55.7&latitudeMin=12.0",
148    "type": "application/json",
149    "rel": "stations",
150    "title": "Stations"
151  },
152  {
153    "href": "https://english.knmi.nl/open-data/actuele10mindataknmistations",
154    "type": "text/html",
155    "rel": "related",
156    "title": "Documentation"
157  },
158  {
159    "href": "https://creativecommons.org/licenses/by/4.0/",
160    "type": "text/html",
161    "rel": "license",
162    "title": "CC BY 4.0 Deed | Attribution 4.0 International | Creative Commons"
163  },
164  {
165    "href": "https://developer.dataplatform.knmi.nl/open-data/citation/Actuele10mindataKNMIstations-2",
166    "type": "text/html",
167    "rel": "cite-as",
168    "title": "Koninklijk Nederlands Meteorologisch Instituut (KNMI) | Meteo data - actual synoptic observations KNMI the Netherlands per 10 minutes | Created 2023-01-01 | urn:wmo:md:nl-knmi-nmc:Actuele10mindataKNMIstations-2 | https://creativecommons.org/licenses/by/4.0/ | CC BY 4.0 Deed"
169  }
170 ],
171 "time": {
172   "interval": [
173     "2023-01-01T00:00:00Z",
174     "..."
175   ],
176   "resolution": "PT10M"
177 }
178 }
179 }
180 }
181 }
```

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)

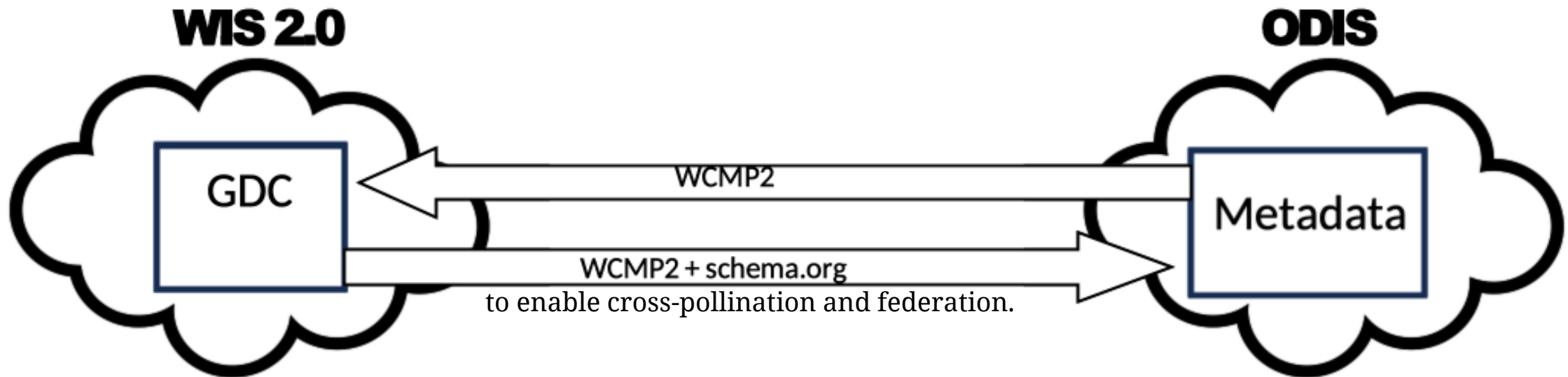
License

Citation

Time (extent) and update frequency

WIS2 / ODIS Integration

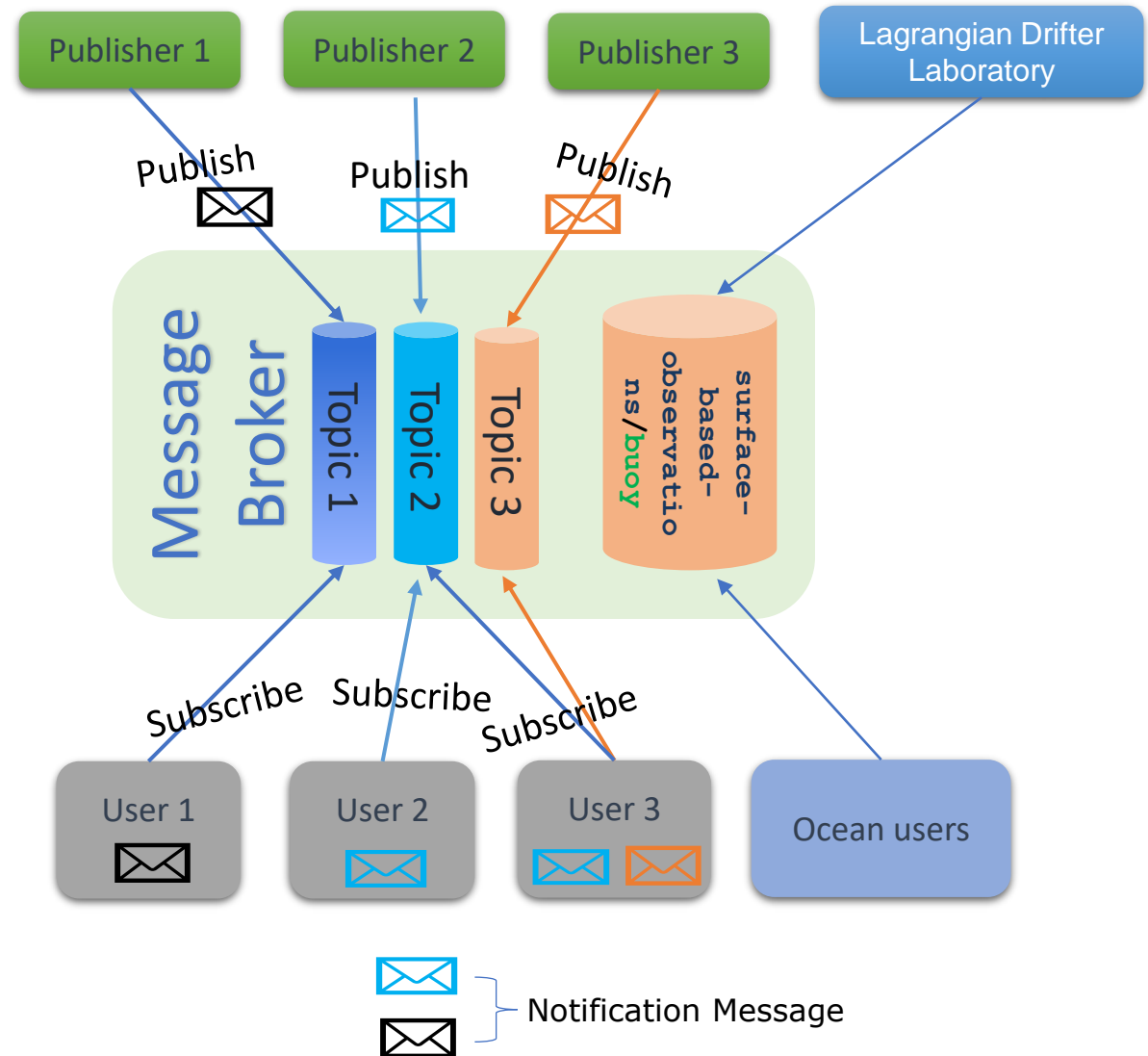
- The WIS2 principles enable lowering the barrier to weather/climate/water data for WMO members. Lowering the barrier is driven by **international standards** for data discovery, access, and visualization
- WIS2 and ODIS, data and metadata exchange is realized using Web architectural principles and approaches



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



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 ('atmospheric-composition', 'climate', 'cryosphere', 'hydrology', 'ocean', 'space-weather', or 'weather')
8	earth-system-discipline-category	As proposed by domain experts and further approved by INFCOM

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

WIS2 for domains

For each Earth domain, the experts from the domain, with the support of the WIS2 team should:

- Further define the Topic Hierarchy, allowing client-side filtering.
 - It must be noted that the Topic Hierarchy is not meant to provide a full description of the data
- Develop the WCMP2 compliant metadata description
 - Each data provider will then have the responsibility to create and then publish the metadata records
 - After 01/01/2025, no data will be published on WIS2, without having a metadata record

WIS2 Node implementation

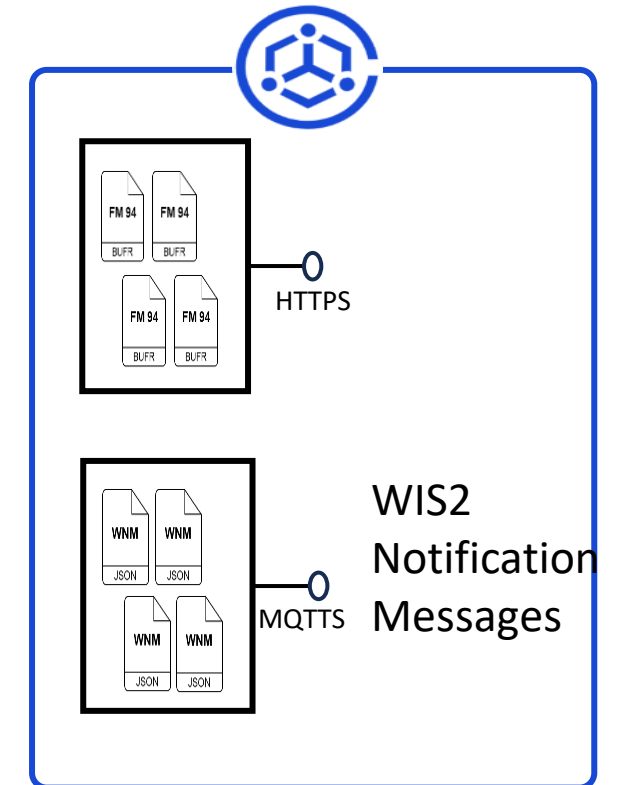
❑ A WIS2 Node, for publishing data, will need the following software components:

1. A HTTPS server (NGINX, Apache,...) hosting the data
2. A MQTT broker (Mosquitto, EMQX, VerneMQ, HiveMQ,...)
 - Both tools are ready-to-use solutions.
 - Some are open source,
 - other are commercial software
3. A « glue » to prepare the WIS2 Notification Message to be published on the MQTT broker when new data is available

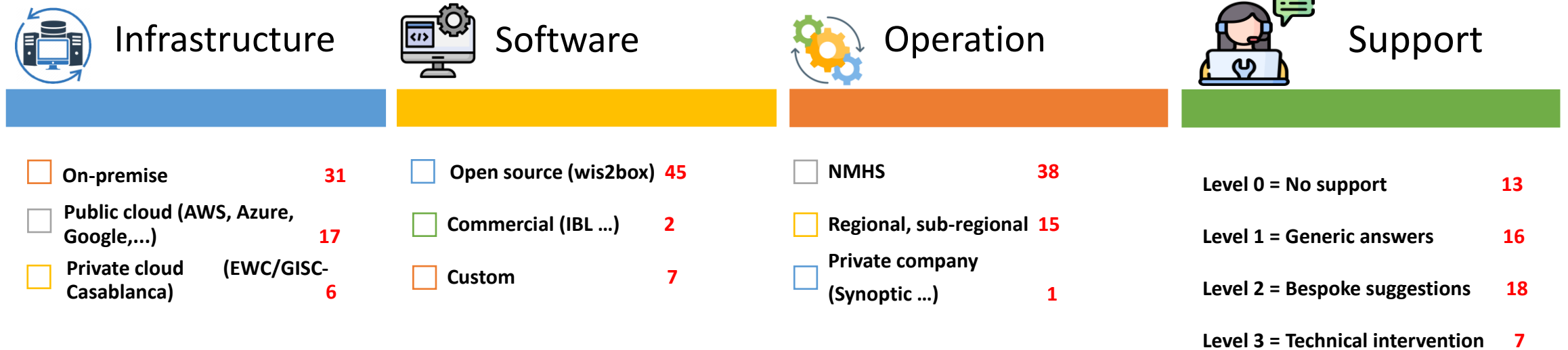
❑ As opposed to the GTS, WIS2 is not a closed club (*)

All approved data sources can publish and get data from WIS2 directly

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



WIS2 node implementation: options



From 2025 onward (start of the operational phase) :

- For installation and support on the software (whatever the solution used), and if needed, WIS Centres will rely on the HMEI
- For day-to-day support, the GISCs will support the WIS Centres in their area of responsibility.

WIS2 contact

- For any question related to WIS2 contact us in:
wis-support@wmo.int



WMO OMM

Thank you.



WORLD
METEOROLOGICAL
ORGANIZATION

wmo.int