WEATHER CLIMATE WATER
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WIS 2.0 Introduction | Pilot phase | Transition

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Organisation météorologique mondiale

Introduction to WIS 2.0

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Why WIS 2.0? WMO Perspective

> “Technological advances and the increasing demand for more and more diverse services from increasingly sophisticated and capable users changes rapidly the service delivery and business models in many parts of the world.”
>
> WMO Strategic Plan (2020-2023)

> “Most Members are ill-prepared for the explosion in data volumes and the growing diversity of new data sources.”
>
> Cg-17

> “Cloud computing, Web services, data analytics, machine learning and other technologies present new operating concepts that will improve operational efficiency, information sharing and service delivery, and enable users to more effectively exploit data.”
>
> CBS led review of emerging data issues

WMO Information System (WIS 2.0)

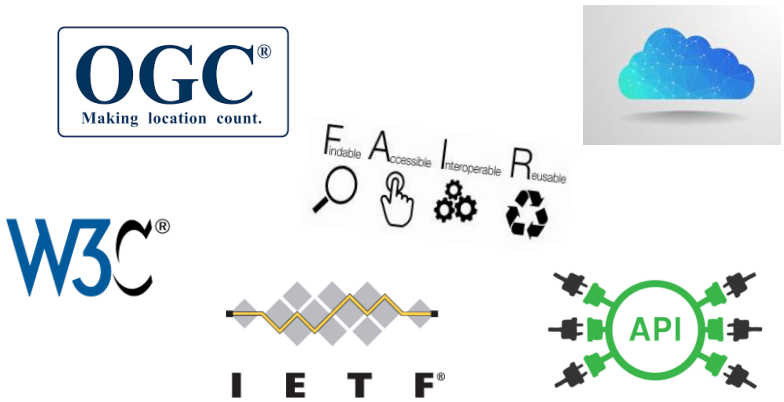
1963 World Weather Watch

1970s Global Telecommunication System

2007 WMO Information System (WIS)

2019 WMO Reform (Earth System Approach)

2021 WMO Unified Data Policy / GBON

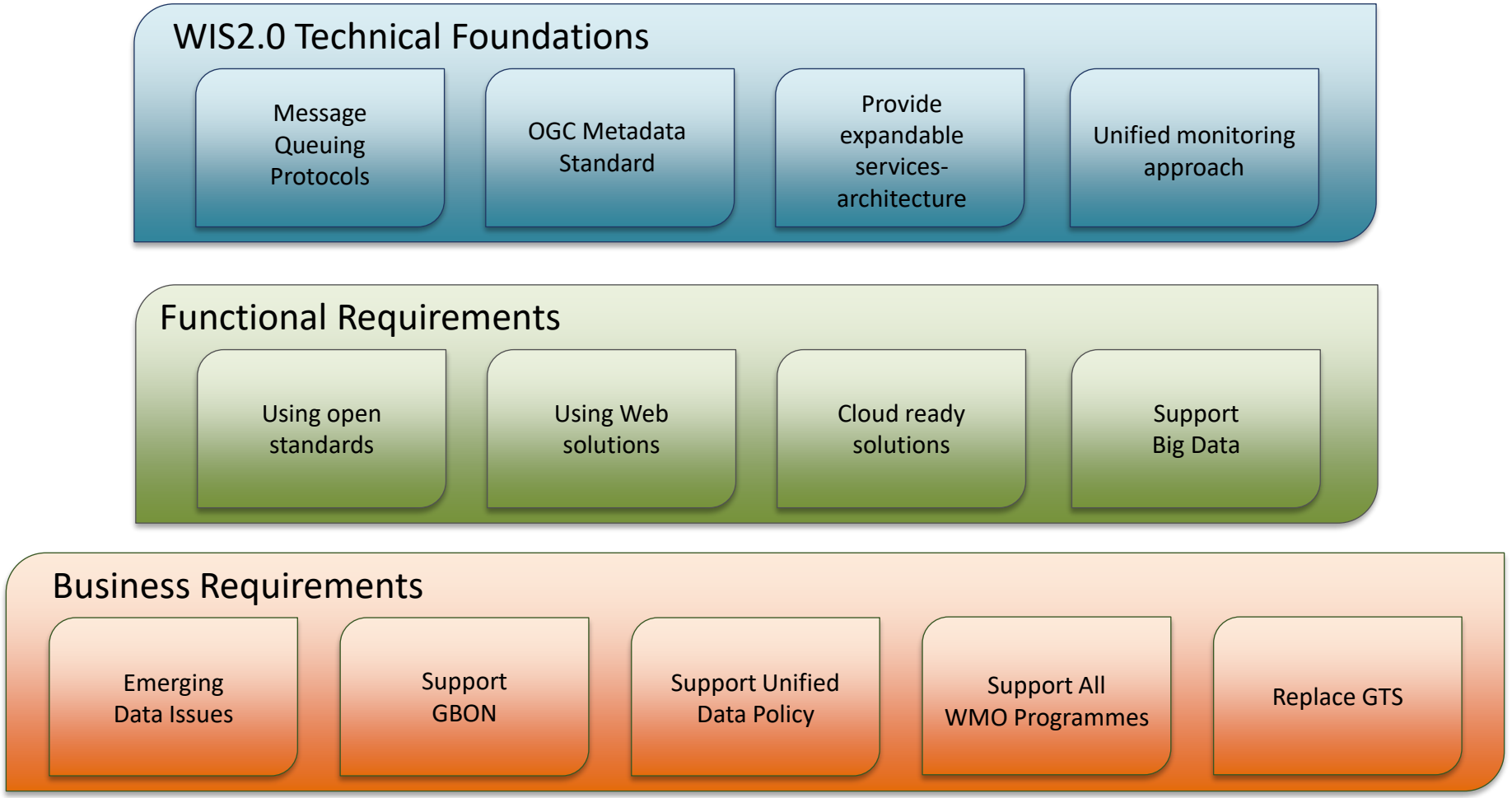


WIS 2.0

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

- Internet and Web technologies
- Open Standards (OGC, W3C, IETF, …), royalty free
- Data sharing through Web and publication/subscription (pub/sub) protocols
- Cloud ready (turn-key solutions)
- Web APIs (Application Programming Interface)

WIS 2.0 Context



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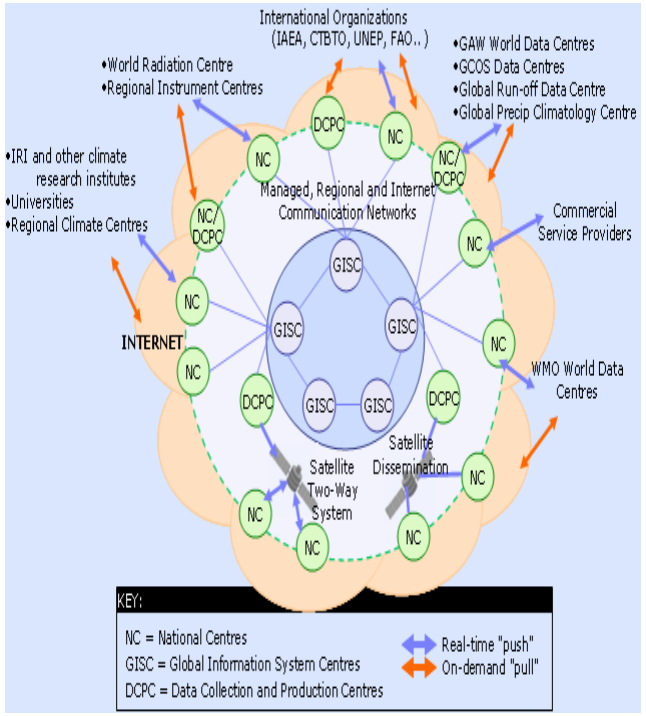
WIS Architecture

WIS1

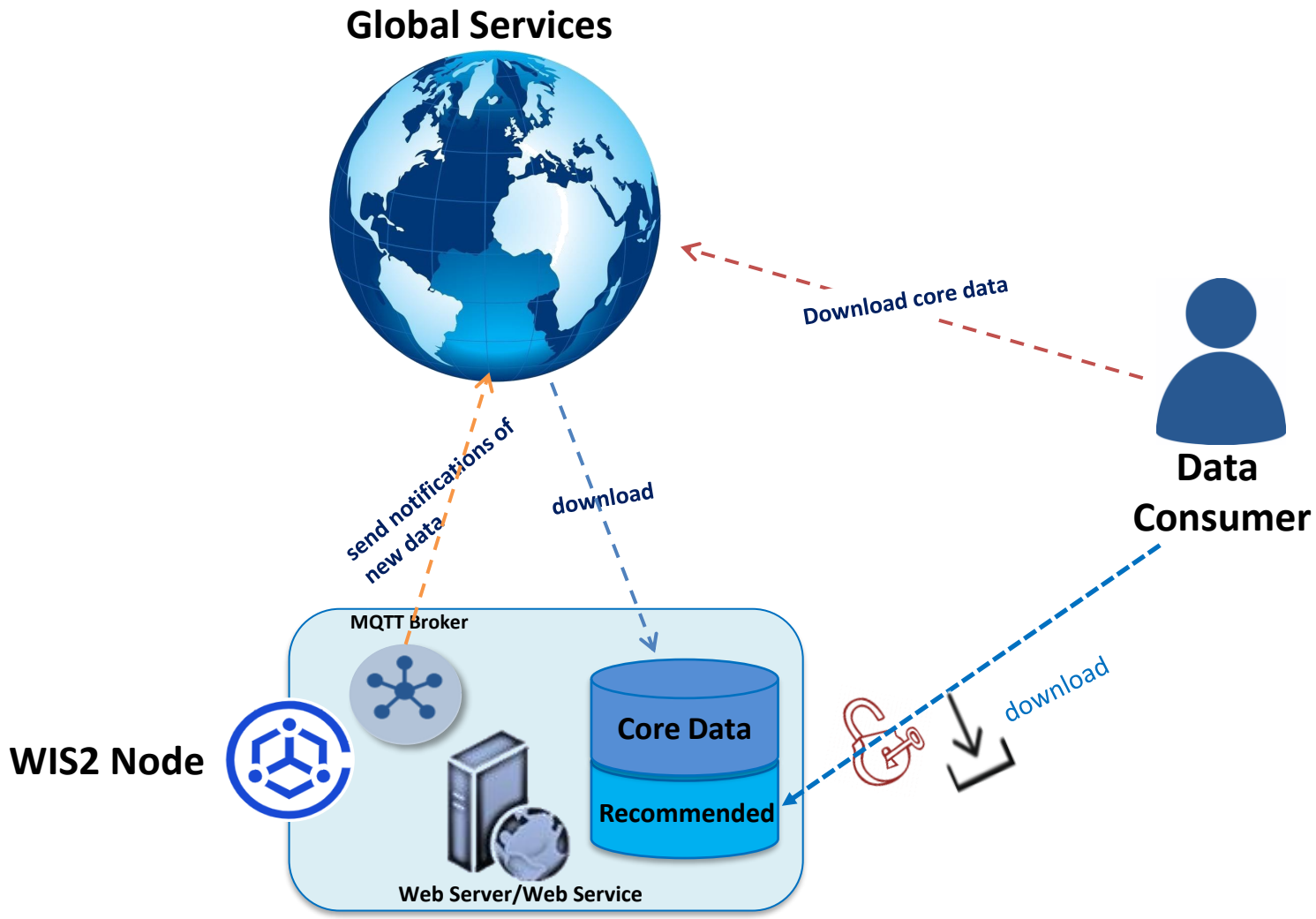


WIS 2.0

- WIS2 node is the component to provide data and associated metadata
- WIS2 node replaces the GTS Message Switching System
- NCs / DCPCs are going to implement a WIS2 Node to exchange data in WIS2
- The WIS2 Node shares data from an HTTPS service and sends notifications to MQTT subscribers
- No need to provide access to all the users in the world, only to some WIS2 Global Services

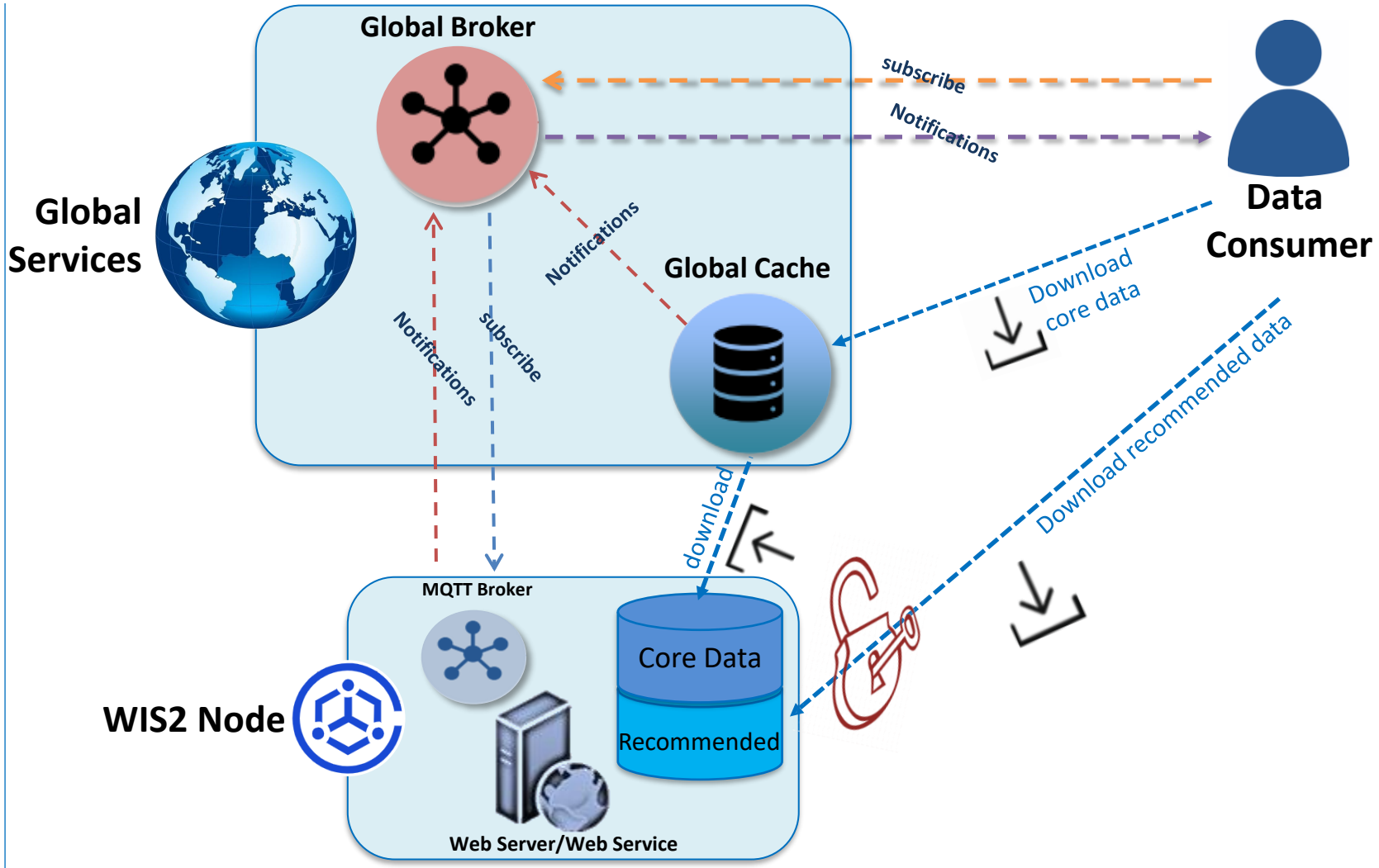
WIS 2.0 Node: based on Web technology

- Central to WIS 2.0 are **WIS2 Nodes**. These are used by National Centres (NC) and Data Collection and Production Centres (DCPC) to publish their **Core** and **Recommended Data**.
- Simply – WIS2 Nodes publish data as files on a Web server or using an interactive Web Service.
  - It runs its own MQTT broker
- And because security and access control is 'baked-in' to Web technologies, **you can decide how you want to control access to your data**.



WIS 2.0 concept: scaling for high-availability

- Recognising the potential high-demand placed on a **WIS2 Node** to serve data to a global audience, WIS2 provides highly-available, high-performance **Global Services** to ensure that WIS2 meets required performance levels.
- A **Global Broker** is used to notify data consumers of availability of new data
- A **Global Cache** is used to distribute copies downloaded from WIS2 Nodes of **real-time** and **near real-time Core Data** with free and unrestricted access - as per Unified Data Policy.
- **Data Consumers** will download data from the **Global Cache** if possible.



WIS 2.0 concept: finding what you need - subscription

- **Data Consumers subscribe** to **Topics** at the **Global Broker** so that notification messages for that topic are immediately sent to them.
- There is a unique **Topic** for each dataset.
- **Topic Structure** organised according to [Annex 1 of the Unified Data Policy] to make it easy to find the topic associated with the data you want.

3 iso country code

Origin | Data/metadata | core | weather|climate|hydrology|atmospheric-composition|cryosphere|ocean|space-weather

`channel/version/wis2/country/center-id/resource-type/data-policy/earth-system-domain/subcategory/…`

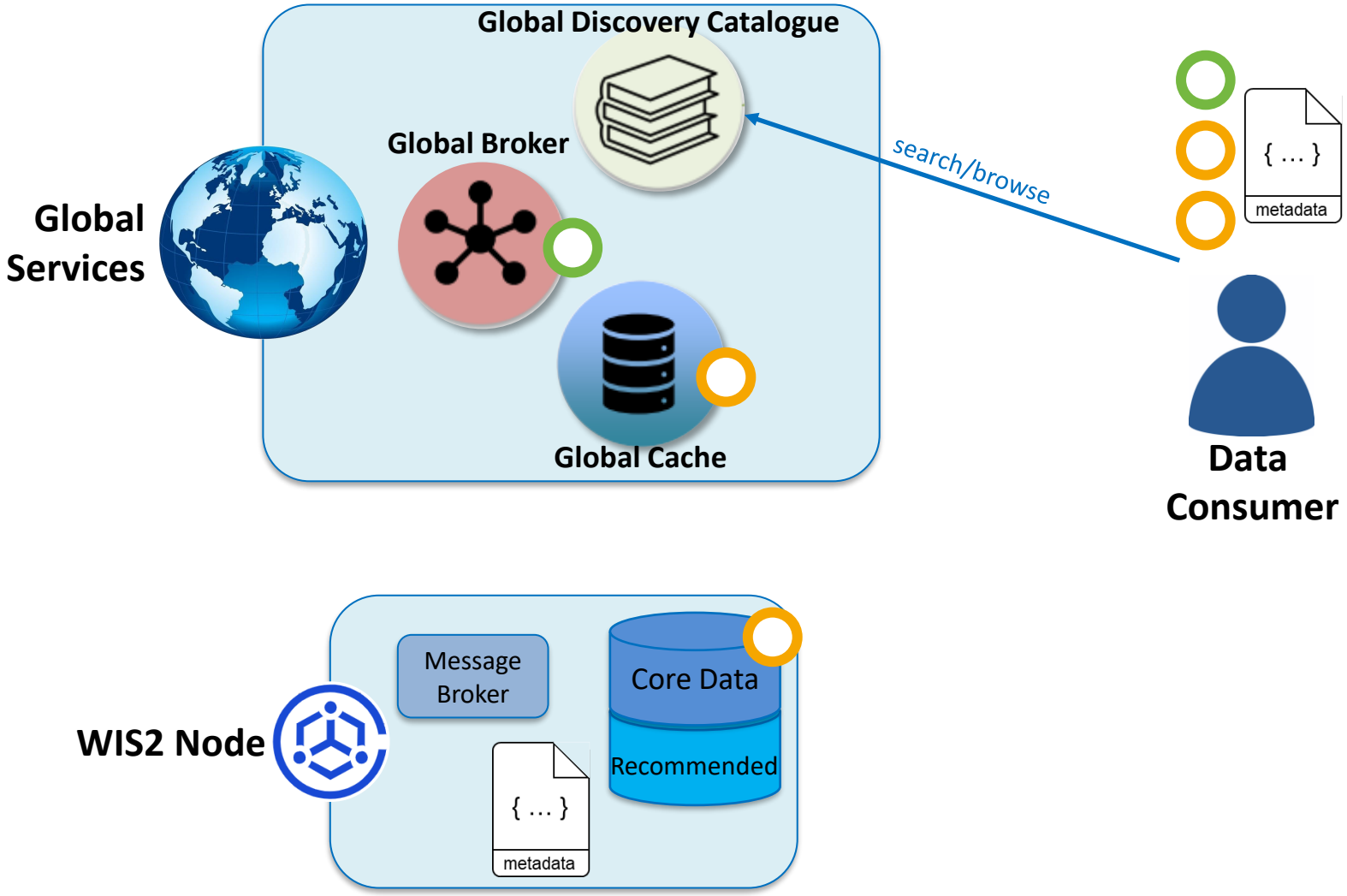
Cache | report | recommended | surface-based-observations

```
cache/a/wis2/arg/argentina_wmo_demo/data/core/weather/surface-based-observations/synop
cache/a/wis2/mar/casablanca_met_centre/data/core/weather/surface-based-observations/synop
cache/a/wis2/mar/casablanca_met_centre/data/core/weather/surface-based-observations/temp
cache/a/wis2/bfa/ouagadougou_met_centre/data/core/weather/surface-based-observations/synop
```

```
origin/a/wis2/arg/argentina_wmo_demo/data/core/weather/surface-based-observations/synop
origin/a/wis2/mar/casablanca_met_centre/data/core/weather/surface-based-observations/synop
origin/a/wis2/mar/casablanca_met_centre/data/core/weather/surface-based-observations/temp
origin/a/wis2/bfa/ouagadougou_met_centre/data/core/weather/surface-based-observations/synop
```

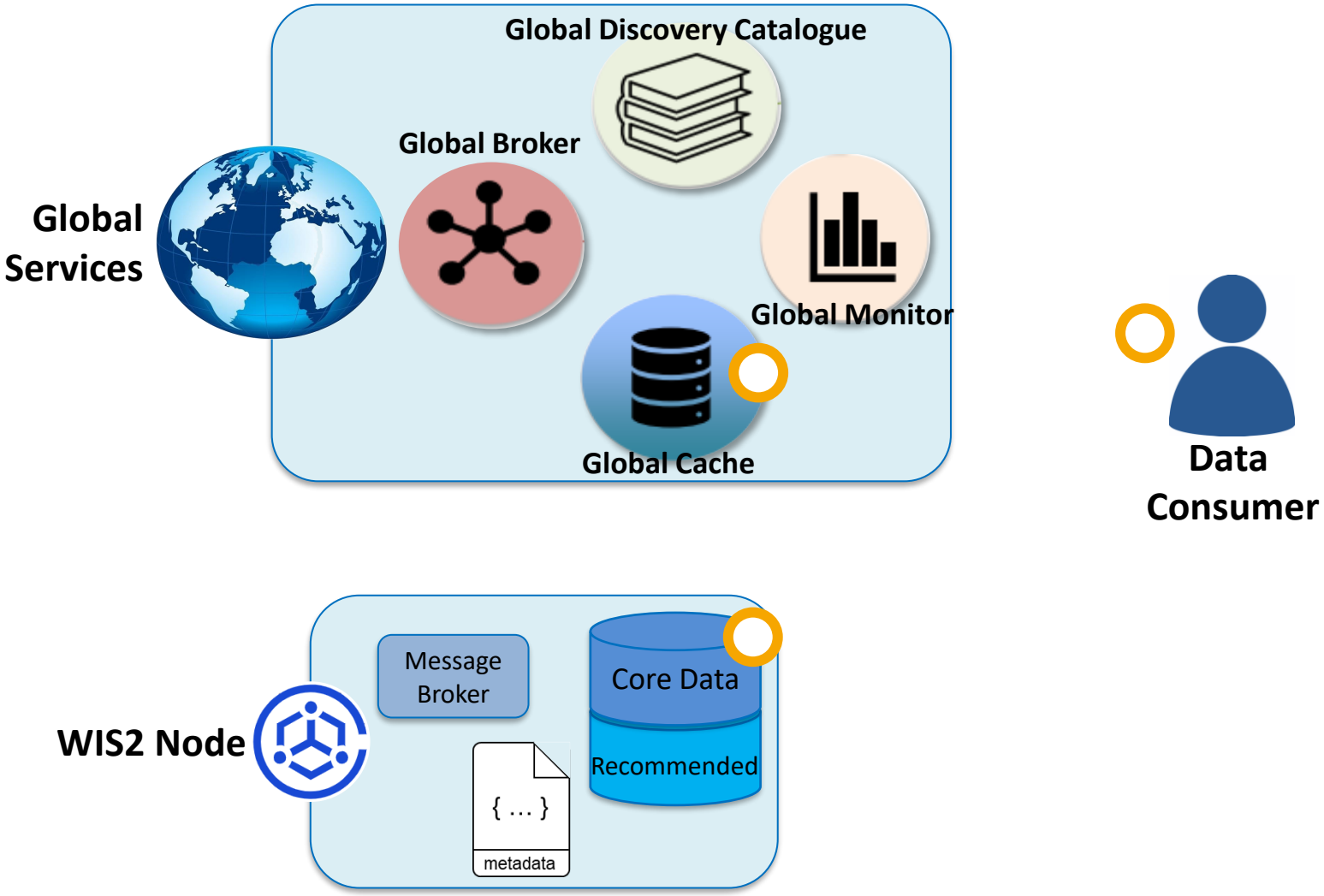
WIS 2.0 concept: finding what you need - discovery

- Data Publishers create **Discovery Metadata** to describe the datasets they make available from their WIS2 Node.
- These metadata records are collected and published at the **Global Discovery Catalogue** (GDC).
- Data Consumer can search/browse the GDC to find the datasets they need.
- GDC organises datasets according to the same standard scheme used in the **Topic Hierarchy**.
- Discovery Metadata records tell Data Consumers where they can **download** data and **subscribe** to notifications.



WIS 2.0 concept: monitoring data sharing

- Finally – WIS 2.0 introduces a **Global Monitor** service that will track what data is made available and whether that data can effectively be accessed by Data Consumers.
- The Global Monitor will provide a 'dashboard' that will support **tracking of compliance** against both the **Unified Data Policy** resolution and **Global Basic Observing Network (GBON)** technical regulations.



Global Services

Downloads core data

Subscribes to topics

Discovers data/services

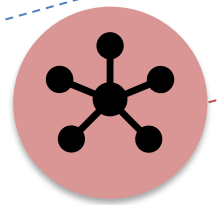
Downloads recommended data

WIS2 node

Global Cache

A storage providing a copy of the WMO Core data from the NCs/DCPCs to be accessed by the users.

- **Data will be open to everyone.**
- **Some Global Caches are required globally for resilience.**



Global Broker

Providing notifications of all the data available in the Global Caches or in originating centers.

Users will subscribe to a Global Broker to get notifications of new data to be downloaded from Global Caches or WIS2 node

Global Discovery Catalogue

It is a discovery catalogue of data and services.

- **Provides an API to list the available data and services**
- **Harvests metadata from the WIS2 Nodes.**

Global Monitoring

Monitoring of data exchanged in WIS2.

- **Sensor Centers will make available statistics from data in real time**
- **Global Monitoring Center will collect statistics from Sensor Centers and provide web accessible maps and results.**

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WIS2 in a box

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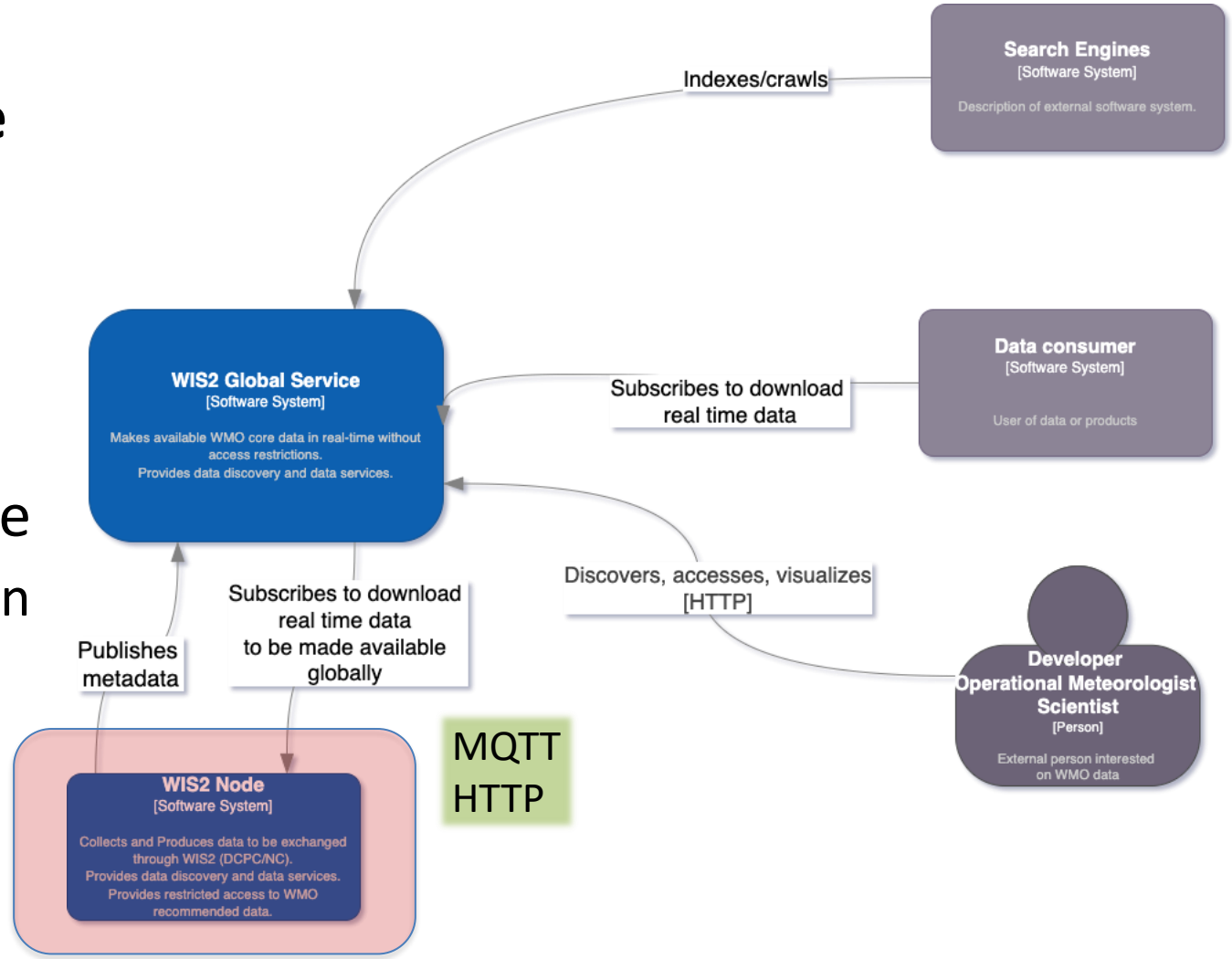
WIS2 in a box: What is it?

- **WIS2 in a box is a reference implementation of a WIS2 Node**
  - **MQTT**
  - **HTTP**
- **Software** (not hardware)
- **Publishing facility/capability** compliant to WIS 2.0 Architecture
  - Provides basic data transformation
  - Can **integrate** with existing data management systems



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[WMO HUB - Home (wis2box.readthedocs.io)](wis2box.readthedocs.io)

WIS2 in a box features

Plug and play

- Free and Open Source Software (FOSS)
- Based on standards (OGC/ISO/W3C)
- Cloud technology
- Deploy
  1. Cloud service
  2. On premises

Data exchange

- Data conversion (CSV to BUFR, …)
- Simple to configure
- Publish – subscribe (Message Queuing Protocols)
- Upload / download

Use & Visualize

- National network data
- International data
- Satellite, NWP
- Based on OGC standards

Discover

- Find data from other Countries and areas
- Find forecast and analysis
- Find satellite data

Monitor

- Visualise the status of National stations
- Monitor the continuity of data transmission
- Provide data to central monitoring tools

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WIS2 in a box is Open

Free and Open Source Software

Open Standards

- MQTT
- GeoJSON
- OGC APIs

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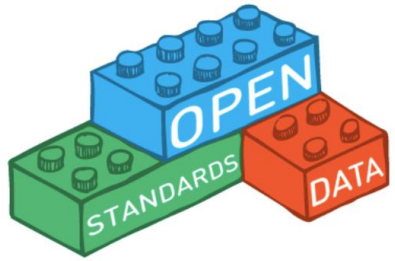
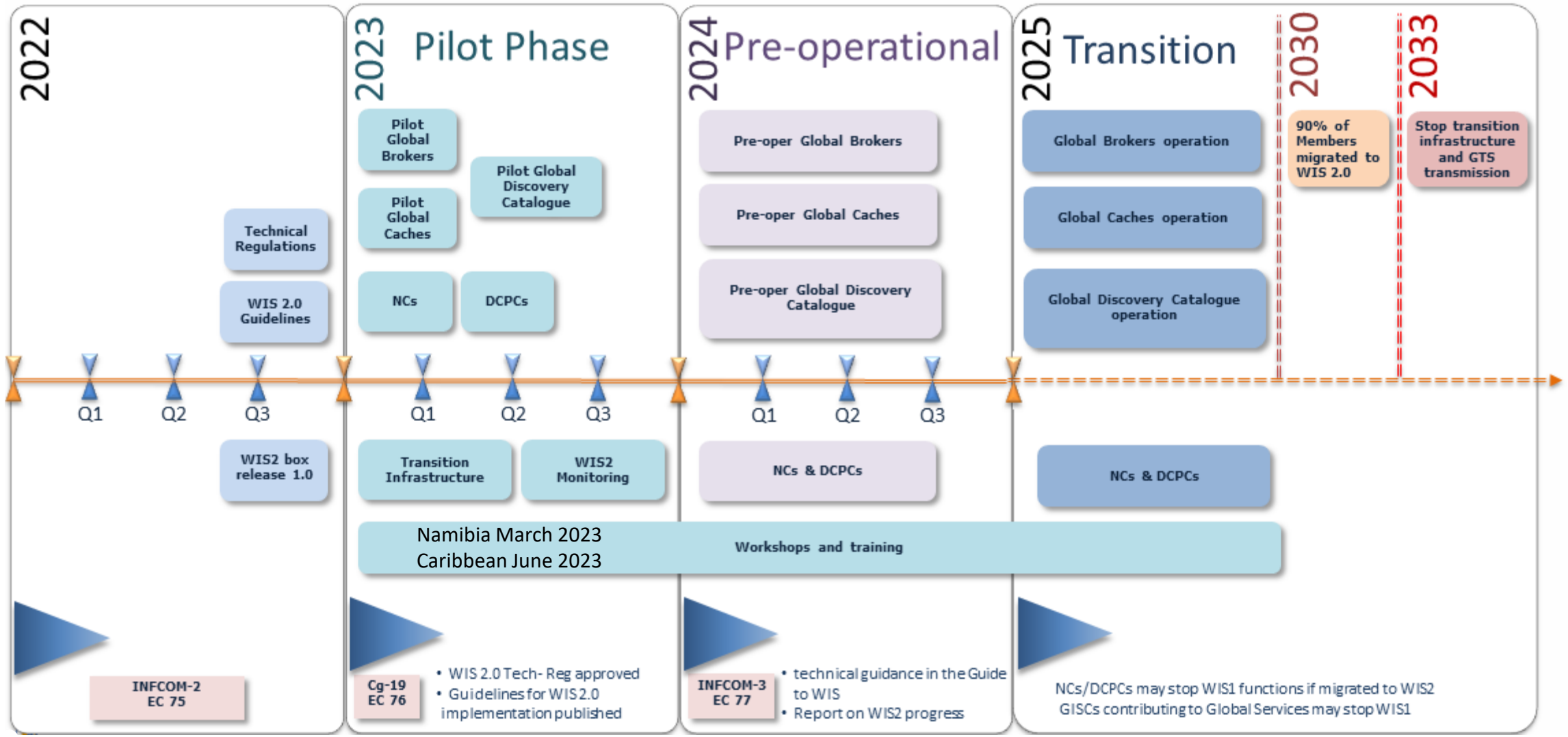


WIS 2.0 implementation plan

Timeline


2022
2023
Pilot Phase
2024
Pre-operational
2025
Transition
2030
2033
Technical Regulations
WIS 2.0 Guidelines
Pilot Global Brokers
Pilot Global Caches
Pilot Global Discovery Catalogue
NCs
DCPCs
Pre-oper Global Brokers
Pre-oper Global Caches
Pre-oper Global Discovery Catalogue
Global Brokers operation
Global Caches operation
Global Discovery Catalogue operation
90% of Members migrated to WIS 2.0
Stop transition infrastructure and GTS transmission
Q1
Q2
Q3
Q1
Q2
Q3
Q1
Q2
Q3
WIS2 box release 1.0
Transition Infrastructure
WIS2 Monitoring
NCs & DCPCs
NCs & DCPCs
Namibia March 2023
Caribbean June 2023
Workshops and training
INFCOM-2 EC 75
Cg-19 EC 76
• WIS 2.0 Tech- Reg approved
• Guidelines for WIS 2.0 implementation published
INFCOM-3 EC 77
• technical guidance in the Guide to WIS
• Report on WIS2 progress
NCs/DCPCs may stop WIS1 functions if migrated to WIS2
GISCs contributing to Global Services may stop WIS1

Pilot Phase

Goals of the pilot phase

Deploy Global Services

Deploy WIS2 Node/WIS2 box

Refine WIS 2.0 architecture

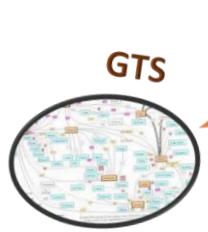
Improve technical aspects

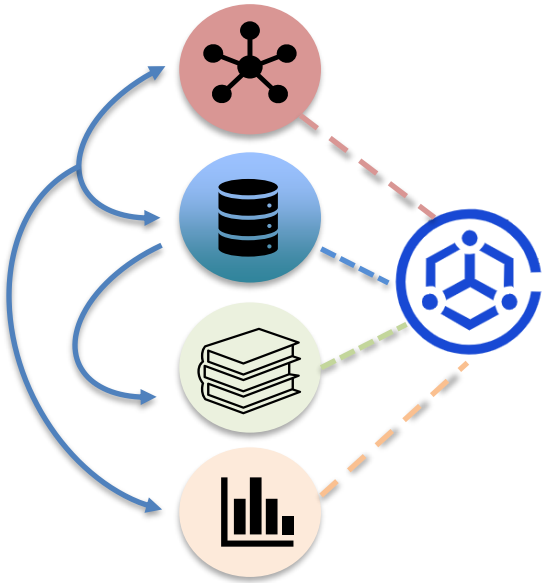
Amend Manual on WIS

Complete Guide to WIS

Specify Monitoring

Initiate the transition phase





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Identify Success Criteria

Running Global Services

Global Broker
- France Q3/2022
- China
- Australia
- USA

Global Cache
- Germany Q3/2022
- Australia
- Japan
- Korea
- USA - Synoptic

Global Discovery Catalogue
- Canada
- Korea
- China

Global Monitoring
- Morocco

Sharing data through GS by running WIS2 Node

Algeria
Argentina
Italy
Morocco
Sweden

ECMWF
EUMETSAT

Sharing data through GS covering all WMO programmes by running WIS2 Node

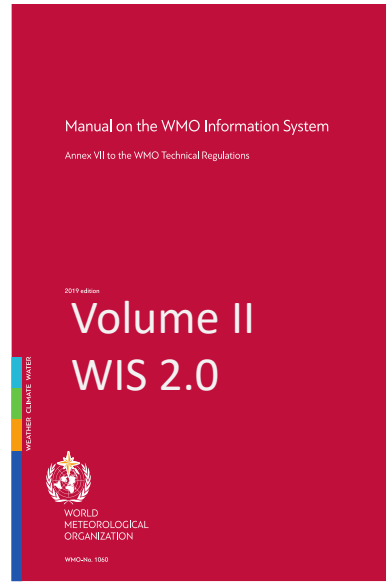
Hydrology:
- Argentina
- Brazil
- Uruguay

Climate:
- Belize

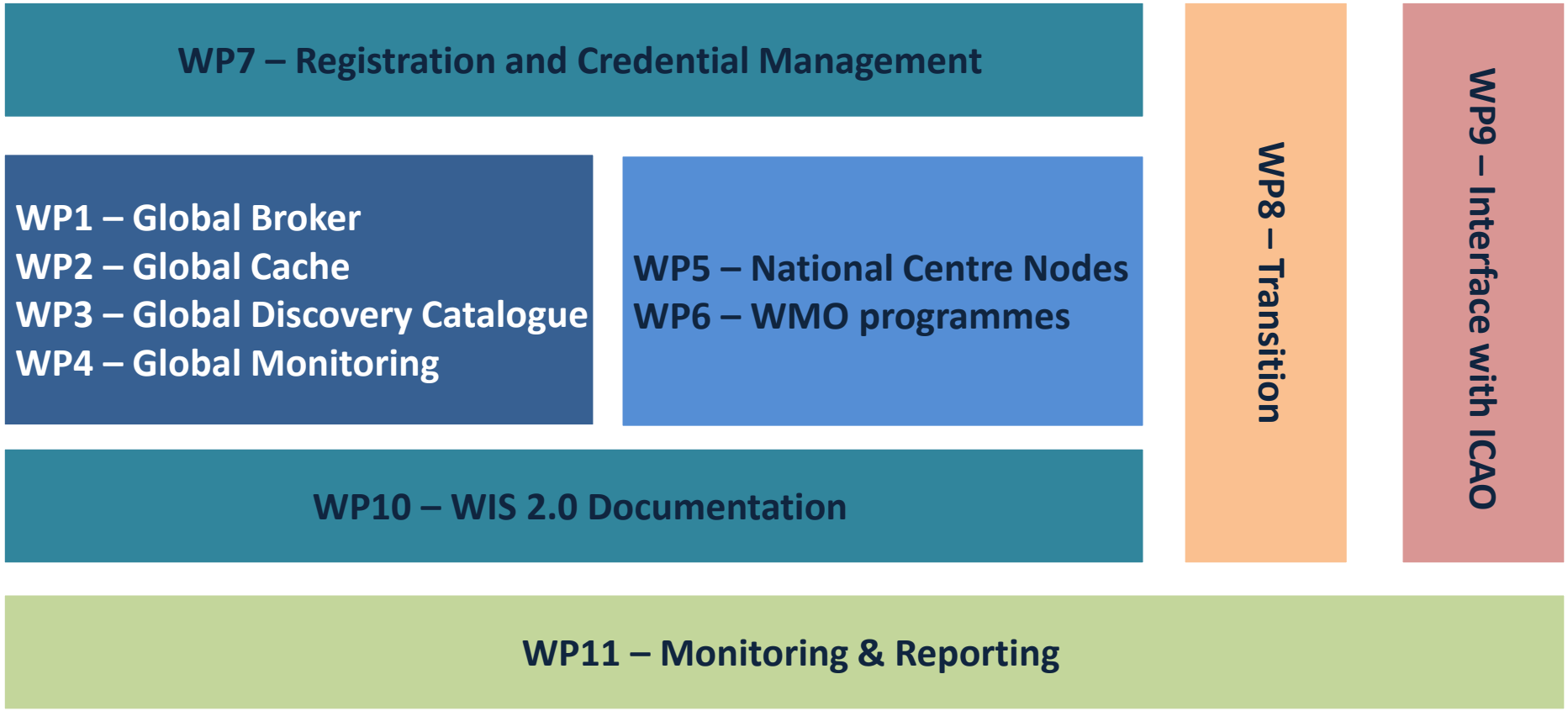
Cryosphere:
- Norway

Ocean

WIS 2.0 Validate Technical Regulations



Work Packages



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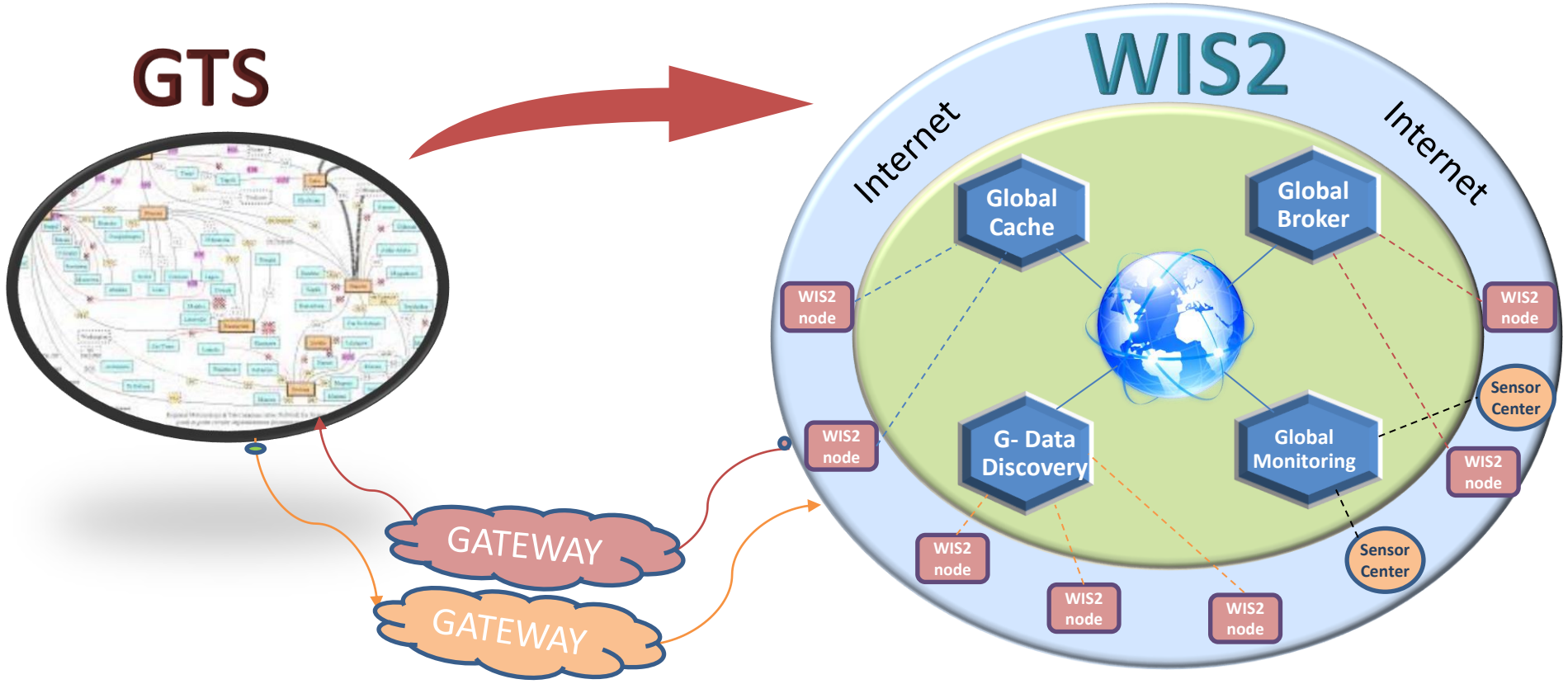
Transition

Data exchange between the two systems



Thank you

Gracias

Merci

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