

WIS2.0

An introduction

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU



September 2021

WMO OMM

World Meteorological Organization
Organisation météorologique mondiale

Hassan HADDOUCH

WIS2 Manager

Plan

- WIS Overview
- Challenges
- Technology shift
- WIS2.0
- Technical approach
- WIS Architecture
- WIS2.0 Principles
- WIS2 Demonstrator projects

What is the WMO Information System?

- WIS 1.0 was Commissioned in 2007 and developed to provide web-based cataloguing and access to data to complement the core data exchange handled by the GTS
- WIS encompasses the infrastructure, process and procedures to discover, access and exchange data
- Although WIS was intended to support all WMO programmes, in reality only the World Weather Watch (WWW) is well represented
- WIS is currently a network for experts (centres from WWW) and faces many challenges in terms of accessibility, ease of use, community buy-in and participation
- In its current form, the WIS, and mainly the GTS, is a niche infrastructure that supports the expert meteorological community



Challenges

WIS is not currently serving its original purpose of providing simple access to WMO data:

- the complexity of the portal interface not providing a seamless experience to the user;
- the search returning too many items;
- the search returning varied data types and products, making it difficult to perform finer grained searches for users;
- the many broken links encountered when trying to access the data;
- the WMO data formats for which the few available tools make the interpretation of the retrieved data problematic.



Technology shift

- Increasing use of the Web as a data sharing platform
- Commercial infrastructure providers offer
 - stable, secure and cost-effective 'cloud' hosting of virtualized computing resources
- Search engines (Google, Bing, Yahoo etc.) remain the common entry point for discovery of information
- Application Programming Interfaces (APIs) and Web Services are now very common solutions for process and exchange of data
- Messaging services and protocols offer new opportunities for sharing meteorological data in real-time based on common industry practices
- Applications such as Dropbox indicate that file distribution services have become commoditized and are no longer the domain of specialized applications such as GTS message switching



WIS 2.0

- WIS 2.0 is being designed and implemented to address the issues of WIS 1.0/GTS and leverage the benefits of technology change since WIS 1.0 was established
- WIS 2.0 will serve the demand of data volume, variety, and velocity with the aim to make authoritative weather, water, and climate data more relevant than ever before for anyone
- WIS 2.0 draws upon experiences from WIS 1.0 and is taking a more collaborative approach:
 - Co-design and develop
 - Focus on tangible benefits to contributors and users
 - Lower barriers (technical, etc.) and foster broad participation
 - Work iteratively
 - Embrace the mantra “nobody left behind” and support LDCs



WIS 2.0: Technical approach

WIS 2.0: Adopts Web technologies

- The core change for WIS 2.0 is use the Web to share data and information
- According to the World Wide Web Consortium (W3C) “the Web is the World’s most successful distributed information system”
- WIS 2.0 will use widely adopted open standards and leverage industry best practices
- Improved data discovery with search engines
- **Restrictions (authentication and authorisation where necessary)**



WIS 2.0: Technical approach

WIS 2.0: uses Web services for publishing data

Data is published via Web services – Web applications that allow computer programmes to access or interact with that data ...



Access control and security are built-in to Web technology

WIS 2.0: Technical approach

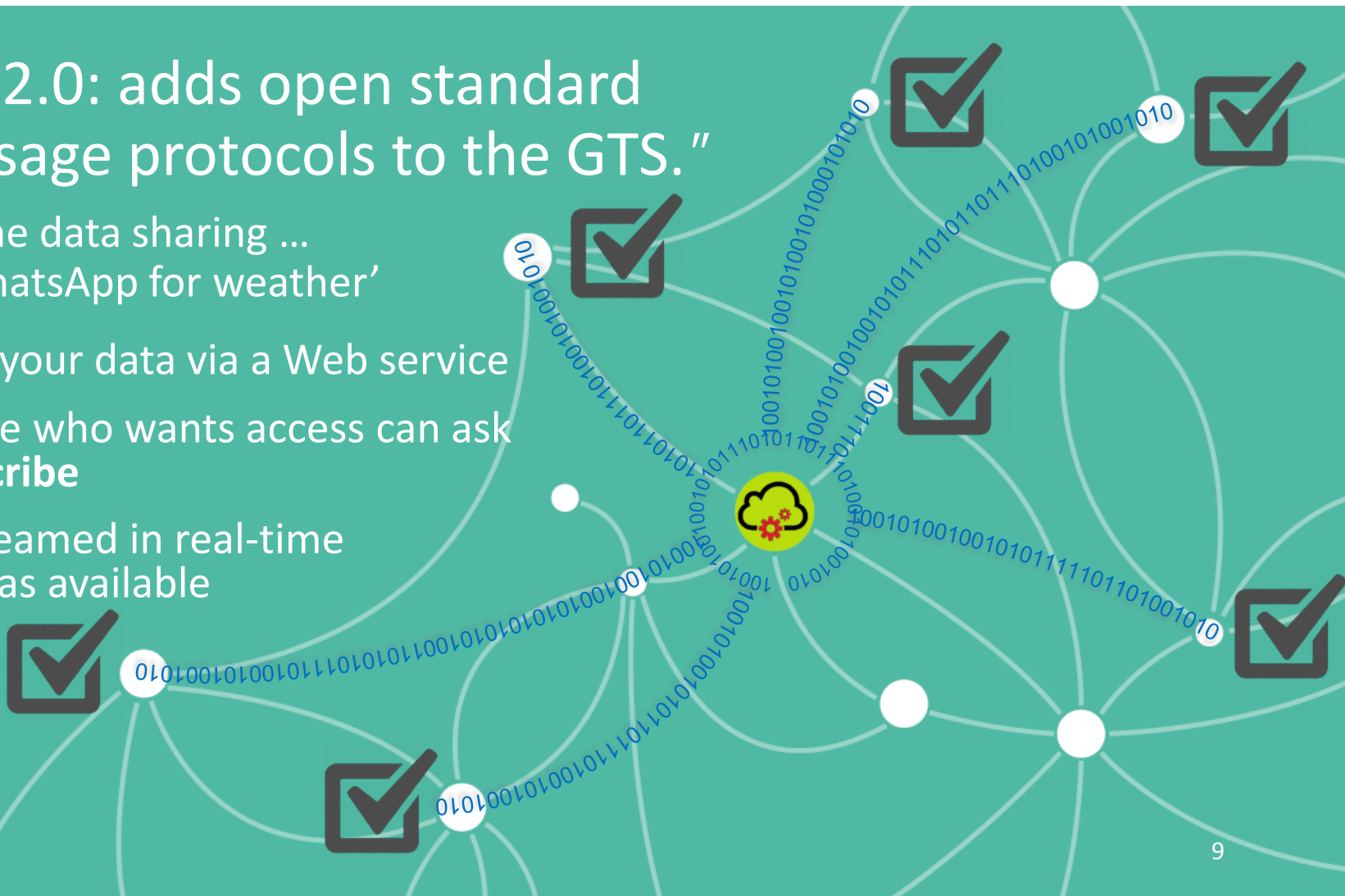
“ WIS 2.0: adds open standard message protocols to the GTS.”

Real-time data sharing ...
Like ‘WhatsApp for weather’

Publish your data via a Web service

Everyone who wants access can ask
to **subscribe**

Data streamed in real-time
as soon as available



WIS 2.0: Technical approach

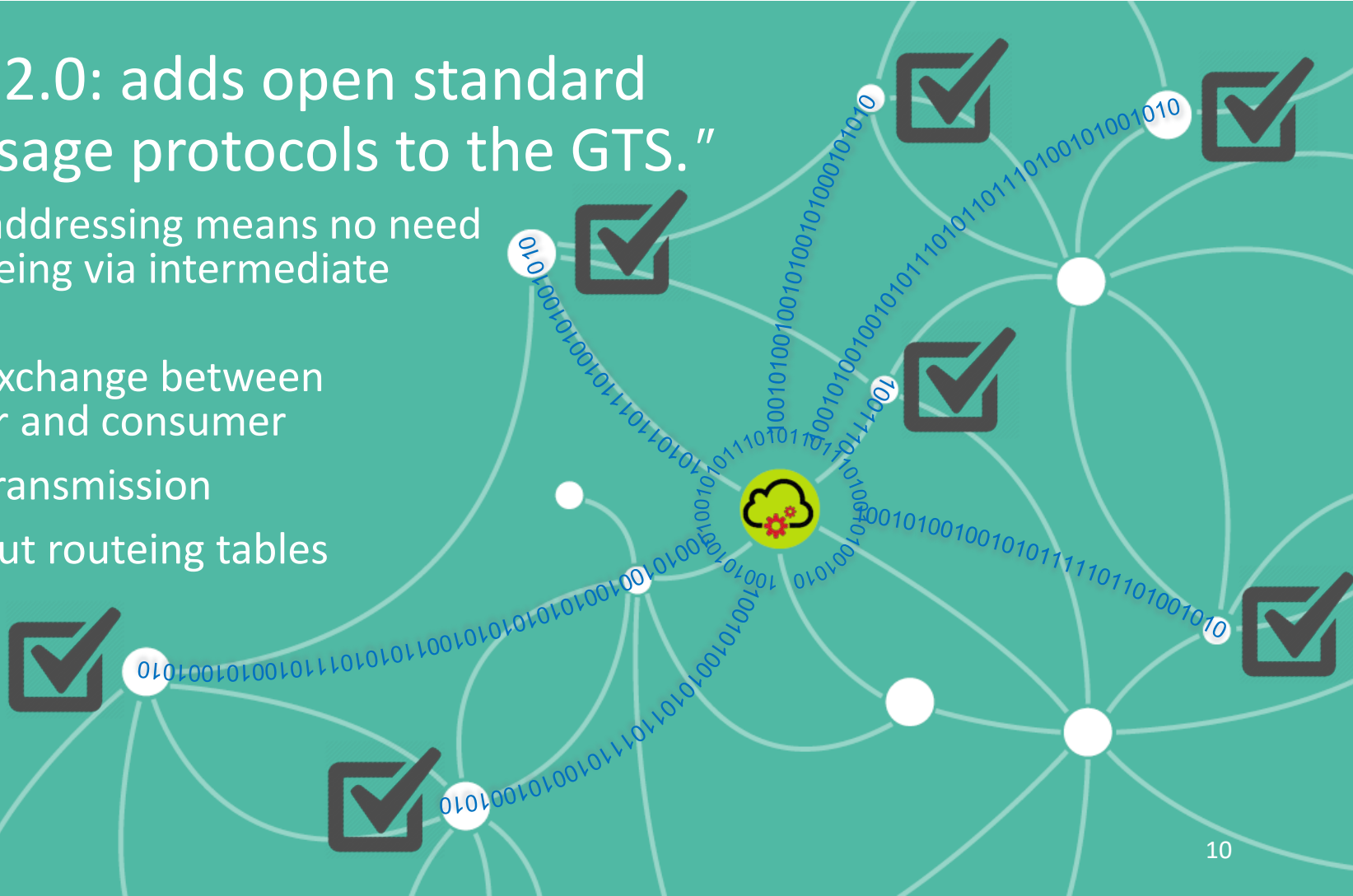
“ WIS 2.0: adds open standard message protocols to the GTS.”

Global addressing means no need for routing via intermediate centres

Direct exchange between provider and consumer

Faster transmission

Phase out routing tables



WIS 2.0: Technical approach

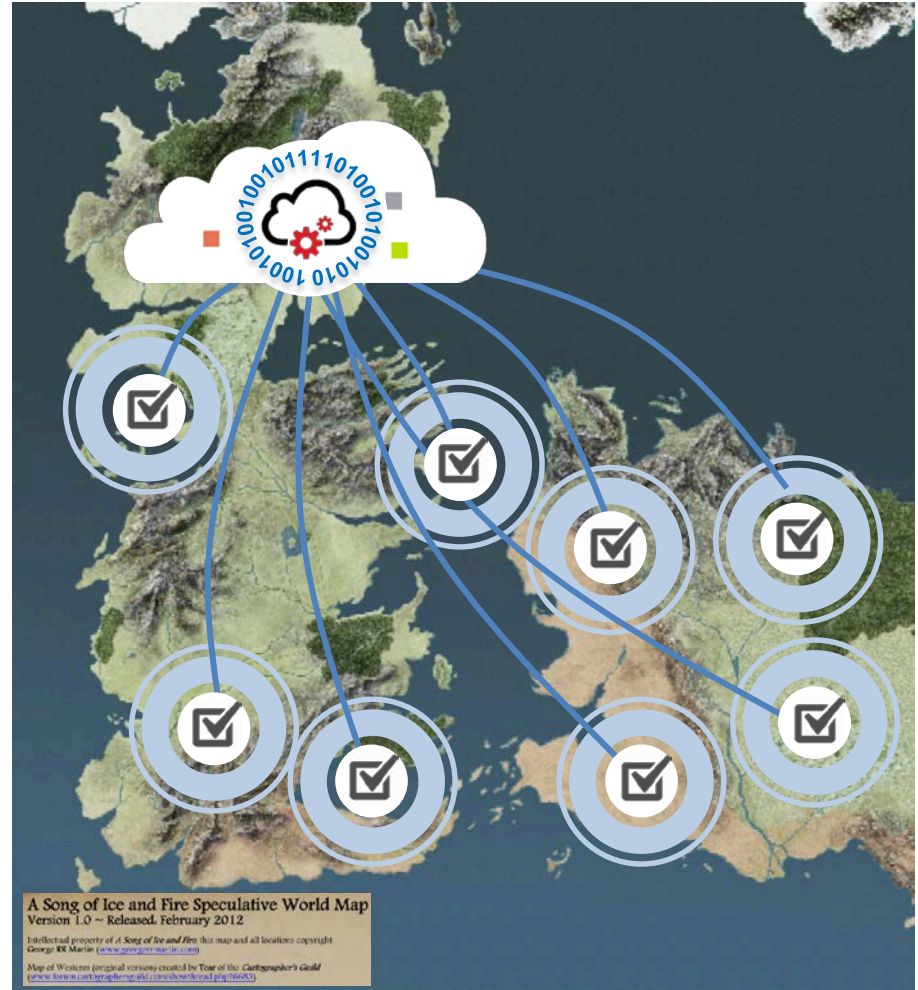
WIS 2.0: Use of Cloud technology

- ❑ data volumes are getting bigger

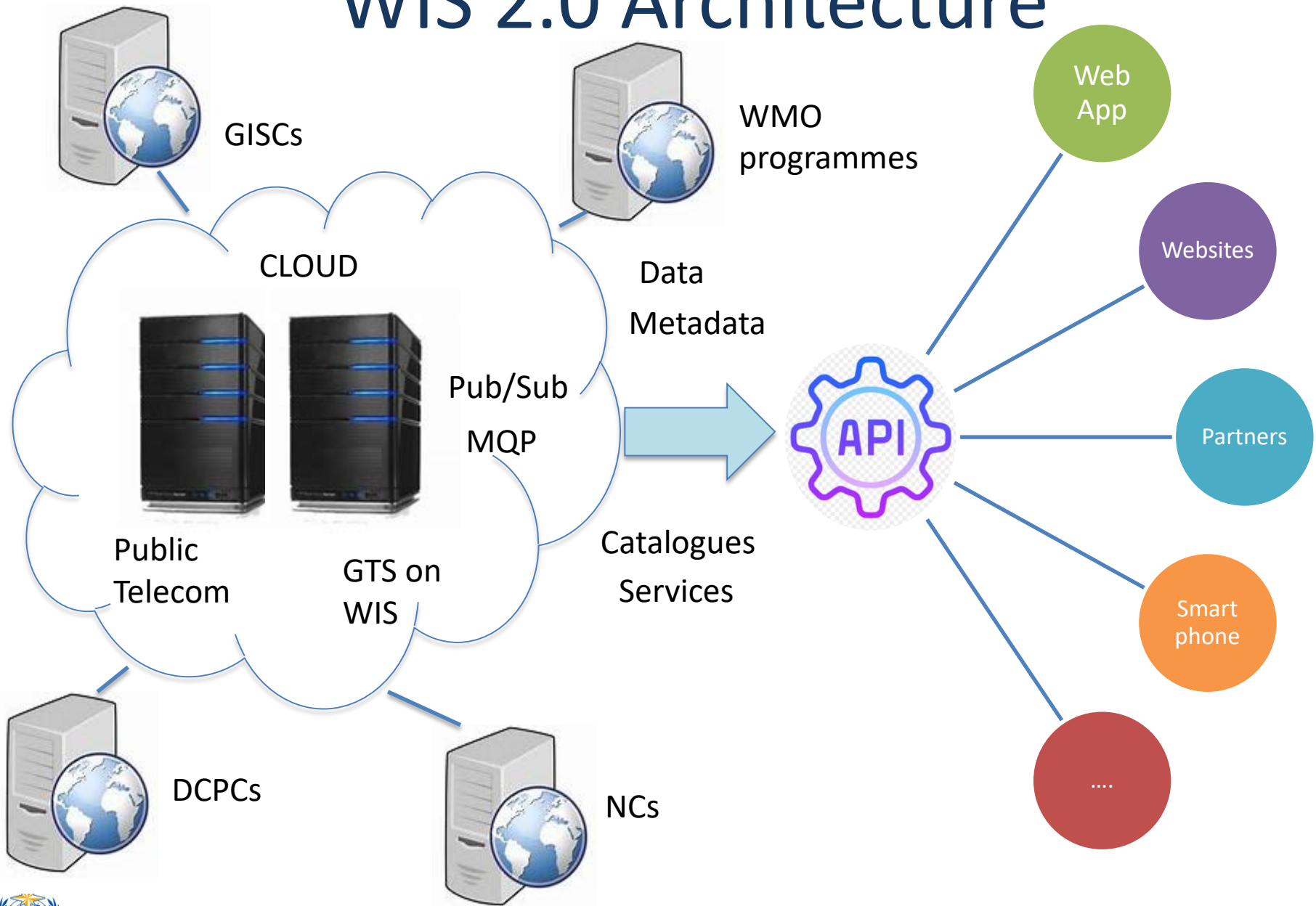
WIS 2.0 encourages use of **cloud technology** to enable users to exploit big data ...

- ❑ Cloud-hosted data platforms provide processing capacity and ready-made tooling

Don't download: use data in-situ



WIS 2.0 Architecture



WIS 2.0 Principles

1. WIS 2.0: adopts Web technologies and leverages industry best practices and open standards.
2. WIS 2.0: uses Uniform Resource Locators (URL) to identify resources (i.e. Web pages, data, metadata, APIs).
3. WIS 2.0: prioritizes use of public telecommunications networks (i.e. the Internet) when publishing digital resources.
4. WIS 2.0: requires provision of Web service(s) to access or interact with digital resources (e.g. data, information, products) published using WIS.
5. WIS 2.0: encourages NCs and DCPCs to provide 'data reduction' services via WIS that process 'big data' to create results or products that are small enough to be conveniently downloaded and used by those with minimal technical infrastructure.
6. WIS 2.0: will add open standard messaging protocols that use the publish-subscribe message pattern to the list of data exchange mechanisms approved for use within WIS and GTS.



WIS 2.0 Principles

7. WIS 2.0: will require all services that provide real-time distribution of messages (containing data or notifications about data availability) to cache/store the messages for a minimum of 24-hours, and allow users to request cached messages for download.
8. WIS 2.0: will adopt direct data-exchange between provider and consumer.
9. WIS 2.0: will phase out use of routing tables and bulletin headers.
10. WIS 2.0: will provide a catalogue containing metadata that describes both data and the service(s) provided to access that data.
11. WIS 2.0: encourages data providers to publish metadata describing their data and Web services in a way that can be indexed by commercial search engines.

WIS 2 demonstrator projects

- Demonstrator projects align to the WIS 2.0 Principles
- Key to exploring, demonstrating, validating, and evolving elements of WIS 2.0
- Demonstrators help to demonstrate benefits of WIS 2.0 to the broader WMO community

WIS 2 demonstrator projects

Data discovery

- GISC Beijing Web services catalogue projects
- Discovery Metadata exchange and harvesting

Data exchange

- GISC Tokyo cloud project
- EUMETNET Supplementary Observation Data-Hub (E-SOH)
- Exploring the use of message queuing protocols for GTS data exchange
- Experimental WIS 2.0 data exchange for data in WMO CF-NetCDF profiles

Earth systems domain focus

- Global Cryosphere Watch
- Open Access to the GTS (Open-GTS)
- WMO Hydrological Observing System (WHOS)

Supporting less developed countries and small island developing states

- Activities include a) modernization of the Malawi Automatic Weather Stations data exchange to support forecasting requirements,
- b) implementation of interconnections between GISC Casablanca and centres in its area of responsibility and leveraging the Internet for data exchange

Data discovery

- Work areas:
 - Modernizing WMO discovery metadata
 - Metadata standards – ISO and W3C standards
 - Metadata search and harvesting/exchange – OGC Records API, publication of metadata for seamless indexing by internet search engines (Google, etc.)
 - Data access - Linked Data concepts, RESTful APIs

Data exchange

- Work areas:
 - Modernizing message queuing protocols
 - Evaluating publication/subscription mechanisms for relevant notifications and data/product access
 - Evaluating modern/mainstream data exchange formats
 - Application of cloud hosted services and processing for supplementary observation data, data visualization, and other capabilities

Earth systems domain

- Work areas:
 - Harmonization of data and metadata within participating communities
 - Integration of community data/systems into WIS for discoverability and exchange
 - Application of modern data and metadata standards and exchange formats for reusability

Support to least developed countries

- Work areas:
 - Implementation of new regional data networks
 - Implementation of interconnectivity between regional centres
 - Implementation of regional data networks and centres with WIS

Thank you Merci



WMO OMM

World Meteorological Organization
Organisation météorologique mondiale