

- (a) urban and coastal areas
- (b) environment/air quality
- (c) sustained transport
- (d) Weather/Climate and Health
- (e) Energy etc.

12. Service Delivery Action Plan

13. Bibliography and Further Reading

Decision 11 (EC-70)

Concept paper on the development of common interfaces for service delivery

The Executive Council:

- (1) Thanks CBS for the development of the Concept Paper on the development of Common Interfaces for Service Delivery (CISD) as contained in the Annex to this decision;
- (2) Acknowledges that as new web-based services emerge from the implementation of WIGOS, WIS 2.0 and seamless GDPFS, that harmonization of these services to provide consistent interfaces will likely benefit to the Global Weather Enterprise;
- (3) Requests that establishment of standard interfaces (e.g. protocols or APIs) for accessing data and services for public service delivery, as expressed in the CISD concept paper, and gathering of the related user requirements be progressed by CBS as part of the seamless GDPFS implementation;
- (4) Further requests Members to share best practices on the development and implementation of web-service interfaces for accessing weather and climate information;
- (5) Further requests CBS collate the feedback from Members and provide guidance, and for the Secretary-General to provide the resources necessary to support this activity.

Decision justification:

- Decision 40 (EC-69) – CBS was tasked by EC to, in coordination with other TCs, set up a mechanism for the development of a concept paper on common interfaces for service delivery. CBS was asked to present the concept paper at EC-70 for consideration for approval;
- CBS Management Group (CBS-MG 2018) recommended that EC-70 endorse the draft Concept Paper.
- Users need to access aggregated “best possible” weather and climate information offered in a seamless manner across geographical and political boundaries. To respond to this need, the Common Interfaces for Service Delivery will seek to meet the requirements of a wide variety of users and provide a technical system for gathering and aggregating weather information from a wide variety of sources, at different levels of technical sophistication. It is an underlying condition that Common Interfaces support the attribution of NMHSs as providers of services, and that the principle of “no Member left behind” be kept in view.

Annex to Decision 11 (EC-70)

Concept paper for the development of common interfaces for service delivery

Introduction

The Executive Council of WMO requested that the Commission for Basic Systems develop a Concept Note on the development of Common Interfaces for Service Delivery (CISD) “driven by data from NMHSs and emerging sources to enable users to seamlessly access weather and climate information in a way that would ensure attribution to NMHSs as providers of services”.

Why Common Interfaces for Service Delivery?

In today’s world of mass travel, global news, and “always on” internet access to information, Members need users to have access to providers of high-quality weather and climate services in a unified and consistent manner, seamless in space and time, which affirms the provenance and authority of this information. Already some of the major global aggregators of information provide such a seamless service of weather information, but typically this is not based on the high-quality information available for many countries through their NMHSs.

While NMHSs, by their nature, have a national remit, the need is for a single international one-stop service for authoritative weather and climate information; one that will combine the high quality typically available via the separate websites of each NMHSs together with the convenience of a seamless service of aggregated global information provided to PC, tablets and mobile phones. There already exist examples of trans-national service delivery of NMHS forecast and warnings information. Hong Kong China has, through the WWIS and SWIC projects, provided a means to aggregate city forecast information and also weather warnings from NMHSs. The GMAS project aims to extend and develop the SWIC concept towards an integrated, map-based presentation of warnings from all NMHSs. Regionally, Belgium, The Netherlands and Luxembourg have cooperatively produced a weather app for the Benelux area. It is envisaged that the CISD will cooperate with, and build on, these developments to provide a richer range of weather data to a wide range of users. This would include probabilistic information as now available from the growing number of ensemble-based systems, and possibly also impact information.

It will be important, in getting further advice and guidance from EC and Congress, to ensure that the CISD concept is developed within a broader framework which encompasses GMAS, WIS2.0 and other existing and proposed projects.

While focusing on the authoritative nature of weather and climate information available from NMHSs, there also needs to be a recognition of the high quality of information available through many private sector providers which can amplify and augment the information presented by NMHSs, and in particular provide additional depth of detail relevant to specific user groups. Thus the CISD should make provision for the merging of meteorological information provided from a range of reputable sources, and presented in many different data formats and protocols, and synthesise these into a unified stream of weather and climate information that can be readily expressed and visualized on internet-connected devices. From the point of view of users, the information presented through the CISD should conform fully to WMO standards and be authoritative with proper attribution to the providers, be they from the public or private sectors.

In defining the scope of the CISD, the first essential task will be to collect the user needs. Primary users will include private-sector global data aggregators such as Apple, IBM, Alibaba, Amazon, Google and other aggregators and data platforms that will be developed, as well as UN and other humanitarian agencies that have a global reach. The needs of these key users will need to be ascertained, as already a significant percentage of weather information is delivered to the public from a source other than an NMHS directly.

The task of developing a CISD is analogous, in some respects, to those tasks already carried out in developing the WMO Integrated Global Observing System, WIGOS, and the WMO Information System, WIS. The CISD will attempt to achieve the same global coordination, but

in the area of Service Delivery. The CISD must be built upon agreed technical protocols and standards, but these will need to be developed in close consultation with the users if they are to gain widespread acceptance.

In embarking on the challenge of developing the CISD, WMO must be aware of the need to support and enhance the authoritative voice of Members in providing warnings and other information about severe weather and its impacts, and must also keep in view the principle that no Member be left behind. It will be a significant challenge to develop an interface that can accept information from the wide range of technical capabilities of WMO Members and provide a unified output which is compatible with some of the most advanced information and communications technology on earth.

It should be clearly established also what the CISD will not attempt to do. Many NMHSs have, in close cooperation with their users, developed technical interfaces for the delivery of products and services to their own client base. The CISD will not attempt to replicate or improve on these. Rather it will offer meteorological service providers a new route to provide their products and services, in common with products and services from other providers, to an international user-base. It will be important to ensure that technological imbalances between Members are not a barrier to the full engagement of all NMHSs with the CISD as a platform for their products.

The interface, which is envisaged as the CISD, must meet the need for interoperability in the digital world. Meteorological services provided via image and text from nationally-based websites no longer meet the requirements of smooth and seamless operation of a world which has entered the digital age. Standard protocols will be required to provide this interoperability between meteorological services and other information communication systems in the digital world.

This introduces the concept of a Common Interface for Service Delivery (CISD); a technical underpinning for the establishment and growth of the Global Weather Enterprise (GWE), providing a mechanism for the delivery of products and services from different elements within the GWE in a unified and streamlined manner.

Purpose of CISD

- (a) Open Service Delivery system designed for seamless availability of and accessibility to data and products for users, particularly in partnership with the private sector.
- (b) Establishment of a widely accepted standard interface (protocol) for access to data and products for public service delivery, including impact-based information;
- (c) Establishment of a mechanism to link user requirements to the meteorological service providers who are registered with the CISD.
- (d) Establishment of a one-stop-shop service of PWS products from WMO members and partners, including private sectors.

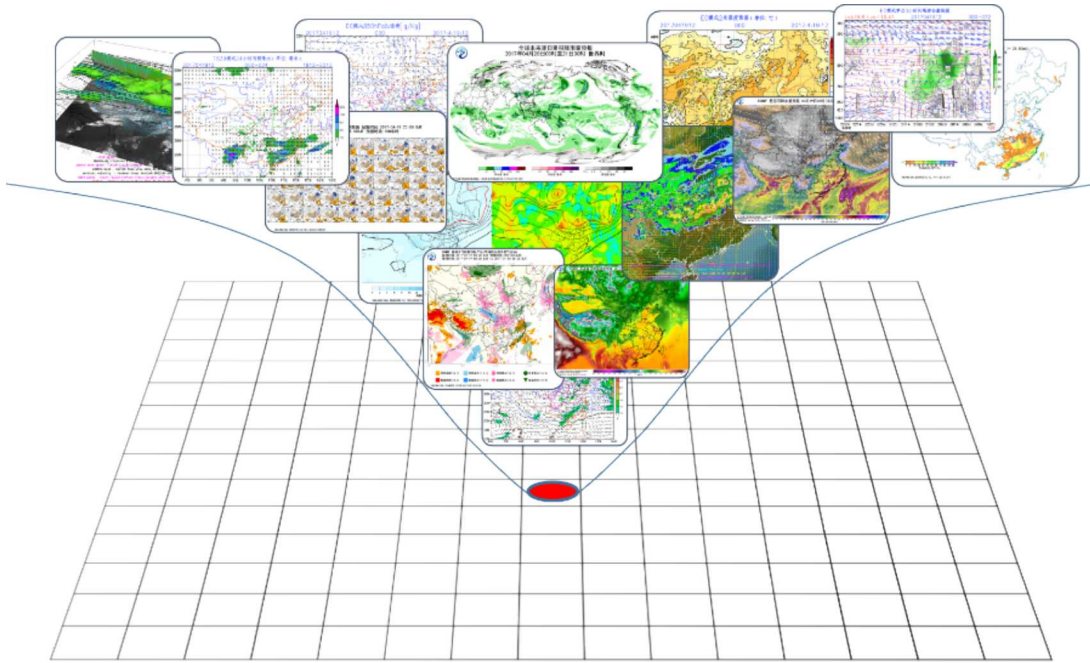


Figure 1. More than 100 NWP models/model members are available for each location in earth. How can these be rationalized into one service?

Definitions

Protocol: First, the CISD will act as a WMO-defined unified protocol, which will aim to be widely accepted by industry and by UN affiliated organizations, and which will include existing standards such as Common Alerting Protocol (CAP), to facilitate the provision of meteorological information services.

Proxy: The CISD will act as a WMO proxy to aggregate and release world-wide weather information from either official NMHS (alert and warnings, high impact weather forecasts and regular forecasts) or private sectors (high impact weather and regular forecasts) with source labelling. Proxy here also means partnership between WMO members and other sectors.

Provider: The CISD will act as a WMO service provider, ideally delivering the “best” or “optimum” forecast based on the verification and assessment of products from diverse sources, except for weather alerts and warnings which will solely come from NMHSs.

Users of CISD

- (a) WMO Members who receive global met-services and contribute to CISD;
- (b) Other meteorological service providers who will receive authoritative products from CISD and contribute their own by service linkage following CISD standards;
- (c) UN-affiliated organizations which need aggregated, authoritative weather and climate information;
- (d) Governmental, inter-governmental and non-governmental organizations active in international humanitarian relief and disaster risk reduction;
- (e) Certified/registered sectors or data aggregators like Google / Facebook;
- (f) Other organization or individuals; CISD should be a facility for many levels of user, with different levels of access possible according to need and to considerations of data policy, among others.

Relationships between CISD and other CBS Projects

The CISD will not itself generate products but will act as a channel through which services can be delivered, or alternatively, direct user requests to appropriate product services. So, existing on-line resources such as **GDACS/GMAS/WWIS/SWIC** can become important inputs for CISD.

WIS 2.0 is a cloud-based information infrastructure and data-exchange platform, which can support the future WMO based functionality of CISD. The relationship between WIS and CISD will be analogous to that between an OS (operating system) and applications. Besides, WIS 2.0 cannot host everything, especially content from private sector providers. The concepts and standards underlying the CISD could also be implemented in other public cloud-based systems such as the Amazon cloud, Google cloud, Alibaba Cloud etc.

Principles in the Implementation of a Common Interface for Service Delivery

NMHS-first and mutual benefits: The CISD will support the authoritative voice of NMHSs and leave no member behind. The CISD will also monitor and measure the products being used, and product providers/owners can decide whether or not to charge for the usage of the products originating with them. This means that CISD is first and foremost a standard of platform, which can be implemented upon WMO/WIS 2.0, or by other sectors.

Cloud based: The CISD will operate as an online service which will be based on WMO Information System (WIS 2.0) – a cloud infrastructure to handle massive concurrent data access.

De-centralized: The CISD will be connected to nodes on the WIS (WMC, RSMC, NMHS) and to private sectors via the internet. But the CISD will not aim for long-term storage of products from diverse sources, but will cache them for real time access, and for the greater efficiency of the data service.

Integrated: Alerts and warnings from NMHSs will go directly via the CISD to enhance the authoritative voice of the NMHSs of WMO Member. Other meteorological service provider information will be carried on the CISD with the source-label provided for user choice. With the help of Seamless GDPFS common platform, products (other than alerts and warnings) can be evaluated and integrated as “best” or “optimum” products, before being distributed via the CISD.

User oriented: A thorough investigation of user needs, user application and user scenarios will be essential if the CISD is to be widely accepted. The CISD should have a user-friendly Web application UI to facilitate location-based and on-demand meteorological services. The CISD should also include a set of APIs to assist with the collection of user feedback. This means that CISD registered users will have more privileges in getting access to more valuable data, products and feedback than ordinary visitors.

Components

Implementation of CISD will be through an alliance of internet nodes that follow the protocols and standards of CISD; the WMO node will be a starting point based on the architecture and cloud infrastructure of WIS2.0. (Figure 3)

(1) **WMO CISD Node:**

- (a) **Common Interface Service:** linked to the services of NMHS (Web service), GDPFS centres (GDPFS common platform), WMO projects (e.g. MHEWS), and other sectors, supplying data and products through online interface to users. Other online products could also be registered as one service of WMO Common Interface.

- (b) **WEBGIS UI:** Based on backend service, a WEBGIS system established to facilitate exploration and online analysis (temporal and spatial analysis) of WMO-organized PWSD products such as Impact-Based Forecasts, GMAS warning etc. WEBGIS UI could be a support tool for decision makers in United Nation affiliated organizations.

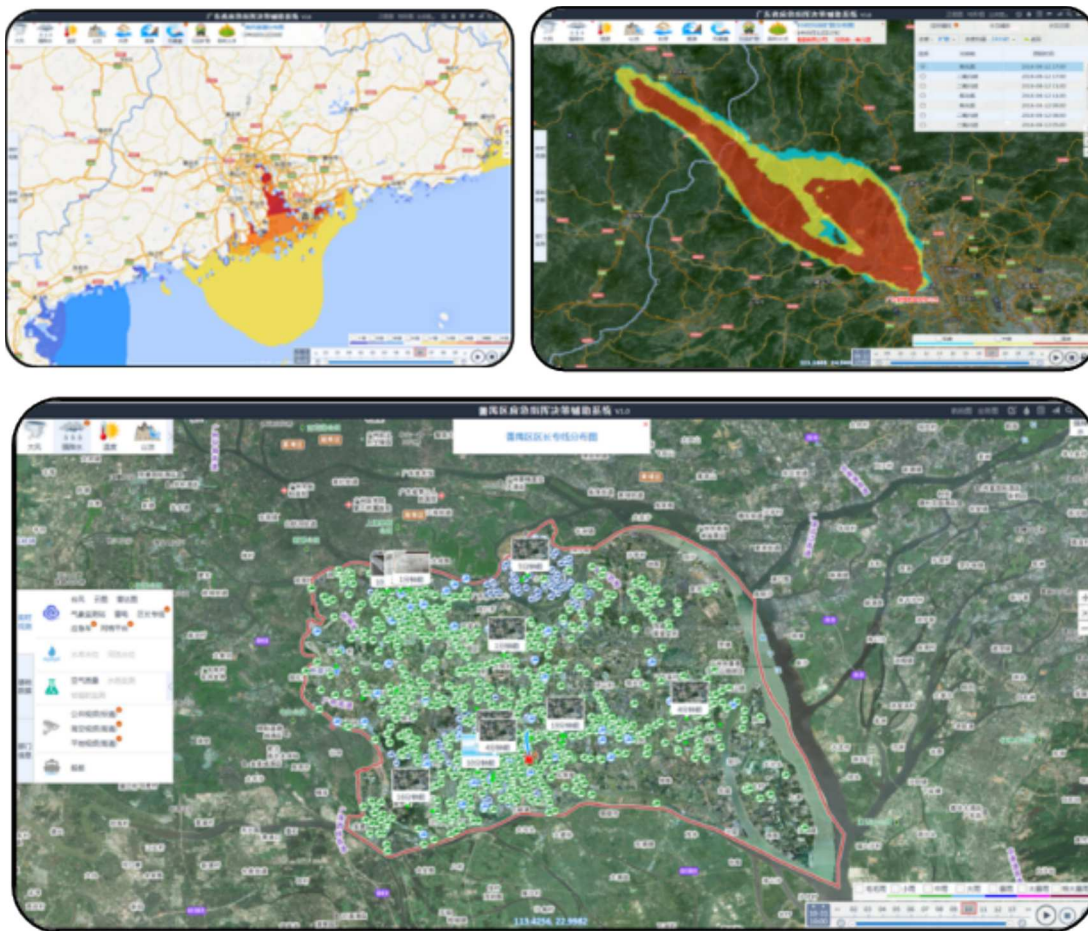


Figure 2. WEBGIS for exploration of PWSD products

- (c) **Cache data:** WMO node doesn't keep long-term storage, but caches products for efficiency of delivery.
- (d) **Registration:** Products from other sectors who want to join the alliance will need to register and provide the relevant metadata relating to their services and products.
- (2) **Other CISD Nodes:**

Encourage other sectors to join the CISD alliance.

- (a) **Common Interfaces for Service Delivery:** strictly follow the standard of WMO common interface protocol;
- (b) **Entity data centre (optional)**

WEBGIS UI (optional) Challenges of a Common Interface

- The first challenge is to solve the authoritative voice issue. Not to jeopardize but enhance the authority of NMHSs while facilitating private sector service provision through the CISD. The formalizing of the concept of the "Authoritative Voice" and its wide acceptance will be an essential pre-requisite to the operational establishment of the CISD.
- Not all Members will have the technical capacity to provide products following the CISD standards. Therefore, improving the technical capacity in providing products and services through digital means, and developing an agreement among NMHSs on the use of standard protocols, will be another challenge.
- It will be important to work closely with international industry associations and smart phone (wear) manufacturers to ensure their acceptance of CISD standards and protocols, and promotion of weather and climate information provided via the CISD.
- Workshops and Pilot/demonstration project will certainly be needed to fully test the CISD concept at various stages in its development.

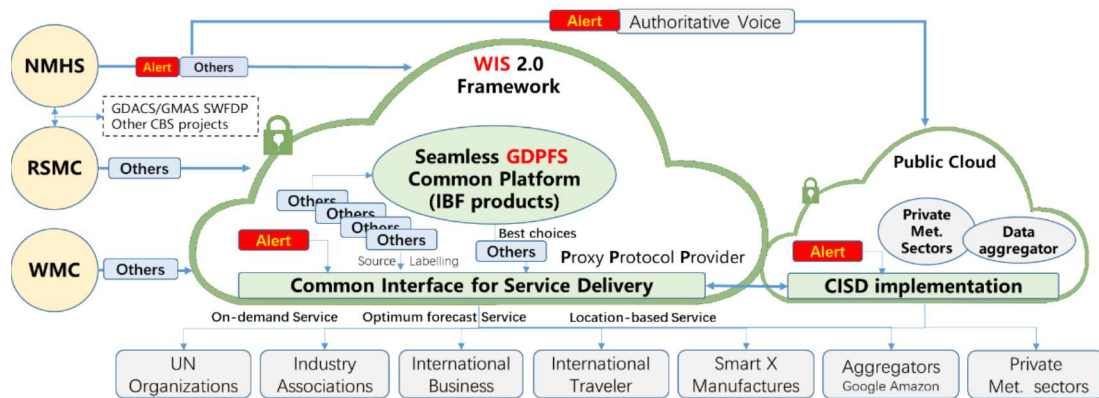


Figure 3. Conceptual Diagram for Common Interface

Roles of WMO members, data aggregators and private sectors in CISD could be both users and contributors of the CISD.

Decision 12 (EC-70)

Symposium to collect Members experiences with Impact-based Forecast and Warning Services

The Executive Council decides to approve the organization of a symposium in 2019 for Members to exchange experiences in Impact Based Forecast and Warning Services (IBFWS) and to collect Members' experiences with IBFWS. It further requests the Secretary-General to provide the necessary support for the Symposium and Members to contribute resources.

Decision justification:

- Recommendation of the CBS Management Group (CBS-MG);
- Decision 4 (EC-69) to put significant emphasis on the training needs associated with the implementation of impact-based forecast and warning services, and requested the Secretary-General to facilitate resource mobilization in support of such training initiatives;