

Summary of the 4th Workshop on WIS Implementation

The fourth workshop on WMO Information System Implementation was held 6-8 December 2016, at the headquarters of the Japan Meteorological Agency (JMA), Tokyo, Japan. Eighteen participants were invited from Cambodia, Indonesia, Lao Republic, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam, and lecturers were invited from Australia and the WMO Secretariat.

The keynote lecture was delivered by Dr. Steve Foreman, WMO Secretariat, about emerging data and related issues, highlighting several presentations made at the Technical Conference at CBS-16. The lecture focused on external drivers of change and new requirements of information lifecycle management, including management of partnership data, which facilitate NMHSs' change to deliver the right service, such as impact forecasts, and earn authoritative voice.

Lectures, practical training sessions and site visits were organized under subjects of AMDCN, radar project in South-east Asia and WIS projects. The workshop was concluded with summary and action items for several key items:

Establishment of AMDCN

- AMDCN is an area network that consists of direct connections between a GISC and each Centre (DCPC and NC) in the GISC's area of responsibility, and is used for collecting and disseminating data for global distribution; GTS was established and has been operated for the purpose of supporting the World Weather Watch (WWW) Programme, and existing GTS link can be considered as part of AMDCN.
- AMDCN of the ASEAN region consists of MPLS and internet connections, with Melbourne and Singapore as connection hubs; discussions are ongoing to increase the bandwidth, possibly by using VPN connections over the internet, which requires involvement of ASEAN members and GISCs Tokyo and Melbourne especially in the GISC backup aspect.
- GISC Tokyo's AMDCN consists of two direct MPLS connections with Bangkok and Manila, and indirect internet connections with Hanoi, Vientiane, Nay pyi Taw and Phnom Penh through Bangkok.
- GISC Tokyo is seeking a way to establish direct connections with the four centres, offering five options to connect to AMDCN: dedicated circuit, MPLS operated by NTT-Com, VPN tunnel over the internet, combination of file-uploading and

subscription over the internet and Himawari cast, which have different characteristics of cost, service levels and protocols.

- GISC Tokyo is in a prototyping phase of establishing internet-VPN connections in GISC Tokyo's AMDCN, and all participating countries are invited to join the prototype to identify technical requirements, e.g. specific router types and required configuration of message switching system.
- GISC Tokyo will refine the prototype based on participants' feedback and incorporate it into the new operational system, which GISC Tokyo is planning to introduce in 2017-2018 period.
- It is generally recommended to have two types of connections to AMDCN, e.g. an internet-VPN connection in addition to the existing dedicated line GTS connection, to improve redundancy of the system, but each NC needs to check the internet bandwidth before setting a new link to avoid latency.
- A virtual private network (VPN) is a technology that gives an option of partly protected internet connection, which can be implemented several IP transport layers: link (MPLS, L2TP, PPTP), network (IPSec) and application and transport (SSL, TLS, SSH).
- WMO Guides on internet security and VPN (WMO Publication No. 1115 & No. 1116) are recommended as good references for these key aspects in establishing AMDCN, especially to understand what VPN can do and cannot do in protecting connections and information.
- GISC Tokyo will continue supports to Centres, within resources available, to establish a connection to AMDCN, based on the results of the questionnaire survey conducted prior to the Workshop.

Radar Project in South-east Asia

- Projects for establishing a regional weather radar network in Southeast Asia are going forward in the frameworks of ASEAN, WIGOS and the ESCAP/WMO Typhoon Committee; projects include aspects of international radar data sharing, for which WIS plays an important role, and regional radar data composite.
- Radar composite based on a high-standard quality control is the effective tool for rainfall monitoring and a foundation of various application products, such as quantitative precipitation estimation (QPE) and quantitative precipitation forecast (QPF).

- As a result of conducted trainings for the implementation of quality control and production of nationwide composite data, real-time nationwide composite data sharing among Malaysia, Thailand and Japan just started in November 2016.
- Countries who are interested in joining the projects are encouraged to join the existing Typhoon Committee framework, emphasizing that the implementation of quality control and production of nationwide composite data is the first step to contribute to the establishment of regional radar network; TMD and MMD are invited to support these countries in collaboration with JMA.
- Processing raw data recorded in various formats and compiling data access/sharing policy are the common major challenges to overcome, identified from regional project experiences in Southeast Asia and Europe (the OPERA programme (Operational Programme for the Exchange of weather RADar information)).
- It is emphasized that NMHSs need to actively approach radar manufacturers to install radar system customized to their specific needs, and to keep an access to necessary technical information such as data format.
- The international data sharing is one of essential parts of the projects, and the involvement of WIS Centres is highly appreciated.

GISC backup

- Each GISC is making backup arrangements with other GISCs to make sure the continuity of essential GISC functions in outages; GISC Tokyo has mutual backup arrangements with GISCs Beijing, Melbourne and Offenbach and GISC Melbourne with GISCs Beijing and Tokyo.
- Multiple backup arrangements are in place by using various telecommunication networks, e.g. GTS, internet and satellite, and therefore GISCs are requested to present procedures and requests to NCs and DCPCs, if any, with likely backup scenarios.

WIS Monitoring

- WIS Monitoring is being developed with the aim of monitoring availability of WIS centre functions and services; it consists of three main components: real-time operations monitoring, quarterly reporting and incident monitoring.
- Real-time operations monitoring is being piloted by WIS Monitoring Common Dashboard developed by collaboration of volunteer GISCs, which collects

real-time monitoring information from all participating GISCs and displays the information on a centralized web portal.

- Real-time monitoring information is published by each GISC on its web server in the form of JSON files with agreed monitoring elements; at this moment, the Common Dashboard collects four different JSON message types: *monitoring.json* (monitoring statistics), *cache.json* (statistics of the GISC's cache), *centres.json* (statistics of other centres connect to the GISC), and *events.json* (any pending calendar events).
- In near future DCPCs and NCs will be invited to participate in WIS monitoring both real-time and quarterly, but technical solutions are still under discussion.