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| WEATHER CLIMATE WATER | **World Meteorological Organization**  **COMMISSION FOR OBSERVATION, INFRASTRUCTURE AND INFORMATION SYSTEMS**  **Third Session** 15 to 19 April 2024, Geneva | **INFCOM-3/Doc. 8.3(5)** |
| Submitted by: Chairs of SC-IMT and SC-ESMP  26.II.2024  **DRAFT 1** |

**AGENDA ITEM 8: TECHNICAL DECISIONS**

**AGENDA ITEM 8.3: WMO Information System**

# eSTABLISHMENT OF A STUDY GROUP ON FUTURE DATA INFRASTRUCTURE

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| **Summary** |
| **Document presented by:** Chair of the Standing Committee on Information Management and Technology (SC-IMT) and Chair of the Standing Committee on Data Processing for Applied Earth System Modelling and Prediction (SC-ESMP)  **Strategic objective 2024–2027:** 2.2 and 2.3  **Financial and administrative implications:** within the parameters of the Strategic and Operating Plans 2024–2027.  **Key implementers:** INFCOM in consultation with SERCOM and RB  **Time frame:** 2024–2026  **Action expected:** Review the proposed draft decision. |

# DRAFT DECISION

## Draft Decision 8.3(5)/1 (INFCOM-3)

### Establishment of a Study Group on Future Data Infrastructure

**The Commission for Observation, Infrastructure and Information Systems decides:**

(1) To reiterate Members’ recognition that:

(a) The explosion of data and the emergence of emulators and other artificial intelligence (AI) applications within the current and future numerical prediction chain is changing the paradigms of data handling and infrastructure that National Meteorological and Hydrological Services (NMHSs) and satellite operators are considering now and in the future;

(b) Data-in-place and data-proximate compute (DPC) strategies, compute access and interoperability, cloud solution and ‘on-the-fly’ processing are all emerging technological concepts that are shaping the future design and operations of the systems which allow data producers and data users to interface; and

(c) These new technologies and concepts are fundamental to the continuous evolution of the WMO Integrated Processing and Prediction System (WIPPS) and the WMO Information System (WIS);

(2) To establish the Study Group on Future Data Infrastructure (SG-FIT) with the terms of reference as provided in the annex to [draft Resolution 6.2/1 (INFCOM-3)](https://meetings.wmo.int/INFCOM-3/English/Forms/AllItems.aspx?RootFolder=%2FINFCOM%2D3%2FEnglish%2F1%2E%20DRAFTS%20FOR%20DISCUSSION&FolderCTID=0x0120004D58D6EBC5C7054898FF36E91D58C193&View=%7B84F6CC21%2D2DD6%2D403B%2DB16A%2D97A4B833DE2B%7D), copied to this document.

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Decision justification: [Resolution 25 (Cg-19)](https://library.wmo.int/idviewer/67177/208) - Technical Regulations of the WMO Information System 2.0, requested INFCOM to study the technological advancements relating to "data-in-place" approaches and their application to data sharing within the WMO Community and develop recommendations pertinent to the future evolution of WIS and WIPPS, including on mechanisms for engagement of cloud infrastructure providers in the evolution.

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[Annex: 1](#Annex)

## Annex to Draft Decision 8.3(5)/1 (INFCOM-3)

## Excerpt from the annex to draft Resolution 6.2/1 (INFCOM-3)

*[This will be adopted as part of the annex to* [*draft Resolution 6.2/1 (INFCOM-3)*](https://meetings.wmo.int/INFCOM-3/English/Forms/AllItems.aspx?RootFolder=%2FINFCOM%2D3%2FEnglish%2F1%2E%20DRAFTS%20FOR%20DISCUSSION&FolderCTID=0x0120004D58D6EBC5C7054898FF36E91D58C193&View=%7B84F6CC21%2D2DD6%2D403B%2DB16A%2D97A4B833DE2B%7D)*]*

## Terms of Reference of the Study Group on Future Data Infrastructure

## (SG-FIT)

### 1. Purpose

In line with [Resolution 20 (Cg-19)](https://library.wmo.int/idviewer/67177/193) - Technical Regulations of the WMO Information System 2.0 and coordinating with Standing Committees on Information Management and Technology (SC-IMT) and on Data Processing for Applied Earth System Modelling and Prediction (SC-ESMP), the Study Group on Future Data Infrastructure (SG-FIT) will:

(a) Seek to collate technological advances on data exchange, specifically on the emerging concepts associated with data-in-place and federated computing and data environments; articulate directions and opportunities for WMO Members within these upcoming environments, inclusive of the need of emerging data-driven systems;

(b) Identify blockers within the community and enablers to mitigate them;

(c) Explore principles of sustainability and business models of these new environments; and, assessing the needs for global standards to operate with these upcoming transformative technologies and infrastructures;

(d) Focusing these explorations in the context of the challenges faced by WMO Integrated Processing and Prediction System (WIPPS) Centres, including Regional Specialized Meteorological Centres (RSMCs), Regional Specialized Hydrological Centres (RSHCs) and World Meteorological Centres (WMCs), satellite operators and the community they serve.

To anticipate the evolution needs of the key infrastructure of WIPPS and the WMO Information System (WIS), the Study Group will undertake the activities articulated around the four areas below, which will continue to be refined to align with the evolving understanding and requirements:

(a) Review and Assessment of technological advances on data exchange and requirements: Through its experts SG-FIT will bring forward assessments of pertinent advances and seek opportunities to test their concepts in the context of the existing WIS infrastructure to understand current barriers and options for mitigation. SG-FIT will work from the established set of use cases, refined as needed, in experimenting with the expansion of concepts, such as standards (formats, APIs, processing workflow) and containerization, and other emerging ones of relevance. The scope of data considered covers observations (including remotely sensed), model input (data assimilation, data-driven model) and outputs (analyses, model fields) as well as training data and inferences;

(b) AI-based data compression: As a subset case of technological development, SG-FIT will explore the emerging potential of AI/ML inferences as data compression mechanism and their potential use in future data exchange;

(c) Business models and concepts: Intrinsic to the data-in-place and data-proximate compute (DPC) concepts are the need for mechanisms for an external partner to use a host infrastructure. The established set of use cases defines configurations to be documented from private to commercial clouds to hybrid/ federated environments. SG-FIT will collate examples of existing technology and mechanisms within private sector, NMHSs, satellite operators and academia to inform WMO and its members of the considerations of such systems. The Study Group will not provide recommendations on adoption of any business model as part of the work described here; however, there will be opportunity to engage with commercial cloud providers which have mature hosting and billing mechanisms in place;

(d) Standards and parameters: SG-FIT will collate recommendations from the above three thrusts as to the technical standards that enable the implementation of these emerging technologies, identify any gaps and facilitate opportunities to develop or enhance standards and profiles in the broader community, such as with the Open Geospatial Consortium (OGC, in the context of the WMO/OGC Memorandum of Understanding), in the course of its experimentations. The standards will capture considerations of access control and security (authentication, authorization to run remote code) and its security verification, execution costing as well as evolution of parameters exchanged in steps with the emergence of data-driven models.

### 2. Composition

SG-FIT will be comprised of up to 15 experts with required expertise specified in the following areas related to future technology of data exchange and their practical implementation, including the representatives of relevant Standing Committees of INFCOM and the Research Board:

* Development and deployment of data exchange technologies and standards in big data context, including for satellite and other remotely sensed data
* WIS and function of WIS Centres
* WIPPS and function of WIPPS Centres
* Federated and data-proximate compute environments as well as cloud environments
* Machine learning development as applied to data compression and reproduction and/or data-driven models
* Business and/or technical models for data and compute hosting

SG-FIT will be led by co-chairs, either of whom will be a member of the INFCOM Management Group.

### 3. Modality of work

One face-to-face meeting during the next intersessional period, complemented by electronic correspondence and tele/video conferences.

### 4. Deliverables

* Recommendations on the three thrusts for considerations in the next phases of WIPPS and WIS to be submitted at the fourth session of INFCOM
* An overview publication on business models and concepts.

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