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| WEATHER CLIMATE WATER | **World Meteorological Organization**  **COMMISSION FOR WEATHER, CLIMATE, WATER AND RELATED ENVIRONMENTAL SERVICES AND APPLICATIONS**  **Second Session** 17 to 21 October 2022, Geneva | **SERCOM-2/Doc. 5.6(4)** |
| Submitted by: Chair of SC-DRR  21.IX.2022  **APPROVED** |

**AGENDA ITEM 5: TECHNICAL REGULATIONS AND OTHER TECHNICAL MATTERS**

**AGENDA ITEM 5.6: Disaster risk reduction and public services**

# Global Multi-hazard Alert System (GMAS) FRAMEWORK IMPLEMENTATION Plan



# GENERAL CONSIDERATIONS

### WMO Global Multi-Hazard Alert System Framework Implementation Plan Overview

1. The WMO Global Multi-Hazard Alert System (GMAS) Framework Implementation Plan attached as an [annex](#_Annex_to_draft_1) to draft Resolution ##/1 (EC-76) was framed by Resolutions and Decisions of several WMO constituent body meetings. The following paragraphs summarize the main elements of these WMO Resolutions and Decisions over the years;

2. At the seventeenth session of the World Meteorological Congress (Cg-17) through [Resolution 5 (Cg-17)](https://library.wmo.int/doc_num.php?explnum_id=3138#page=258) - Public Weather Services Programme, the Secretary-General was requested to carry out the enhancement necessary to enable the Severe Weather Information Centre (SWIC) website to disseminate weather warnings that would be provided in Common Alerting Protocol (CAP) format by Members;

3. Following Cg-17, the sixty-eighth session of WMO Executive Council was held. During this session, [Decision 6 (EC-68)](https://library.wmo.int/doc_num.php?explnum_id=3166#page=73) – Implementation of the Common Alerting Protocol, was adopted, which requested the Secretary-General to enhance advocacy of CAP and accelerate the implementation of CAP especially in developing and least developed countries. Moreover, the former Commission for Basic Systems was requested to develop provisions on CAP utilization in the WMO Technical Regulations to assure harmonization of CAP-enabled alerting systems operated by Members and intensify CAP-related activities;

4. During the sixty-ninth session of WMO Executive Council, [Decision3 (EC-69)](https://library.wmo.int/doc_num.php?explnum_id=3645#page=172) - WMO Global Multi-Hazard Alert System, endorsed the initial draft vision of theWMO GMAS ‘To be recognized globally by decision makers as a resource of authoritative warnings and information related to high-impact weather, water, ocean and climate events’. It further requested the Executive Council Working Group on Disaster Risk Reduction to further advance the GMAS concept;

5. During the seventieth session of WMO Executive Council,[Decision 4(EC-70) - *,*](https://library.wmo.int/doc_num.php?explnum_id=4981#page=154) *Development of the Global Multi-hazard Alert System* EC requested the Working Group on Disaster Risk Reduction to gather additional user requirements to inform the development of the WMO GMAS. Additional user requirements were gathered and presented at the eighteenth session of the World Meteorological Congress (Cg-18) and the development of the GMAS Framework Implementation Plan was agreed at the eighteenth session of the Cg-18, through [Resolution 13 (Cg-18)](https://library.wmo.int/doc_num.php?explnum_id=9827#page=69) - WMO Global Multi-Hazard Alert System;

6. Following Cg-18, the seventy-first session of WMO Executive Council was held. During this session, [Resolution 1 (EC-71)](https://library.wmo.int/doc_num.php?explnum_id=10248#page=9) ***-*** Development of the Global Multi-Hazard Alert System Framework and the WMO Coordination Mechanism Concept, requested the President of the Commission for Weather, Climate, Water and Related Environmental Services and Applications (SERCOM) to lead the development of the GMAS Framework and the WMO Coordination Mechanism Concept;

7. The first session of the Commission for Weather, Climate Water and Related Environmental Services and Applications, in [Decision 8 (SERCOM-1)](https://library.wmo.int/doc_num.php?explnum_id=10767#page=126) - WMO Revised Framework Concept and Implementation Plan Outline for the Global Multi-Hazard Alert System, requested the Standing Committee on Disaster Risk Reduction and Public Services (SC-DRR) to further refine the GMAS Framework Implementation Plan taking into account the initial GMAS Concept annexed to Resolution 13 (Cg-18) and regional consultations;

8. Accordingly, the Regional Associations guided the framing of the GMAS Framework Implementation Plan through the implementation of pilot projects and endorsement of GMAS related Resolutions and Decision, most notably: [Resolution 1 (RA 1–17)](https://library.wmo.int/doc_num.php?explnum_id=6251#page=8) - Enhancing multi-hazard and impact-based services for disaster risk reduction in Regional Association I; [Resolution 12 (RA II-16)](https://library.wmo.int/doc_num.php?explnum_id=3549#page=125) - Pilot project to enhance meteorological disaster risk reduction capabilities in Regional Association II*;* [Decision 7 (RA III-17)](https://library.wmo.int/doc_num.php?explnum_id=5711#page=87) - Enhancing international exchange of weather forecast and warning*;* [Decision 4 (RA V-17)](https://library.wmo.int/doc_num.php?explnum_id=5693#page=93) - Strengthening multi-hazard early warning services and contribution of Regional Association V (south-west Pacific) to a WMO GMAS; and [Resolution 3 (RA VI-17)](https://library.wmo.int/doc_num.php?explnum_id=4559#page=13) - WMO GMAS;

9. The importance of the GMAS Framework and the need to scale alerting capacities in Members was further stressed by United Nations Secretary-General Guterres in his call at World Meteorological Day in 2022 to ensure every person on Earth is protected by early warning systems (EWS) within 5 years. During the seventy-fifth session of WMO Executive Council, with the adoption of [Resolution 3 (EC-75)](https://meetings.wmo.int/EC-75/_layouts/15/WopiFrame.aspx?sourcedoc=/EC-75/English/2.%20PROVISIONAL%20REPORT%20(Approved%20documents)/EC-75-d04(2)-UN-GLOBAL-EARLY-WARNING-ADAPTATION-INITIATIVE-approved_en.docx&action=default) - UN Global Early Warning / Adaptation Initiative, requested the Commission for Weather, Climate, Water and Related Environmental Services and Applications (SERCOM) to lead, in consultation with the Commission for Observation, Infrastructure and Information Systems (INFCOM) and the Research Board, the Capacity Development Panel, with support of the Secretariat, the development of an initial action plan, in alignment with the next Strategic Plan and based on needs of the most vulnerable Members who need support for establishing effective end-to-end early warning services, to respond to the “UN Global Early Warning/Adaptation Initiative”;

10. Noting that the GMAS Framework Implementation Plan was developed in consultation with INFCOM, and the Research Board and describes the proposed activities required to establish a Framework that includes a repository of warnings and defined information flows and which builds on and leverages existing WMO standards and infrastructure to:

(a) Enhance the alerting capabilities of Members;

(b) Enhance the authoritative voice of Members’ NMHSs in issuing official early warnings.

The Implementation Plan will be built on the following principles:

(a) Promotion of efforts to strengthen Members ability to issue alerts and warnings through national, regional and global capacity strengthening;

(b) Leveraging of existing WMO mechanisms and infrastructure (and their future enhancements), especially within the Global Data and Processing Forecasting System (GDPFS) and the WMO Information System (WIS);

(c) Respecting national mandates and data policies;

(d) Engagement and Outreach with WMO Constituent Bodies;

(e) Ensuring updates to appropriate documents such as in the Manual on the GDPFS;

(f) Recognition that some alerting information may be considered sensitive by Members or issuing institutions;

(g) Support Members to realize the aspirations set forward in WMO Unified Policy for the International Exchange of Earth System Data;

(h) Encourage Members to share products and analysis that may be of use to regional colleagues;

(i) Enhancement of attribution and acknowledgement of authoritative warnings (and other products) to increase visibility of Members at the National, Regional, and Global scales;

(j) Warning issued through authoritative sources are officially recognized, so that they may not be altered or amended by third parties.

**World Weather Information Service (WWIS) and the Severe Weather Information Centre (SWIC)**

The World Weather Information Service (WWIS) and the Severe Weather Information Centre (SWIC – as developed by Hong Kong Observatory (HKO)) are considered as core components of the GMAS Framework. HKO plan further development of SWIC, thereby providing the GMAS Framework with additional options through which to visual authoritative warnings.

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# DRAFT RECOMMENDATION

## Draft Recommendation 5.6(4)/1 (SERCOM-2)

### Global Multi-Hazard Alert System Framework

THE COMMISSION FOR WEATHER, CLIMATE, WATER AND RELATED ENVIRONMENTAL SERVICES AND APPLICATIONS,

**Recalling** [Resolution 5 (Cg-17)](https://library.wmo.int/doc_num.php?explnum_id=3138#PAGE=258), [Decision 6 (EC-68)](https://library.wmo.int/doc_num.php?explnum_id=3166#page=73), [Decision 3 (EC-69)](https://library.wmo.int/doc_num.php?explnum_id=3645#page=172), [Decision 4 (EC-70)](https://library.wmo.int/doc_num.php?explnum_id=4981#page=154), [Resolution 13 (Cg-18)](https://library.wmo.int/doc_num.php?explnum_id=9827#page=69), [Resolution 1 (EC-71)](https://library.wmo.int/doc_num.php?explnum_id=10248#page=9), [Decision 8 (SERCOM-1)](https://library.wmo.int/doc_num.php?explnum_id=10767#page=126), [Resolution 1 (RA 1–17)](https://library.wmo.int/doc_num.php?explnum_id=6251#page=8), [Resolution 12 (RA II-16)](https://library.wmo.int/doc_num.php?explnum_id=3549#page=125), [Decision 7 (RA III-17)](https://library.wmo.int/doc_num.php?explnum_id=5711#page=87), [Decision 4 (RA V-17)](https://library.wmo.int/doc_num.php?explnum_id=5693#page=93), [Resolution 3 (RA VI- 17)](https://library.wmo.int/doc_num.php?explnum_id=4559#page=13), and [Resolution 3 (EC-75)](https://meetings.wmo.int/EC-75/SitePages/Session%20Information.aspx),

**Noting** the global, regional, and subregional platforms such as Meteoalarm of the European Meteorological Services Network (EUMETNET), and efforts underway in the Regional Associations which served as proof of concept for the development of the GMAS Framework,

**Further noting** the development since Cg-18 of the GMAS Framework Concept by the Services Commission Standing Committee on Disaster Risk Reduction and Public Services (SC‑DRR) Expert Team on GMAS,

**Emphasizing** the fundamental role of National Meteorological and Hydrological Services (NMHSs) as the official and authoritative providers of early warnings for hydrometeorological hazards,

**Expresses** its appreciation to the various regional efforts, including Hong Kong Observatory (HKO) and its support through hosting of the Severe Weather Information Centre (SWIC) and the US National Oceanic and Atmospheric Administration (NOAA) and its support to the development of the WMO Alert Hub;

### Having examined the GMAS Framework Implementation Plan prepared by the SC-DRR *[Japan]* in consultation with other subsidiary bodies,

**Recommends** to the Executive Council the adoption of GMAS Framework Implementation Planthroughthe draft resolution provided in the [annex](#_Annex_to_draft_1) to the present recommendation.

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[Annex: 1](#annex)

For more information, see the annexes to the GMAS Framework Implementation Strategy and Plan:

[Annexes I-VII GMAS Framework Implementation](https://wmoomm.sharepoint.com/:w:/r/sites/wmocpdb/_layouts/15/Doc.aspx?sourcedoc=%7B4CA0F332-6DB2-42BD-BE9C-6530CCD4AD81%7D&file=ANNEXES%20I-VII%20GMAS%20Framework%20IP.docx&action=default&mobileredirect=true) Plan

[Annex VIII GMAS Framework Work Plan (6 September 2022)](https://wmoomm.sharepoint.com/:w:/r/sites/wmocpdb/_layouts/15/Doc.aspx?sourcedoc=%7B5A207899-FF6A-4338-AAAF-A76B3A20FA63%7D&file=ANNEX%20VIII%20GMAS%20Framework%20Work%20Plan%202022_09_06.docx&action=default&mobileredirect=true)

## Annex to draft Recommendation 5.6(4)/1 (SERCOM-2)

**Draft Resolution ##/1 (EC-76)**

### Global Multi-Hazard Alert System Framework

THE EXECUTIVE COUNCIL,

**Recalling** [Resolution 5 (Cg-17)](https://library.wmo.int/doc_num.php?explnum_id=3138#PAGE=258), [Decision 6 (EC-68)](https://library.wmo.int/doc_num.php?explnum_id=3166#page=73), [Decision 3 (EC-69)](https://library.wmo.int/doc_num.php?explnum_id=3645#page=172), [Decision 4 (EC-70)](https://library.wmo.int/doc_num.php?explnum_id=4981#page=154), [Resolution 13 (Cg-18)](https://library.wmo.int/doc_num.php?explnum_id=9827#page=69), [Resolution 1 (EC-71)](https://library.wmo.int/doc_num.php?explnum_id=10248#page=9), [Decision 8 (SERCOM-1)](https://library.wmo.int/doc_num.php?explnum_id=10767#page=126), [Resolution 1 (RA 1–17)](https://library.wmo.int/doc_num.php?explnum_id=6251#page=8), [Resolution 12 (RA II-16)](https://library.wmo.int/doc_num.php?explnum_id=3549#page=125), [Decision 7 (RA III-17)](https://library.wmo.int/doc_num.php?explnum_id=5711#page=87), [Decision 4 (RA V-17)](https://library.wmo.int/doc_num.php?explnum_id=5693#page=93), [Resolution 3 (RA VI- 17)](https://library.wmo.int/doc_num.php?explnum_id=4559#page=13), and [Resolution 3 (EC-75)](https://meetings.wmo.int/EC-75/SitePages/Session%20Information.aspx),

**Noting:**

(1) That one of the key drivers in the WMO Strategic Plan is the need to strengthen production and delivery of accessible and authoritative meteorological and hydrological information and services,

(2) The potential benefits of the Global Multi-hazard Alert System (GMAS) in enhancing the alerting capabilities of Members, as described in [Resolution 13 (Cg-18)](https://library.wmo.int/doc_num.php?explnum_id=9827#page=69) - WMO Global Multi-Hazard Alert System,

**Noting further with satisfaction** that Members have already expressed their support for the GMAS Framework through the piloting of demonstration projects,

**Recognizing**: The World Weather Information Service (WWIS) and the Severe Weather Information Centre (SWIC) are considered as core components of the GMAS Framework,

**Expresses** its appreciation to the various regional efforts, including Hong Kong Observatory (HKO) and its support through hosting of the Severe Weather Information Centre (SWIC) and the US National Oceanic and Atmospheric Administration (NOAA) and its support to the development of the WMO Alert Hub;

**Having considered** Recommendation 5.6(4)/1 (SERCOM-2),

**Having agreed** Recommendation 5.6(4)/1 (SERCOM-2),

**Having examined** the GMAS Framework Implementation Plan, including its Annexes, *[Japan]*

**Approves** the GMAS Framework Implementation Plan, including its Annexes, *[Japan]* as provided in the [annex](#_Annex_to_draft_1) to the present resolution;

**Requests:**

(1) The Executive Council to monitor and guide the development of the GMAS Framework Implementation Plan, including its Annexes, *[Japan]* at each session;

(2) The Commission for Weather, Climate, Water and Related Environmental Services and Applications (SERCOM) to:

(a) Establish a process to ensure accountability and governance of the activities of the GMAS Framework;

(b) Explore how best to incorporate the GMAS Framework in relevant WMO frameworks and normative documents such as the GDPFS Manual;

(3) The Regional Associations to support implementation of the GMAS Framework by inclusion and coordination of its activities within their respective regional work plans;

(4) The Secretary-General to:

(a) Facilitate the GMAS Framework implementation, including through the realization of resource mobilization opportunities with development partners and by connecting the implementation of the GMAS Framework;

(b) To ensure the resources necessary to oversee the implementation of the GMAS Framework according to a project management approach;

(c) Report to the Executive Council on the above activities;

**Urges** Members operating Global Data and Processing Forecasting System (GDPFS) Centres to contribute to the implementation of the GMAS Framework;

**Invites** Members to facilitate, through public-private-academic engagement, development of various public and/or commercial services incorporating official and authoritative warnings of Members to be made widely available to the global community, as a result of the GMAS implementation; *[Japan]*

**Further urges** Members to contribute to the GMAS Framework through the secondment of experts or other in-kind and/or financial support.

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[Annex: 1](#_Annex_to_draft_1)

For more information, see the annexes to the GMAS Framework Implementation Strategy and Plan:

[Annexes I-VII GMAS Framework Implementation](https://wmoomm.sharepoint.com/:w:/r/sites/wmocpdb/_layouts/15/Doc.aspx?sourcedoc=%7B4CA0F332-6DB2-42BD-BE9C-6530CCD4AD81%7D&file=ANNEXES%20I-VII%20GMAS%20Framework%20IP.docx&action=default&mobileredirect=true) Plan

[Annex VIII GMAS Framework Work Plan (6 September 2022)](https://wmoomm.sharepoint.com/:w:/r/sites/wmocpdb/_layouts/15/Doc.aspx?sourcedoc=%7B5A207899-FF6A-4338-AAAF-A76B3A20FA63%7D&file=ANNEX%20VIII%20GMAS%20Framework%20Work%20Plan%202022_09_06.docx&action=default&mobileredirect=true)

## Annex to draft Resolution ##/1 (EC-76)

## GMAS Implementation Plan

GMAS FRAMEWORK IMPLEMENTATION STRATEGY AND PLAN

**About this document**

This Vision, Strategy, and Implementation Plan (IP) will guide the implementation of the Global Multi-Hazard Alarm System (GMAS) Framework as directed by the eighteenth session of the World Meteorological Congress (Cg-18), through its [Resolution 13 (Cg-18)](https://library.wmo.int/doc_num.php?explnum_id=9827#page=69).

This document contains two major parts, multiple annexes and an appendix. It was developed by the Expert Team on GMAS (ET-GMAS) leveraging the work of earlier related bodies and of multiple teams, working groups and individuals both within the WMO and in other organizations. It will be regularly reviewed by the Regional Associations, the Standing Committee on Services for Disaster Risk Reduction and Public Services (SC-DRR), the Commission for Weather, Climate, Water and Related Environmental Services and Applications (SERCOM), and Congress, and including comments received via online consultations. Effort was made to ensure that this IP leverages all relevant WMO entities and capacity development activities, as well as other relevant institutions dealing with hazards and alerting.

Although some parts of this plan are well defined, others are generally described because some specifics of implementation are dynamic and will be developed as the alerting framework is built out. Hence, as with many complex implementations, this plan is a living document. Its oversight and management are in the “Way Forward” section of Part II.

Part I includes the vision, context, long-term goals and conditions for success. This is primarily drawn from [Resolution 13 (Cg-18)](https://library.wmo.int/doc_num.php?explnum_id=9827#page=69) – WMO GMAS, and the Concept Note for a WMO GMAS.

Part II presents the IP. It focuses on the objectives, outputs and activities needed to accomplish the purpose of this plan. It also addresses partnerships and the way forward. Specific roles and responsibilities are addressed, particularly for the Technical Commissions, Regional Associations, WMO Programs and activities and Members. This section is intended to be concise but at the same time have enough information to ensure clarity of the intended result. The objectives and outcomes are expected to remain static although the organization could decide to modify facets of the plan as implementation evolves. Execution of some activities requires ongoing development work as well as more detailed information. Therefore, the IP presented in Part II is supported and supplemented by several annexes that are dynamic in nature. The annexes also document additional information relevant to the plan and should be updated on as needed to support the implementation. Additional annexes may be added if needed.

Annex I contains background information and general material that supports the implementation of the alerting framework.

The GMAS Framework has both functional aspects and technical/physical components and will build on existing and future WMO mechanisms and infrastructure, recognizing and highlighting the ownership of Members.

Annex II addresses the functional aspects of the alerting framework. This Annex describes the information flows relevant to the creation and sharing of authoritative alerting and warning information produced by Members and addresses repositories of alerts and warnings. It builds on and leverages existing WMO policies and procedures for sharing authoritative alerting and warning information produced by Members. This Annex is intended to be informative but not normative

Annex III addresses the technical/physical components that compose or contribute to the functional aspects. Many of these components are existing WMO systems or centres operated by Members that contribute to the ability of Members’ to create, share and access alerting information including applicable standards and protocols. These components also provide for users to access information. This Annex will describe components that contribute to the GMAS Framework, including the relevant WMO mandated institutions (as outlined in GDPFS).

This Annex is not intended to replace the documentation in WMO Manuals and Guides such as for the WIS and the GDPFS. It is intended to gather the information or references here in one place to facilitate the implementation of the GMAS framework and potentially aid the update of official documentation.

Annex IV contains the communications strategy to enhance the authoritative voice of Members in issuing official early warnings for high-impact weather, water, ocean, and climate events; promote and improve the availability and accessibility of Multi-hazard Early Warning Systems (MHEWS) as envisioned in the Sendai Framework for Disaster Risk Reduction (DRR) 2015–2030; Enhance the visibility of WMO and its Members in contributing to the Sendai Framework for DRR 2015–2030 and the Sustainable Development Goals (SDGs) to the UN and the media; and d) Foster cooperation and good practices for DRR/MHEWS on national, regional and global levels, including cross-border collaboration.

Annex V contains a list of GMAS Framework relevant resources including technical regulations, guides, training materials, etc.

Annex VI consists of the monitoring, evaluation, and learning process to guide the implementation of the GMAS Framework via a Result-Based Management (RBM) approach, to aid decision-making towards explicit goals and facilitate learning from both past successes and challenges and those encountered during implementation.

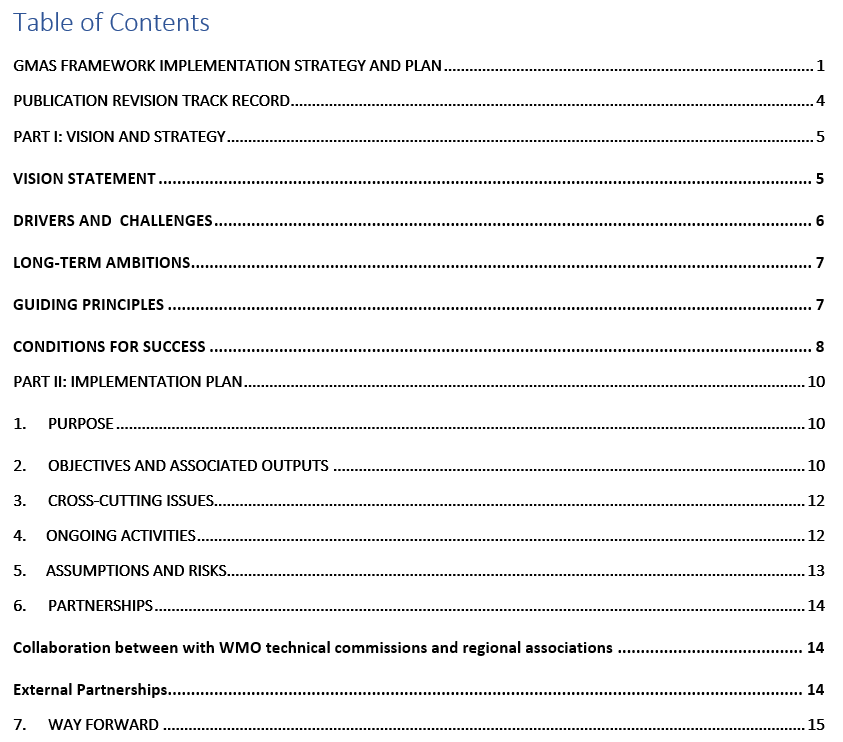
Annex VII consists of the components of capacity development that should be addressed to ensure the objectives of the GMAS Framework are reached. It should be noted responsibility for these components fall to various bodies and institutions across the WMO and its Members and partners

Annex VIII is the GMAS Framework work plan which consists of the recommended actions, and activities designed to accomplish the objectives of the IP. Some of these are already underway and are proceeding in parallel to the development of the IP itself. This is because these activities address already identified needs and tasks that either have a separate but GMAS Framework related driver or decision or the nature of the item is such that the importance or timing of the item warrants it being done in parallel if the objectives of the GMAS Framework are to be accomplished in a reasonable time. The ongoing alerting or warning related activities within the Technical Commissions falls into *[Hong Kong, China]* this category because appropriate constituent body review is needed and waiting until after approval of the IP would significantly set back progress.

Because of the number of items to be accomplished and the overall size of the work plan, Annex VIII is being maintained in a separate document. Although the objectives themselves remain fixed unless the EC or Congress modifies them, the work plan itself will be dynamic as items are completed or new items are identified.

The appendix contains a list of acronyms and definitions as used in the document and their meaning. Whenever existing WMO definitions exist they will be used and cited.

This GMAS FRAMEWORK IMPLEMENTATION STRATEGY AND PLAN (IP) will be kept under review and updated as needed until agreed by the EC or Congress that the GMAS Framework can be considered implemented. Then the alerting framework will continue to evolve through the normal proceedings of the WMO. The conditions to enable the determination of the GMAS Framework as being implemented are included in the IP.



PUBLICATION REVISION TRACK RECORD

Once approved, updates to this IP will be documented here.

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**PART I VISION AND STRATEGY**

**VISION STATEMENT**

*“By 2025 the GMAS Framework is recognized globally by decision makers as a resource of authoritative warnings and information related to high-impact weather, water, ocean, and climate events”.*

**The Rationale for a GMAS Framework** – The primary intent of the GMAS Framework is to be useful and provide guidance to WMO Members as they individually or jointly evolve their alerting and warning services in order to enhance the ability of people and organizations in their societies to save lives and protect property during emergencies. The GMAS Framework focuses specifically on alerting and warning functions across WMO. The impetus for this WMO focus is that alerting and warning has been rapidly evolving in recent decades, spurred by amazing advances in affordable Information and Communications Technologies (ICTs), and by widespread movement toward an all-hazards and all-media approach to alerting and warning. These trends have been surfacing positive synergies and new opportunities, and most WMO Members have been leveraging these with enthusiasm.

As one example of such synergy, alert and warning messages can now be delivered to in‑vehicle navigation systems worldwide, provided the messages are in CAP format and freely available on a host such as the WMO Alert Hub. This capability is realized through an ISO standard, TPEG2-EAW (Emergency Alerts and Warnings), coupled with CAP, International Telecommunication Union (ITU) Recommendation X.1303. Weather and other hazard threats in the domain of National Meteorological and Hydrological Services (NMHSs) are encompassed in this global capability simply because both CAP and TPEG2-EAW are designed for all-hazards.

Another example of increasing synergy is the impact of redistributors of alerting information. Redistributors often play a key role in ensuring alerting information very reaches the public and other users of the information. They expand the reach of alerting authorities. Redistributors of alerting information including traditional media thus can positively contribute and strengthen the authoritative voice of alerting authorities.

The GMAS Framework will leverage these synergies to the benefit of alerting authorities as well those potentially impacted. By addressing alerting holistically as is done with other predictive and guidance information, the opportunity for benefiting relevant multi-hazard domains and the ability to reach a much broader population is significantly increased.

**Transition from Traditional Approaches** – Traditionally, there have been myriad approaches to alerting and warning, often focusing individually on a single hazard threat and a particular channel for dissemination. For instance, approaches to the delivery of weather alerts can involve a wide range of special formats, special-purpose devices, and arcane telecommunications media, and these can vary further according to the audience (e.g., aircraft, ships at sea, the public, etc). The formats and media requirements for alerts and warnings dealing with hazard threats other than weather have been very divergent as well. The net result of so much divergence is a confusing and inefficient patchwork of alerting systems across nearly all types of hazards, with each patch typically managed as a separate “silo”. The GMAS Framework can help WMO Members and WMO institutions to bridge these traditional silos and to leverage the amazing new opportunities.

The traditional, patchwork approach to alerting and warning has evolved profoundly in this century, and this is also evident in uptake of the CAP standard. Today, 90% of the world’s population lives in a country with at least one national-level CAP news feed in operation or in testing. This evolution also tracks with the increasing transition to online media from traditional mass media such as broadcast radio and television. The digital features of CAP messages are attuned to online media to a much greater degree than what is possible with text-oriented mass media.

Implementation of the GMAS Framework has significant complementarity and linkage to improved IBF/IBW. The continuing review and update of the GDPFS should treat alerts and warnings at one end of the spectrum services provided. Likewise, linkage and consistency with WMO’s new Unified Data Policy is essential.

**DRIVERS AND CHALLENGES**

 Key drivers for the development and implementation of the GMAS Framework:

(a) Major gaps in national MHEWS that continue to cause high losses and death tolls;

(b) The need to build disaster resilience by strengthening the capacity of WMO Members’ NMHSs to deliver timely and effective services for DRR as an integral part of their national platforms for DRR and climate change adaptation (see the WMO Statement at the Third United Nations World Conference on DRR (WCDRR));

(c) The targets expressed in international agreements, such as the global Target G of the Sendai Framework for Disaster Risk Reduction 2015–2030 which aims “*to substantially increase the availability of, and access to, multi-hazard early warning systems and disaster risk information and assessments to people by 2030*”;

(d) Growing demand for access to multi-hazard information as decision makers realize the power of assimilating environmental information into both their short-term response and longer-term decision-making processes;

(e) Provision of weather, water, ocean and climate information from non-authoritative sources that continue to proliferate through avenues which at times can cause ambiguity in the minds of disaster managers and the public, resulting in delay to key decisions and, ultimately, loss of life;

(f) The need for the global community, and in particular those who live near political boundaries or are at risk of transboundary hazards, to have easy access to transnational, multi-hazard information including warnings to help mitigate risks and impacts while ensuring respect for the national mandated authorities for warning issuance;

(g) The need to maintain and improve the visibility of National Alerting Authorities (NAAs, including NMHSs) and of WMO and the recognition of their products and services by key national, regional and global users and stakeholders, in order to secure the sustainability of the key mandates of the NMHSs and WMO.

 Challenges to be addressed: (Not all of these challenges can be addressed directly by the GMAS Framework however understanding them and their relevance is important to ensure factors that can mitigate the challenge be *[Hong Kong, China]* considered.)

(h) Users of alerting information need to know who to trust. Multiple players (universities, private sector including global companies and social media, global redistributors, etc) may cause confusion if attribution and recognition of proper alerting authorities isn’t provided or respected;

(i) Some Members may have coordinated practices for multi-hazard early warning in place. Each agency or authority should have an established mandate. Coordination procedures on warning alerting information and dissemination should address the common goal of reaching all impacted users;

(j) Some people at risk do not receive alerts or warnings. The last mile may not be digital or electronic communication. Partnerships should be encouraged between local level organizations and civil protection services. The role of aggregators should be considered;

(k) Some receivers at risk do not understand the alerts or the potential impacts;

(l) Some receivers do not have the capacity or resources to act and even if they do may choose *[Hong Kong, China]* not to act;

(m) Limited information availability, skill or technological capacity may reduce the ability to create or issue high quality alerts and warnings;

(n) There may be organizational inertia that needs to be overcome to improve alerting and waring;

(o) Affordability and sustainability can present challenges to progress;

(p) Understand levels of vulnerability, including from cascading events, can result in lower effectiveness of the warnings and any response.

**LONG-TERM AMBITIONS**

In response to these challenges and drivers of change, the following Long-Term Ambitions are identified and with the implementation of the GMAS Framework should yield societal benefits:

 All Members have the capacity to issue alerts and warnings

 Targeted groups receive and act as a result of issued authoritative alerts

 Official and authoritative alerts and warnings are widely available to the global community in the Common Alerting Protocol (CAP) format *[Japan]*

 Data on global *[Czech Republic]* weather, water, ocean and climate extremes are available

 Decision-making processes are supported by the GMAS Framework

 Science supports alerts and warnings to enhance action

**GUIDING PRINCIPLES**

 Promotion of efforts to strengthen Members ability to issue alerts and warnings through national, regional and global capacity strengthening

 Leveraging of existing WMO mechanisms and infrastructure (and their future enhancements), especially within the GDPFS and the WIS

 Respecting national mandates and data policies

 Engagement and Outreach with WMO Constituent Bodies

 Ensuring updates to appropriate documents such as in the Manual on the GDPFS

 Recognition that some alerting information may be considered sensitive by Members or issuing institutions

 Support Members to realize the aspirations set forward in WMO Unified Policy for the International Exchange of Earth System Data

 Encourage Members to share products and analysis that may be of use to regional colleagues

 Enhancement of attribution and acknowledgement of authoritative warnings (and other products) to increase visibility of Members at the National, Regional, and Global scales

 Warning issued through authoritative sources are officially recognized, so that they may not be altered or amended by third parties

**CONDITIONS FOR SUCCESS**

The conditions needed for successful achievement of the Long-Term Ambitions include the following:

 Provisions are in place to allow any Member(s) or RA(s) or other institutions who wish to operate within the Framework can do so

 Institutional arrangements relevant to the GMAS Framework are in place

 Centres relevant to the GMAS Framework have operational procedures and relationships in place

 Guidance & regulatory material is updated and available

 Responsibilities for ongoing management and update of Framework relevant matters are in place and undertaken by the appropriate bodies

 Key ancillary functions are in place such as monitoring

 Policy, advocacy, and communication activities increasingly embed NMHSs in crisis management decision processes

 Monitoring mechanisms are in place for key indicators of the GMAS Framework

 Members’ alerting and warning capabilities relevant to the GMAS Framework are known

 The value chains for alerts and warnings are defined in guidance materials and understood by Members

 Recommended products and services are defined and updated with through existing review mechanisms

 Mechanisms are in place to identify capacity issues and advocate for solutions

 Cooperation between stakeholders is established and robust

 Cooperation is focused and based on common understandings so the entire system benefits

 Alerting information availability respects WMO Data Policy

 Members’ alerts are widely available to users and redistributors

From a functional perspective, the ultimate success of the GMAS Framework would be to have all relevant alerts and warnings produced, aggregated, displayed and available to Members and the global community, with clear understanding of impacts and actions to be taken and highlighting the authoritative voices from Members worldwide.

From a more technical point of view, success could be considered when the Framework allows the sharing, aggregation, display and use of available authoritative alerts and warnings from Members who are able to produce them.

A more reasonable and realistic view would be a mixed approach, considering the development of technical and physical components together with the number of Members feeding warnings into the Framework. This number (or its yearly increase) could be followed as a Key Performance Indicator (KPI).

From these considerations, capacity development of a significant number of NMHSs is a crucial stake towards a successful GMAS Framework implementation. In this respect, the GMAS Framework IP should incorporate all possible activities benefiting the development of Members’ capacities. As a significant number of capacity development projects are under way under different auspices, donors’ support and cooperation frameworks, it is hoped that the combined efforts will significantly improve the situation over time.

**PART II IMPLEMENTATION PLAN**

**1. PURPOSE**

WMO Members, NHMSs and institutions as well as partners will collaborate under this IP to enact a Framework to enhance alerting capabilities. This IP will be supported by WMO in the period 2024–2027, to achieve the objectives outlined below, thus significantly improving the capacity of Members to deliver alerts and warnings based on the latest science and technology. There are existing ongoing activities relevant to the GMAS Framework that have been agreed by Members through constituent bodies. These activities are in this plan.

**2. OBJECTIVES AND ASSOCIATED OUTPUTS**

**Objective A.** Establish a framework that includes a repository of warnings and defined information flows, building on and leveraging existing WMO standards and infrastructure that allow for sharing authoritative warning information produced by Members.

**Output 1.** Repositories and/or access instructions that allow for sharing authoritative warning and alerting information produced by Members are documented including WIS catalogues and other centres, systems or institutions that aggregate or provide alerting information. Information flows to support this output are also documented.

**Objective B.** Especially for Members that need to strengthen their warning system(s), provide a roadmap for capacity development (on national, subregional and regional levels, including sharing of good practices) to enable them to issue warnings more effectively and efficiently and of higher quality.

**Output 2.** A roadmap for capacity development (on national, subregional and regional levels, including sharing of good practices) to enable Members that need to strengthen their warning systems to issue warnings more effectively and efficiently and of higher quality. This include appropriate guidance and training materials.

**Objective C.** Improve and promote the availability, affordability and accessibility of Members’ MHEWS as envisioned in the Sendai Framework, ensuring that they have authoritative warning information (sources) available to anticipate, mitigate, prepare for and respond to weather, water, ocean and climate events.

**Output 3.** The guidance and training materials needed to improve and maintain Members’ MHEWS as envisioned in the Sendai Framework exists and Members also have access to have authoritative warning information (sources) to anticipate, mitigate, prepare for and respond to weather, water, ocean and climate events

**Objective D.** Enhance the authoritative voice of Members’ NMHSs in issuing official early warnings for weather, water, ocean, climate and space weather events that efficiently reach decision makers and those at risk and Members’ capacity to use authoritative information in preparing for and responding to these events.

**Output 4 a.** Members’ NMHSs and appropriate agencies are documented alerting authorities for issuing official early warnings for weather, water, ocean, climate and space weather events.

**Output 4b.** Arrangements are in place for authoritative warnings for weather, water, ocean, climate and space weather events efficiently and reliably reach decision makers and those at risk.

**Output 4c.** Guidance materials and training is available and provided to Members on how to access and use authoritative information in preparing for and responding to hazardous events.

**Objective E.** Enhance the visibility of the NMHSs to their governments and development agencies and of WMO in general, as key contributors to the 2030 Agenda.

**Output 5.** An outreach and communication strategy is established and implemented to raise the visibility of the NMHSs and the WMO to their governments and development agencies, as key contributors to the 2030 Agenda

**Objective F.** Foster cooperation in disaster risk management and MHEWS on national, regional and global levels, including cross-border and interregional collaboration (creating a community to share warning information and to promote harmonization to the extent possible/appropriate).

**Output 6 a.** Develop and implement a strategy to enhanced cooperation in disaster risk management and MHEWS on national, regional and global levels, including cross-border and interregional collaboration

**Output 6b.** Organize a community of practice to share warning information and to promote harmonization to the extent possible/appropriate

**Objective G.** Provide a framework for development agencies to invest in MHEWS capacity development projects for Members.

**Output 7**. Establish a program or project to facilitate investment by development agencies to support MHEWS capacity development projects for Members.

**3. CROSS-CUTTING ISSUES**

Issue identification and consultations made during preparation of this IP revealed some issues that are cross-cutting in nature and extend across the objectives and outcomes identified. These issues are related mainly to functioning of multiple agencies and domains within the alerting landscape.

In many countries, there are multiple agencies or institutions that have responsibilities or functions relevant to warning and alerting. This often affects the visibility, financing, sustainability, governance and management of Members’ institutions. NGOs also enter this picture. There are often political or governmental aspects that bear on these matters.

This IP should consider and appropriately address monitoring, capacity building, training, resource investment, development and sustainability in order to ensure a robust alerting Framework.

Ensure the WMO Data Policy is considered and its annexes are reviewed in regard to warning and alerting information.

Monitoring and evaluation should address each objective to ensure the conditions for success are reached. However more importantly, to help manage progress and adjust actions to address any areas that are not progressing as expected or desired

**4. ONGOING ACTIVITIES**

**Capacity Development** – A significant number of nations are lacking in the requisite capacity to fully leverage the emerging opportunities highlighted by the GMAS Framework. A couple of examples, WMO joined with IFRC, ITU, United Nations Office for Disaster Risk Reduction (UNDRR), WBU and others in the [Call to Action on Emergency Alerting](https://cap-uptake.s3.amazonaws.com/call-to-action.html). Also, the UN Secretary-General announced on 23 March 2022: “the United Nations will spearhead new action to ensure every person on Earth is protected by early warning systems within five years”. In line with these and other pronouncements, the GMAS Framework IP anticipates the need for significant Capacity Development support for alerting and warning systems. Ongoing and planned capacity development is addressed in Annex VII. It is recognized there will be emerging considerations.

The GMAS Framework IP will support the development of software components to be used as toolkits as well as guidelines, practices and training materials, taking advantage of, and building upon, existing material where available. With such an approach, the benefits will be shared among all GMAS Framework providers.

**Coordination Within and Among Nations** – The GMAS Framework IP recognizes that many actors are involved in delivery of alerting and warning services, and coordination has become increasingly essential. Within a nation, an alerting authority often needs to collaborate with various other institutions such as the national agency responsible for coordinating emergency or disaster response, the national telecommunications regulatory authority, and a range of responder agencies such as civil protection, police, firefighters, etc. At international and global scales, the contributions of governmental, non-governmental, and commercial sector actors can be of great value as well in the enhancement of alerting and warning services. Of course, traditional media as well as online and other media are also essential partners in communicating alerts and warnings to the public. Accordingly, WMO works with UNDRR and ITU in training broadcast radio and television media to understand modern Early Warning Systems and the CAP, as part of the Media Saving Lives initiative.

While WMO has embarked on a GMAS Framework, pilots have been initiated in some regions. Learning from the development and implementation of these pilots will inform the forward trajectory of GMAS in other regions. The prioritized activities for the pilots are designed to enable quick action and quick wins to build momentum to addresses longstanding capacity gaps.

**5. ASSUMPTIONS AND RISKS**

As with any initiative, there are assumptions the key players will have the necessary financial and personnel to accomplish the objectives. This is true for this implementation at national, regional and global levels and across relevant domains.

It is assumed the WMO Secretariat has the appropriate resources to assist Members with the execution of this plan or that they will be made available.

To be fully successful there are also considerations regarding the ability and willingness of key stakeholders outside of the WMO and NMHSs. It is assumed that any shortcoming in this regard can be overcome.

Failure of either of the above presents risks but does not prevent WMO success within the realm of significantly improved alerting and warning capabilities for most of its Members.

Additionally, although it is planned that the objectives and outcomes within this plan be attained within a regular four-year financial period, it is possible that additional time may be needed for some. A key deliverable is that the responsibilities and processes for alerting and warning support within the GDPFS and other relevant programs is in place. As such, continued improvements should be self-guiding and EC or Congress may be comfortable that this initiative can be closed out knowing that evolution will continue as a normal practice of the organization.

Addressing water, weather, climate and other relevant disasters will continue to be considered a priority.

Other potential risks to progress of implementation include:

Changing political landscape, affecting resource availability or needs.

Change to political or societal priorities due to unforeseen events such as another pandemic or highly impactful environmental disasters.

Failure to align with other organizations’ relevant activities, UNEP, UNDRR, IFRC, NGOs, etc.

**6. PARTNERSHIPS**

Successful achievement and implementation of the GMAS Framework will require partnerships to:

 Foster collaboration for sustainable, improved, tailored *[New Zealand]* alerts and early warning services

 Strengthen the alerting capacities of National Meteorological and Hydrological Services *[Czech Republic]*

 Support regional and transboundary initiatives and approaches that optimize coherence in alerts

 Improve the general understanding of the societal benefits of alerts and early warning services

 Stimulate the establishment of partnerships at global, regional, national, and local level including partners from academia, public, and private sectors to enhance impact-based alerts and early warning services

 Strengthen the research and social science linkage bringing science to services

## Collaboration between *[P/INFCOM]* WMO Technical Commissions and Regional Associations

The GMAS Framework development and implementation will be aligned with and benefit from the activities of the WMO Technical Commissions and Regional Associations, their programmes and working mechanisms, including existing projects, activities and initiatives upon which the GMAS Framework can build, such as:

 Elaboration of MeteoAlarm, GMAS-Asia, and the SEE-MHEWS-A Project [RA III, Caribbean] and similar initiatives aiming to enhance multi-hazard impact-based services.

 The Severe Weather Forecasting Programme (SWFP), Flash Flood Guidance System (FFGS), Coastal Inundation Forecasting Demonstration Projects (CIFDP) in the different regions and subregions.

 Implementation of CAP and its harmonization and availability of CAP-enabled systems such as the Finnish Meteorological Institute (FMI) Smart Alert System.

 Peer to peer partnerships between GDPFS centres.

 There are many more relevant contributions from the WMO Technical Commissions and Regional Associations. They are listed in Annex V and will be updated as needed and as the contributions change.

## External Partnerships

Successful implementation of the Framework will require external partnerships with key organizations to:

 Foster collaboration for sustainable, improved, impact-based alerts and uptake in decision-making processes

 Strengthen the capacities of National Meteorological and Hydrometeorological Services to enhance alerting capabilities

 Support regional and transboundary initiatives and approaches to enhance consistency in alerts through data exchange

 Improve the general understanding of the societal benefits of MHEWS

 Assist in responding to the requirements of international processes

 Stimulate the establishment of partnerships at global, regional, national, and local level including partners from academia, public, and private sectors to enhance monitoring and use of data and products

 Foster linkages with UN and Humanitarian institutions including the uptake of alerts in sector specific and other decision-making contexts

 Foster linkages through public private partnership activities that enhance Members alerting and warning capacities

**7. WAY FORWARD**

**Management**

The implementation of the GMAS Framework should be managed as a project following a recognized project management approach. (Cg-18, Res 13)

The Executive Council to oversee and facilitate the implementation of the GMAS Framework. (Cg-18, Res 13)

The Services Commission should lead the implementation of the GMAS Framework. It should coordinate and collaborate with the Infrastructure Commission, Regional Associations and other appropriate bodies. The Secretariat should provide the necessary support functions. With completion of implementation, the activities and supporting functions should have evolved into the routine management of alerting activities for the WMO.

**Communication and outreach**

Activities will be planned to reach out to all key stakeholders to introduce the GMAS Framework concept, including objectives, benefits, risks, capacity development and training, as well as the modalities of how the GMAS Framework will be implemented. Members, other potential users and stakeholders should be cognisant of their roles and should be informed on the project progress and achievements. Events, activities, basic documents and general information material (e.g., factsheets, leaflets, posters) will be made available widely, possibly on a GMAS Framework dedicated website.

A communication and outreach strategy is an integral part of the GMAS Framework IP and is included in the Work Plan. A consultant has been hired to develop the communication strategy.

**Resources Including Budget**

Once this IP is approved, the Secretariat in consultation with Members should make the appropriate resources available to support the activities needed to reach the expected outcomes defined in this plan.

It should be noted that the activities and outcomes relevant to this plan are spread across the WMO organization. They include those related to infrastructure such as for the centres and protocols relevant to generating and sharing alerting information; those related to providing training, updating competencies and providing guidance and documentation, and those needed to monitoring progress and collaborate with Regional Associations and partners.

**Monitoring and assessment of the IP**

The monitoring and assessment of the GMAS Framework IP will be done by the Executive Council based on inputs and monitoring of progress of work plan of Technical Commissions, Research Board, Regional Associations and other implementing bodies and by assessment of defined milestones and success criteria for all activities, outputs and outcomes. Reports on progress will be produced for consideration of EC and Congress (Cg).

The evaluation methodology will be designed against key implementation activities as identified in the GMAS Framework IP and will focus on activities, deliverables, timeline, and responsibility with respect to the resources available. Midterm evaluation, interim progress reports and post-implementation reviews will be planned as a means of providing early feedback on progress towards success, and as a means of meeting accountability and transparency requirements for the development and implementation phase.

**Review of the IP**

Based on the monitoring and assessment, the Services Commission through its relevant bodies will provide a periodic update of this plan and submit it to the Executive Council for endorsement and guidance. The Services Commission will coordinate with the Infrastructure Commission, Regional Associations and other relevant groups.

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