WORLD METEOROLOGICAL ORGANIZATION

POLICY FRAMEWORK FOR PUBLIC-PRIVATE ENGAGEMENT

(Approved by the 70th Session of the Executive Council, June 2018)

1. INTRODUCTION

1.1 Global factors

WMO, as a United Nations organization, is driven by the Global UN agenda. Today, it is based on the 2030 Agenda for Sustainable Development adopted in 2015 with its 17 Sustainable Development Goals (SDG). The achievement of the 2030 SDGs will require different sectors and actors working together in an integrated manner by pooling financial resources, knowledge and expertise. The new development era with 17 intertwined SDGs and 169 associated targets as a blue print for achieving the sustainable 'Future We Want', cross sectorial and innovative multi-stakeholder partnerships will play a crucial role for meeting the targets by the year 2030.

Sustainable Development Goal 17, which reads "Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development", recognizes multi-stakeholder partnerships as important vehicles for mobilizing and sharing knowledge, expertise technologies and financial resources to support the achievement of the SDGs in all countries, particularly developing countries. Goal 17 further seeks to encourage effective partnerships between public, private and academic sectors, as well as civil society, building on the experience and resourcing strategies of partnerships.

The majority of United Nations organizations have adapted, or are in the process of adapting, their respective strategies and/or policies to reflect the 2030 Agenda.

1.2 WMO context

WMO Congress defined 'partnership' as working with international agencies, other organizations, academia, the media and the private sector to improve the range, quality and delivery of critical environmental information and services. WMO partnerships, some of which were formed decades ago, are in concert with the rolling WMO Strategic Plan which maintains a strategic objective 'Strengthened Partnerships' with the realization that new and strengthened partnerships and cooperation activities are needed to improve NMHSs' performance in delivering services and to demonstrate the value of WMO contributions within the United Nations system, relevant regional organizations, international conventions and national strategies.

An important milestone in the WMO history of partnerships with non-State entities was the adoption by the Twelfth World Meteorological Congress (1995) of a policy on, and a new practice for, the international exchange of meteorological data and products (Resolution 40 (Cg-XII)). An annex to Resolution 40 provided "Guidelines for relations between National Meteorological or Hydrometeorological Services and the commercial sector". It was clearly stated in these guidelines that the purpose was "to further improve the relationship between NMSs and the commercial sector. The development of the exchange of meteorological and related information depends greatly upon sound, fair, transparent, and stable relations between these two sectors."

The WMO World Weather Open Science Conference (WWOSC) held in Montreal, August 2014, put a special focus on the need for a broad dialogue between the public and private sectors, with a strong engagement of academia and other relevant entities, such as learned societies, to respond to the changing landscape of the weather, climate and hydrological science and services, which could be best described as a Global Weather Enterprise. The outcomes of the WWOSC discussions encouraged the conduct of a series of multi-stakeholder follow-up

dialogues supported by the WMO and partner organizations, such as the Global Facility for Disaster Reduction and Recovery (GFDRR) of the World Bank Group and the Association of Hydro-Meteorological Equipment Industry (HMEI).

The Seventeenth World Meteorological Congress (Cg-17 (2015)) gave a new perspective to partnerships by acknowledging the growing involvement of entities which can be identified as belonging to the "private sector" (private companies, citizen's associations, bloggers, etc.) in weather, climate, water and related environmental matters. These private sector entities have been active to a varying extent in the full value chain of activities, starting with observations; extending to data acquisition tools and technologies, information generation and processing technologies; and culminating in product dissemination and services. Congress thus recognized this part of the private sector as a set of stakeholders in end-to-end service delivery supporting the WMO vision, mandate and objectives. Congress highlighted the different, and at times, complementary roles and responsibilities of NMHSs, academic institutions, research and technological agencies, and the private sector. It was felt that closer interactions between the public and private sectors would stimulate innovation and facilitate cross-fertilization, ultimately benefitting the society. Congress noted that WMO had a unique opportunity to initiate such an interaction and emphasized that inaction may limit the benefits to be derived for the users. On the other hand, such activities could also lead to proliferation of weather and climate information of various nature and quality which could challenge the NMHSs mandate to disseminate authoritative weather information and warnings to the public and disaster management authorities as well as the rest of the enterprise in delivering on their missions. It was also recognized that the private sector initiatives do increase the availability of weather services for the citizens; it was of paramount concern to ensure the sustainability of NMHSs over time.

Acknowledging the challenges, Cg-17 recognized that WMO guidance on engagement with the private sector would help NMHSs to keep pace with the activities at the national and international levels and enhance efficiency and service delivery, including in support of the development of observational and communication infrastructures at the local and regional level.

Following the directives given by the Cg-17, several activities have been undertaken with the aim to build awareness and improve the understanding between the public, private and academic sectors. The 68th Session of WMO Executive Council (2016) held for the first time a Special Dialogue on the "complementary and cooperative contributions of public and private sector institutions to meteorology and hydrology". In 2017, EC-69 adopted "A Roadmap to the Eighteenth World Meteorological Congress on the Public-Private Engagement (PPE)". A key element of this Roadmap is the development of a WMO Policy Framework on PPE which would assist Members and stakeholders from all sectors by providing a set of guiding principles and highlighting the challenges and opportunities that need to be addressed in order to harness the potential benefits from working together for the benefit of society.

2. OBJECTIVES OF THE POLICY FRAMEWORK

The Policy Framework for Public-Private Engagement guides global, regional and national action by the World Meteorological Organization and its Members to promote active engagement between the public, private and academic sectors, and all stakeholders to successfully manage and participate in the Global Weather Enterprise. It outlines principles and guidelines aimed at maximizing the benefits of an inclusive weather-enterprise approach.

Developed in line with Resolution 67 (Cg-17) and Decisions 73 (EC-68) and 61 (EC-69), the Policy Framework outlines:

(a) The current potential for public-private engagement in the context of the Global Weather Enterprise;

(b) Principles for public-private sector engagement based on the "Key Issues to be addressed in developing policies and principles for engagement" (Annex 2 to Decision 73 (EC-68));

(c) Evolving roles at stakeholders at global regional and national levels;

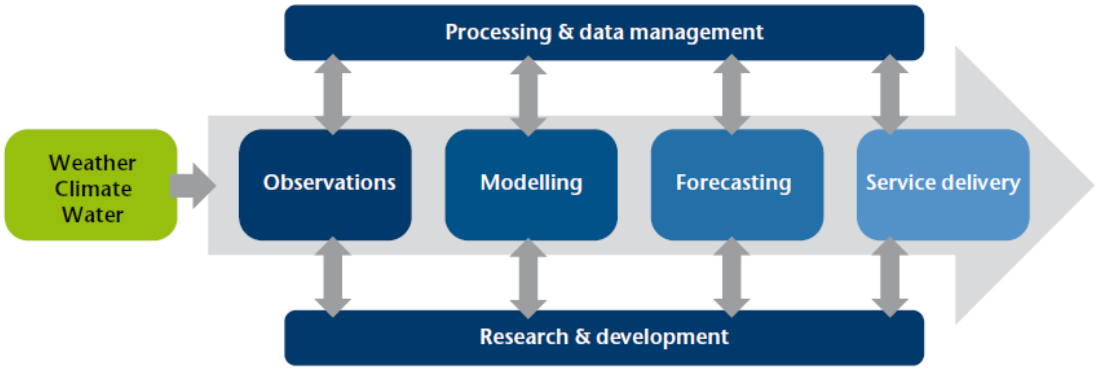
(d) Options for guiding public-private partnerships and directions for development of WMO guidance to Members.

This framework is intended to serve as a first step in on-going work to address these issues and shape a robust way forward in a changing environment. It aims to build understanding and enhance cooperation among stakeholders to sustain and expand the weather enterprise and to maximize its benefits to society in the short- and long-term. The framework seeks to strengthen and enhance opportunities for Members, their NMHSs and the private sector, on the basis of ethical behaviour to ensure a level playing field, enable efficiency and innovation, and utilize an inclusive approach to funding fundamental infrastructure and research.

The framework supports and builds upon the WMO Convention, existing policies and related regulations and guidance. The Convention has ensured the world's nations do cooperate to create and sustain an international system to observe and predict weather, climate and water; provide reliable information and services to support effective decision-making; reduce the loss of life and property; further sustainable development; and preserve the environment and the global climate for present and future generations of humankind.

3. PUBLIC-PRIVATE ENGAGEMENT IN THE GLOBAL WEATHER ENTERPRISE

The need for a WMO Policy Framework on PPE stems from the realization of a new landscape in all business areas covered by the WMO Convention, which form the value chain of the weather, climate and hydrological services.



(Figure taken from: *Valuing Weather and Climate: Economic Assessment of Meteorological and Hydrological Services*, WMO-No.1153)

The flow of activities along this value chain and the interconnections between its modules need to be further analysed in the context of the Global Weather Enterprise. This would allow to identify potential for gaining efficiency and improving quality through partnership arrangements with the participation from all sectors, in particular, partnerships that will enable

bridging existing gaps in capacity and access to essential information and products in the developing part of the world.

3.1 Historic perspective

An enterprise notion and multi-stakeholder approach could be traced back deeply in the roots of the WMO and its preceding international cooperation initiatives. It is seen in one of the first meeting invitations send to the international meteorological communities:

"We venture by the present circular to invite the heads of Meteorological Institutes, the Meteorological and other Learned Societies, as well as private scientific men and practical observers in the domain of Meteorology, to this consultative meeting, which is to be held in Leipzig …"

From the invitation letter to the Meteorological Conference at Leipzig[1], August 1872

The weather enterprise of the 20th century was primarily based on public sector investments. WMO Member States collectively built a global infrastructure under a globally coordinated World Weather Watch (WWW) Programme, composed by three global systems – the Global Observing System (GOS), the Global Telecommunication System (GTS) and the Global Data Processing and Forecasting System (GDPFS). WWW has been realized and made operational on a 365/24/7 basis through an agreed set of global standards for observations, data processing and service delivery which ensured the needed harmonization and interoperability. A number of global and regional centres hosted by NMSs formed the backbone of the communication and numerical modelling needed for the forecasting of the main atmospheric variables. States cooperated, coordinated and collectively invested in building the expensive satellite segment of the Global Observing System.

While the WWW was a predominantly a public sector endeavour, it would not have been successful without an essential scientific and technological support from the academia and the private industry. At that stage, the participation of the private sector in the service delivery was generally limited with the exception of several countries, where private companies have become prominent mostly in the provision of weather services to media outlets.

Significant changes in the weather enterprise structure started happening during the last 10-15 years. While this change is evident across the globe its manifestations vary greatly by region and country. Five primary factors are influencing change:

(a) Scientific and technological innovation;

(b) Growing demand for meteorological, climatological, hydrological, marine and related environmental products and services from commercial interests, the general public and government sector;

(c) Global action for adaptation to climate change and the United Nations Sustainable Development Goals;

(d) Public-sector institutional and resource constraints;

[1] Leipzig Conference (1872) prepared the way for holding, in Vienna in 1873, the First International Meteorological Congress, which established the International Meteorological Organization (IMO), the predecessor of the WMO.

(e) Private-sector increased involvement and investment, consolidation and globalization.

These factors shape the processes within the global weather enterprise with a pronounced trend of accelerating growth in terms of stakeholder participation and financial turnover. Amidst this change, it remains in the interest of all parties to have a robust national and global meteorological and hydrological infrastructure, as this forms the information backbone of the global weather enterprise. This requires all countries to reaffirm their commitments and acceptance to their responsibilities in funding and operating national observing networks and communication means, adherence to respective standards and procedures necessary to sustain a global sharing of requisite and quality assured. Substantial internationally coordinated scientific and research effort underpins the operational systems and ensures their evolution with uptake of innovation, as well as continuous human capacity building through education and training.

From being mostly engaged in manufacturing equipment and providing media services, recently, the private sector involvement has been rapidly growing in all aspects of meteorological and hydrological services, including a number of companies building 'end-to-end' capability with regional and global coverage. Such a growth is substantially expanding both opportunities and challenges for all players, including the NMHSs.

3.2 Evolving roles

The impact of these changes on the current institutional arrangements widely accepted by WMO Members for the collection, processing, and exchange of meteorological, hydrological, climatological and other environmental data, as well as for the generation and provision of respective information and services, could be far-reaching. The potential exists to improve the efficacy and reach of warnings, forecasts and other services within societies around the world. At the same time, concerns have been raised that these changes might erode the core observational assets usually managed by NMHSs, as well as their status, funding and modes of operation. Such erosion could impact sustained long-term, national observing capabilities, and thereby harm national and global climate monitoring. There could be risks to the role of NMHSs as the single national authoritative voice for severe weather warnings and other core governmental purposes, all of which could have negative impacts on end users and other stakeholders of the weather enterprise. There are numerous case studies and practices present in various parts of the community today and examples from other sectors that can inform best practices for effective PPE to mitigate these risks.

Within the weather enterprise, national, regional and international institutions and business models vary greatly. All stakeholders, however, contribute to the core mission of the enterprise to help protect life and property, to help foster economic growth, and to improve quality of life. Government, private sector, academia and civil society all play important roles. By its Convention, WMO plays a key role in understanding and facilitating the contributions of Member countries and their weather enterprise stakeholders.

Historically, the public sector has led funding and development of the backbone infrastructure of the weather enterprise. The development of observational networks and provision of weather, climate and hydrological services have been considered as national governments obligations as "public goods"[2]. Recently, technological changes and changes in users' requirements have provided new opportunities for the private sector to contribute to the provision of those services in support of public interest as well as to meet specific stakeholder needs.

In the case of weather services, one of its distinguishing characteristics is its dependence on observational data from around the globe. No one nation could provide even basic services to its citizens without continuous, real-time access to such data internationally. While investments in obtaining these observations are made at the national level, the collective benefits only accrue if: (i) a sufficiently large number of nations decide to make these investments; and (ii) these nations share the resulting data with each other. Members have invested in public sector institutions because weather, climate and hydrological services have proved essential to the safety and security of their citizens; a fundamental role of government. These factors should still be true even in the case of both public and private sectors contributing to collection of data.

At the same time, the private sector is also a valued contributor in well-being of nations and has been active in the weather enterprise for decades across all elements of the value chain. It serves a number of very important roles, including as a source of investment, a driver of technological development and innovation, a partner in service development and delivery, and an engine for economic growth and employment.

4. PRINCIPLES OF ENGAGEMENT

A major role of the Policy Framework is to establish a set of basic principles to provide directions, express responsibilities and goals. The PPE policy framework steps on the core values and goals of the WMO as an organization, and serves two main tasks: to guide an effective engagement of the public, private and academic sectors in the GWE, and to guide Members' intentions and efforts in expanding the public-private-academic partnerships for ensuring better service to their governments, business and citizens.

These principles will provide a framework to facilitate the formulation and implementation of partnerships between the WMO and the business sector, respectively, between the NMHS and private sector at country level, while safeguarding the integrity, impartiality and independence of the WMO and preventing and mitigating potential risks of adverse impacts on core mandates and services.

4.1 'People First' principle

Recognizing the core mandate of supporting local-to-global decisions related to saving life, property and economic productivity, by providing essential, meteorological, climatological,

[2] Public goods, in economic terms, are those that exhibit the following two characteristics:

Non-rivalry of consumption – one person's consumption does not reduce the amount available to others; and

Non-excludability – it is impossible or extremely expensive to exclude from benefit a person or organization that refuses to contribute to the cost.
These two characteristics mean that even in free market economies, market processes do not provide them, or do not provide them at socially optimal levels.

hydrological and environmental information, WMO adheres to the "People First"[3] approach to public-private engagement and partnerships promoted by the UN Economic Commission for Europe (UNECE) and widely accepted as a vehicle to achieve the UN SDGs.

'People-first' principle sets out a clear statement that out of all the stakeholders, 'people' should be the priority and main beneficiary. The focus of PPE and PPPs in the context of the GWE should be on improving the safety and quality of life of communities, particularly those that are fighting poverty. GWE partnerships should provide increased access to essential, affordable and fit-for-purpose products and services for all, thus contributing to resolve vulnerabilities and sensitivities to weather and climate impacts, which in turn would strengthen the enterprise by creating new demand and opportunities for weather, climate and hydrological services.

WMO contributes to this 'People-first' principle with its programmes supporting meteorological and hydrological service providers including NMHSs with free and open available data and products.

4.2 WMO Guidelines on commercial relations

Commercial weather activities have been growing in the last two decades of the 20th century. WMO had the challenge to find a solution to crucial issues facing WMO and the world meteorological community: how to maintain and improve the free exchange of meteorological data and products whilst safeguarding the economic concerns of Members and the development of their national Meteorological Services.

In response to this, Congress adopted a policy showing that WMO was committing itself to broadening and enhancing the free and unrestricted international exchange of meteorological and related data and products. This policy, known as Resolution 40 (Cg-XII), provided also "guidelines for relations between national meteorological or hydrometeorological services (NMSs) and the commercial sector" (Annex 3 to resolution 40), with the understanding that the development of the exchange of meteorological and related information depends greatly upon sound, fair, transparent, and stable relations between the public and 'commercial'[4] sectors. While dating back to more than 20 years now, most of the generic guidance on the relations between the non-commercial (or non-for-profit) entities and commercial entities, co-existing in the data and service delivery domains, remain valid in their attempt to 'urge' the sectors 'to recognize the interdependence and mutual benefit possible from cooperative interaction. However, it has also been recognized that adoption and application of these guidelines is highly variable.

4.3 Mutual benefit

A successful GWE builds on both public sector and private sector contributions, and each sector contributes to the success of the other. While the public sector is more likely to invest in long-term programmes and underpinning core infrastructure, such as that required to deliver the sustained, high quality climate record, the private sector can be more responsive to selected investment in data gaps to meet special needs and application of emerging technologies. The public sector's deep understanding and trusted connection with its user community is critical to assured community safety through responsiveness to authoritative warnings, while the capacity and technological agility of the private sector can present opportunities to meet novel

[3] Promoting People first Public-Private Partnerships (PPPs) for the UN SDGs, UNECE, July 2016

[4] Resolution 40 uses the term 'commercial sector' with the understanding that the guidelines apply to the commercial sector engaged in meteorological activities, which includes government organizations engaged in commercial meteorological activities.

and emerging service needs. The WMO offers a strong foundation of science, data and global standards which can inform and influence the development of these services and offer assurance to end-users regarding their quality. The private sector depends on the essential scientific and observational underpinning provided by the public sector and can be powerful advocates for sustained government investment in core public infrastructure and capability.

Recognizing the key importance of data availability for all sectors of the GWE, a commonly developed and agreed framework to promote fair and equitable exchange of data and products will be essential for a successful cooperation on all matters concerning the GWE and will contribute to the full realization of its potential. Such a framework would be equally applicable to both private and public sector. It will be particularly important for life-saving missions, like disaster risk reduction, and for improving the access to critical information in the least developed countries, to establish sustainable and affordable conditions for access to data from the private sector.

4.4 Towards a new set of principles for public-private engagement

In moving forward, public-private engagement activities should be guided and informed by the following set of principles, which are derived from the UN Global Compact[5] as well as from guidance given by the Executive Council (Decision 73 (EC-68) refers).

A. Advancing the over-arching goals articulated in the WMO Convention, namely:

(a) Protection of life and property;

(b) Safeguarding the environment;

(c) Contributing to sustainable development;

(d) Promoting long-term observation, collection and sharing of meteorological, hydrological and climatological data, including related environmental data;

(e) Promotion of endogenous capacity-building;

(f) Meeting international commitments;

(g) Contributing to international cooperation.

B. Shared value: Engagement between the public, private and academia sectors should create shared value and seek "win-win" situations whereby both public entities and businesses can recognize the opportunities for innovation and growth, based on science, in meeting society's needs. Creating shared value can be done by leveraging private-sector expertise and supporting technology transfer, by promoting free and unrestricted data sharing based on national circumstances with intellectual property rights duly respected, and by accelerating uptake of research and technological developments into operations and stimulating the generation of new services, translation and dissemination of valuable knowledge, and by investing in local research and developing human capacity through training, thereby supporting the sustainability of the global weather enterprise.

C. Sustainability: Public, private and academic sectors should seek opportunities for engagement where they can provide leadership on matters critical to sustainability of the

[5] Information about UN Global Compact is available at: https://www.unglobalcompact.org/

weather enterprise and where joint action is needed to gain efficiencies and better serve society. The three sectors should seek to identify opportunities to assume complementary roles, minimizing overlap or competition where this would lead to inefficiencies or be detrimental to the sustainability of the weather enterprise.

D. Advancing together: The rapid development of science and technology carries the risk of widening the gap between the developed and developing countries; the availability of global service providers might lead to marginalization of national agencies if not up to required service quality requirements. At the same time, there is also an opportunity for developing countries to leapfrog ahead with the smart adoption of innovative solutions in implementing those activities WMO defines as the key role of NMHSs, i.e., providing the core observing infrastructure and authoritative voice in public safety related services that must be recognized and maintained. At the same time, a new approach to a better engagement with private and academic sectors as well as to investment policies, both national and through development financing, should be promoted to support and enhance the provision of high quality products and services to users in all countries based on need. This will include efforts to help bridge existing gaps and develop capacity of developing countries, LDCs and SIDS, through public-private-academia-donors partnerships for sustainable development projects. A key principle to be maintained is that all countries, no matter what their state of development, should have the possibility and be helped to advance.

E. Level playing field: Both public and private sectors have much to offer to advance collective objectives in support of the public goods and specific stakeholder needs. As such, public and private sector communities should both have the opportunity to propose cooperative arrangements or other forms of engagement which will facilitate working together, when appropriate. Weather, climate and hydrological services offered by both public and private sectors should be provided with an assured level of quality. WMO and Member governmental agencies can engage with the private sector for the purposes of development and provision of products and services that explicitly support and accelerate achievement of the goals of WMO and those of Member governments. However, to the extent reasonable, engagement should not provide exclusivity or imply endorsement or preference of a particular private-sector entity or its products or services. Moreover, over the past decade, the private sector has invested in various aspects of the weather enterprise, including in observational networks and dissemination mechanisms. This creates a unique opportunity for two-way collaboration and sharing, including of data and expertise, to facilitate the attainment of common objectives and extract maximum benefit from the value chain for all involved. In the interest of a commonly supported level playing field, exclusivity of data ownership existing on both the public and private side of activities of data gathering and dissemination should be avoided.

With due regard to national legislation, members should ensure that access to commercial data with use restrictions is treated equally between private arms of NMHSs and private sector companies. All enterprise stakeholders, including NMHSs, should comply with relevant national legislation and policy with respect to both data provision and the avoidance of anti-competitive behaviour. Where an NMHS operates both public and private arms, these should be treated as distinct entities when engaging in activities including: the exchange of data and products (including computer model output); and the provision of services (including consultancy services). Furthermore, where an NMHS with a private arm receives or generates data or products that it does not completely distribute on a full and unrestricted basis under resolutions 25, 40 or 60 to commercial users, the commercial activities of the NMHS should receive equivalent treatment as commercial users.

F. Integrity: WMO and the public agencies established by its Members should seek to engage in mutually beneficial relationships and partnerships with academia and the private sector

so as to benefit society. The integrity of the WMO and the agencies established by its Members, as well as their credibility, independence and impartiality should be maintained in the engagement.

G. ***Sovereignty:*** The prerogative of WMO Members in how weather, climate and hydrological services are to be arranged and provided within their sovereign nations should be respected. This includes national or regional policies for making public data and products available on an open and free principle.

H. ***Transparency:*** Engagement with the private sector should be transparent. Information on the nature and scope of major arrangements should be available to the concerned entities and to the public at large.

5. GLOBAL, REGIONAL AND NATIONAL ROLES

Promoting better public-private engagement would require on-going consultation and action at global, regional and national levels. This will include defining respective roles of WMO constituencies in their interaction with other stakeholders of the weather enterprise.

5.1 Global level - The World Meteorological Organization

The World Meteorological Organization facilitates worldwide activity and cooperation around weather, climate and water for the benefit of all nations and humankind overall. The WMO role supporting effective public-private engagement includes:

A. ***Modernized and clearly articulated standards and recommended practices.*** WMO is a recognized standard-setting organization and its standards and recommended practices are developed to enable a unified global data exchange in the weather, climate, water and environment areas; a highly harmonized data processing and forecasting; as well as, provision of services with an acceptable level of quality and standard to specific economic sectors and the public. Standards are constantly developing based on both evolving requirements and evolving technology. WMO, throughout its existence (and before that time, the International Meteorological Organization (IMO)) managed to mobilize a global community of expertise to support the development, validation and promulgation of standard and recommended practices, which, once approved by the Congress, provided the needed level of standardization, interoperability and investment-sharing that led to the today's highly successful Global Weather Enterprise. With the understanding that these regulations shall be respected by all providers in all Member countries, WMO should in the future engage more experts from the private sector and academia, including through sector's professional associations like the HMEI and other relevant international bodies, in the standard-setting process for a shared ownership of these standards. As WMO work in standards and practices setting expands to consider PPE, care should be taken in not prescribing specific solutions but rather should focus on desired outcomes and performance. WMO should also enhance its role to help ensure quality in data and services. In particular, compliance with standards should be promoted in all enterprise sectors and supported by agreed verification and validation measures.

B. ***Encouraging free and unrestricted exchange of data*****.** Governments who signed the WMO Convention have committed to following its regulations, including standards and practices related to the collection and sharing of data and products between stakeholders to support the global infrastructure as outlined in Resolutions 25 (Cg-XIII), 40 (Cg-XII) and 60 (Cg-17) and relevant technical regulations. WMO will develop and adapt guidance for NMHSs and other stakeholders as needed on free and unrestricted exchange of data as it applies to

the current environment, in which private-sector entities may assume larger roles in data provision.

***C. Facilitating dialogue between all stakeholders*.** WMO should, together with its Members, formulate strategies to better communicate the value of public meteorological and hydrological services. Furthermore, WMO has proactively set up and participated in the on-going global dialogue between public, private and academia stakeholders, engaging players and tracking developments and trends. Over time, and giving due consideration to existing forums, it should lead development of formal mechanisms to support regular, on-going dialogue with private and academic sectors along all parts of the value chain. Such mechanisms should provide a platform for exploration and resolution of issues and should seek to offer the members of the enterprise more parity in order to foster a spirit of cooperation and partnership. The governance structures and experience of other international organizations may provide useful models. WMO technical commissions should actively seek to better engage available expertise not only from the public sector, but also from academia and private sector. Such an all-inclusive approach will require innovation in the way the technical bodies conduct their business engaging efficient use of modern communication and collaboration technology.

***D. Investigate emerging issues as well as new roles, and implementing such roles as appropriate*.** As the weather enterprise evolves, WMO should monitor issues emerging around public- private engagement that could significantly affect either its Members or the sustainability of the global weather enterprise. Among those issues, it should investigate the feasibility and desirability of taking on new roles to help ensure quality in data and services. For example, in an increasingly crowded marketplace, there is a pressing need for an international authority to objectively validate the quality of the provided information and services, thus helping users in their selection of providers based on quality assurance. WMO programmes and expert bodies have been engaged in the development and implementation of verification methodologies, inter-comparison campaigns and quality management guidance. Verification of forecasts of different providers from both private and public sectors has also been done by independent third parties. In the future, such quality assurance activities should be better coordinated and criteria should be developed with the participation of the three enterprise sectors in order to distinguish between a "good service" and a "bad service". The WMO Secretariat also needs to continue to expand dedicated expertise in "meteorology as a business".

5.2 Regional level – regional associations

WMO regional associations interface with their Members, liaise with other stakeholders, designate and support regional centres for delivery of regional services to Members. To support engagement with private sector and other stakeholders, regional associations are urged to take on roles including:

***A. Gathering and disseminating information and guidance*.** Regional associations are urged to facilitate change management and advocate for inclusive consultations, including knowledge and experience sharing, in order to enable Members to learn from each other and provide support as needed for effective public-private engagement. Knowledge can be shared globally through the WMO Secretariat to regional and national levels, as well as directly by regional associations with Members and other stakeholders.

***B. Raising awareness and capacity-building to Members*.** Regional associations are urged to provide capacity-building training to agency staff and leadership in practices needed for effective promotion of the value of weather services as well as public-private engagement. Such a capacity-building should highlight the need for public-private-academia

partnerships in the light of the UN SDGs and should come with practical examples of good national practices.

***C. Exploring further cooperation in service provision at regional and sub-regional level*.** The regional associations should take a lead in informing their Members of the ongoing development of the Global Weather Enterprise and its expected growth. A key element to be well understood and exploited is the increasing internationalization of the service delivery. Modern technology allows for a global and regional provision of data and information services which in the past were provided exclusively by national entities. Such a trend poses both opportunities and risks, which regional associations should address to help their members adapt to this new environment. In particular, regional associations should study and promote examples of regionalization of certain services through bilateral or multilateral cooperation between Members which improve competitiveness of services and reduce their costs. Such sub-regional and regional approach should again not be limited to the public sector, but to explore achieving more efficiency through public-private cross-border engagement without compromising national mandates or quality requirements.

5.3 National level – Members and NMHSs

Given the increasing participation of the private sector, Members and their designated agencies such as NMHSs are urged to take action to maintain and improve agency engagement with the private sector to strengthen the weather enterprise with the aim of maximizing benefits to the Members in the short- and long-term. Effective engagement also offers opportunities to strengthen NMHSs and all entities involved in the weather enterprise. Roles include:

***A. Fostering structured dialogue with the private sector*.** Members and their designated agencies such as NMHSs are urged to reach out proactively to set up structured dialogue between public, private and academic sector stakeholders on issues of common interest. Regular dialogue would be more effective to improve mutual understanding and foster relationships. In this, Members and NMHSs may benefit from recognizing the opportunities where national objectives converge with those of the private sector.

***B. Encouraging appropriate legislation, business models, performing change management and building on core strengths*.** In an environment where private sector engagement in meteorological and hydrological services is likely to continue in the decades ahead, NMHSs should strongly consider building expertise, to develop their research and development capability, and to continuously enhance the quality and dissemination of their products and services to allow them to thrive in an increasingly competitive environment. They may also wish to undertake initiatives in order to understand and adapt to on-going changes in their business models, including potential initiatives involving national legislation to enable effective public-private engagement to leverage resources and build upon the strengths of the sectors. Recognizing the increasing stress on the public budget in many States, which in turn puts a lot of stress on the NMHSs ability to maintain and develop their infrastructure and service capacity, national legislation enabling effective and equitable public-private engagement, creating 'win-win' solutions to serve better the society and strengthening the authoritative role of NMHSs, may be appropriate.

***C. Promoting uptake of WMO standards and guidance*.** On an on-going basis, Members' governments are urged to ensure that all national players providing meteorological or hydrological functions comply with WMO technical regulations (standards and recommended practices, procedures and specifications) that are designed to ensure global standardization and quality of data and products. WMO will also issue guidance for effective engagement between public and private actors in the weather enterprise and to provide some 'rules of

engagement' for Members and other stakeholders. Members also are urged to promote awareness of and compliance with these standards and guidance among other stakeholders.

***D. Fostering partnerships between public and civil society entities*.** In an evolving world, with societal vulnerabilities to weather and climate risks growing, designated Member agencies such as NMHSs are strongly encouraged to consider the needs and resources of public sector and civil society weather, climate, hydrological, marine and other related service consumers, and where opportunities exist to improve services for vulnerable end users, to seek to provide data and other information at cost-recovery rates or less.

***E. Exploring new partnerships at national and cross-border nature*.** In anticipation of a growing diversity in a multi-stakeholder weather, climate and hydrological service provision landscape, partnerships between national agencies or multi-national service delivery models through bi-lateral or multilateral agreements for certain services, should be encouraged. Such models would leverage resources, improve efficiency and allow consistent and seamless services across national borders.

6. PUBLIC-PRIVATE ENGAGEMENT FOR CAPACITY DEVELOPMENT

The UN sustainable development agenda 2030 makes a call to join-up efforts to better serve countries, and it creates a sense of urgency for country level action. Most of the Sustainable Development Goals (SDGs) are linked to weather-, climate- and water-sensitive areas. Achieving them requires the multi-stakeholder public-private-academic Global Weather Enterprise (GWE) to develop and expand its capability to help reduce the vulnerability of societies to weather and climate extremes. The goals set by the 2030 Agenda, the Sendai Framework and the Paris Agreement is mobilizing an increasing amount of investments, which effectiveness will highly depend on the quality of weather, climate and hydrological information supporting those investments.

While demands for information and service provision are increasing exponentially, many national meteorological and hydrometeorological services (NMHSs) in developing countries are confronted with major performance challenges. Closing this capacity gap requires scaling up collaboration and leveraging of WMO expertise and knowledge through strategic partnerships for increased impact.

Capacity development actions to ensure production of and access to high-quality weather, hydrological and climate information needed for sustainable development, will require a concerted effort of all GWE stakeholders, but also a mobilization of significant financial resources. This challenging task brings the development finance institutions (DVI) as another important partner in the GWE. The growing flow of resources for building the capacity of hydrometeorological services including from the Green Climate Fund (GCF), Multilateral Development Banks, and bilateral partners require a more systematic and complementary approach for sustainable investments. Efforts need to focus not only on "more" but also "better" investments to increase capacity and relevance of NMHSs as key players for a country's sustainable development

The GWE has a major role in developing business models to ensure the best use of the significant donor funds for raising the capacity of the developing countries in a sustainable manner. The interlinkages and interdependencies between the developing and developed world substantiate two main business cases for the enterprise: the business case of a sustainable global infrastructure to run global services, and the business case of enabling developing countries to develop local capacity and benefit from the global services available. A component

of the capacity supporting local capabilities throughout the WMO community is currently and will continue to be, tied to the ability of the growing private sector to create jobs, especially as the government sector shrinks in the face of contracting budgets. In this regard, a focus on the growth of the local workforce with expertise in the IT and science-to-service advancements will go hand-in-hand in the development and growth of local capabilities within the private sector that will be required to sustain the capacity development envisioned for all Members.

Development projects with public-private engagement have a potential to provide sustainable solutions for modernizing national infrastructure and enhancing the access to and the quality of the requisite services needed by the national economy and citizens. To enable such partnerships, it is necessary for both public and private sector stakeholders to build mutual trust, respect a code of ethics and strive to establish long-lasting engagement. Business models based on leveraging of the resources, cost- and revenue-sharing, should be further developed and promoted. The academic sector has also its important role in such partnerships by bringing innovation and training and education opportunities.

At international level, WMO should work closely with the development financing institutions in designing projects that are based on prioritized national needs following the 'people first' principle, financially viable to ensure sustainability, and reinforcing the capability of the developing countries to be part of the international exchange of data and products through the WMO global systems.

Appendix: 1

APPENDIX

GLOSSARY OF TERMS

Note: The definition of terms related to public-private engagement is a work in progress. Thus, the definitions of terms below should be seen as related to the context of this Policy Framework and not as universally applicable.

Academic Sector means public or private higher education establishments awarding academic degrees, public or private non-profit research institutes whose primary mission is to pursue research. (*definition used by the European Commission*)

Private sector (business sector): Either for-profit, and commercial enterprises or businesses; or business associations and coalitions (cross-industry, multi-issue groups; cross industry, issue-specific initiatives; industry-focused initiative); including but not limited to corporate philanthropic foundations".

***Public-private engagement*:** Engagement by NMHSs (and/or other public agents) with the private sector in various modes in the production and delivery of weather, climate, hydrological, marine and related environmental information and services while respecting the public interest and the mandates of NMHSs and keeping in mind budgetary constraints.

Public–private partnerships are voluntary and collaborative relationships among various actors in both public (State) and private (non-State) sectors, in which all participants agree to work together to achieve a common goal or undertake specific tasks. Partnerships may serve various purposes, including advancing a cause, to implement normative standards or codes of conduct, or to share and coordinate resources and expertise. They may consist of a specific single activity, or may evolve into a set of actions or even an enduring alliance, building consensus and ownership with each collaborating organization and its stakeholders. While they vary considerably, such partnerships are typically established as structured cooperative efforts with a sharing of responsibilities as well as expertise, resources and other benefits.

Weather Enterprise: A name used to describe the multitude of systems and entities participating in the production and provision of meteorological, climatological, hydrological, marine and related environmental information and services. For brevity, the name only refers to "weather"; however, the enterprise encompasses all business areas of WMO, including weather, climate and water; and all core activities – observations, modelling, data-processing and forecasting, and other services and related research. The weather enterprise includes public-sector entities (NMHSs and other governmental agencies), private-sector entities (such as equipment manufacturers, service-provider companies and private media companies) and academia, as well as civil society (community-based entities, NGOs, national meteorological societies, scientific associations, etc.). The weather enterprise has global, regional, national and local dimensions.

Global Weather Enterprise is the global dimension of the multi-national multi-stakeholder weather enterprise encompassing all contributors to the Earth system monitoring, prediction and service provision from public, private and academic sectors, as well as learned or civil society entities.

Data and services: The terms data and services are understood as complementary and often overlapping. Their use and definition is expected to develop over time.

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