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Submissions from entities in the United Nations system and elsewhere on their efforts in 2016 to implement the outcome of the WSIS

Submission by

World Meteorological Organization

This submission was prepared as an input to the report of the UN Secretary-General on "Progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society at the regional and international levels" (to the 20th session of the CSTD), in response to the request by the Economic and Social Council, in its resolution 2006/46, to the UN Secretary-General to inform the Commission on Science and Technology for Development on the implementation of the outcomes of the WSIS as part of his annual reporting to the Commission.

WMO Submission to WSIS Report 2016

Part 1: Executive Summary

1. The World Meteorological Organization (WMO) is committed to the promotion, coordinating and support of implementation of ICTs for improving global, regional and national production, exchange and distribution of information, forecasts and warnings on weather, climate, and water.
2. Underpinning the delivery of information to the public, businesses and governments are the ICT systems that collect weather, climate and water information from around the globe and that support the production of analyses and forecasts. WMO has continued to develop its WMO Information System that allows and facilitate wider accessibility to this information. WIS provides greater visibility of the information that is available and allows users to access information either on demand or through routine delivery when it is updated.

3. A progress has been made on improving climate data related technology and systems, to allow the availability of high quality and long term climate data from all sources that can be made ready for climate change monitoring, climate prediction and climate services. In addition to improving climate change monitoring and related applications, an emphasis is being made to link these efforts with the data needs of the four priority areas of the Global Framework for Climate Services: Agriculture and food security, Water, Disaster Risk Reduction and Health. Work on the establishment of a High Quality Global Data Management Framework for Climate is progressing. Investement has been made in Burkina Faso, Mali and Niger for modernising data infrastructure with improved data management facilities as part of a programme for enhancing operational capabilities and skills within developing and least developed countries. Within Climate Resilience and Early Warning System initiative (CREWS) which was set up in Paris at the occasion of COP21, WMO has been given the responsibility to develop capabilities of number of countries to support their capacity in early warnings, including enhancing the basic systems for collecting, managing and analysis of weather and climate information and predictions.

4. The successful development of the Severe Weather Forecasting Demonstration Project is continuing to evolve in five geographical regions, with one mature project reaching a "continuing development" stage, while four others continue in either demonstration stage or in planning. Additional projects are also in consideration. The organization and techniques developed in this project allow decision makers in countries with less developed infrastructure to take advantage of meteorological analyses and predictions generated around the world, thereby reducing the impact on life and property of severe weather events. Key priorities and future plans of the project include the transitioning of existing SWFDP regional projects into sustainable Severe Weather Forecasting Operations and the establishment of the SWFDP service in further geographical areas (i.e. to make the techniques available to more regions of the world).

5. The World Weather Information Service that provides public access to authoritative weather information for cities throughout the world has been updated to allow the public to subscribe to their cities of interest via the web allowing easier access to authoritative forecast and climate information from national weather services (http://dcpc.worldweather.org/). ICTs are being harnessed by government weather organizations around the world to improve the services they offer to citizens. An example service in Uganda where fishermen on Lake Victoria are sent weather warnings by SMS in a service designed to reduce loss of life that is now being extended to neighbouring countries.

Part 2: Analytical overview

1. Weather, climate and water information is available from a large number of sources, but the end user often has little indication of the origins of the information. The quality and consistency of the information becomes crucial during a hydro-meteorological induced emergency. This has led to the concept within WMO of a "single authoritative voice" for issuing weather warnings and the detailed information associated with them. If the authorities responsible for responding to emergencies base their decisions on differing information, the resulting actions are inconsistent and may work against each other. To remain credible, the single authoritative source within a country has to provide high quality information as well as having the support of the national government.
2. WMO achieves its objectives through facilitating international agreement among the National Meteorological and Hydrological Services (NMHS) around the world. Challenges to the use of ICT collaboration tools have included great variability between nations of the ICT infrastructure available, low uptake of tools that are not part of the daily working environment of the collaborators, and security constraints within organisations' ICT infrastructures that restrict access to collaboration web sites. The most effective techniques remain email lists and wikis, and telephone conferences where time differences permit.

3. The WMO Information System (WIS) builds on the routine exchange of weather information that has been in place for more than half a century, retaining the core attributes of fast and reliable delivery of time and operationally critical information. WIS allows users to discover what information is available through WIS and allows authorised users to publish into WIS, download data on demand or to subscribe to information whenever it is updated. WIS also supports alternative methods of transporting information, making it possible for research institutes, for example, to publish information routinely without needing a dedicated connection to the (expensive) private network that is used to exchange critical information. This delivers the twin benefits of operational meteorology delivering more accurate information through the availability of additional types and volumes of observations and product information, and allowing a wider range of services through the combining of weather information with that from other disciplines. WIS is underpinned by international telecommunications that have to connect all countries in a secure manner. The seventeenth World Meteorological Congress, noting that the effectiveness of WIS in exchanging internationally information that is critical for safety of life is sometimes limited by restrictions that deny some countries

access to equipment needed for full participation in the WIS, passed resolution 31 (Cg-17) classifying telecommunications between WIS centres as an essential service for creating and distributing data, products, warnings and advisories for the protection of life and property.

4. Climate information and related services are underpinned by data that are necessary to conduct analytical studies, feed model predictions and calibrate other type of data such as from remote sensing platforms. Therefore, data requires longer term observations and higher quality than the data used for ordinary weather forecasting systems. In this regards a particular attention is being given by WMO to ensure that these criteria are met at global and national levels, using best available technology, standards and tools. Leveraging on WIS, WMO is currently developing the functional architecture of the GFCS/Climate Service Information System (CSIS). CSIS functions spans from data management of histrocial data, provision of climate forecasts to providing long term change predictions and projections.

5. The SWFDP was initiated to enable all national Meteorological and Hydrological Services (NMHSs) to issue effective severe weather warnings to disaster management and civil protection authorities in their respective countries. Using a Cascading Forecasting Process, the Project makes global-scale products available to Regional Specialized Meteorological Centres (RSMCs) that integrate and synthesize them in order to provide daily guidance for NMHSs in their geographical region. Thus, the NMHSs have greater capability to identify hazardous weather conditions in the short- and medium-range and issue forecasts and warnings accordingly. Because NMHSs in a geographical region typically need similar products, the Project makes efficiency gains by coordinating their requirements. Where possible, the limited bandwidth of many of the receiving NMHSs is taken into account, with the file sizes of guidance products being minimal.
6. The WMO Technical Conference on "Emerging Trends in Information and its Use" was held on 20-21 November 2016, in Guangzhou, China, in association with the 16th session of WMO Commission for Basic Systems. The presentations of the conference explored emerging issues, opportunities and challenges for Members, and for NMHSs in particular, right across the data value chain and highlighted the important role of data and information and the associated technologies in just about every activity they undertake, from making and sharing observations, to analysis and prediction, to production and dissemination of services, to engaging and interacting with users. Significant technological advances are already being integrated within some services, from high performance computing to cloud to Artificial Intelligence (AI) technology, and the innovative use of data, especially 'big data'. This ‘big data capability, when taken in conjunction with the multitude of measurements that drive our science, models, knowledge of the environment, forecasting systems and service delivery, provides significant potential for all Members, and reinforces the importance of providing practical guidance and support to build capability, enable sound, value-based choices and prepare members for a more agile future. The conference concluded by highlighting that emerging trends in information and its use touch on all aspects of the work of WMO Members and that without concerted action and increased agility, by Members and by WMO

as a whole, the role of NMHSs in the delivery of services for the safety, security, well-being, and prosperity of its citizens and industries will become increasingly challenged.

Part 3: Innovation and Progress, plans

1. Central to the WMO Information System is the use of international standards. In addition to WMO's own standards for data representation that are designed for highly efficient data exchanges of specialised information so that large volumes can be exchanged in a short time, WIS uses standards developed by the Open Geospatial Consortium and the International Standards Organisation. WMO is taking an active part in the standards development processes for these organisations so that the standards evolve to be able to represent the complex descriptions of time and space that are needed for meteorology, water and climate information. Enhancing the standards, rather than working around their limitations, means that weather, water and climate information will be available more easily to a wider community. The first application of these standards to be approved formally within WMO was in support of international civil aviation.

2. WIS addresses the mechanics of making information available to users. WMO has another Programme, called the WMO Integrated Global Observing System (WIGOS) that is designed both to increase the quantity of weather, water and climate observations and to improve their quality and confidence in that quality. Like WIS, it seeks to involve more scientific communities in the generation and sharing of observations of the environment so that research, operational and end user products can be made more accurate and relevant. Standards supporting WIGOS were approved in 2015, and work has started on their implementation.

3. Two major projects were launched in improving the capabilities of Member states to deliver high quality climate data and services. WMO and several partner organisations launched the Indian Ocean Data Rescue initiative in April 2014 to build a robust foundation for climate data necessary for developing climate information and services by the National Meteorological and Hydrological Services in the Indian Ocean rim countries and islands, covering 17 nations. A recent analysis showed that several countries in this region have been implementing data recovery projects, which is a major step forward to better understand the behaviour of weather and climate extremes based on the information recovered from old climate archives that were at risk of loss or deterioration. The international Data Rescue initiative (I-DARE) which was launched at the occasion of 16th session of the Commission for Climatology in July 2014 is now operational. I-DARE is an web portal infrastructure informing on best technology, tools and standards for recovering digitising and utilising historical climate data. In addition, information technology standards are being implemented. A specification document on Climate Data Management Systems was developed to help Member States to use standard and most up to date systems for organising, managing and analysing climate data from all sources. These specifications are now included as part of the WMO/WIS regulatory

material, hence constituting a new reference for managing climate data and developing its supporting technology and systems.

4. An unqualified success, the Severe Weather Forecasting Demonstration Project (SWFDP) is providing developing countries in southern and eastern Africa, and island states of the southwest Pacific with information needed to make better decisions on mitigating the impacts of severe weather, but has also delivered improved ways of working between national, regional and global operational centres and experts, and establishing partnerships among these experts and people who have the responsibility for planning for and managing the response to severe weather events. This same approach is near completion, and soon to commence their demonstration stages in two other regions in Asia. The SWFDP is expanding its scope by establishing synergies and integrating for example flood forecasting in Southern Africa, which would facilitate such integration in other regions of the globe in the future. ICT is crucial to the success of the project: global observations of the weather underpin the approach; numerical weather forecasts produced by the most advanced NMHSs are made available to the forecasters in the affected nations, who are supported through training in how to interpret the forecasts and verification (as part of the NMHSs' quality management framework); and the forecasters work closely with the decision makers using relationships that are built up during the project.

5. Planners, operations teams and the public use weather information routinely, and a wide range of weather services exist to support them. Climate change means that it is no longer enough to look at historical events to determine what is likely to happen during the lifetime of a building, road or other investment, or to develop the regulations to ensure public safety. A new range of services will be needed to support these activities, and to exploit developments in climate science to assist planning for seasonal and longer time scales. WMO is taking a leading role in the Global Framework for Climate Services to make sure that nations are able to develop and apply science-based climate information and prediction to planning, policy and adaptation practices, supported by ICT. A project led by WMO involving GIAR/CCAFS, CICERO, CMI, WHO, WFP, IFRC is piloting the co-production of information and knowledge to deliver actionable climate services in support of food security, nutrition, health and disaster risk reduction in Malawi and Tanzania. To support the flow of information in support of climate services, WMO is preparing a data policy to encourage exchange of information related to climate services.

6. Providing an agreed authoritative source of weather information is crucial to successful management of weather related events. ICT has a role to play in this; the authoritative source has to be as accessible, if not more so, than other sources. Even those weather services with the most developed ICT infrastructures have to work hard to maintain this position. The WMO Weather Information Service, hosted by Hong Kong (China), delivers authoritative web-based weather forecasts for cities around the world using information provided from the national weather service of each participating country. The smart phone applications were updated in 2013, and the main web site is being reviewed to improve functionality. Other countries are collaborating with other service providers. In Uganda the weather service is working with a mobile

telephony provider to deliver an SMS warnings service to reduce the loss of life among fishermen on Lake Victoria. Neighbouring Tanzania is building on this experience to provide a similar service to support fishers, farmers and the transport industry and is also cooperating with community radio to enhance the penetration of messages. The improvement of the warnings themselves in this project is being addressed through a Severe Weather Forecasting Demonstration Project covering six Eastern African countries. To support the concept of authoritative sources of information to support emergency response, not just for weather information, that is used by major organizations to prioritize information they offer to responders during times of crisis, WMO is promoting the use of the Common Alerting Protocol by weather services, and has run workshops to allow national weather services to provide their warnings in this form to supplement more traditional ways of distribution.

7. The WMO has set-up a number of mechanisms (Expert teams, provision of references and catalogues, for defining, identifying, cataloguing and monitoring weather and climate hazards and extremes. It is expected that these mechanisms will lead to a global portal for cataloguing and managing extremes providing consistent information on characterization of these events in terms of type of event, location, duration, magnitude and timing. This facility will allow for better evaluation of the types of losses and damages associated with different types of events, identification of the most damaging events, definition of thresholds for taking action, and investigation of trends. Such a categorization is an important prerequisite for the Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes and for the United Nations Office for Disaster Risk Reduction Global Assessment Reports on Disaster Risk Reduction, by bringing a standardized approach of National Meteorological and Hydrological Services to the analysis and recording of extreme hydro-meteorological events in national databases, and by supporting the international exchange and validation of these data.