Report of the 2018 CAP Implementation Workshop

Background

The 2018 CAP Implementation Workshop was held 31 October - 1 November, in Hong Kong, China. The Workshop was hosted by Hong Kong Observatory (HKO) and co-sponsored by the International Association of Emergency Managers (IAEM), the International Federation of Red Cross and Red Crescent Societies (IFRC), the International Telecommunication Union (ITU), the OASIS standards organization, and the World Meteorological Organization (WMO). The 57 Workshop participants came from 25 countries: Austria, Botswana, Canada, China, Comoros, Germany, Guinea-Bissau, India, Italy, Malaysia, Mexico, Nepal, Netherlands, Philippines, Republic of Korea, Saudi Arabia, South Africa, Sri Lanka, Switzerland, Thailand, The Gambia, United Kingdom, United States, and Zimbabwe.

The Workshop was a technical meeting intended solely for information sharing among experts. Accordingly, Workshop participants represented themselves; they did not formally represent any organizations with which they may have been affiliated.

The following other documents may be also of interest:

- The Programme lists all of the Workshop agenda topics and links to the presentations;
- The list of Speakers includes speaker biographies and portraits;
- The list of Participants gives name, organizational affiliation, and e-mail address of each.

Ancillary Meetings

An all-day CAP Training session was held on 30 October in the same venue as the Workshop, a community conference center adjacent to HKO. An all-day Filtered Alert Hub Workshop was held on 2 November in a conference room at the offices of HKO.

Report Process

At the Workshop, participants agreed a process for producing this Workshop Report. The Workshop Chair, Eliot Christian, would produce a draft Report in consultation with the participant hosts and co-sponsors (HKO, IAEM, IFRC, ITU-D, OASIS, and WMO). The draft

then was to be shared among Workshop participants for a period of two weeks, with the Chair making revisions based on comments from participants. Thereafter, the Chair would publish the final Report and link to it from the 2018 CAP Implementation Workshop website.

Presentation Summaries by Agenda Item

3.1 AccuWeather and CAP

Dan DePodwin gave a presentation emphasizing that AccuWeather shares a common public service mission with National Meteorological and Hydrological Services and governments around the world: to "save lives, protect property and help people prosper". He talked about the continuing need for advancements in awareness, preparation, and response to weather by the public, citing the sometimes misalignment between weather event risks and the degree to which people prepare and react. This is important because weather across the globe continues to cause preventable casualties, even as people acknowledge their concerns about dangerous weather and their desire for more safety and preparedness education.

Dan said that AccuWeather is the most well known source for weather information in the world. He emphasized that AccuWeather CAN and WILL work in partnership with governments to help reach people in new ways.

Under the heading "best practices for digital distribution of weather alerts", Dan asserted that AccuWeather regards warnings formatted in CAP to be the most robust and suitable for digital distribution and consumption. Dan highlighted five key components to effective weather warning data systems and illustrated each with specific references to CAP alert elements:

- What is the weather hazard?
- Where is the hazard occurring?
- When will the hazard occur?
- Why does the user need to be aware of the hazard and how should they react?
- How will the user get additional/updated information on the hazard?

3.2 Architecture of a Global-scale Alert Hub

Ian Ibbotson was not able to participate in person but he pre-recorded this video, which was viewed by participants at the Workshop. He talked in some detail about the system design of the Filtered Alert Hub (FAH), accessible online at http://alert-hub.org. (Note: a general overview of FAH is available here.)

Ian explained that we are now implementing the second version of FAH, using the freeware "Rabbit Message Queue (MQ)". This will replace the first FAH version, which is based on the Lambda facilities available exclusively on Amazon Web Services (AWS). The Rabbit MQ version is showing much improved performance, especially in terms of reduced worst-case latency in the near-real-time event processing at the heart of FAH. Rabbit MQ also provides portability across clouds, and it can be deployed on non-cloud platforms.

The Rabbit MQ version of FAH features three new components: Feed Facade (a feed fetcher for dealing with Internet news feeds in RSS or ATOM format); CAP Collator (the core of the event processing for dealing with messages in CAP format specifically); and DevOps (the development and operations tools set, which includes the Docker freeware for FAH installation).

Once all essential functions of CAP alert processing are verified to be operating as expected, the Rabbit MQ system on AWS will fully replace the AWS Lambda version.

3.3 CAP and Mobile Multimedia Alerting

Menno Bot first briefly introduced “one2many”, the international company for which he works. The company is provides Cell broadcast, Multimedia broadcast and Public Warning Portal as well as CAP consultancy. He then explained the 5G-XCAST research project with its focus on providing broadcast in 5G for various use-cases and drilled down further to the Public Warning use-case.

Menno explained why CAP was chosen for implementing multimedia alerts and how multimedia content could be created to accompany the alert. The setup for the test network was explained, delivering the multimedia message from the alert originator to the phone, using LTE broadcast (eMBMS). He then explained some of the early results of the tests (as the project is not finished yet) and other opportunities to explore during the project.

3.4 CAP and Natural Disasters

Efraim Petel gave a presentation that addressed five topics:

- Natural Disasters Hazards Prediction
- Why natural disasters alerts are needed now more than ever
- Characteristics of a CAP Natural Disaster Warning System
- CAP features supporting Natural Disasters alerts
- Cost Effectiveness of a CAP Natural Hazards Warning System

3.5 CAP Implementation in India

The presentation by Sabyasachi Majumdar and Arun Yadav began by describing India's "National Disaster Management Plan 2016". They mentioned a prior attempt at early warning system implementation through the National Cyclone Risk Mitigation Project. These experiences led to the vision of India's CAP-enabled "Integrated Early Warning Platform for Disaster Management". For dissemination of warnings, the system will focus on SMS and Cell Broadcasting, leveraging the huge telecom infrastructure in India (1.2 billion mobile subscribers, 24 million landline subscribers, 431 million internet users).

The implementing agency is the National Disaster Management Authority (NDMA) under the aegis of the Ministry of Home Affairs. NDMA enlisted the Department of Telecommunications (DoT) to form regulation and policies for dissemination of early warnings. DoT involved the Centre for Development of Telematics (C-DoT), to architect, design and develop the new CAP-enabled Early Warning Platform. That platform will integrate existing alert and warning systems at the national, state, territorial, and local levels so that any forecasting agency can address public or emergency responders of a specific area simultaneously using all available media (SMS, IVR call, TV, Radio, Siren, Road Signage, Railway station announcement system, social media etc.), with alerts and warnings in vernacular languages.

Testing and further development of the CAP Early Warning Platform is underway. One challenge noted is that the implementation effort in India needs a forum to flag and resolve CAP implementation problems. Among the other most significant challenges are:

- Wide diversity across India (differences in population density, alerting mechanisms, hazard profiles, 22 major languages)
- Smartphone penetration is less than 30%, so cell broadcast is necessary
- Large number of Government and Private Organizations need to be collaborate under the CAP Early Warning Platform
- Support for Legacy systems is essential

The way forward in the immediate future is focused on certain warning dissemination opportunities: Radio (420 stations), Private FM Channels (157 stations), Television (16 stations), Private News Channels (115 stations), Indian Railway, Electronic Road Signage, Electronic Sirens (in 13 cyclone-prone States), and Social Media.

3.6 CAP Implementation in Italy 2018

Marcello Marzoli explained that since 2011 the Italian National Fire Corps (CNVVF) has had an interoperability policy based on CAP. The CNVVF operational data sharing initiative has progressed since then, with an increasing number of rescue authority and stakeholders sharing operational data. The operational data shared deals primarily with incidents and activities concerning: Floods, Extreme weather, Forest Fires, Fires and explosions, Gas leakages, and various Civil Protection emergencies.

Among the partners in these data sharing agreements across Italy are: Comune Venezia, Carabinieri (National Police), Città metropolitana di Venezia (Provincial Authority), and the Ministero dei Beni Culturali (Cultural Heritage Authority). There are also agreements with several drainage authorities: Consorzio Bonifica Veneto Orientale, Consorzio Bonifica Piave, Consorzio Bonifica Acque Risorgive, and Consorzio Venezia Nuova. The Consorzio Venezia Nuova agreement includes the MOSE gates that safeguard Venice and its lagoon.

There has also been an interoperability effort focused on the sharing of GIS data based on CAP, specific to daily rescue activities. The targets were two distinct geographic information system platforms: GEOSDI and ESRI.

Marcello Marzoli also noted extensively various ways in which Italy is helping with CAP-related interoperability activities focused on improving the implementation of the European Union Civil Protection Mechanism, through the EU IN-PREP innovation action in particular.

3.7 CAP Implementation in Mexico 2018

Mario Ruiz gave a presentation focused on three cases: CAP on Floods, CAP on Social Event, and CAP on Earthquake and Reconstruction. In the case of floods, he showed data from an "Economic Evaluation of Disaster on Floods: Comparing No Warning (Sept 2013) and Warning (June and Sept 2017)". The data indicate significant advantages to the use of warnings.

The social event case concerned a "Passion of Christ" event with a congregation of 2 million people in Iztapalapa 14-21 April 2017. An Emergency Operations Center was set up, using a Command Incident System with CAP for operational issues. Approximately 1,300 people trained on use of the system. With the support of the Mexico´s City Civil Protection Secretary, the system proved effective.

Mario's third case concerned two earthquakes. The first was a magnitude 8.2 earthquake that occurred about midnight on 7 September 2017 near the city of Pijijiapan, Chiapas. This earthquake event was perceived by approximately 50 million people in 15 states, with the

highest intensities in Chiapas and Oaxaca. Accordingly, the dissemination of alerts was massive. The second of the two earthquakes was a magnitude 7.1 on 19 September 2017 in Mexico City. Mario's focus in this earthquake was on reconstruction, specifically the identification and evaluation of homes damaged. Damage reports were collected by 700 people using a smartphone app that fed data into a database.

Mario concluded with a reference to winning an award at the 2017 Multi-Hazard Early Warning Conference in Cancun.

3.8 CAP Implementation in the Comoros Islands

Fouad Issoufa opened his presentation with an overview of the Comoros Islands and its National Meteorology Directorate. He explained that the Directorate has a mission to inform the population, particularly regarding extreme weather events such as floods, cyclones, tsunami, and strong winds. In the case of a disaster, the Directorate informs the Ministry of the Interior, which in turn informs the population by radio or television.

Fouad said that the Comoros Islands must establish CAP. This is because of its geographical situation which exposes the islands to multiple hazards types. He noted that the population is not currently being informed of hazard threats in real-time, and that evacuation of the population in case of disaster is not considered reliable.

3.9 CAP in Deutscher Wetterdienst

Martin Klink started his presentation with an overview of the warning system of Deutscher Wetterdienst (DWD), which is based on the NinJo Meteorological Workstation. He explained that the system is based on the generation of "warning proposals"--alert-like data units that are used as the basis for warning creation. Because the proposals and any manual creation of warning data is integrated into the meteorological workstation, the system maintains comprehensively for all of Germany the polygons with meteorological attributes and alert attributes data about potential hazards.

The DWD Warning Product Generation (WPG) system enables automatic product generation and distribution, with representation of a warning tailored to each specific audience/purpose. Furthermore, it supports automatic distribution to various channels and applications.

Martin emphasized that CAP is the most important exchange format for warning products in DWD. He listed a number of "hidden" advantages attributable to CAP. He summarized by saying that CAP defines the necessary attributes of a warning message on a understandable fundamental level. Although not every system will natively support CAP, any system design which aims for processing/storing/managing/visualizing hazard-related data can use CAP as its reference.

3.10 CAP in the Philippines

Arnel Manoos presented on behalf of the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA). His presentation was organized in five parts: Introduction, CAP in PAGASA, Experiences, Updates, and Concerns.

The Introduction explained the role of PAGASA, especially in the context of communication about the many hazard threats that impact the country. Arnel then spoke about the evolution of CAP experiences in PAGASA, beginning with Google Public Alerts, continuing through the Sahana implementation, showing the new Web site, and highlighting the recent Flood

Forecasting work. Under the heading of Updates, Arnel mentioned the information sharing collaboration between PAGASA and the Philippine Red Cross. He also noted automatic CAP generation from radar observations and automatic CAP for Severe Weather, among other developments.

Arnel finished by noting several concerns. Primary is that the Philippine Office of Civil Defense is not yet an active participant in CAP-enabled early warning. He also highlighted that additional ICT personnel are needed to respond to the growing demand.

3.11 CAP in the Regional Integrated Multi-Hazard Early Warning System

Jeiann Ermac began with an overview of the Regional Integrated Multi-Hazard Early Warning System (RIMES). Established in 2009, RIMES is an intergovernmental organization managed by 45 Member countries and collaborating countries spread across Asia, Africa, and the Pacific.

Jeiann noted that the Key Services of RIMES are: Improving data availability; Earthquake, tsunami & ocean services; Weather, climate & hydrological services; and, Capacity building. She highlighted that these services are supported by six Decision Support Systems (DSS) developed at RIMES: SESAME (for Agriculture), CRISH (for Public Health), SMART (for Disaster Management), OSFAS (for Ocean information), Flood DSS (for flood forecasting), and CDAAS (for Climate data analysis).

Jeiann explained that each RIMES DSS performs alert dissemination through a common processing model. This common model means that each RIMES DSS can publish CAP alerts through the common DSS processing step that generates warning/advisory messages. She said that has not yet been done, but she now realizes it is achievable and well worth doing.

3.12 China's National Early Warning Release System

Jinjun Pan presented as deputy director of the Public Meteorological Service Center of the China Meteorological Administration (CMA), which serves as the National Early Warning Center of China. His presentation addressed development of the National Early Warning Release System (NEWRS) and CMA participation in the Global Multi-hazard Alerting System (GMAS).

In China, the 2007 "Law on Response to Emergencies" called for establishing a nationwide unified early warning release system. Through extensive collaboration across government and in partnership with media, NEWRS became operational in 2015. The system is comprised of 1 national center, 31 provincial centers, 343 municipal centers, and 2015 county centers.

NEWRS is based on CAP and includes four kinds of emergency incidents: natural disasters, accidental disasters, public health emergencies, and social security incidents. Several aspects of NEWRS were described: its integrated system design, its comprehensive sharing of warning information across departments, and its many types of channels for publishing warnings.

On the topic of GMAS, CMA and HKO are working to establish a regional multi-alarm system (GMAS-Asia), based on CAP and the prototype WMO Alert Hub. Objectives of GMAS-A are:

- To promote experience sharing among NMHSs in Asia in disaster risk reduction
- To organize training courses
- To provide assistance to relevant members to improve operational capability in meteorological risk reduction

3.13 IFRC Perspective on CAP Alert Hubs

Omar Abou-Samra changed his presentation tile to "Reflections from IFRC on Early Warning/Early Action and need for improving public understanding of alerting protocols". He opened the presentation by noting that the International Federation of Red Cross and Red Crescent Societies (FRC) is the world's largest humanitarian organization. IFRC is comprised of 191 National Societies with 30,000 branch offices and 17 million volunteers. It uses a community based, participatory approach. Although IFRC acts as an auxiliary to government, it is Independent and neutral.

Omar focused first on the IFRC "Universal Apps" which is based on the IFRC Public Education and Public Awareness (PAPE) key messages. It includes weather and disaster alerts in addition to RC/RC messaging to the general public. Users of the apps can monitor specific locations and can share alert messages using SMS and social media. The Hazards apps are designed to deliver official alerting agency messages, with a strong preference for CAP. The companion "What Now" service provides immediate action messages from National Societies, based on PAPE and targeted to households and individuals. It supports 20+ hazards in 78 languages.

Under the heading "Key reflections", Omar listed: Educate public on decision making process; Clearly communicated roles and responsibilities; Alerting authority responsibilities AND roles for media, emergency management, elected officials; Multi-channel delivery is critical; Check on your neighbor; Clear key messages; High priority alerts vs weather forecasts; Alert hubs should be multi-hazard; To aid multi-channel delivery of alerts - encourage re- broadcasters to use Alert Hubs; Use WhatNow Service/harmonized key messages to improve early action; Standard lists of event types; and, CAP mandatory for official public alerts.

3.14 Indigenous Language Alerts with CAP

After provided a bit of personal background, Rob Hopkins explained some aspects of CAP in Canada, with a focus on dissemination via radio. He noted that there is text, audio and image support for radio and television and that Cell Broadcast for mobile was recently launched. He noted Pelmorex NAAD distributes CAP alerts by TCP\IP socket, C Band or 2 KU band satellite. He also that CAP in Canada specifies support for indigenous languages, but it is not used at present. He cited various examples of alerts especially relevant in the far north: Aggressive Wild Animals; Extreme Cold and Blizzards; Extended Power and Telecommunications Outages; and Evacuation notifications for Fire, Floods and Landslides.

Rob then talked about his Open Source CAP Client for radio and television automation. He said that it is used internationally on every continent, except for Antarctica. He also noted that it runs on generic PC equipment including the 35 USD Raspberry PI.

Turning specifically to indigenous languages, Rob explained there 90 countries with indigenous communities and thousands of indigenous languages. Canada has 634 indigenous groups with 20 spoken dialects. He said the challenges are: not everyone is located near a cell base station or has a smartphone phone; equipment manufacturers do not support indigenous dialects; and TTS engines do not presently support indigenous languages. The solution he is pursuing is based on compiling key phrases recorded in indigenous languages by community members. Artificial intelligence is then applied to associate the message in CAP alert with the available recorded phrases. The result will be an open source framework available for any countries and language to use.

3.15 Integrated Public Alert and Warning System

May Wu opened her presentation with an overview of the U.S. Integrated Public Alert and Warning System (IPAWS) Program. Originally instituted during the Cold War, the current system is grounded in subsequent U.S. law, and in Federal Policy and Regulation. As a system, the IPAWS vision is to have one alert disseminate to several channels for the public, including mass notification systems. IPAWS intends to be easier to use by public safety/alerting authorities and to enhances alert and warning capabilities in aspects such as increasing alert coverage, increasing the likelihood that the public will take action, and increasing the degree of public awareness.

May emphasized that IPAWS is used by local, state, territorial, tribal, and federal agencies to send geo-targeted emergency alert and warning messages to the public. As IPAWS owner, the Federal Emergency Management Agency (FEMA) is responsible for:

- Development, operations and maintenance of the IPAWS
- Partnering with the private sector communications industries
- Providing technical assistance to State and local governments to insure that timely and effective disaster warning is provided

May presented an overview of the IPAWS system architecture. She noted that 44 different vendors provide CAP alert publishing tools currently in use by state/local authorities using IPAWS. She explained how IPAWS serves as an aggregator of alerts for the 1,169 IPAWS Public Alerting Authorities. May also explained how IPAWS acts as the interface to dissemination mechanisms such as the Wireless Emergency Alert (WEA) system, among others. She distinguished SMS delivery from cell broadcast message delivery as well.

May's final topic concerned changes to WEA adopted in 2016 that are being rolled out over time. This includes changes necessary to support alerts in Spanish in addition to English.

3.16 An Issuing Authority Perspective on Using CAP

Norm Paulsen of Environment Canada (EC) presented on its nation-wide, multi-hazard CAP implementation. He noted today EC issues between 100K and 200K warning messages each year for many weather related events and hazards. He explained that EC uses CAP to alert its numerous known partners and that many unknown partners pick up EC CAP alerts for their own use as well. EC partners present those warnings to various audiences, including the general public, first responders, private clients and more. Much of the public alerting in Canada is handled by the National Alert Aggregation and Dissemination System (NAADS), operated by Pelmorex, a commercial company.

Norm said that EC distinguishes its partners in two categories:

- Engaged Partners that consume all available warning information in support of their own alerting services to clients
- Dis-Engaged Partners that want information in an already presentable form that they can simply through and thereby satisfy some policy requirement

Norm's presentation focused on how Canada deals with specific CAP elements, which includes organizing Canada-specific groups of CAP extensions which they call "layers". As an example, Norm explained that Canada defines a special class of Emergency Alerts that are to be

broadcast immediately due to the high urgency, severity, and certainty of the emergency. These are identified by a CAP parameter named "layer:SOREM:1.0:Broadcast_Immediately" that has its value set to "yes". Norm also mentioned that Canada has now implemented Cell Broadcast.

3.17 ITU and Emergency Telecommunications

Vanessa Gray started by asserting that ITU is committed to help the world communicate. ITU is comprised of 193 Member States plus 800 Sector Members and Academia. Although each of three sectors of ITU has a specific mandate, all work cohesively toward connecting the world and helping achieve Sustainable Development Goals through use of ICTs.

Vanessa emphasized that disasters have devastating effects on peoples' lives and that climate change makes things worse. In that light, ICTs offer ever growing opportunities to predict, to track, to warn and to save lives, especially given that more and more people are covered by a mobile network, using the Internet, etc. She noted that the Global Guidelines on National Emergency Telecommunication Plans will include use of CAP as a Best Practice.

Vanessa also presented some ideas to bolster the role of ITU-D in CAP implementation and measurement worldwide:

- Awareness raising & capacity building: Capacity building workshops & training; Emergency telecommunication/disaster risk reduction events; and Guidelines on national emergency telecommunication plans
- Better coordination with ICT community through ITU Membership: Telecommunication/ICT policy makers, regulators, private sector
- ITU Study Group Question 5/2: Utilization of telecommunications/ICTs for disaster preparedness, mitigation and response
- Monitoring progress in CAP implementation.

Vanessa closed by noting that the next Global Forum on Emergency Telecommunications (GET-19) will be held in Mauritius, 4-6 March 2019.

3.18 The New Severe Weather Information Center Website

Armstrong Cheng started by noting various hazard events that have affected Hong Kong over the years. He then asserted various needs. One is for a common language for warnings and alerts on a global level that is aligned with the Sendai Framework for DRR. Another need is for impact based forecasting to position forecasters as intermediators with Civil Protection. His list included a need for exchange of best practises among and within countries; a need for information for travelers, media, and NGO´s in emergency situations; and a need for technical standardization, including the CAP standard. Armstrong then listed the objectives of the proposed Global Multi-hazard Alert System (GMAS).

Under the heading "Key Considerations in System Design" he stressed it is important to use a standard to facilitate effective communication of forecasts and warnings to users including general public, media, decision makers. He then presented the new Severe Weather Information Center (SWIC) website, on which color is used as a visual aid for quick identification of CAP warnings of various level of severity and is totally not related to the color of warnings. In his concluding remarks, he stated that SWIC 2.0 provides meteorological and hydrological warnings and alerts for common situation awareness. He also noted that there will be

customized CAP feeds for the cities in the World Weather Information Services (WWIS) and MyWorldWeather app, which can include pushing CAP warnings to users in target cities/areas.

3.19 Overview of Meteoalarm and CAP Implementation

Andreas Schaffhauser opened his presentation by explaining that MeteoAlarm is a programme of EUMETNET, a grouping of 31 European National Meteorological Services. Meteoalarm aggregates and displays meteorological and hydrological warnings so that they are easily understandable to the general public and European (re)users. Created more than ten years ago, MeteoAlarm currently is led by ZAMG of Austria and includes 37 national partners.

Andreas explained that one of the main concepts of MeteoAlarm is to add common value through a consistent warning philosophy plus an easily understandable four level color code. Under the heading of Data Collection and Dissemination, Andreas explained that alerts published by a national partner are typically received by MeteoAlarm in CAP format and are then aggregated and disseminated via real-time via CAP feeds to (re)users of the data. When these alerts are also ingested by the global-scale WMO Alert Hub, CAP feeds are thereby enabled at the national, European, and global levels.

It was noted that Meteoalarm convened a Task Team to review and propose how MeteoAlarm's CAP implementation can better meet the needs of Meteoalarm members. The Task Team included partners from UK Met Office, DWD, Meteo France, KNMI, FMI, ARSO, MeteoSwiss, AEMET, and ZAMG. The Task Team arrived at an agreed position on what constitutes core mandatory components for the next CAP iteration in Meteoalarm. But, the Team decided that further work is required on optional CAP components, and on how to integrate the "risk matrix" approach discussed in the context of Impact-Based Forecasting.

Concerning the future of Meteoalarm, Andreas noted that a major redesign of the system (Meteoalarm 2.0) is planned. He also asserted that MeteoALarm strongly supports the proposed GMAS (Global Multi Hazard Alert System) concept of WMO.

3.20 WMO Perspectives on CAP Implementation Worldwide

Samuel Muchemi opened his presentation by noting that weather comprises the top economic risk, according to the Global Risk Landscape 2018 report at the World Economic Forum, Davos. He noted that WMO has long promoted CAP and the next step may be that CAP will be included in the WMO Technical Regulations, which is the foundational document of WMO as an international treaty institution.

Sam also noted that implementation of CAP requires resources, especially in least-developed and developing countries. He explained that WMO Member countries have been able to host "CAP Jump-star" expert assistance over the years, most recently in Laos and Vietnam. These have been supported financially by projects funded by WMO Members, including: the Severe Weather Forecasting Demonstration Project (SWFDP), the Climate Risk & Early Warning Systems (CREWS), and the HIGH impact Weather Lake System (HighWAY), among others. Sam also mentioned that WMO maintains the international Register of Alerting Authorities, which is supported operationally by HKO.

The proposed WMO Global Multi-hazard Alert System (GMAS) was introduced. Sam explained that GMAS would be positioned as "an authoritative source of warnings and information related to high-impact weather, water, ocean and climate events". He ended his presentation with mention of an upcoming meeting that will address the intersection of Impact-Based Forecasting

(IBFP) and CAP. The intent is to assure that public alerts prepared with IBF techniques are issued in a manner consistent with CAP.

3.21 Update on OASIS Emergency Management Technical Committee Work

Elysa Jones presented on behalf of the OASIS Emergency Management Technical Committee (EM TC), chartered in 2003. Her main topic was the family of OASIS Emergency Data Exchange Language (EDXL) Standards.

Elysa provided updates concerning ongoing EM TC work to develop a consensus international CAP "Event" Term List. She said the EM TC requested input from over 1200 implementers. The material received has been reviewed but the work is ongoing. A few dozen terms remain to be addressed, such as input received recently by EUMETNET and the published material from the New Zealand CAP implementation. Elysa also noted the EM TC is still looking forward to input from the IFRC and from the U.S. National Institute of Standards and Technology.

Under the heading of EM TC Standards Adoption, Elysa stated that any product can be listed in the OASIS EMTC product directory, without regard to membership. The only requirement is that the product uses the CAP and EDXL standards. She noted the directory references a current invitation to bid a republic of Mauritius contract for a CAP aggregator.

Offers to Host the 2019 CAP Implementation Workshop

The Workshop participants were invited to put forward suggestions regarding the location of a possible 2019 CAP Implementation Workshop. The tentative idea is that the Workshop will be in the September-November period. There is an offer from the city of Whitehorse, Canada, to hold the 2019 Workshop there. It is also expected there will be an offer from Mexico City, Mexico, to hold the Workshop in that city.