Planning of WMO Global Multi-hazard Alert System (GMAS) in relation to Tropical Cyclones

TECO

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Outline

- Background of WMO GMAS
- Schematic of GMAS
- WMO Alert Hub
- Common Alerting Protocol (CAP)
- Enabling CAP in Severe Weather Information Centre (SWIC)
- Future's Plan

WMO Global Multi-hazard Alert System (GMAS) - Background

- Decision 3.2(1)/1 (EC-69 ,10-17 May 2017) on GMAS
- Vision
  - Recognized globally by decision makers as authoritative warnings and information related to high-impact weather, water, ocean and climate events
- Objectives
  - Provide authoritative information and advice into UN agencies and humanitarian community in both their operational and longer term decision
  - Aggregate authoritative source of information from Members

WMO Global Multi-hazard Alert System (GMAS) – Objectives

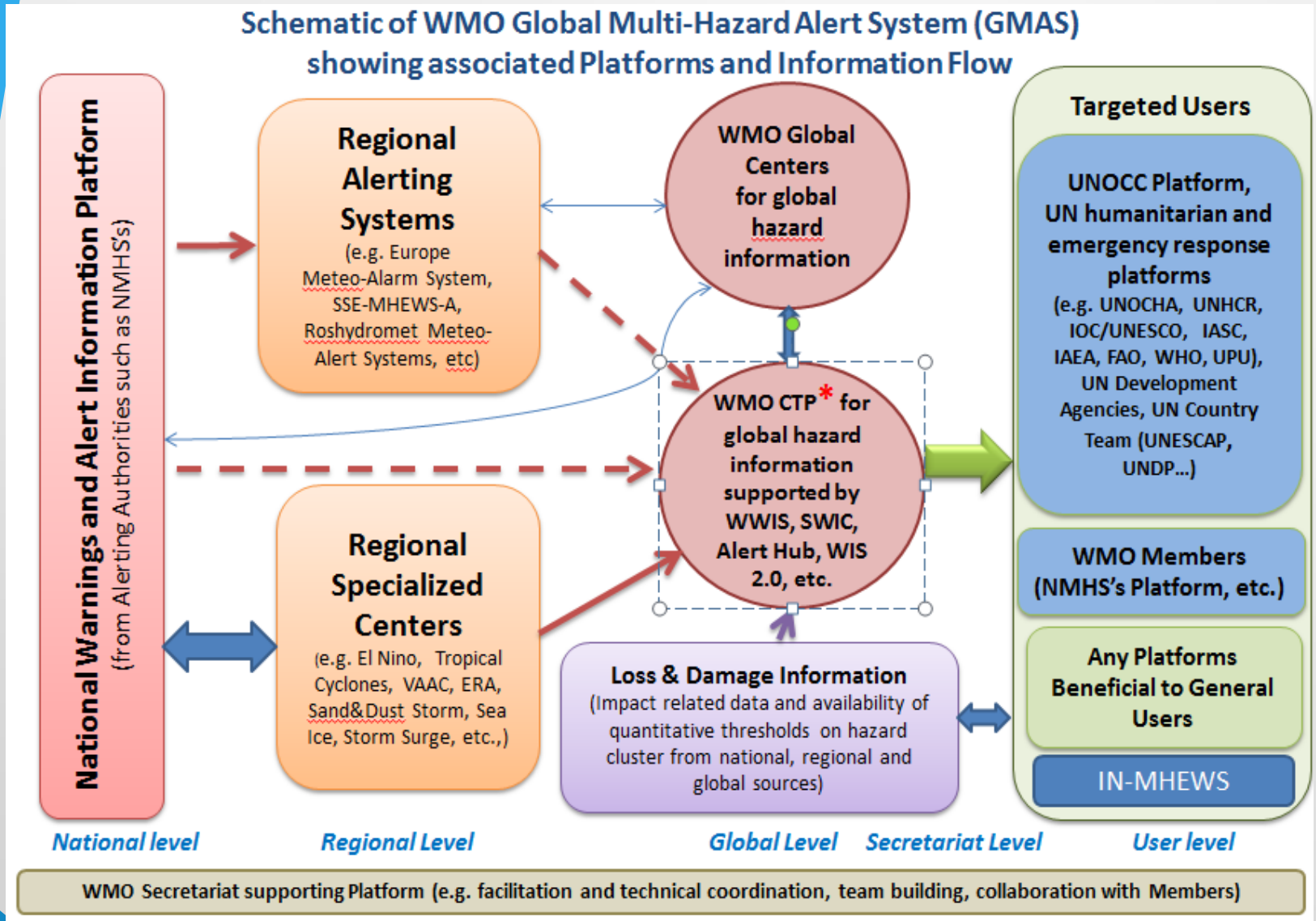
- Objectives (Cont'd)
  - Strengthen partnerships with stakeholders to deliver warnings to the general public in the most efficacious manner;
  - Raise the visibility of NMHSs at the national, regional and global scales;
  - Raise the visibility of WMO at the UN level;
  - Enhance the authoritative voice of Members;
  - Strengthen Members' capability and capacity to provide better service

WMO Global Multi-hazard Alert System (GMAS) - Benefits

- Benefits
  - Help to save lives, livelihoods and property
  - Increased recognition of NMHSs products and services
  - Increased standardization of hydrometeorological warning information among WMO Members (through utilization of CAP)
  - Increased sharing and harmonization of hydrometeorological warnings and hazard products among Members
  - Increased focus on NMHS capacity development to provide reliable, actionable, and timely warnings
  - Improved user decision-making for humanitarian agencies
  - Quick access to authoritative alerts to better inform public, media, tourism sectors, other weather sensitive sectors

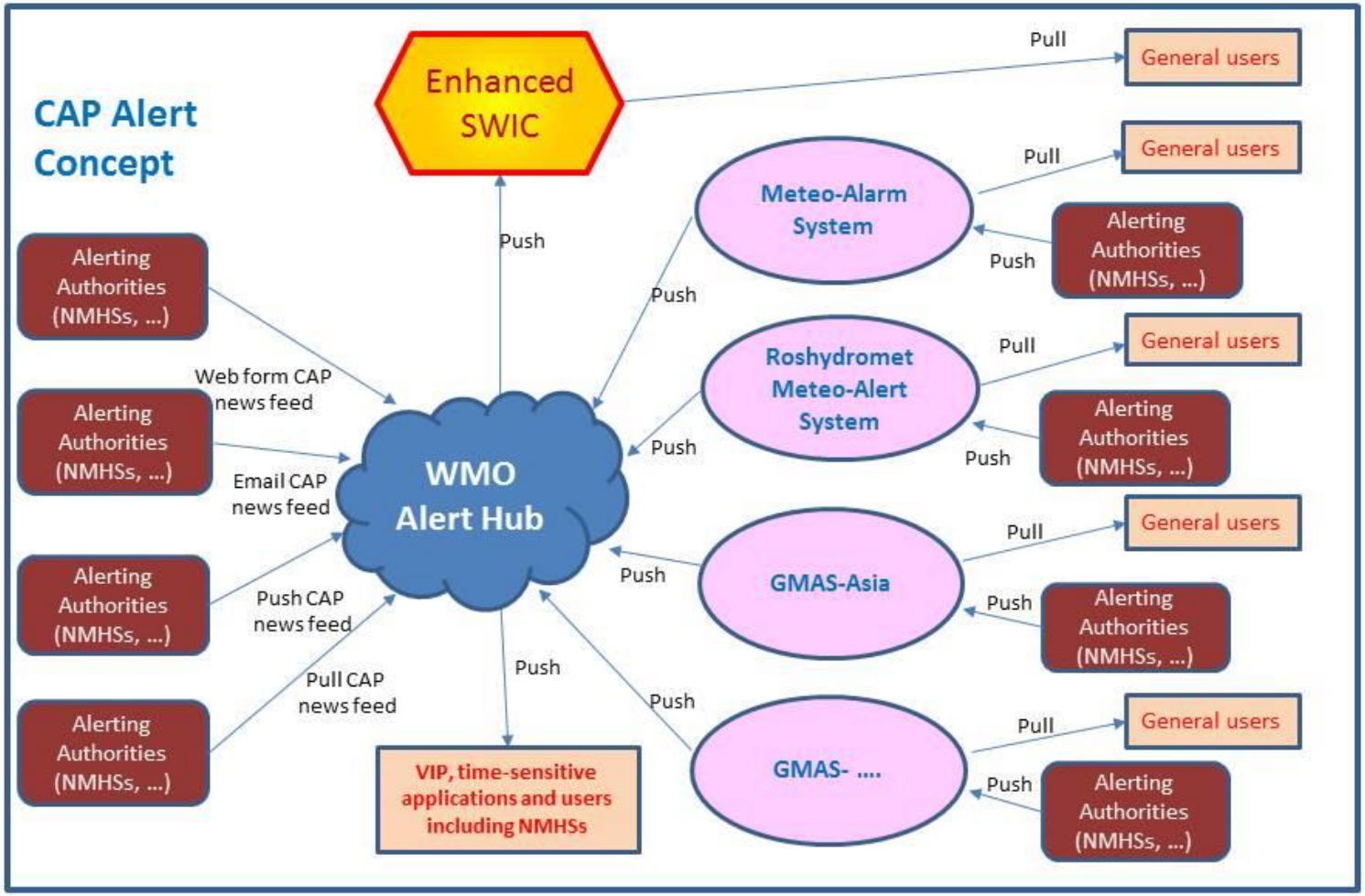
WMO GMAS Initiative

- EC-69 requested EC WG/DRR to
  - further advance the concept and the development of a strategy that emphasizes the following components:
    - Focus on the benefits to and requirements of users;
    - Emphasize that NMHSs are official authoritative source and in most countries, a single voice, on weather warnings in respective cases;
    - Consider the role of RSMCs in providing guidance to Members (e.g. tropical cyclones, and climate products);
    - Consider both the meteorological and hydrological aspects;
    - Accommodates public and private capacities and use cases;
    - Takes into account other service providers such as GDACS;
    - Utilize the CAP or other industry standards to enable a robust mechanism for aggregating warnings from Members.
  - develop a project plan with key deliverables for EC-70
    - Detailed plan aimed at gathering the requirements;
    - Detailed proposal which leverages existing mechanisms (e.g. CBS Management Group Task Team on DRR) in consultation with RAs and TCs.

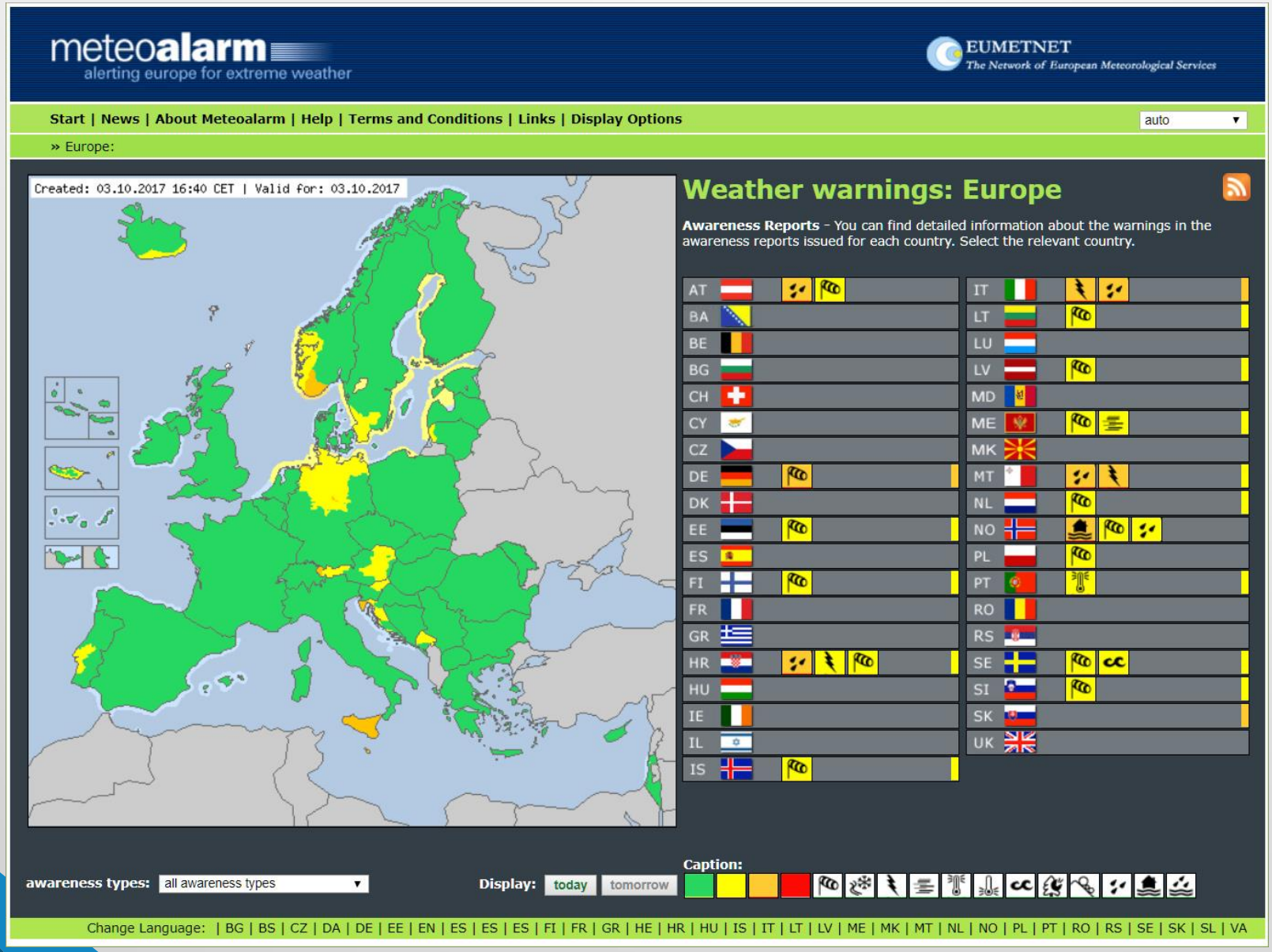


* CTP – Common Technical Platform is a framework with relevant protocols, standards, open systems, etc. which have been agreed by all relevant stakeholders to show all the authorized warnings and associated impact-related information that have been made available by WMO Members to be accessible to the decision makers and others.

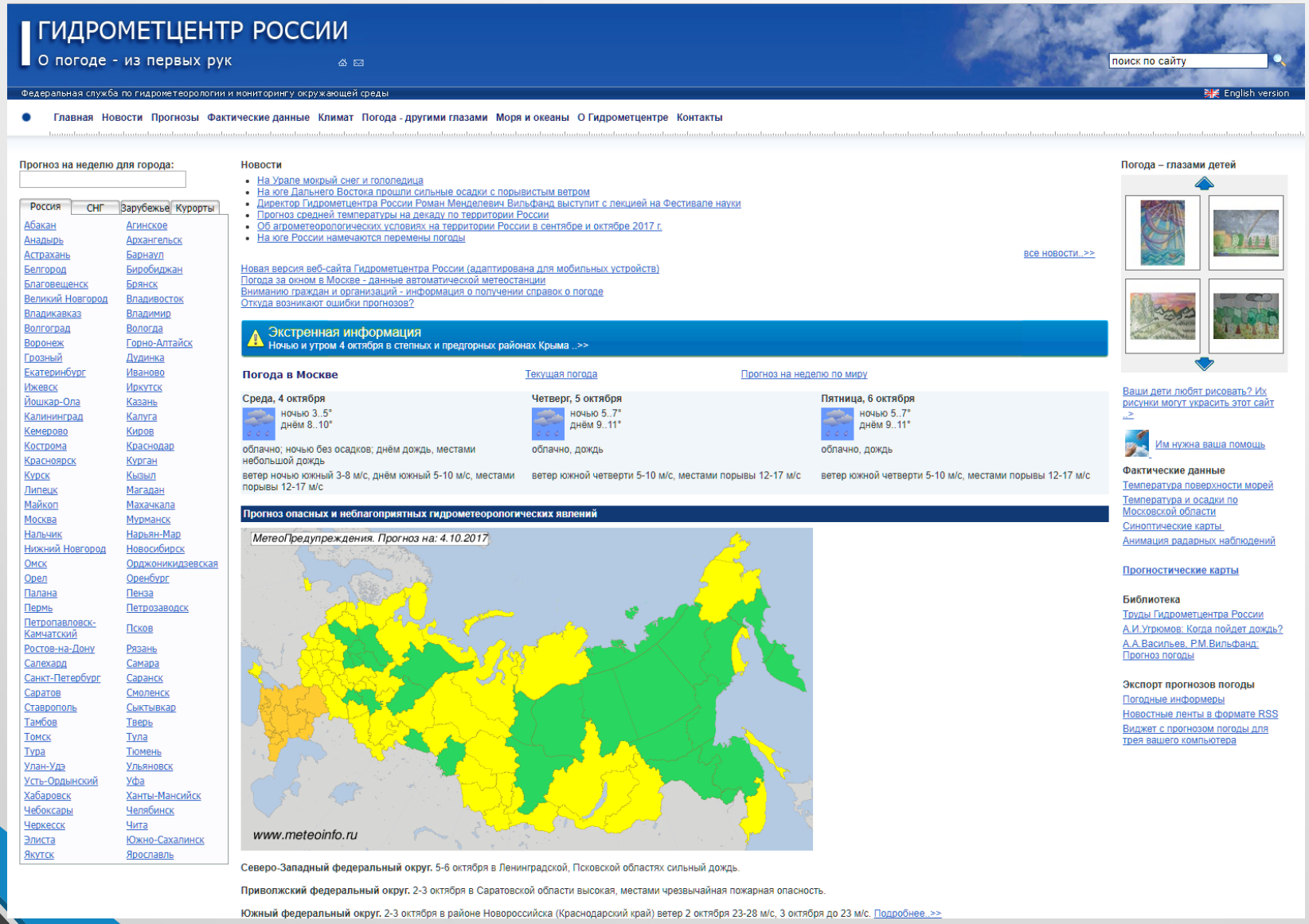
WMO Alert Hub within GMAS



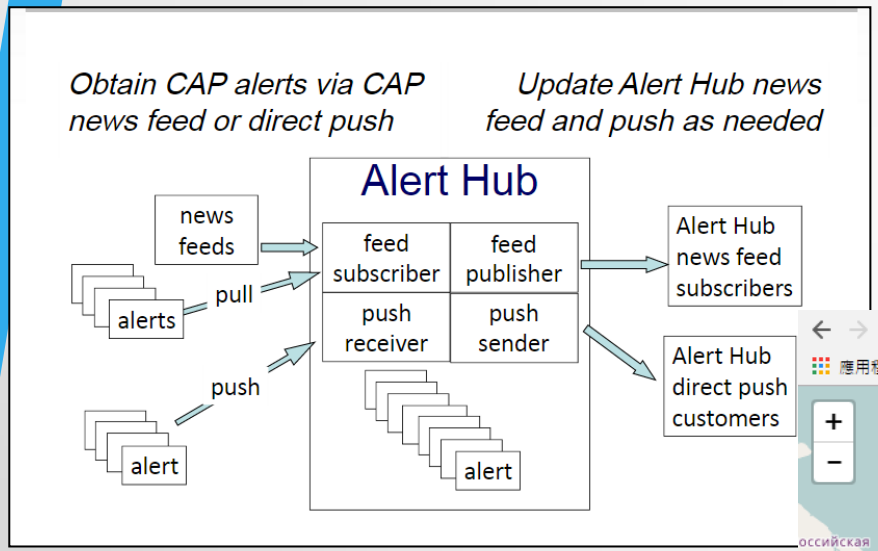
EUMETNET Meteoalarm



Roshydromet Meteoalert

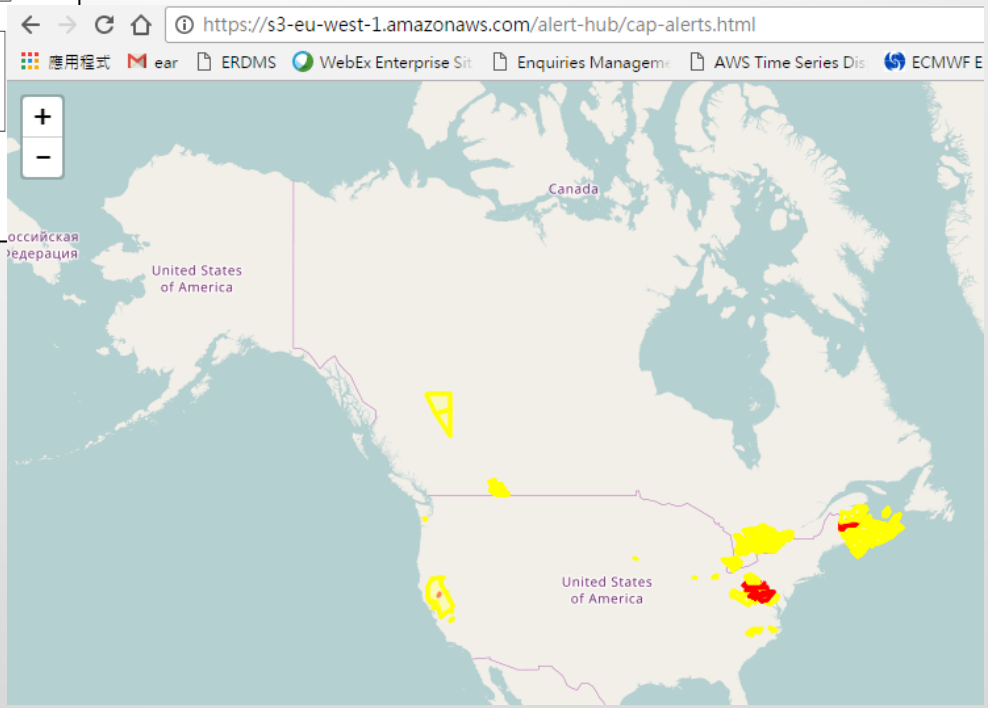


A Prototype of WMO Alert Hub



Courtesy: Eliot Christian

Development based on Filtered Alert Hub, which is a part of the NOAA Big Data Project.



The cloud-based Filtered Alert Hub aggregates emergency alerts worldwide.

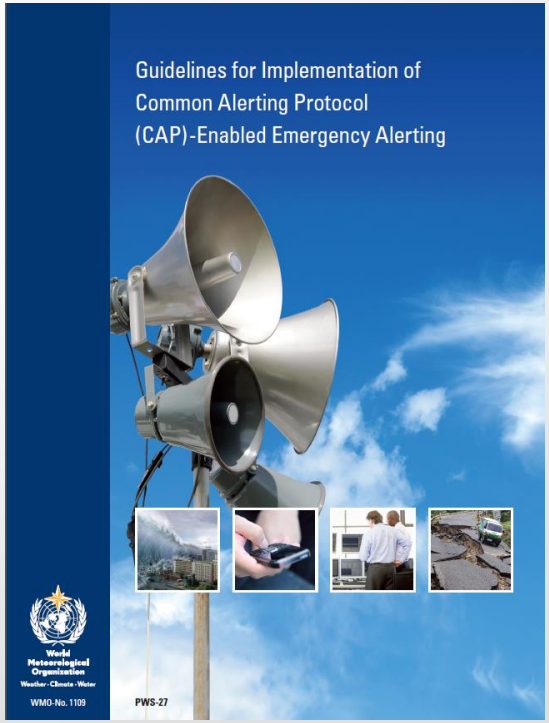
What is CAP?

The Common Alerting Protocol (CAP) is an XML-based data format for exchanging public warnings. It is a standard message format designed for All-Media, All-Hazard, communications:

- **over any and all media** *(television, radio, telephone, fax, highway signs, e-mail, Web sites, RSS "Blogs", …)*
- **about any and all kinds of hazard** (*Weather, Fires, Earthquakes, Volcanoes, Landslides, Child Abductions, Disease Outbreaks, Air Quality Warnings, Transportation Problems, Power Outages …)*
- **to anyone:** the public at large; designated groups (civic authority, responders, etc.); specific people

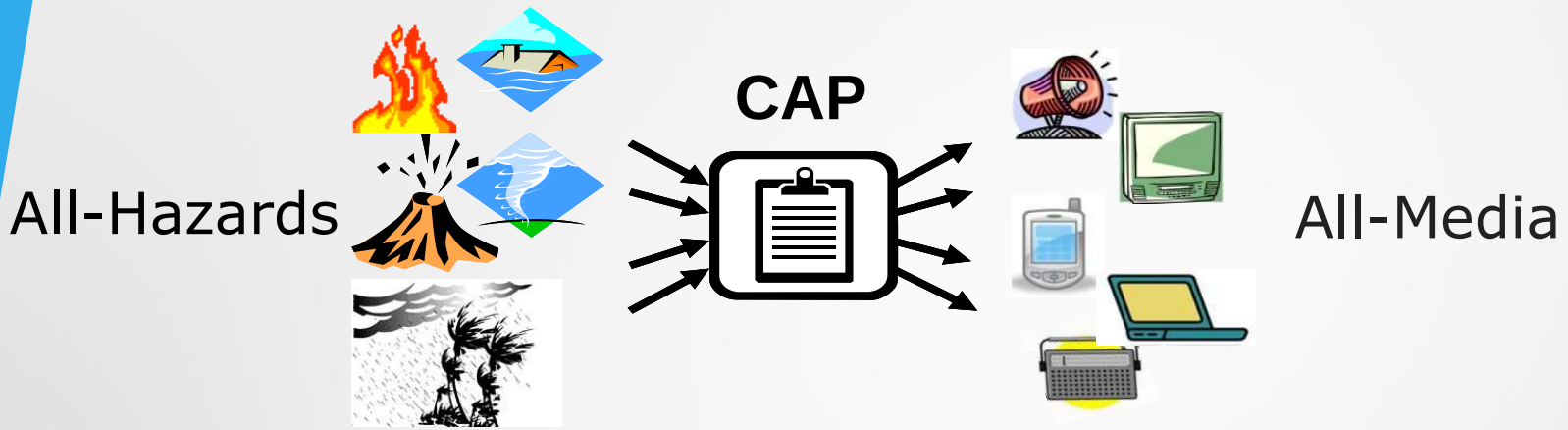
Cg-15 2007 endorsed adoption of CAP as standard for alerting

Cg-17 2015 reaffirmed the value of CAP



WMO-No. 1109

Benefits of CAP

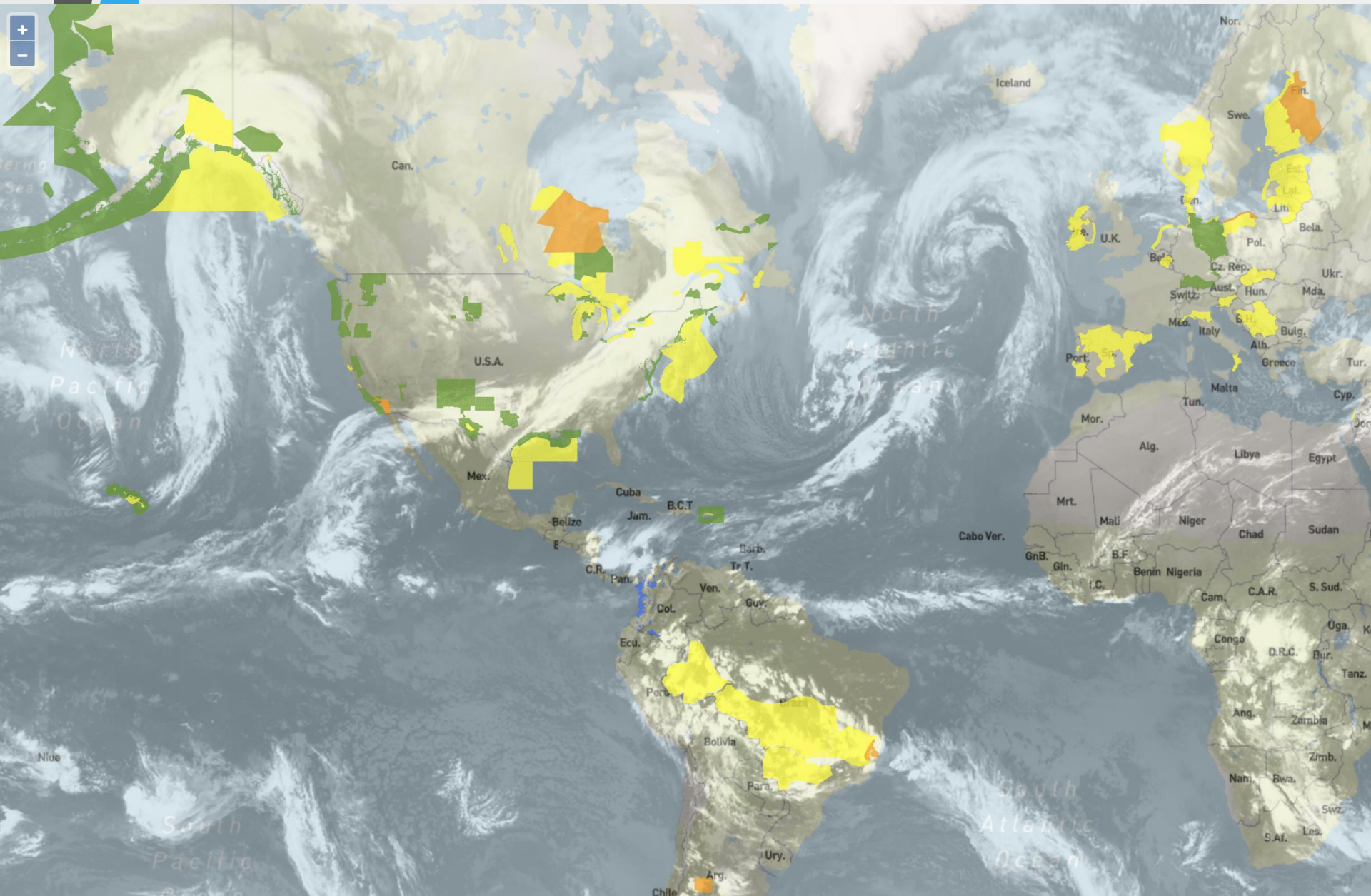


- Reduce cost/complexity - A CAP message sender can activate multiple alerting systems with a single input
- Facilitate common situation awareness - Standardized alerts from many sources can be compiled for situational awareness, providing a whole picture across all types of local, regional, and national alerts
- Consistency - CAP provides consistency over multiple channels, allowing exact corroboration of alert information
- Flexibility - CAP useful for multilingual and special-needs populations.
- Breakthrough standard - Geographic information in a CAP alert allows targeting of users

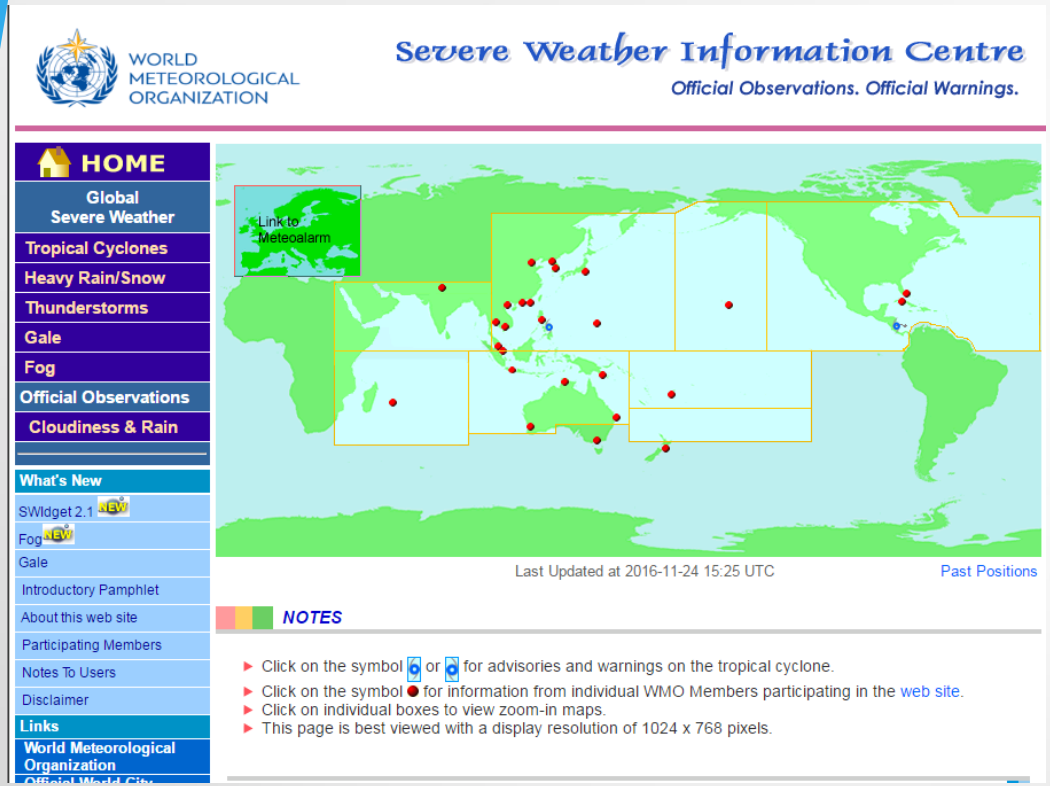
CAP – Ideal Tool for Conveying Impact-based Forecast to Users

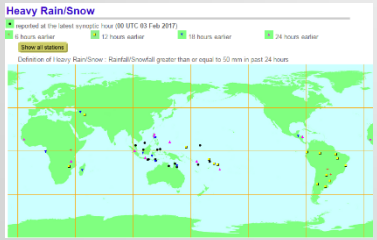
urgency	cap. alertInfo. urgency. code	The code denoting the urgency of the subject event of the alert message (REQUIRED)	(1) The "urgency", "severity", and "certainty" elements collectively distinguish less emphatic from more emphatic messages. (2) Code Values: "Immediate" - Responsive action SHOULD be taken immediately "Expected" - Responsive action SHOULD be taken soon (within next hour) "Future" - Responsive action SHOULD be taken in the near future "Past" - Responsive action is no longer required "Unknown" - Urgency not known
severity	cap. alertInfo. severity. code	The code denoting the severity of the subject event of the alert message (REQUIRED)	(1) The "urgency", "severity", and "certainty" elements collectively distinguish less emphatic from more emphatic messages. (2) Code Values: "Extreme" - Extraordinary threat to life or property "Severe" - Significant threat to life or property "Moderate" - Possible threat to life or property "Minor" - Minimal threat to life or property "Unknown" - Severity unknown
certainty	cap. alertInfo. certainty. code	The code denoting the certainty of the subject event of the alert message (REQUIRED)	(1) The "urgency", "severity", and "certainty" elements collectively distinguish less emphatic from more emphatic messages. (2) Code Values: "Observed" – Determined to have occurred or to be ongoing. "Likely" - Likely (p > ~50%) "Possible" - Possible but not likely (p <= ~50%) "Unlikely" - Not expected to occur (p ~ 0) "Unknown" - Certainty unknown (3) For backward compatibility with CAP 1.0, the deprecated value of "Very Likely" SHOULD be treated as equivalent to "Likely."

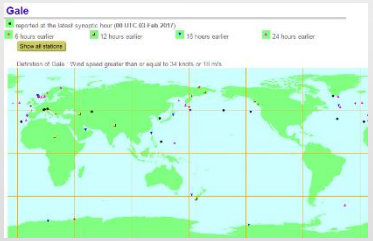
CAP and GIS enabled SWIC?



Severe Weather Information Centre (SWIC)







- Centralised platform to provide official authoritative warnings and information issued by NMHSs
- Contains advisories issued by RSMCs/TCWCs
- Features warnings on tropical cyclones and worldwide information on severe weather

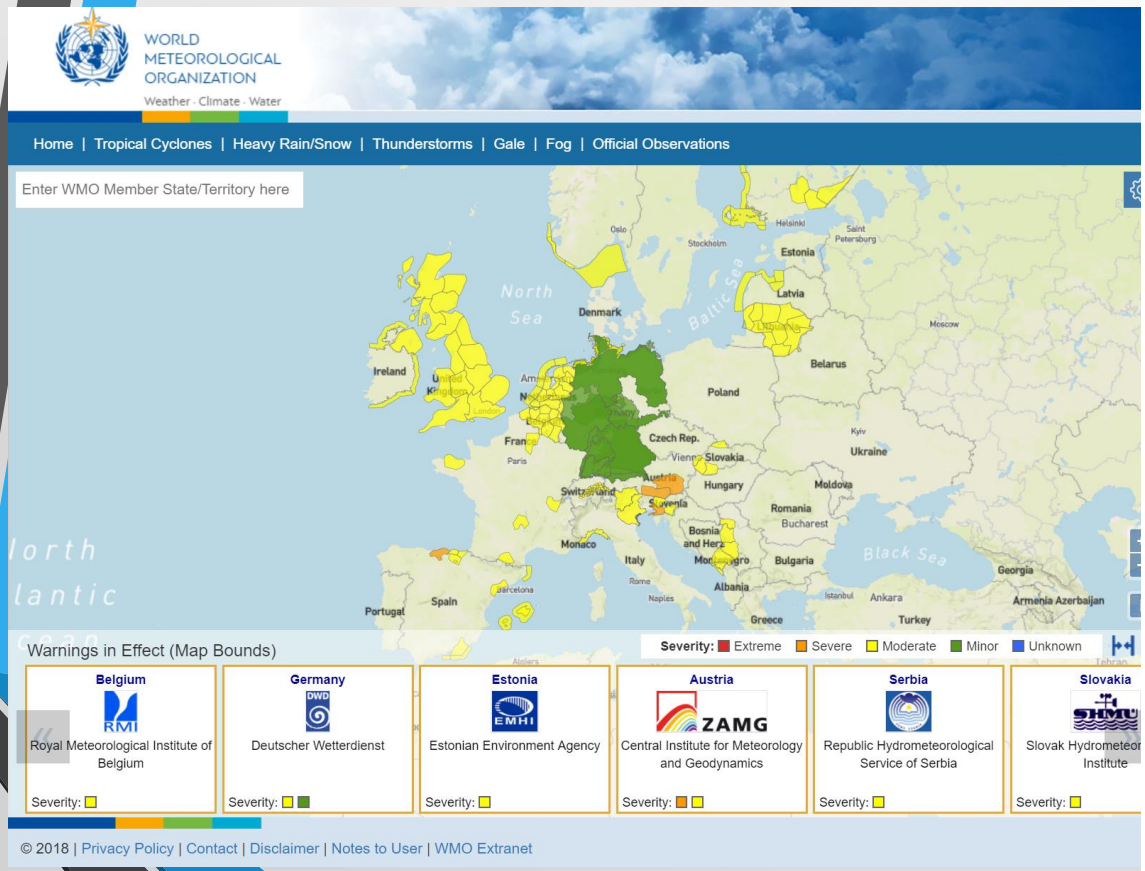
Challenges

- Not all hazards covered
- Inconsistent content/format
- Proliferation of warning websites from other sectors

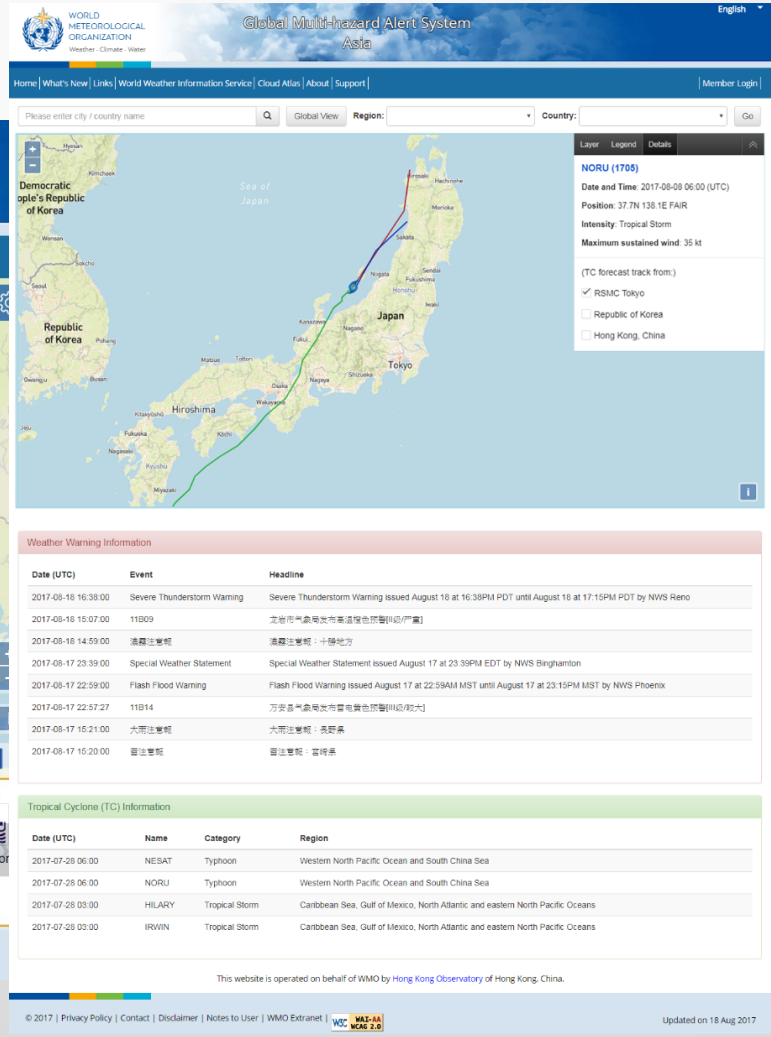
Enabling CAP in SWIC

A PLATFORM TO COLLATE, DISPLAY & SHARE WARNINGS ISSUED BY NMHSs AND RSMCs/TCWCs

Warnings issued by NMHSs in CAP



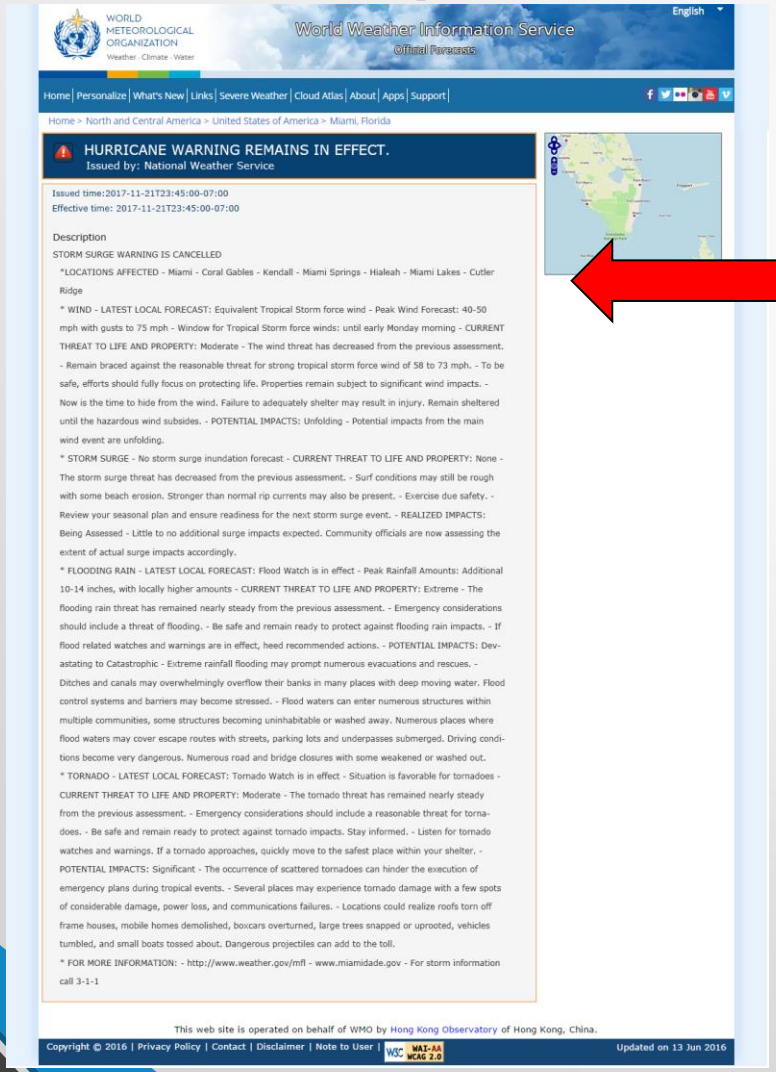
Tropical Cyclone

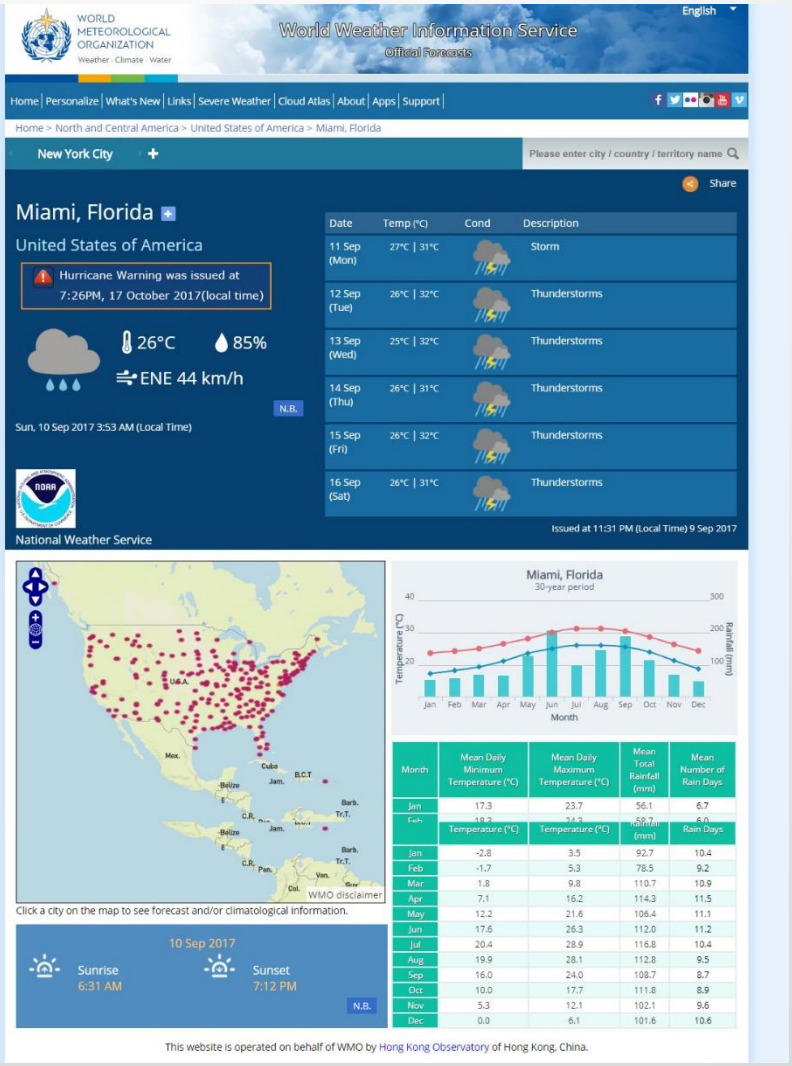


WMO World Weather Information Service (WWIS)

- Global official weather observations, weather forecasts and climatological information
- Official weather information from for 2,123 cities from 169 Members in 11 languages

Upgraded WMO WWIS website to incorporate Members alerts in CAP https://worldweather.wmo.int/





TC Warnings and Advisories

- TC warnings/advisories are indispensable information for users and should be made available in GMAS & upgraded SWIC
- Currently, limited TC information available on SWIC (current/past TC positions & hyperlinks to warning advisories).
- The upgraded SWIC is intended to include other TC info such as forecast positions/intensity, movement, wind radii, etc.
- Challenge: TC warnings/advisories issued by some RMSCs & TCWCs are in free text format, NOT machine-readable.
- Machine-readable format: facilitate reuse by GMAS and other applications.
- Examples: TC advisories from BoM (in CXML format) and RSMC Tokyo of JMA (in CAP format on experimental basis)

Recommendation: RSMCs and TCWCs provide TC advisories in machine-readable format to GMAS so that TC information in their respective responsible areas can be made available to GMAS for use by the UN humanitarian organizations, NMHSs and other global users.

Future's Plans

- Upgrade SWIC to become an online GIS-enable platform to aggregate, display and share authoritative warnings and alerts in CAP format from WMO Alert Hub and other industry standards
- A example of display platform for the GMAS
- Mature WMO Alert Hub aggregating official alerts and warnings from NMHSs and officially Registered Alerting Authorities (RAAs)
- Encourage NMHSs to adopt CAP format for their warnings and disseminate these warnings to WMO Alert Hub and thus SWIC
- Enhance WWIS to become a online GIS-enable platform for official weather observations, authoritative forecasts and warnings provided by NMHSs around the world
- To implement RA II Pilot Project on Asian GMAS (Resolution 5.2/10 (RA II-16))

Conclusion

- Tropical cyclones are amongst the most destructive weather systems on the earth.
- Effective dissemination of warnings to users is very important in reducing the loss of life and damages.
- GMAS is a WMO global platform aggregating authoritative multi-hazard warnings issued by NMHSs and RAAs, including RMSCs and TCWCs.
- The NMHSs / RAAs contributing to GMAS will be recognized as the only authoritative source of multi-hazard warning information.
- It is highly desirable and essential for RSMCs and TCWCs to make available their TC advisories in machine-readable format

Thank you

Questions and Comments?

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Impact Forecasting

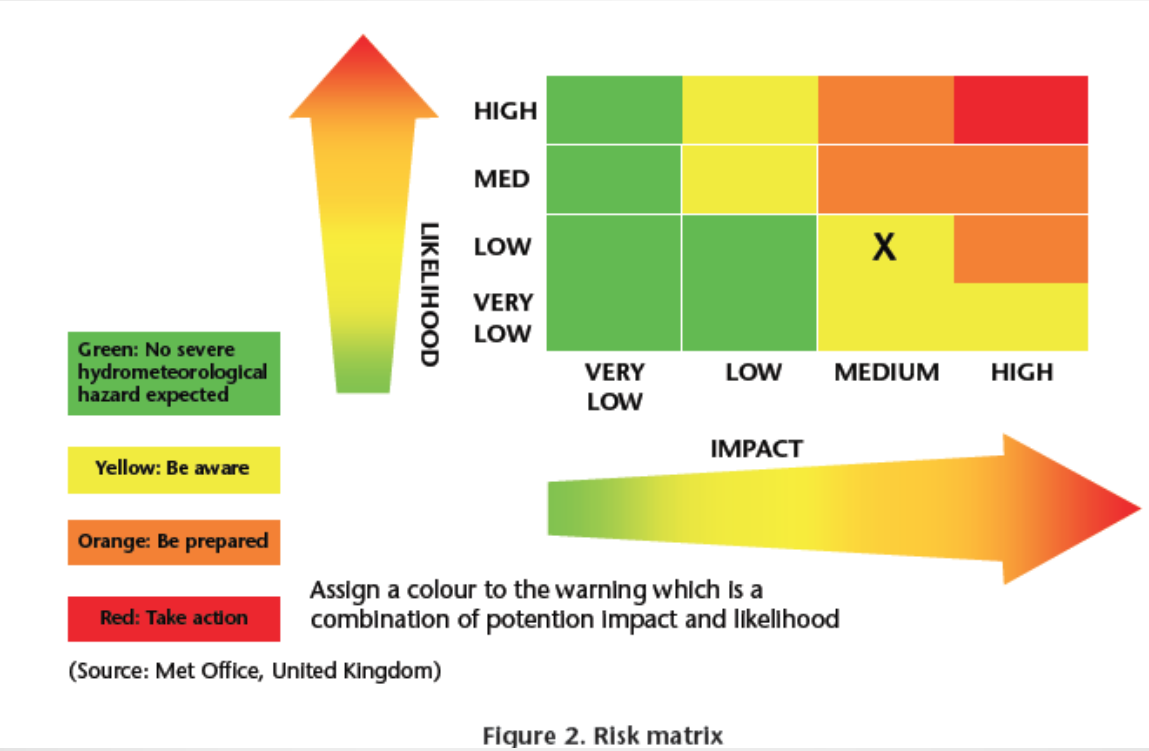
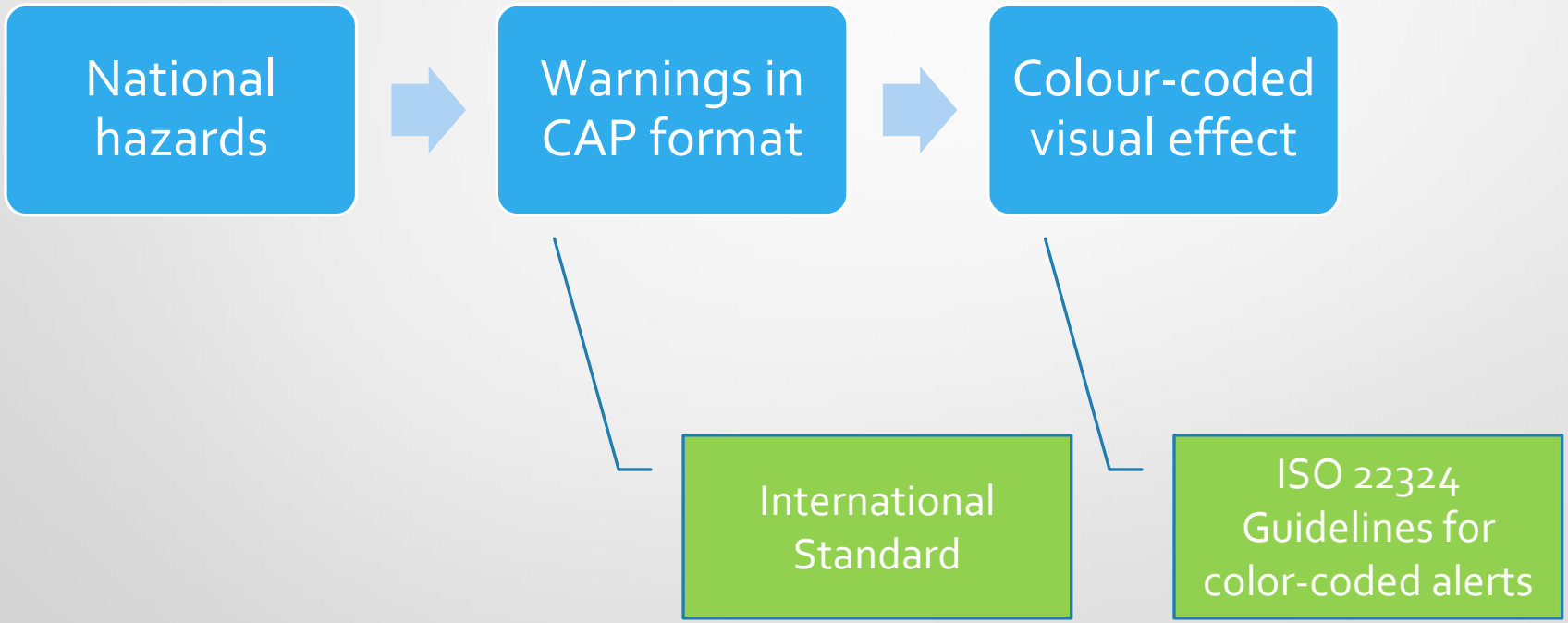


Figure 2. Risk matrix

- Consistent means for the early expression of potential impact, well in advance of a significant hydrometeorological event
- Progressively express changing expectations of risk as a function of varying exposure, vulnerability and hydrometeorological likelihood

WMO-1150 Guidelines on Multi-hazard Impact-based Forecasting and Warning Services

CAP – Potential candidate for Standardizing Impact-based Warning Presentation



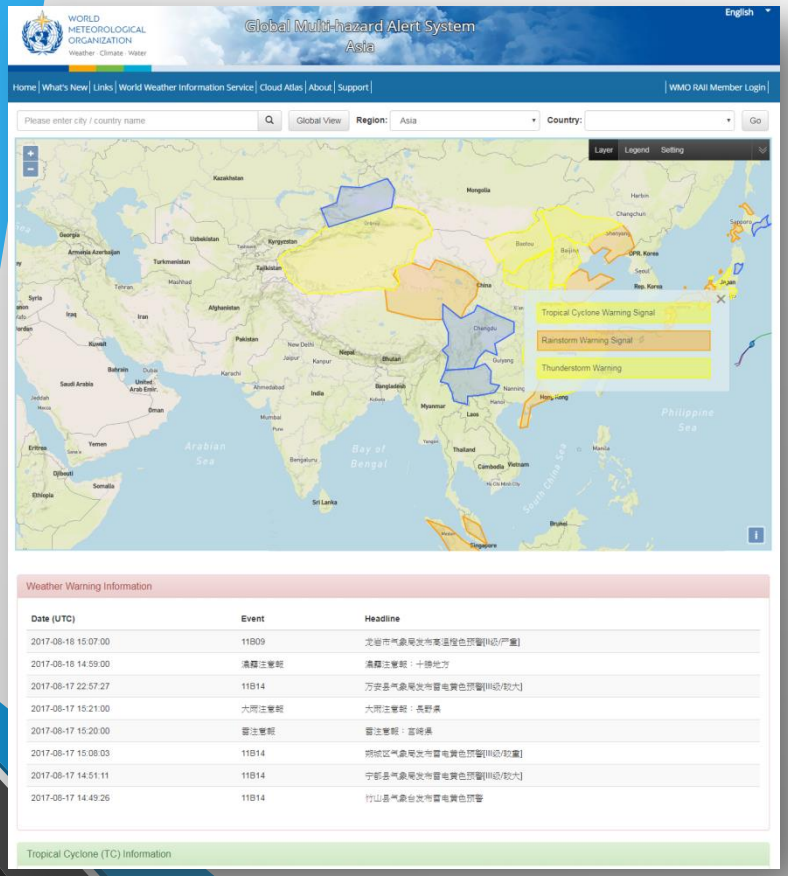
ISO 22324
Guidelines for colour-coded alerts

- Red, yellow and green (and the spectrum in between in terms of hue) should be used to express status of hazard
- **Red** is associated with **danger** and should be used to notify people at risk to prepare to take appropriate safety actions **immediately**
- **Yellow** is associated with **caution** and should be used to notify people at risk to **prepare** to take appropriate safety actions
- **Green** is associated with a **safe** status and should be used to notify people at risk that **no action** is required

A Possible Strategy to Display Warnings in Upgraded SWIC

Scale-dependent granularity

Regional View



National View