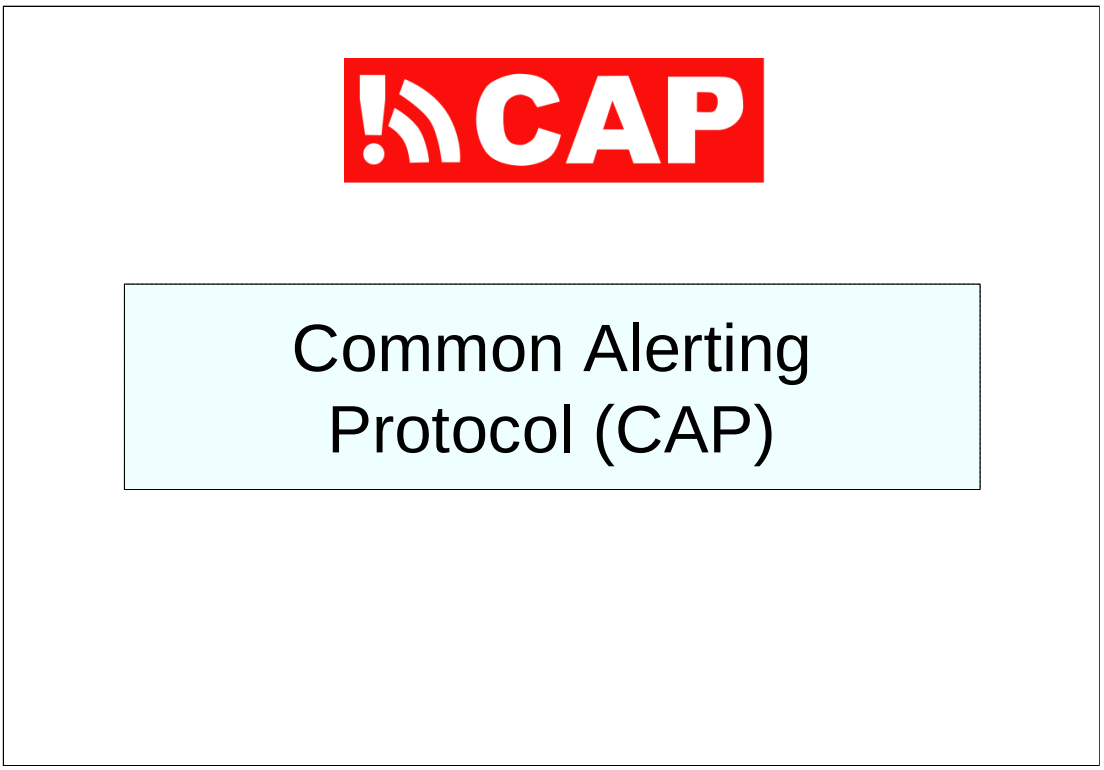
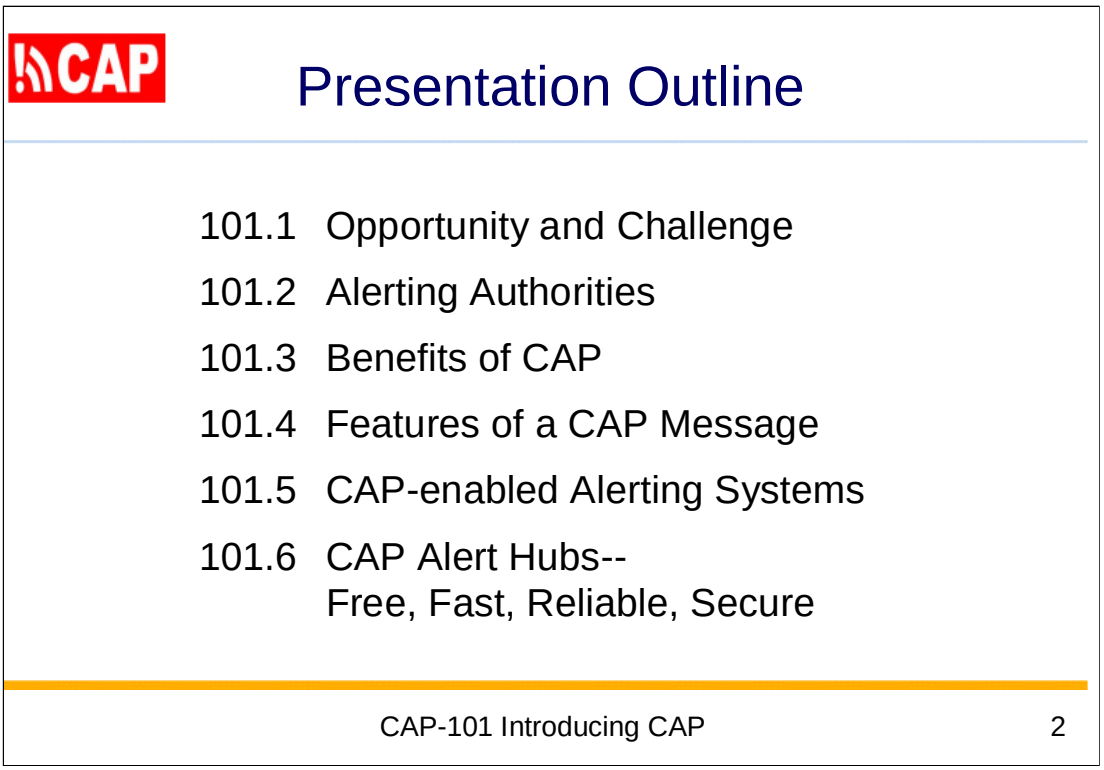


The title of my presentation is: "Introducing the Common Alerting Protocol (CAP)".

My name is Eliot Christian. Since 2001 I have been involved in defining and promoting CAP, especially internationally.



These are the major topics I will cover in this presentation.

The first topic is "Opportunity and Challenge".

Warnings Via Commercial Media

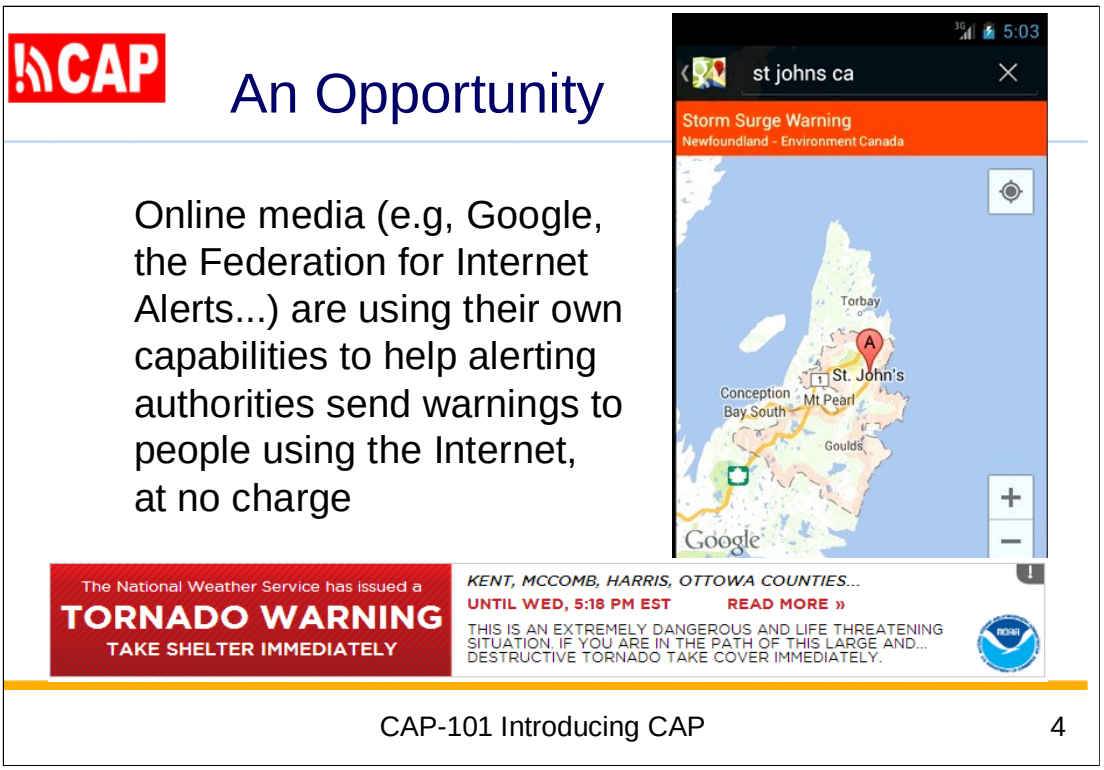
Commercial TV and radio send warnings as "crawl text" and/or audio

What about online media users?

CAP-101 Introducing CAP 3

Alerting authorities have long relied on commercial media, such as broadcast radio and television, to help disseminate public warnings. Many television stations insert "crawl text" with the warning message, and radio stations insert a recording. This public-private collaborative effort required decades to implement and consumes huge, ongoing investments in specialized technology.

Unfortunately, all of this technology does **nothing** to reach users of online media.



Luckily, we now have a **great opportunity** for alerting authorities to reach people with targeted warnings, through public networks.

Here we see Google showing an official warning of a Storm Surge in St John's, Newfoundland.

Below it we see a tornado warning from the U.S. National Weather Service, overriding advertisements on Web pages for users in the alerting area.

For an alerting authority like the U.S. National Weather Service, this commercial public dissemination costs nothing extra. These global technology companies are using their own resources and capabilities to help get the warnings out.

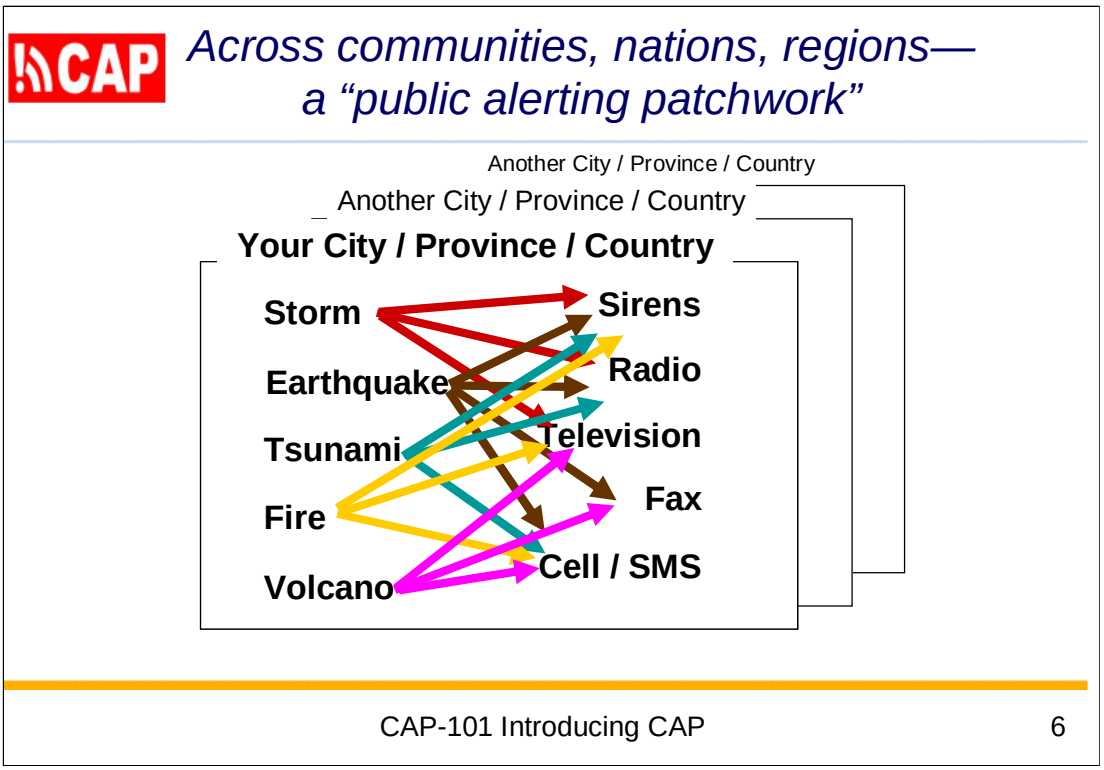
So, huge investments in new technology are not required. The only requirement is that alerting authorities implement the CAP standard.

The Challenge of Alerting

All governments have various public alerting systems:

- **Earthquakes/tsunami** by e-mail, news wire, Web sites, pagers, telephone calls ...
- **Weather** by news wire, fax, radio, television, e-mail, SMS text on cell phones ...
- **Fire, Security, Transportation** by television, radio, sirens, police with bullhorns...

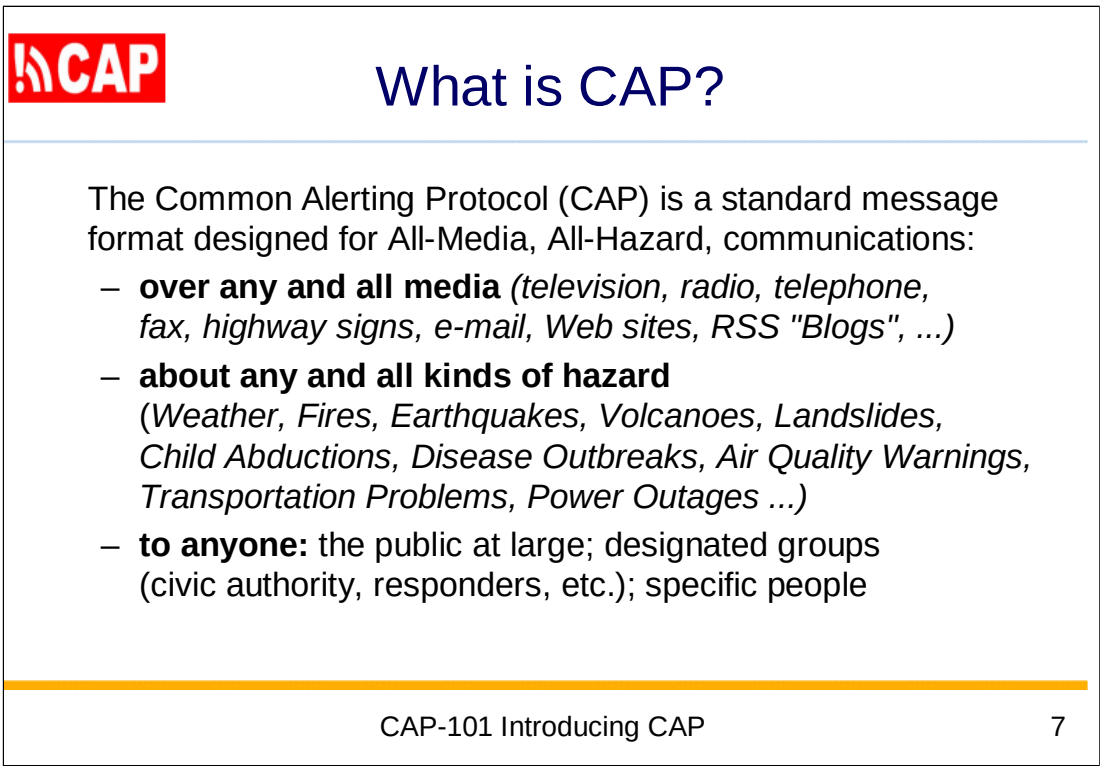
When a major hazard threatens, technical agencies send out notices and public alerting systems kick in. But, each public alerting system has its own particular methods.



From local communities to entire nations, societies everywhere have a patchwork of systems, often designed just for *particular* emergency situations and for *particular* communications media.

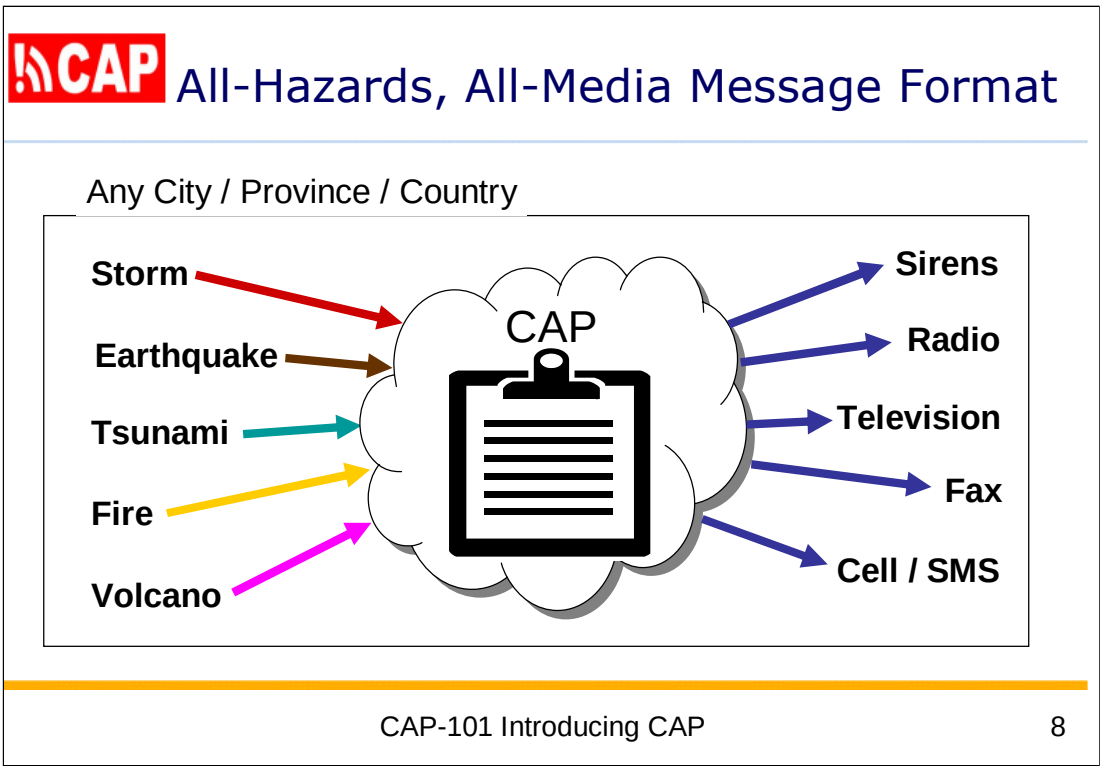
Obviously, this patchwork approach is wasteful. It may also be dangerous if:

- People miss out on alerts they should have gotten.
- People get alerts that are not intended for them.
- People get confusing messages that are difficult to confirm.



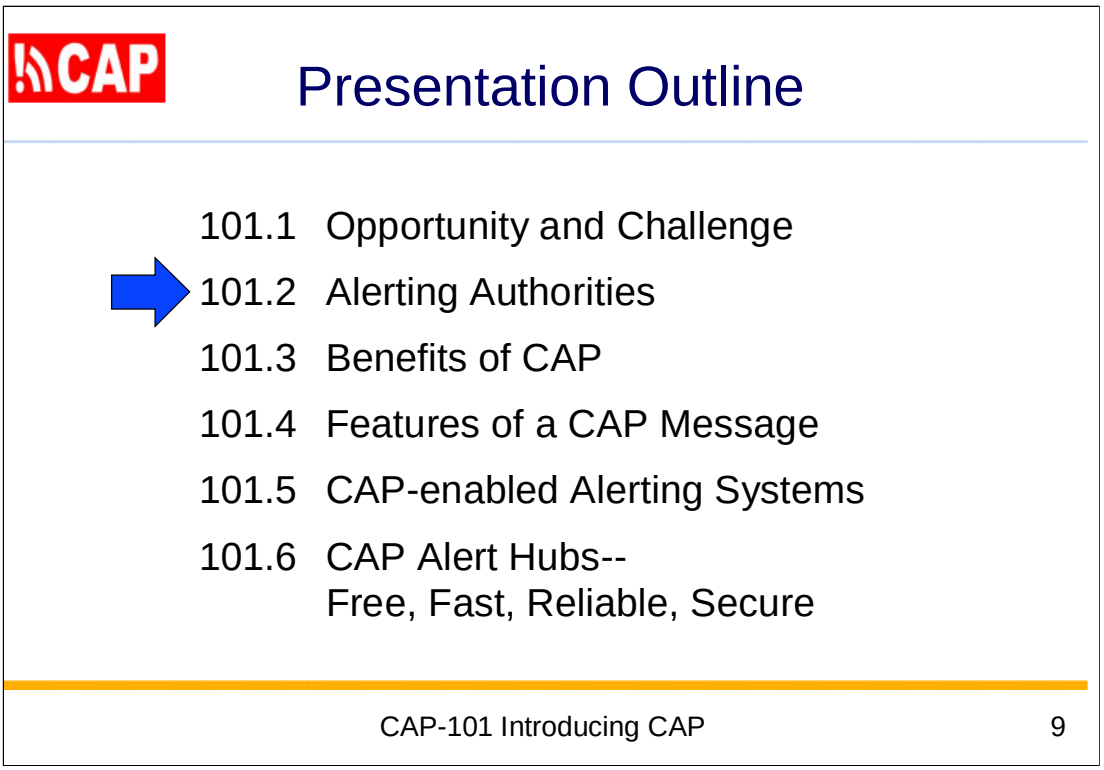
CAP provides a "standard business form" for alerting, designed for **any media,** to communicate information about **any kind of hazard** situation.

The message can be targeted to: the general public; designated groups such as civic authorities or responders; or to specific individuals.

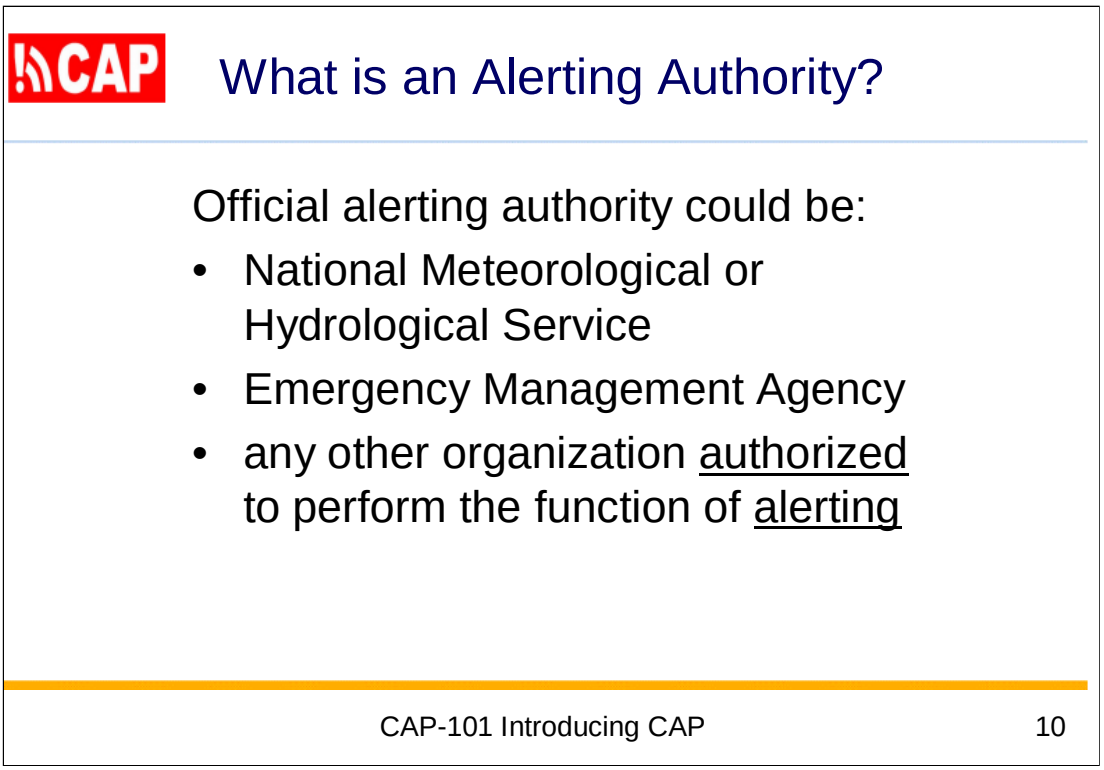


Without CAP, emergency messages are typically plain, unstructured text. Without a standard, all-hazard, all-media public alerting on broad scales was not possible.

Now that we have the CAP standard format for emergency alerts, simple tools can be used to get critical messages to affected people: wherever they are and whatever they are doing.



I want to take a moment on the term "Alerting Authority".



At the national level, an official alerting authority is:

- a National Meteorological or Hydrological Service,
- an Emergency Management Agency, or
- any other nationally authorized organization.

An "alerting authority" can be any organization officially authorized to perform public alerting.

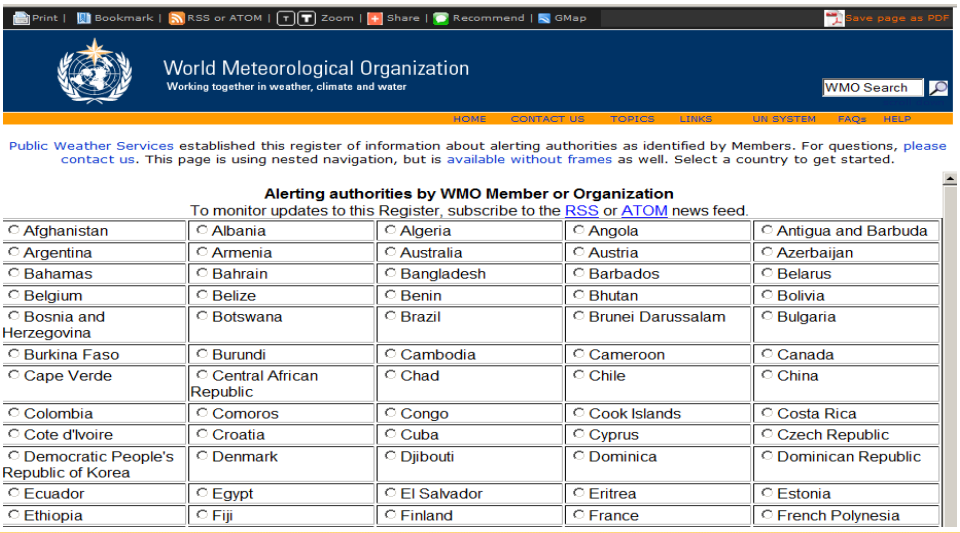
Different countries have their own policies on what it means to be "officially authorized". But , there is agreement that official alerting authorities should known internationally.

As alerting now uses large public networks, it is impossible to know your sources personally, as might have been the case in a small town.

The international Register of Alerting Authorities was set up like a referral service--you have a degree of trust in a registered alerting authority because you trust the service that registered them.

Register of Alerting Authorities

http://www.wmo.int/alertingorg



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World Meteorological Organization
Working together in weather, climate and water

WMO Search

HOME CONTACT US TOPICS LINKS UN SYSTEM FAQs HELP

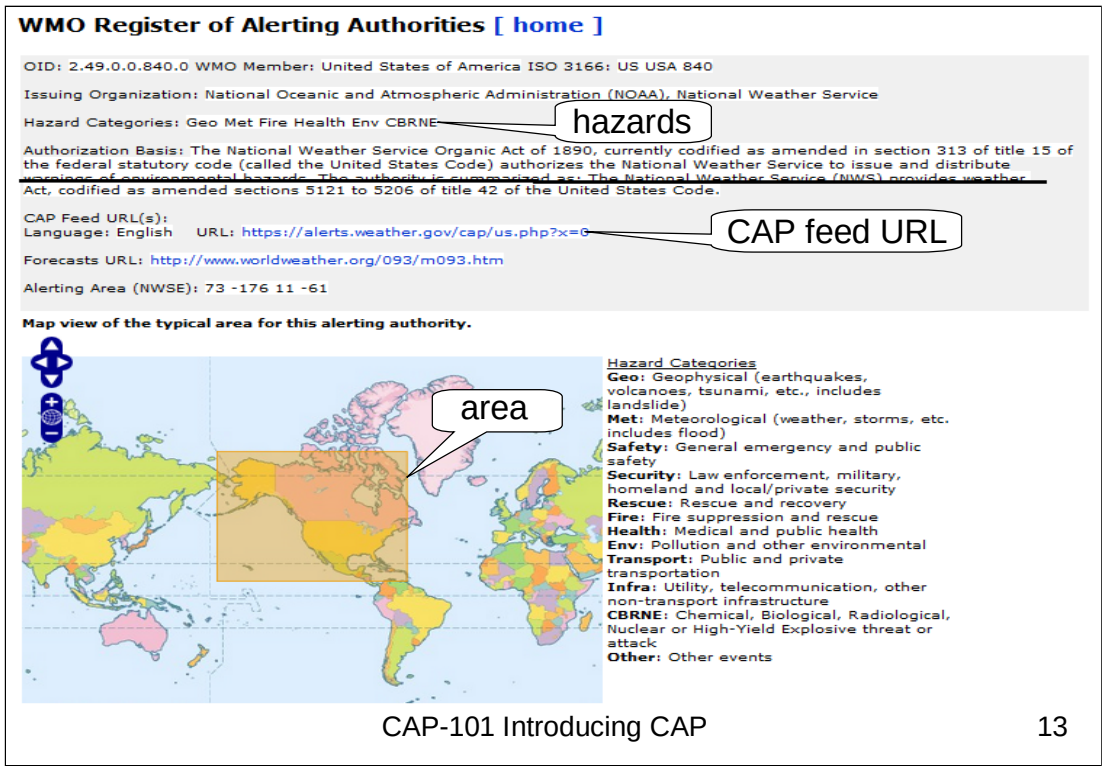
Public Weather Services established this register of information about alerting authorities as identified by Members. For questions, please contact us. This page is using nested navigation, but is available without frames as well. Select a country to get started.

Alerting authorities by WMO Member or Organization

To monitor updates to this Register, subscribe to the RSS or ATOM news feed.

Afghanistan	Albania	Algeria	Angola	Antigua and Barbuda
Argentina	Armenia	Australia	Austria	Azerbaijan
Bahamas	Bahrain	Bangladesh	Barbados	Belarus
Belgium	Belize	Benin	Bhutan	Bolivia
Bosnia and Herzegovina	Botswana	Brazil	Brunei Darussalam	Bulgaria
Burkina Faso	Burundi	Cambodia	Cameroon	Canada
Cape Verde	Central African Republic	Chad	Chile	China
Colombia	Comoros	Congo	Cook Islands	Costa Rica
Cote d'Ivoire	Croatia	Cuba	Cyprus	Czech Republic
Democratic People's Republic of Korea	Denmark	Djibouti	Dominica	Dominican Republic
Ecuador	Egypt	El Salvador	Eritrea	Estonia
Ethiopia	Fiji	Finland	France	French Polynesia

This is the first page of the international Register of Alerting Authorities.



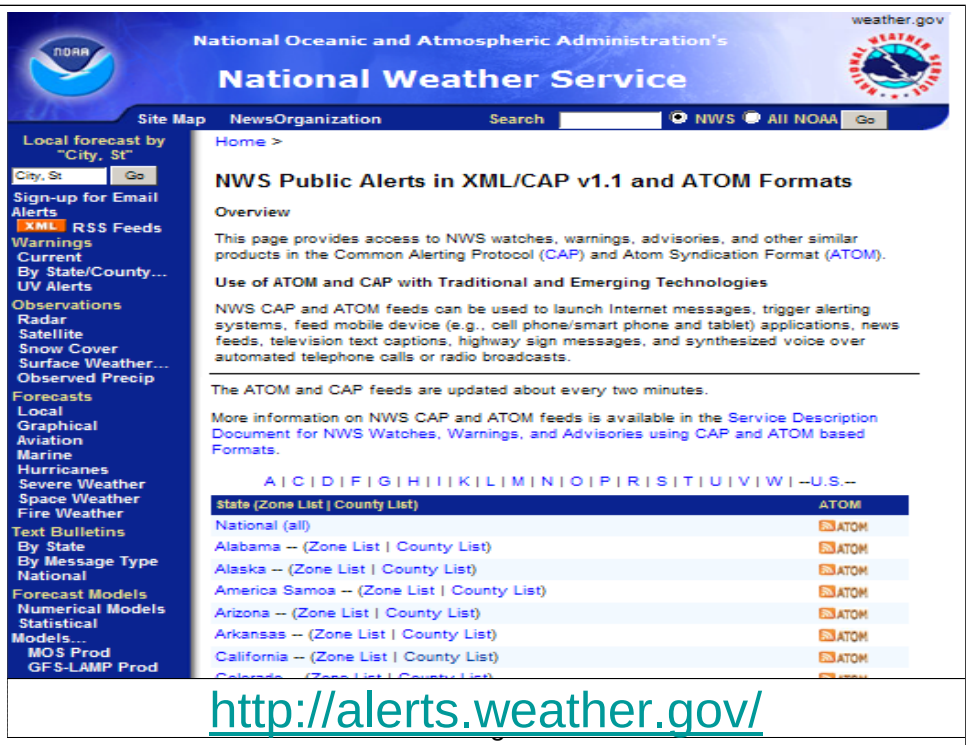
This screen shot shows one alerting authority of the United States, NOAA's National Weather Service.

We see the the hazard categories for which this authority typically issues alerts: Geo, Met, Fire, Health, Environment, and CBRNE (Chemical, Biological, Radiological, Nuclear or high-yield explosive).

On the map we see the typical alerting area for this alerting authority.

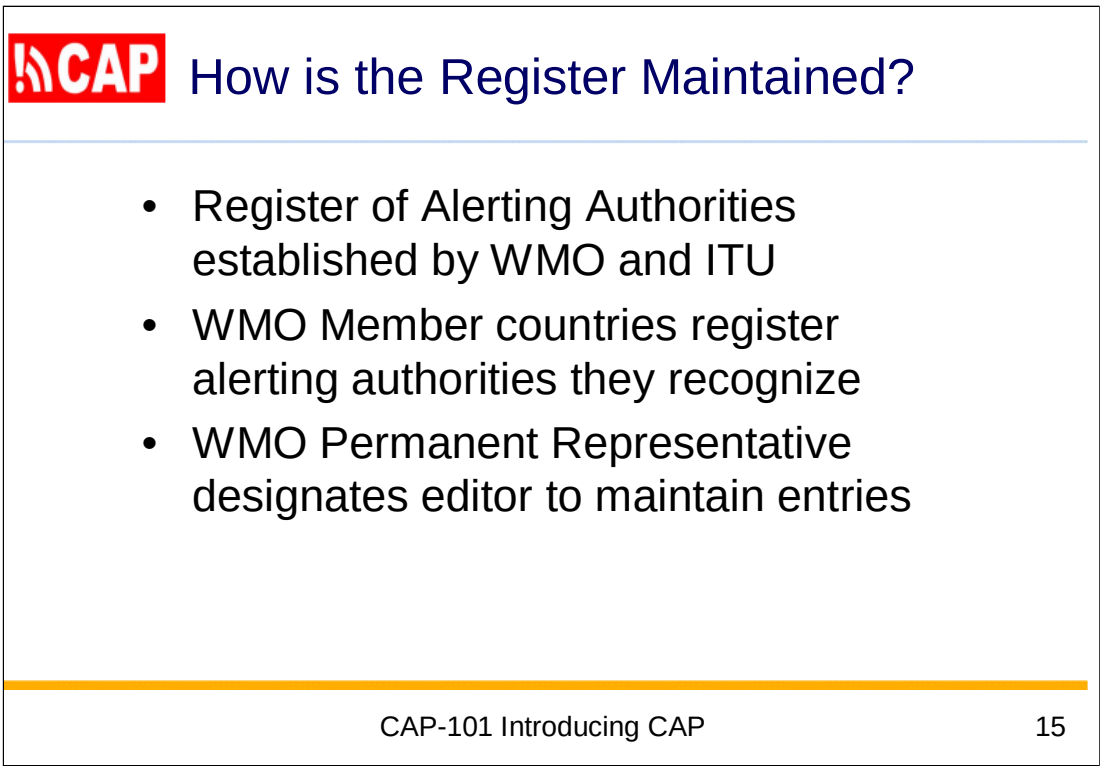
In this case, there is a CAP feed URL.

CAP Internet News Feed



http://alerts.weather.gov/

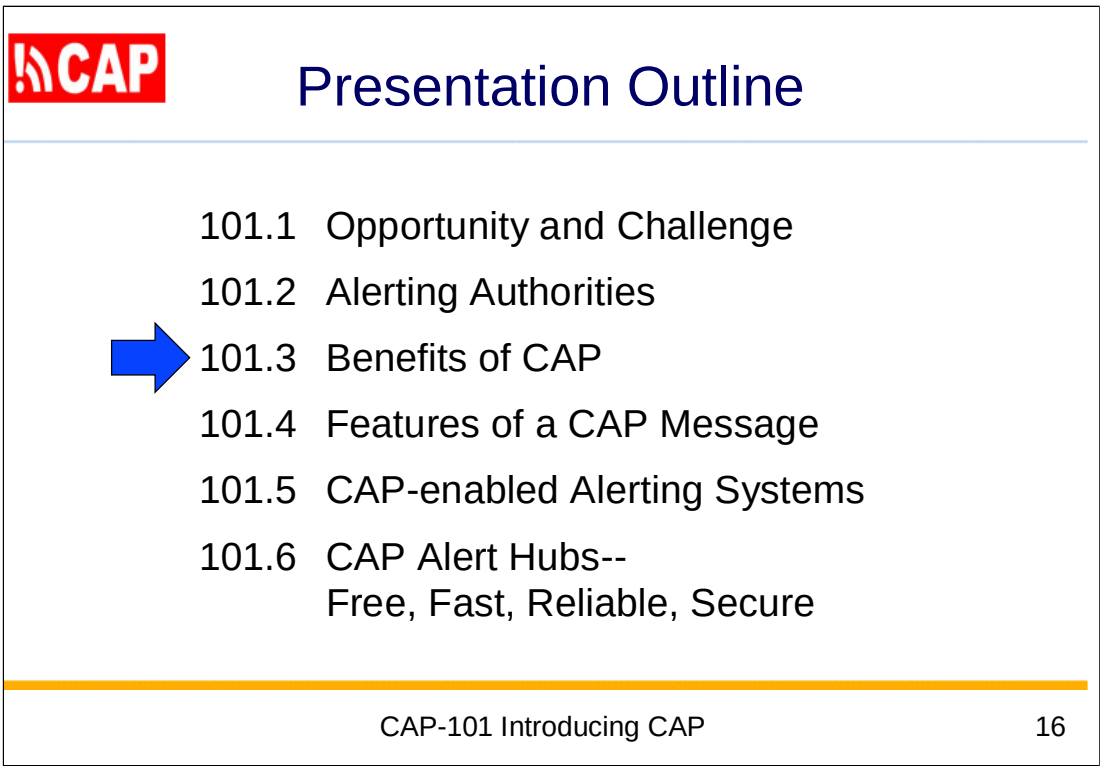
If we follow that URL, we see here the CAP alerts disseminated by the U.S. National Weather Service as Internet “news feeds”.



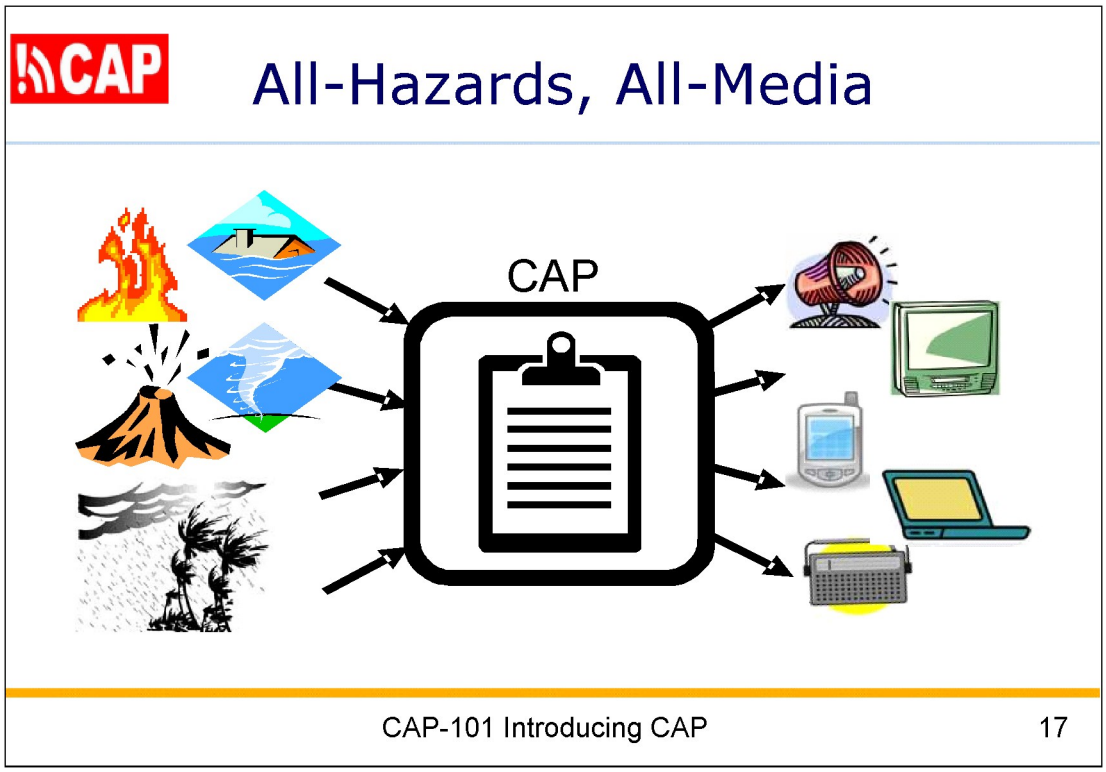
The international Register of Alerting Authorities was set up by the World Meteorological Organization (WMO) and the International Telecommunication Union (ITU).

Each WMO Permanent Representative (PR) maintains entries for their nation. The PR represents the entire nation and should register all nationally recognized alerting authorities.

Right now, there are about 500 listed authorities. This includes at least two per country--the National Meteorological or Hydrological Service, plus the Red Cross/Red Crescent National Society.

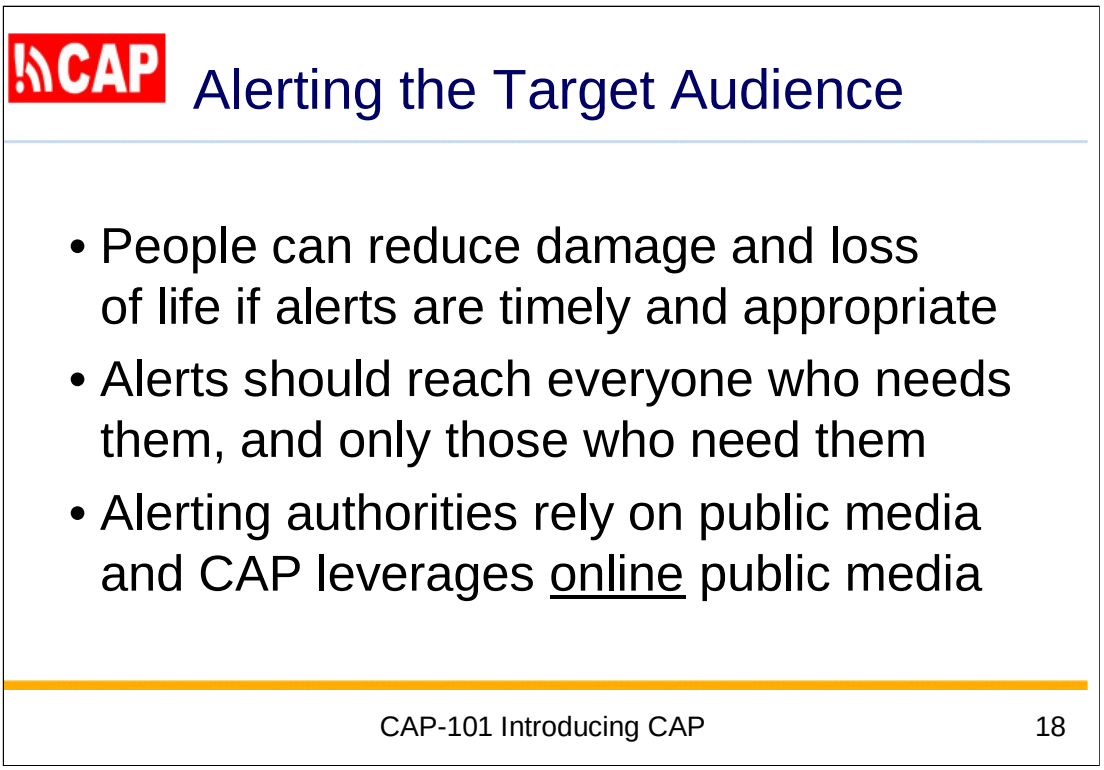


I'd like to highlight certain Benefits of CAP.



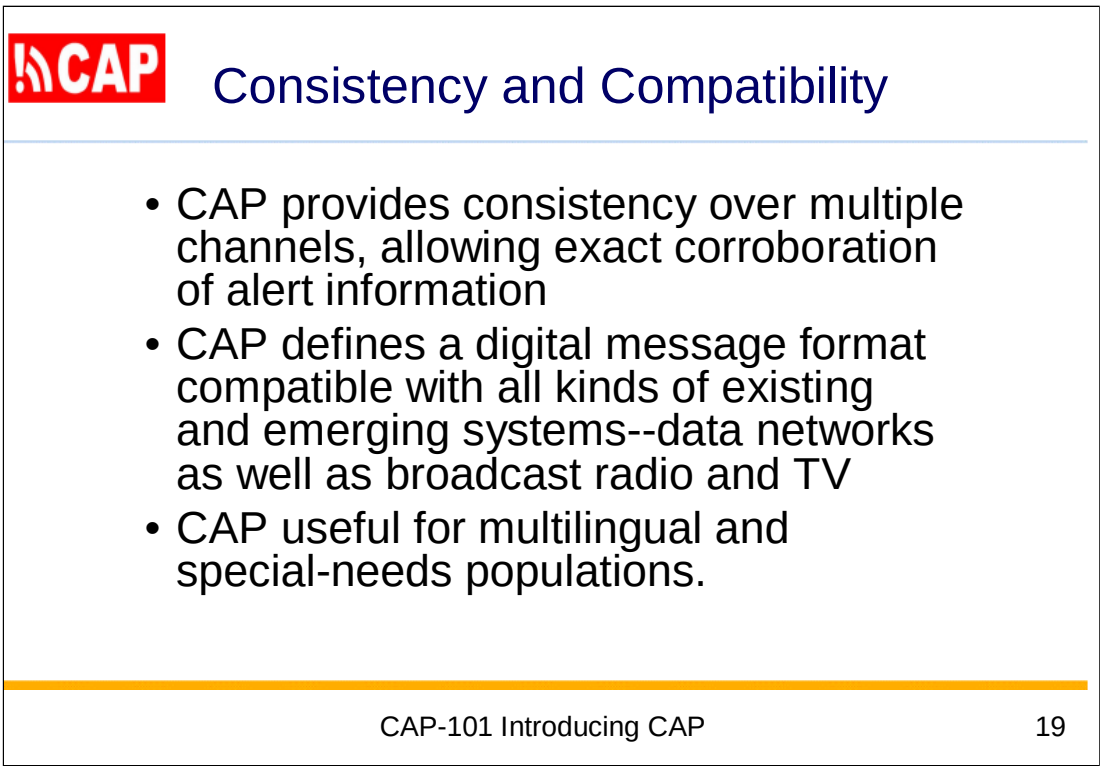
CAP can supplement or replace single-purpose interfaces between alert sources and dissemination media. So, CAP can be viewed as a kind of "universal adaptor" for alert messages.

I refer to CAP as a "standard business form". In paper, such a form might be carried on a clipboard. People involved in all kinds of hazard situations would all have this same form.



We know that **timely** and **appropriate** alerting does enable people to reduce damage and loss of life from natural and man-made hazard events.

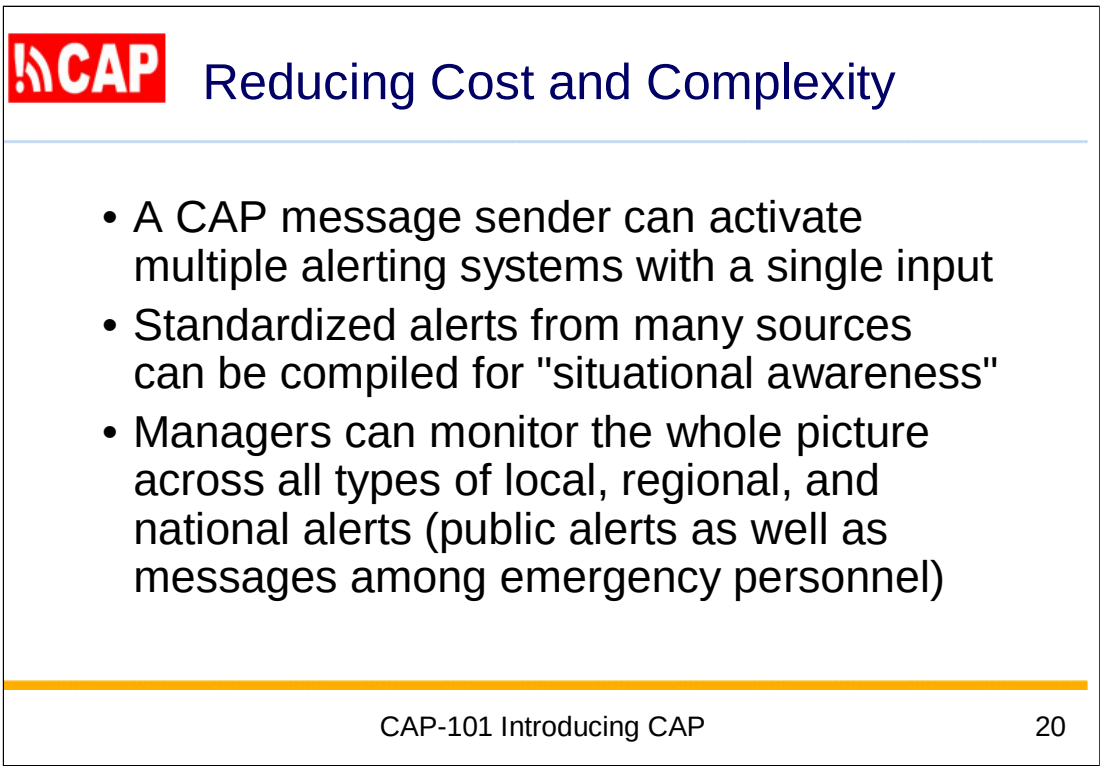
Alerting authorities that implement CAP leverage the Internet to get warnings to the right people as soon as needed.



People do not typically act on the first alert signal--they look for confirmation. CAP helps people get exact confirmation of alerts coming through multiple channels.

CAP defines a digital message format applicable to **all** technologies, because it is structured and codified rather than free text.

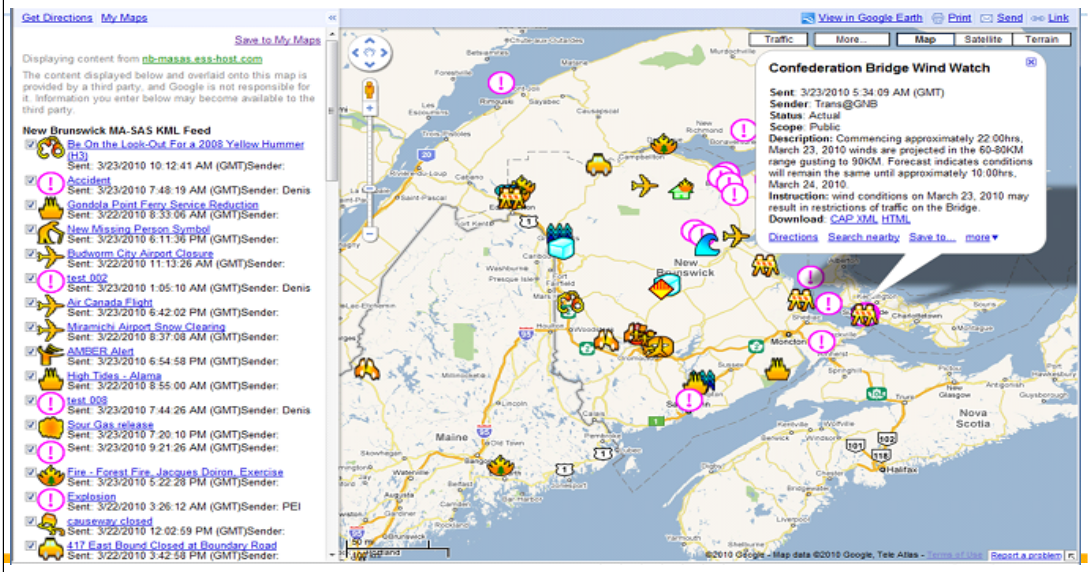
CAP messages therefore are very useful to customize messaging for multilingual and special-needs populations.



A CAP message can activate multiple alerting systems with a single input, reducing the cost, complexity, and delays when sending out alerts.

On the receiving side, alerts from many sources can be compiled to monitor the whole picture across all types of local, regional, and national alerts.

Common Operating Picture



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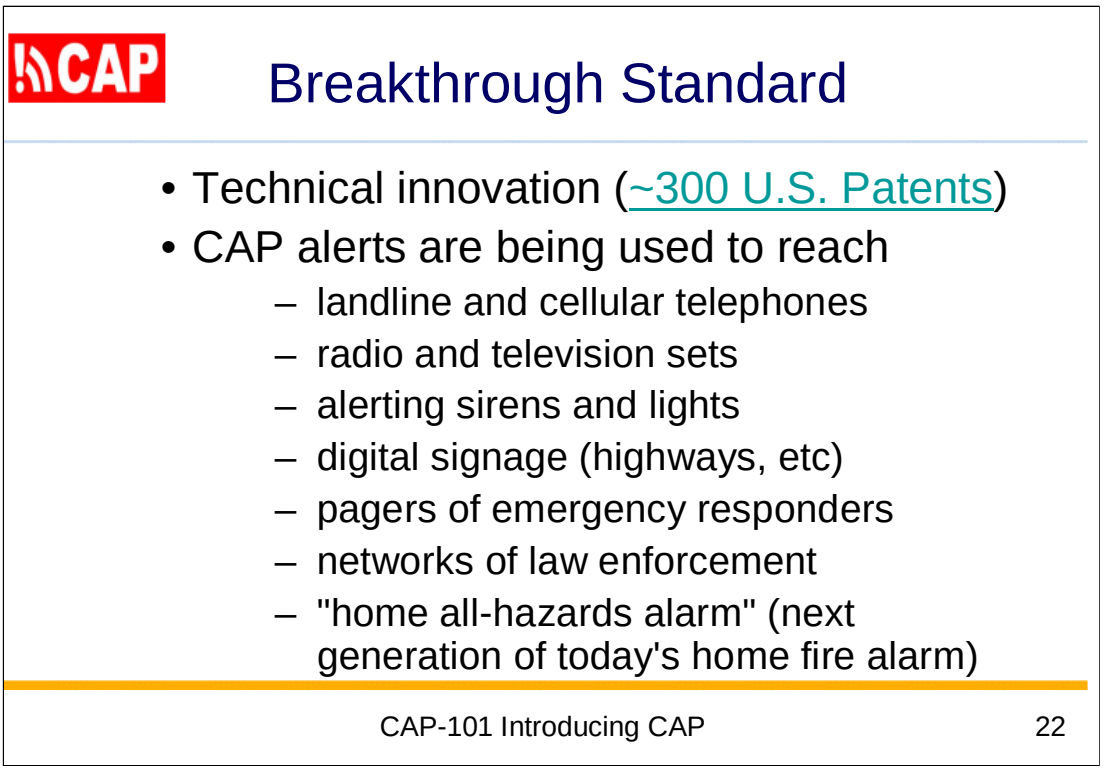
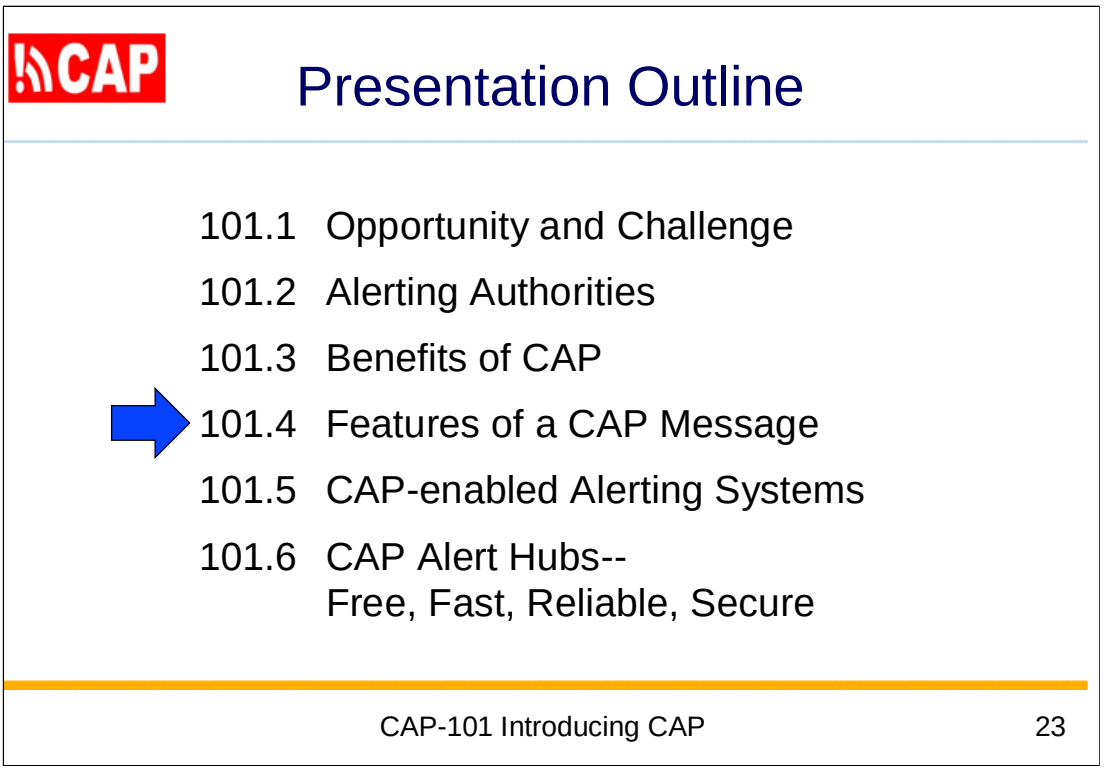
Here we see a "Common Operating Picture" with CAP alerts displayed on a map interface.

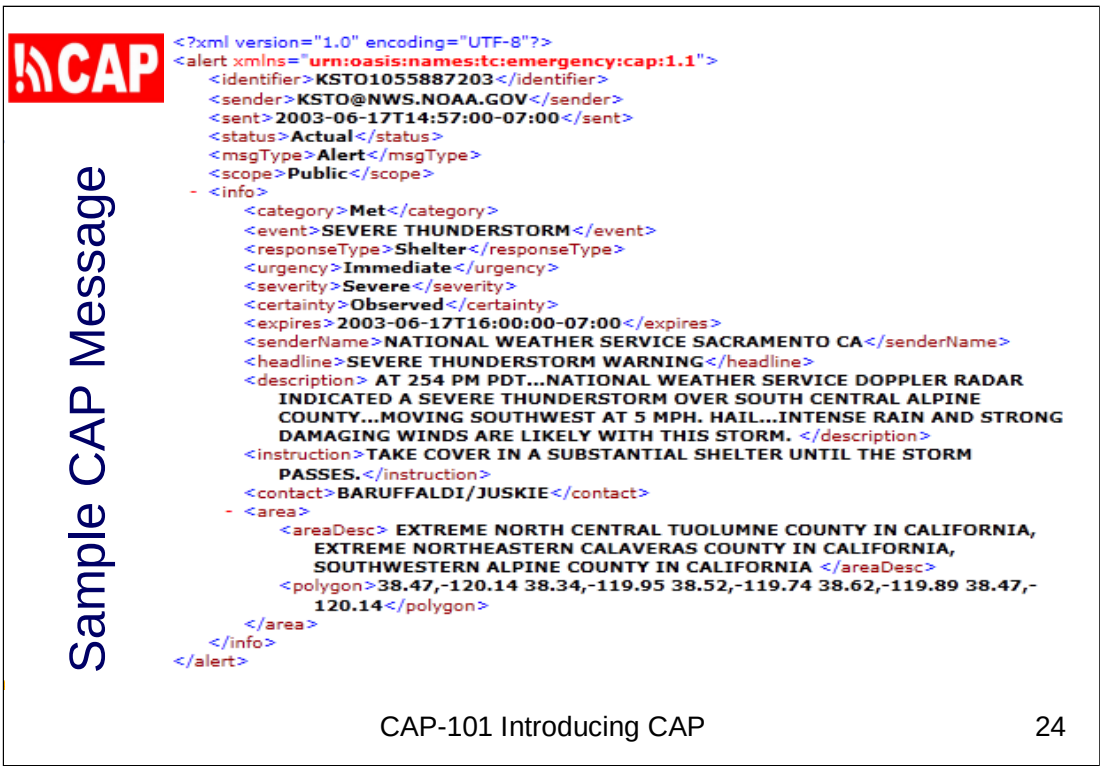


From a technology perspective, CAP is a breakthrough standard that has opened the door to technical innovation.

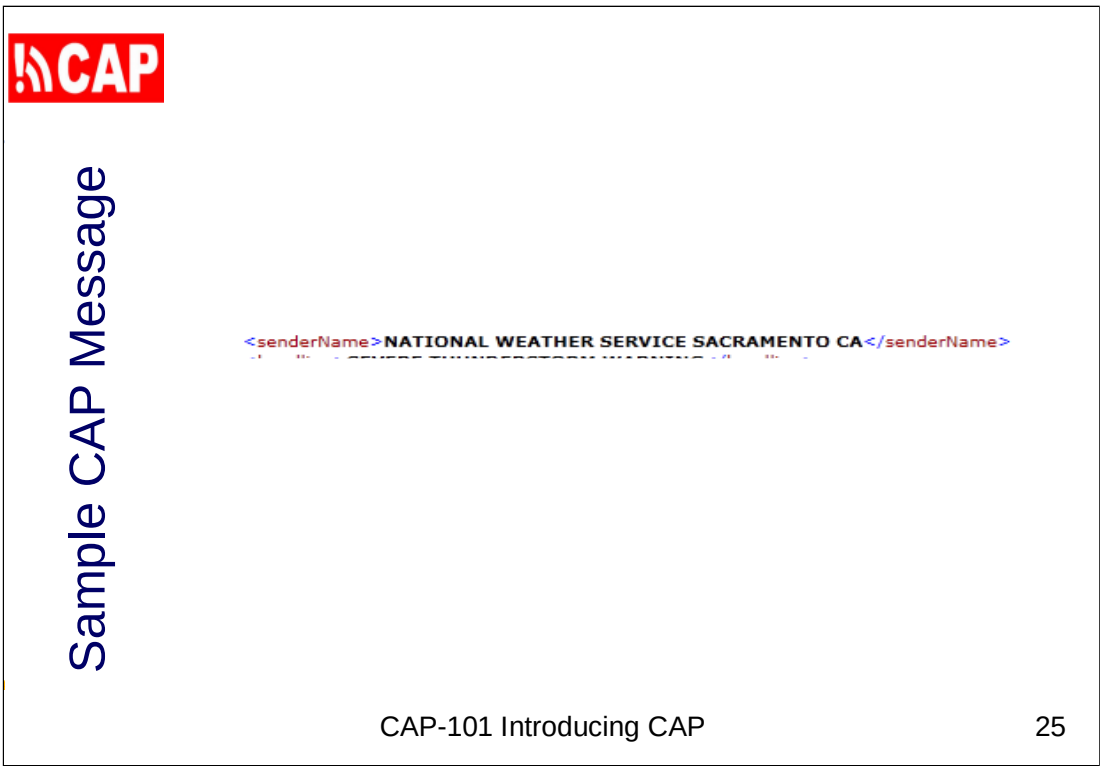
For instance, the geographic information in a CAP alert allows targeting of landline and cellular telephones, radio and television sets, alerting sirens and lights, digital signage (such as highway billboards), the pagers of emergency responders, networks of law enforcement, and, most recently, "home all-hazards alarms".



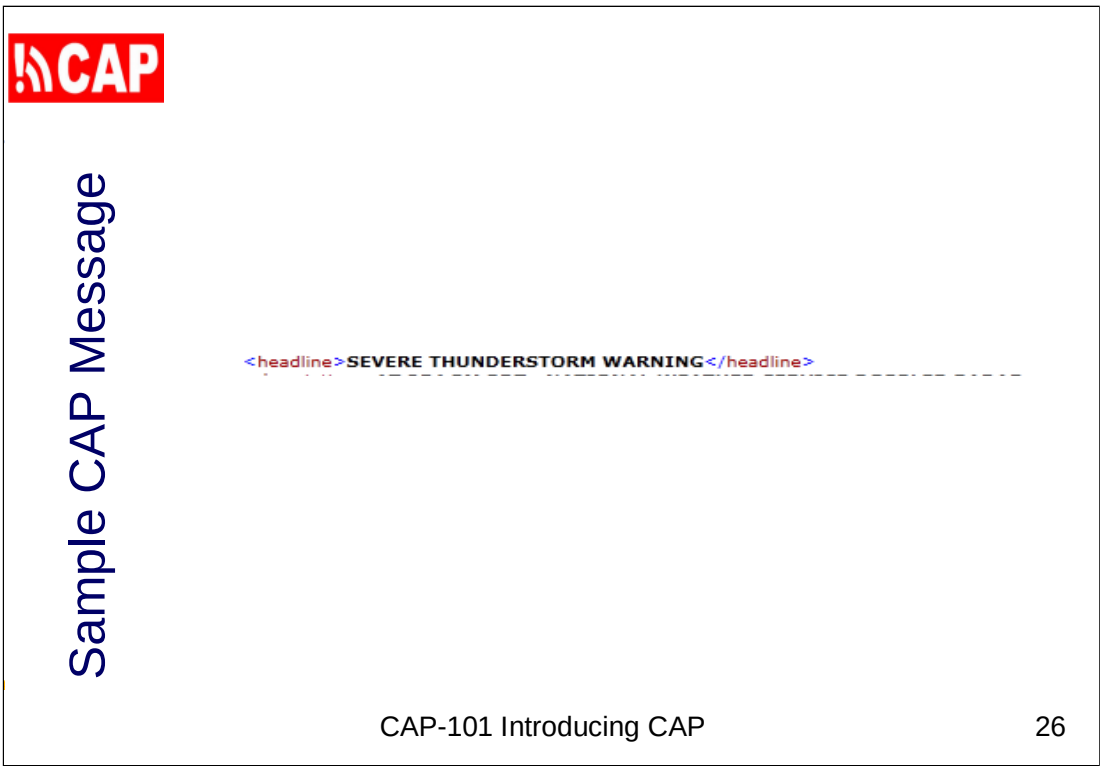
Now let's take a closer look at the "Features of a CAP Message".



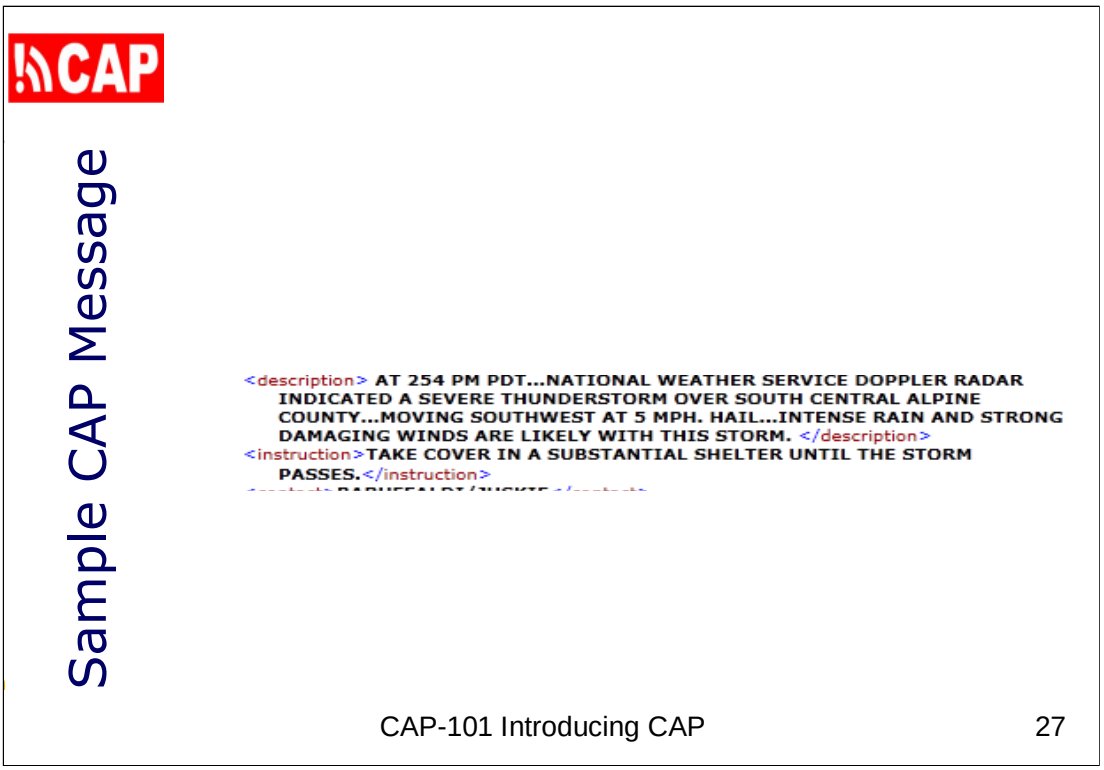
This is an example alert message in the CAP format, in its raw form.



This particular CAP message has the senderName: "**National Weather Service, Sacramento, California"**.

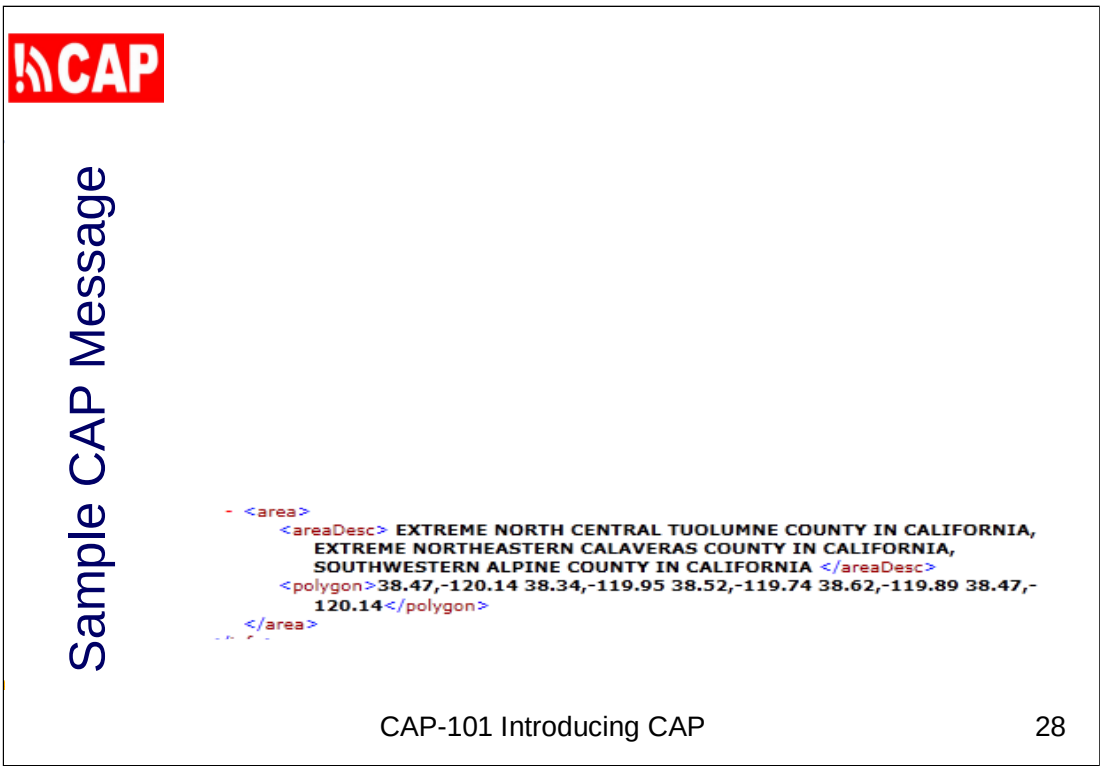


Here the headline is: "**Severe Thunderstorm Warning".**



In the description we see that the storm is likely to have "**hail...intense rain and strong damaging winds"**.

And, the instruction says: "**take cover in a substantial shelter until the storm passes**".



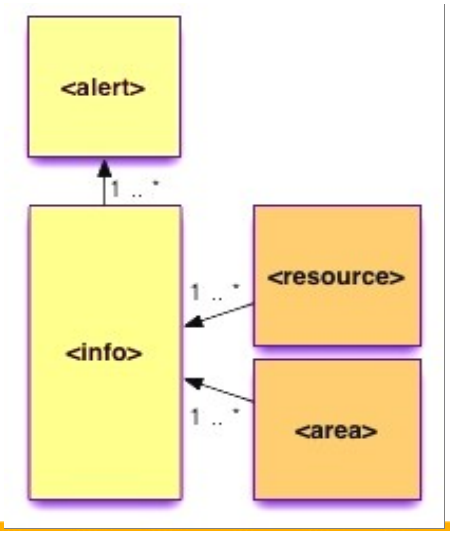
Notice the alerting area. For human readers, the area is described in text.

And, for processing by automated tools, the area is delineated by a polygon with latitude/longitude vertices.

Structure of a CAP Message

CAP Messages contain:

- Text values for human readers, such as "headline", "description", "instruction", "area description", etc.
- Coded values useful for filtering, routing, and automated translation to human languages



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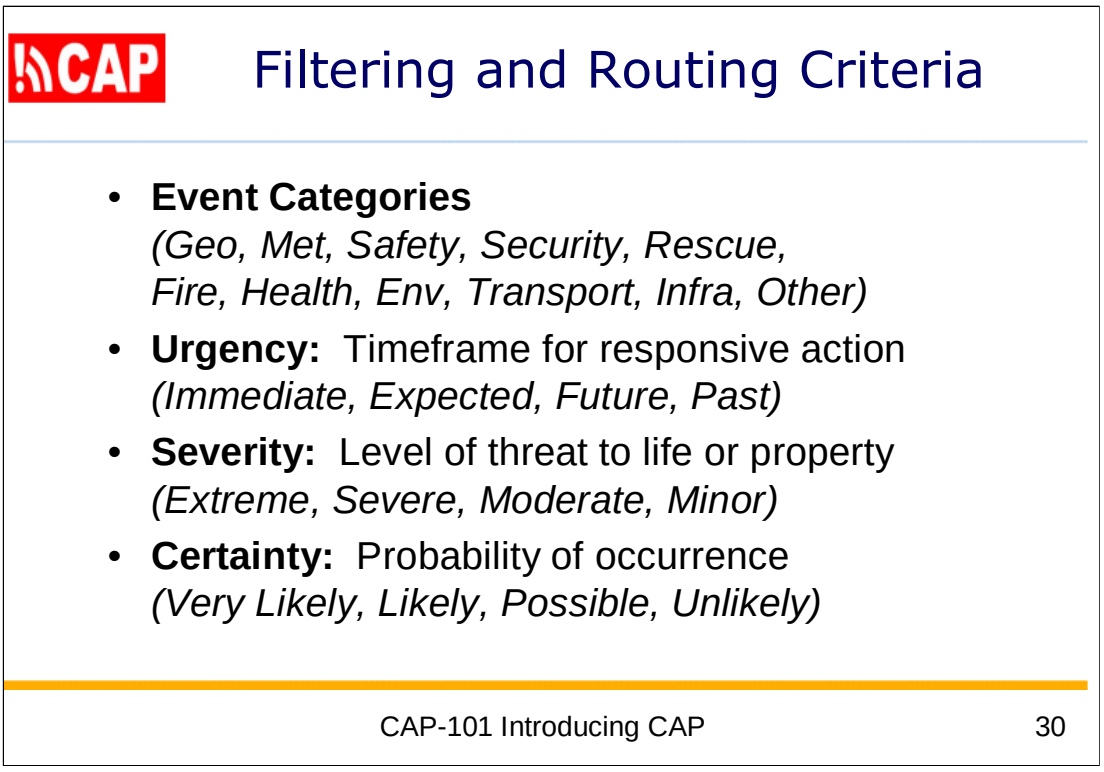
This is a critically important feature of CAP messages.

CAP Messages contain some text values for human readers, such as "area description", "headline", and "instruction".

But, CAP messages also contain **coded values** that are so crucial for automated filtering, routing, and translation to human languages.



Let's look at some of these “coded values” in CAP.

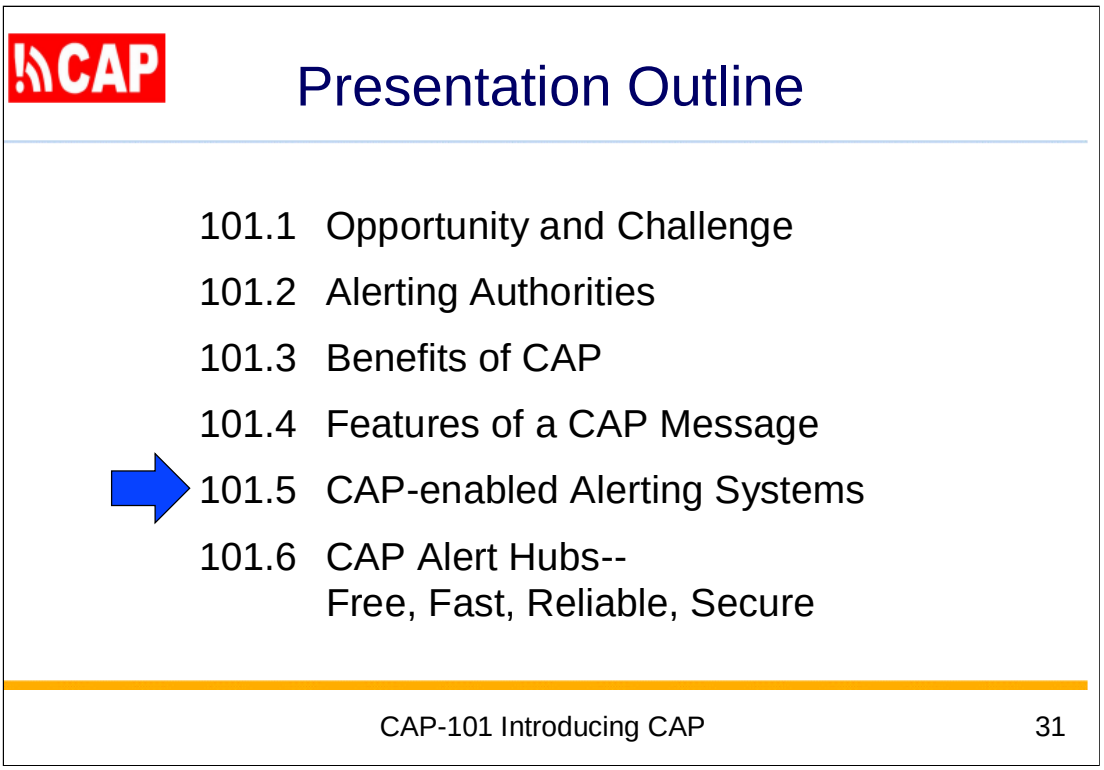
For **Event Category**, the sender can indicate: Geophysical, Meteorological, Safety, Security, Rescue, Fire, Health, Environmental, Transport, Infrastructure, and Other.

The relative priority of this message, from a receiver attention perspective, is characterized by three CAP elements:

Urgency: Timeframe for responsive action

Severity: Level of threat to life or property

Certainty: Probability of occurrence



Now I'd like to focus on some examples of CAP-enabled alerting systems.

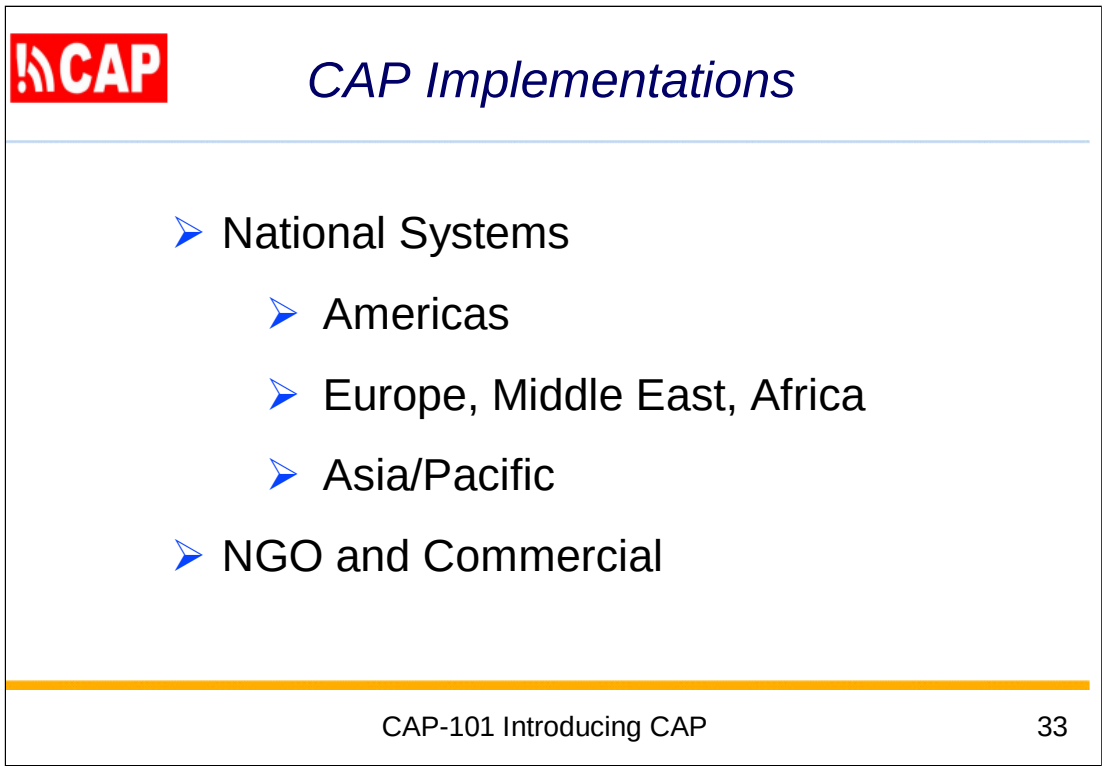
Typical CAP-based Alerting System

Based on CAP, Alerting Solutions Inc (ASI) supports many delivery methods:

U.S. Emergency Alert System (EAS), local radio station, local cable TV, sirens, strobe lights, e-mail, SMS, voice telephone, intercom / digital telephony, computer pop-up's, Web sites, social media (Twitter, Facebook, Myspace...), Emergency Call Boxes, reverse Weather Radio, building loudspeakers, voice fire speakers, police car loudspeakers, 800 Number/Hotline, LED signs and LCD screens

This diagram gives a sense of the range of alerting methods that a typical CAP-based alerting system supports when it is deployed.

Notice that even devices like modern sirens can be controlled with CAP messages.



I am going to list quite a few CAP systems I know about personally. But this is certainly **not** all of the CAP systems in operation.

My survey of CAP systems starts with National governments, grouped in three slices:
first, the Americas; followed by
Europe, the Middle East, and Africa; and
ending with Asia and the Pacific.

Then I will survey some of the interesting CAP systems led by Non-Governmental Organizations and by Commercial organizations.

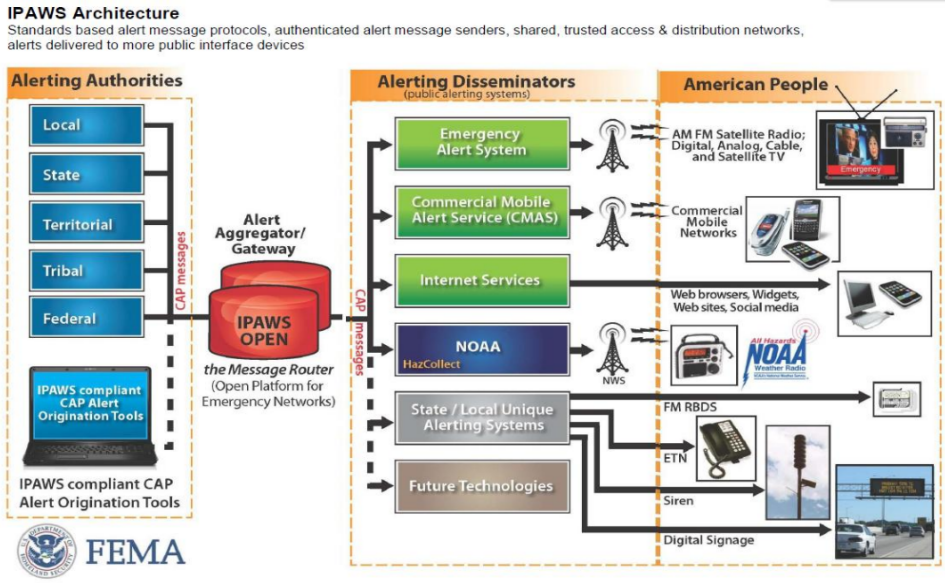
For the Americas, I list these 25 countries or territories with operational or in-progress CAP implementations. I will remark on just a couple of these.

Here you see the CAP Feed URL for several United States CAP feeds maintained by alerting authorities listed in the Register of Alerting Authorities. Two are operated by the National Oceanic and Atmospheric Administration (NOAA): the National Weather Service CAP and the National Tsunami Warning Center CAP news feed. The CAP feed for the Pacific Tsunami Warning Center is not yet operational, but it is expected soon.

The Earthquakes news feed from the United States Geological Survey (USGS) was one of the first CAP alert sources. A recent addition from USGS is the CAP news feed for the Volcano Hazard Program.

The Environmental Protection Agency has a CAP feed source for Air Quality Alerts. EPA is extending this approach to many cities worldwide through its AirNow initiative.

U.S. Integrated Public Alert and Warning System (IPAWS)



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The Integrated Public Alert and Warning System (IPAWS) helps authorized officials to deliver alerts to the U.S. public through multiple communications pathways.

IPAWS aggregates CAP alerts from over 1,000 sources. I understand about 150 vendors of CAP software have products validated as IPAWS-compliant.

In South America, CAP is implemented in Argentina, Brazil, Chile, Colombia, and Guyana.

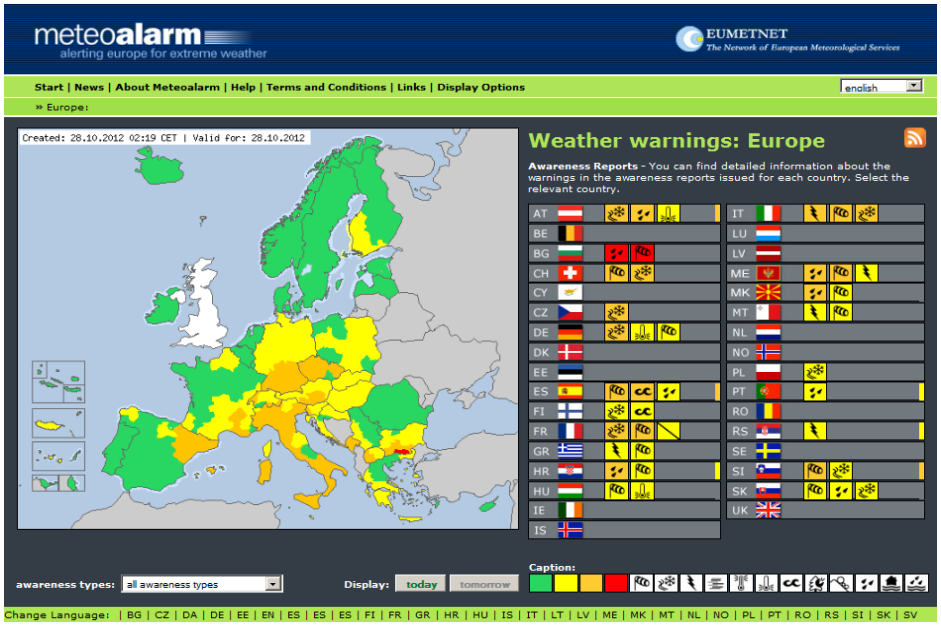
The CAP system in Brazil is called "Alert-AS" because is intended to be used freely by any nation throughout South America.

The CAP system in Chile is provided by a commercial firm in Israel.

Now let's turn to Europe, the Middle East, and Africa.

I am aware of operational or in-progress CAP Implementations in these 48 countries.

MeteoAlarm



In Europe, the MeteoAlarm system is operated on behalf of 36 European national weather services. MeteoAlarm features a graphic Web page intended to highlight severe weather situations.

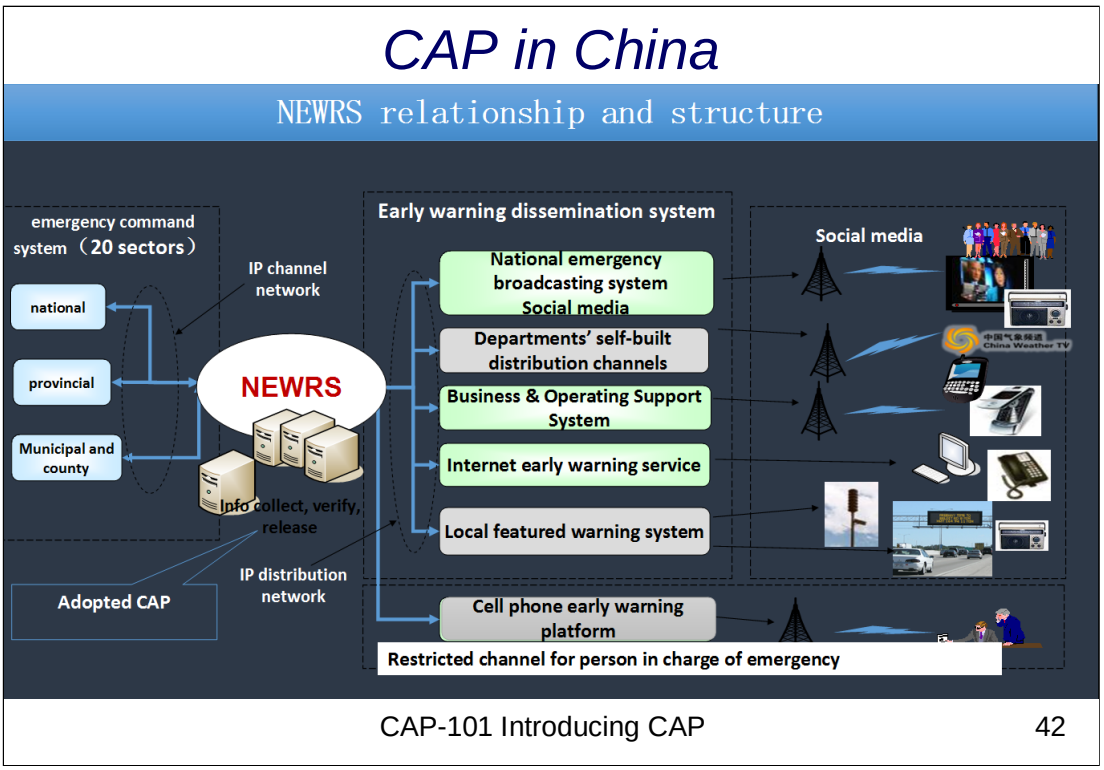
MeteoAlarm is now publishing CAP alerts in news feeds specific to each partner country.

MeteoAlarm is expanding to include Israel, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan.

Turning to Africa, I am aware of these eleven countries with operational or in-progress CAP implementations.

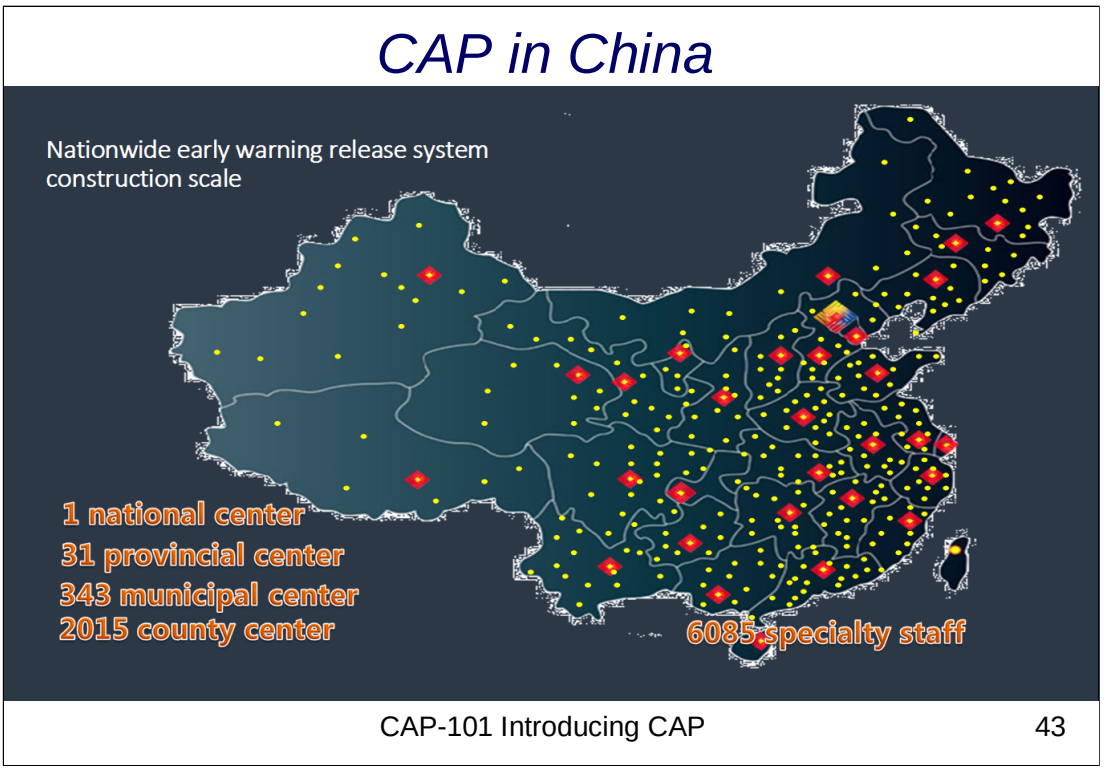
Last, I would like to address the Asia-Pacific region.

I am aware of these 25 countries/territories with operational or in-progress CAP implementations.

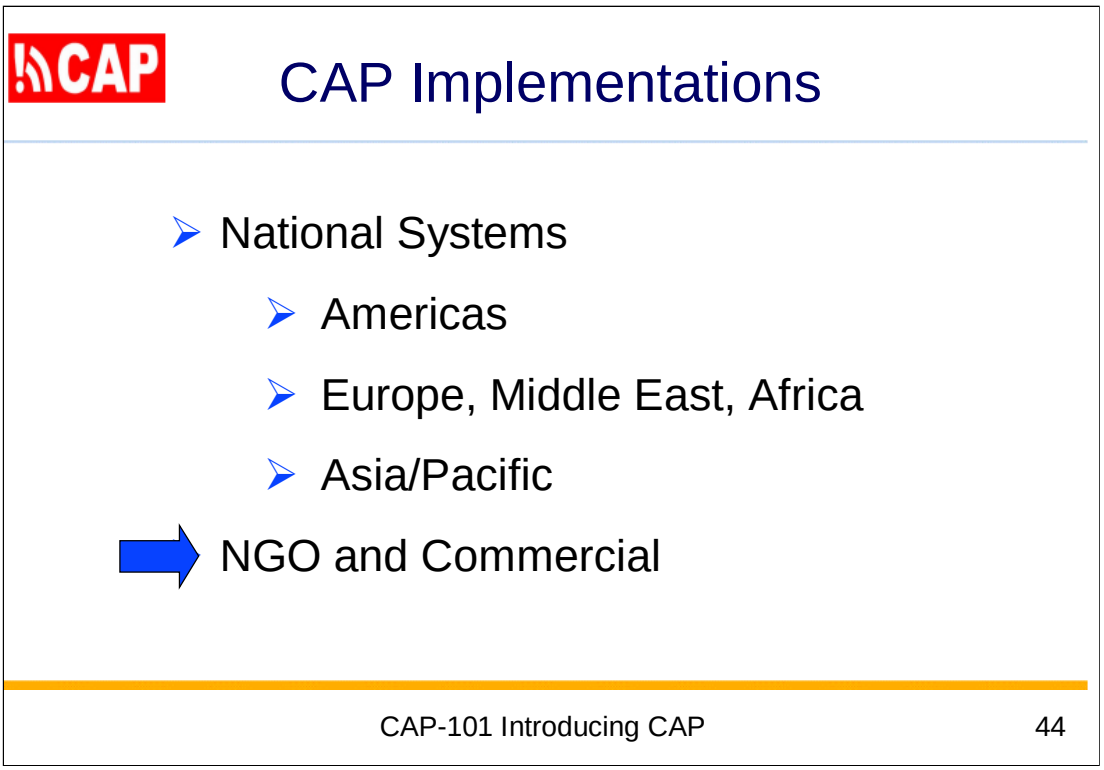


I would like to dwell on China for a bit here .

China implemented CAP-enabled alerting for all hazards nationwide. Their National Early Warning Release System (NEWRS) gathers information from emergency command sectors and disseminates the information to the public and emergency management personnel throughout China.

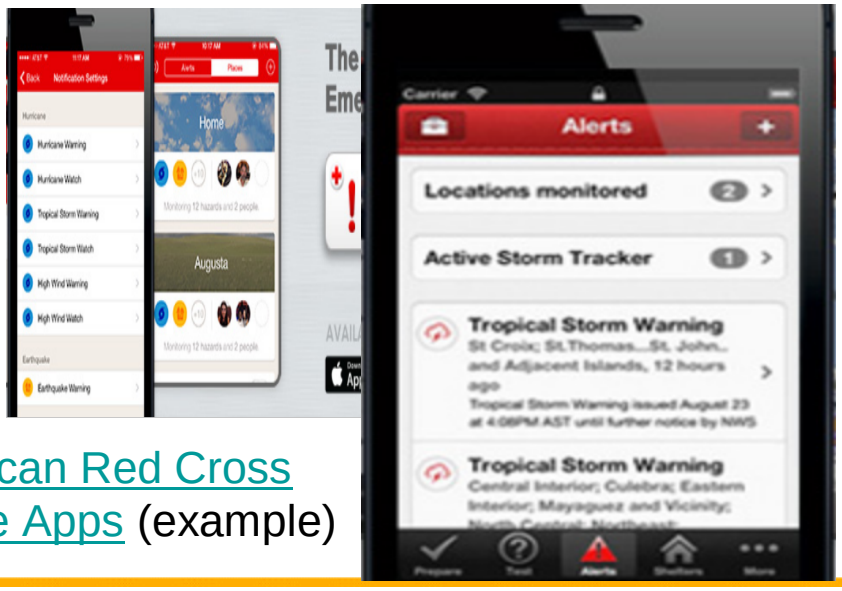


This is the world's most extensive CAP-enabled warning system--comprised of 1 national, 31 provincial, 343 municipal, and 2,015 county centers.



Now let me turn to CAP systems that are led by Non-Governmental Organizations and by Commercial organizations.

IFRC Universal App Program



American Red Cross Mobile Apps (example)

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The most prominent NGO in the context of emergencies is the International Federation of Red Cross and Red Crescent Societies (IFRC).

IFRC launched the Universal App Program in 2013.Universal App provides common templates for each Red Cross/Red Crescent National Society to customize and distribute free mobile apps. These address needs such as giving first aid, finding shelters, and making emergency preparedness kits. It includes templates for "Hazard Apps" that help people get alerts from authoritative CAP alert news feeds.

Eighteen RC/RC National Societies have already implemented the Hazards App, including: Indonesia, Myanmar, Philippines, United States, Vietnam, and 12 countries in the Caribbean area. Four other IFRC National Societies have Hazard apps in development:: Argentina, Canada, Suriname, and New Zealand.

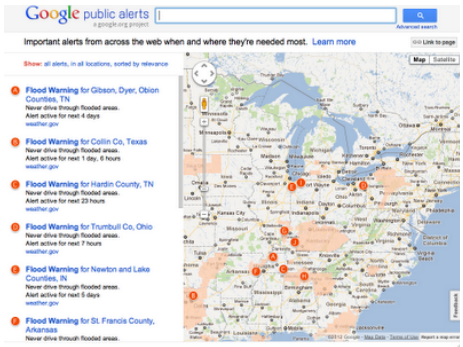
Hazards App is able to create and publish CAP alerts as news feeds. This feature can be used by any Red Cross/Red Crescent National Society, all of which are now included in the international Register of Alerting Authorities maintained by WMO.

This CAP alert publishing capability of the Hazards App can be shared with other alerting authorities in the country as well.

Google Public Alerts

- Platform designed to bring users relevant emergency alerts when and where they are using Google tools
- Whether user sees an alert depends on search query, which alerts are active, and the event importance
- To see all active alerts, go to homepage ➔

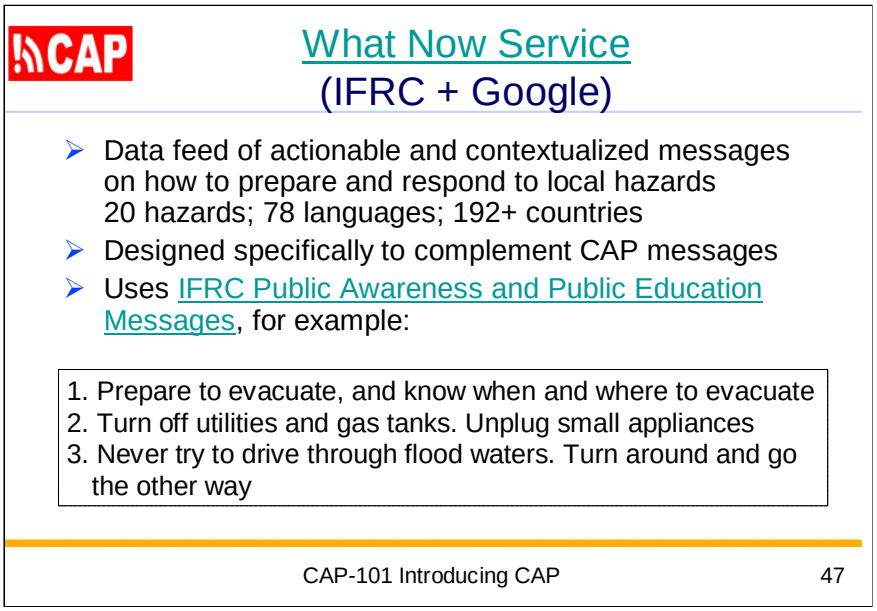
http://www.google.org/publicalerts



Google Public Alerts is designed to bring users relevant emergency alerts when and where they are using Google services, such as search, maps, and so on.

Also, users can see all of the active alerts at the Google's public alerts homepage.

This homepage also gives instructions to interested organizations who want to make emergency information available through this Google tool.



IFRC worked with Google to create the new "What Now" Service. This service is a data feed of actionable and contextualized messages concerning how to prepare and respond to local hazards.

The messages are available for 20 different hazards, in 78 languages. Eventually, the messaging will be locally customized for more than 192+ countries.

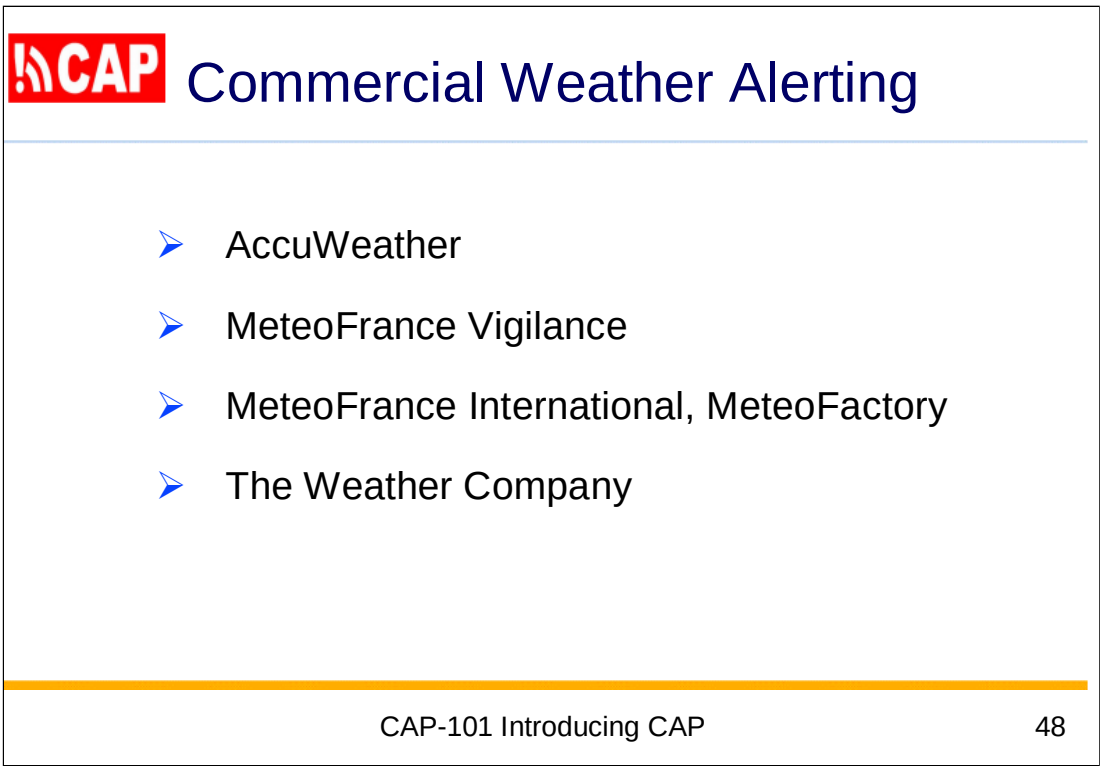
The service is designed specifically to complement CAP messages. It uses the IFRC Public Awareness and Public Education Messages. These messages are crafted to be well-understood by the local public.

Here is an example of the message for a Typhoon warning:

1. Prepare to evacuate, and know when and where to evacuate

2. Turn off utilities and gas tanks. Unplug small appliances

3. Never try to drive through flood waters. Turn around and go the other way.

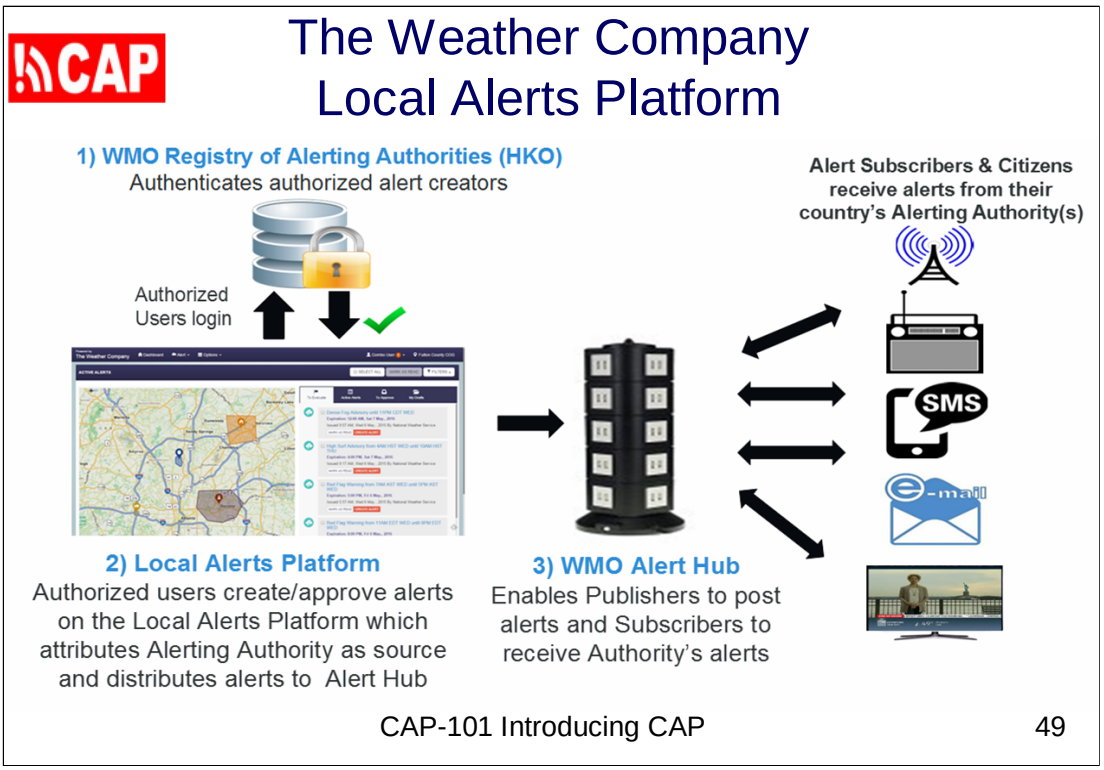


Under Commercial Weather Alerting, there are several things to mention.

AccuWeather has integrated publicly available warnings from the governments of over 50 countries, many using CAP, into AccuWeather.com. AccuWeather apps and partner apps reach 1.5 billion people globally in over 100 languages.

The MeteoFrance Vigilance system is moving to CAP as well. MeteoFrance has a strong relationship with the national civil security organization. Also, 90% of the French people know about the Vigilance map, which has been in use since 2001.

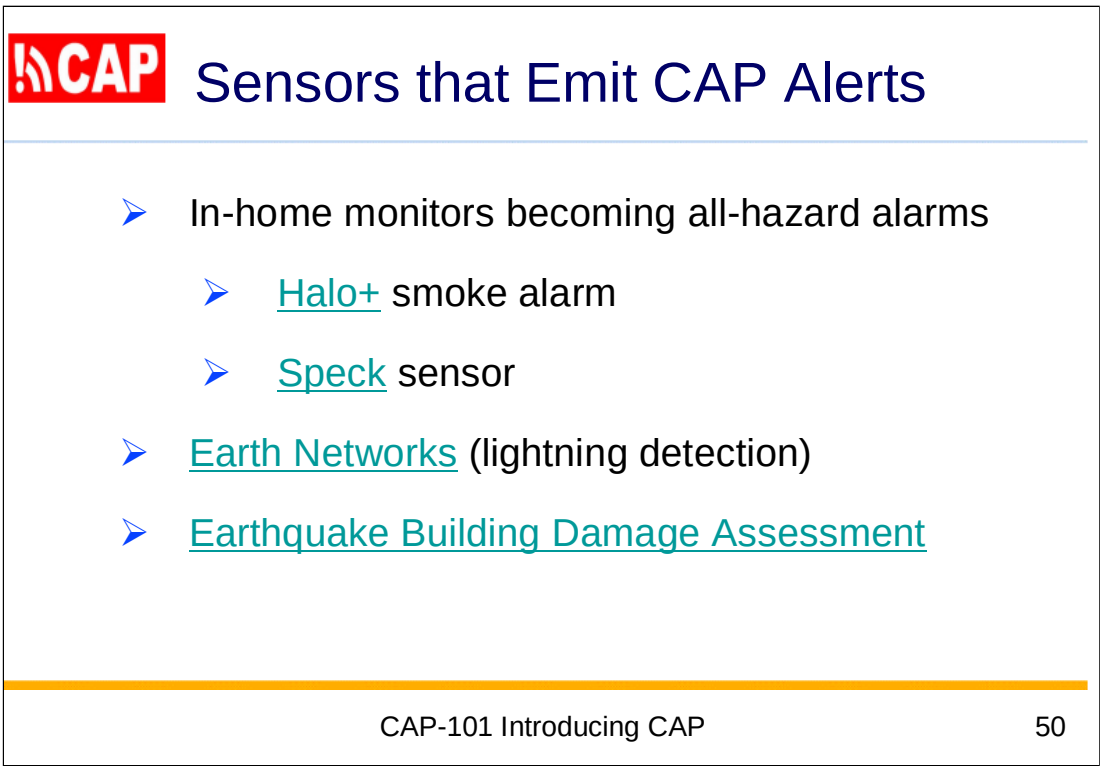
MeteoFrance International supports CAP alert creation and dissemination. This is primarily through their product suite known as MeteoFactory. MeteoFactory is used by 14 countries: Argentina, Cambodia, Egypt, France, India, Indonesia, Kenya, Lebanon, Libya, Madagascar, Qatar, South Africa, Swaziland, and Viet Nam.



The Weather Company, an IBM business, distributes meteorological alerts and forecasts, powering over 2 billion global mobile devices.

They are developing a free cloud-hosted tool, known as the "Local Alerts Platform" to enable meteorological alerting authorities to create and communicate all-hazards alerts.

Here is a diagram showing how this cloud-based software works with other alert dissemination components, including the WMO Alert Hub. I will have moroe to say about Alert Hubs shortly.



I am aware of two examples where in-home monitors are picking up CAP alerts in order to become all-hazard alarms.

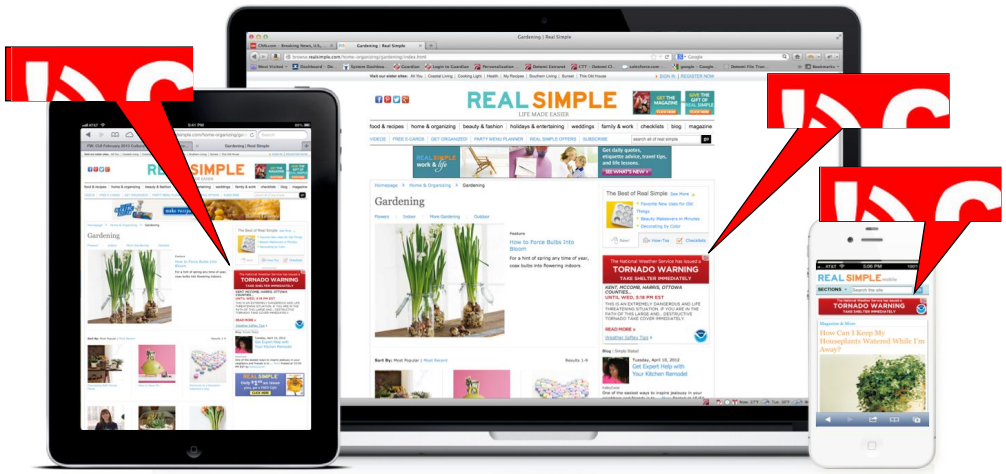
The Halo in-home smoke sensor is a network device, designed for emerging economies. It already has the capability to pick up CAP alerts from the U.S. National Weather Service, so it is straightforward to make it into an all-hazards alarm.

Another device, called Speck, detects fine particulate matter in the indoor environment. The device has network connectivity and the company told me they are already working on adding an all-hazards alerting capability.

Earth Networks produces CAP alerts for thunderstorms. These alerts are generated based on sensors that monitor radio emissions from lightning (in-cloud and cloud-to-ground).

I am also aware of real time building sensors for earthquake damage assessment. In these systems, CAP is used to send floor-by-floor alerts to central command and control systems.

Federation for Internet Alerts



Advertising companies overlay online ads to show high-priority warnings from official alerting authorities

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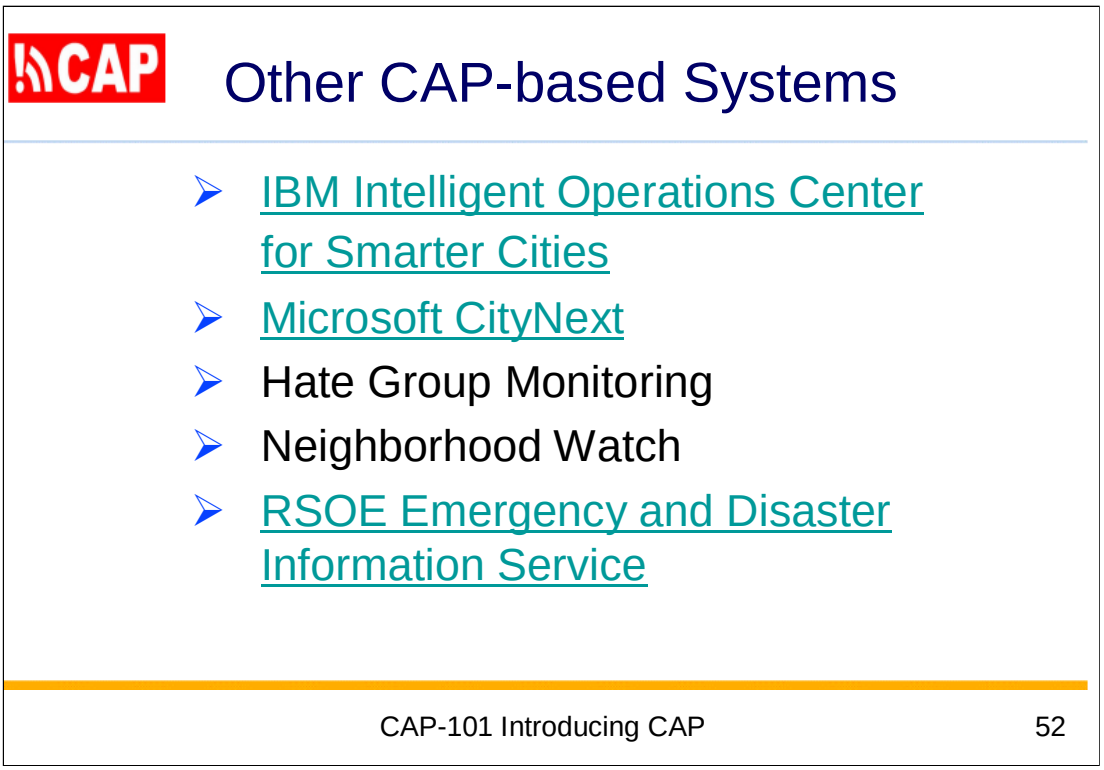
The Federation for Internet Alerts operates a facility for displaying CAP alerts as overlays of online ads.

The advertising technology already has information about the user's location. So, to determine whether to override an advertisement with a particular CAP alert, the system matches the user's location to the CAP alert area. Only critical warnings are displayed to users—CAP alerts that require immediate action, such as a specific tornado warning.

CAP alerts are harvested continuously from online CAP alert feeds at official sources given in the international Register of Alerting Authorities.

This is now being expanded beyond the United States, where it is already used for about a dozen different kinds of CAP alerts from the National Weather Service and other sources.

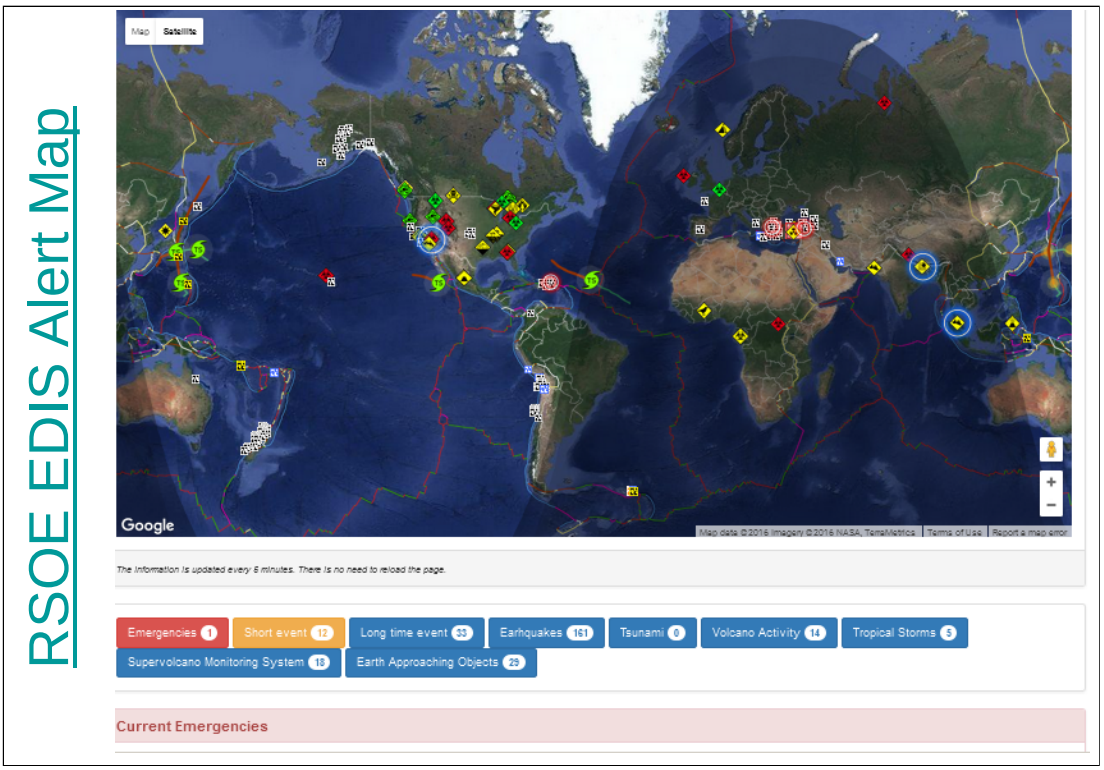


The IBM Intelligent Operations Center for Smarter Cities supports CAP. So does Microsoft CityNext, and those CAP alerts are used by security services like Pinkertons.

One of the *earliest* implementations of CAP was for the monitoring of hate groups in Germany, reported at the first CAP Implementation Workshop, in 2006.

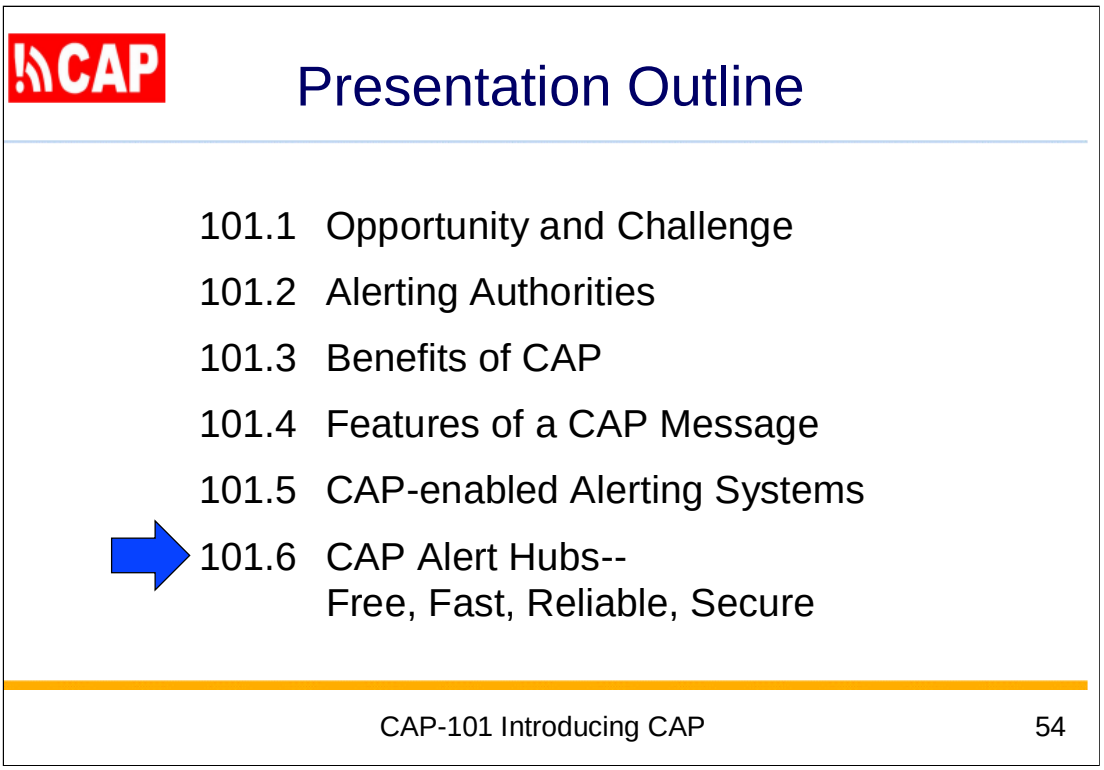
I am aware of an extensive CAP implementation supporting "Neighborhood Watch" in many communities. This is a very local facility for neighbors to inform each other about events they observe personally.

There are also very sophisticated applications of CAP in the analysis of news. The Hungarian national Emergency and Disaster Information Service (EDIS) makes CAP alerts out of thousands of news outlets and other sources.

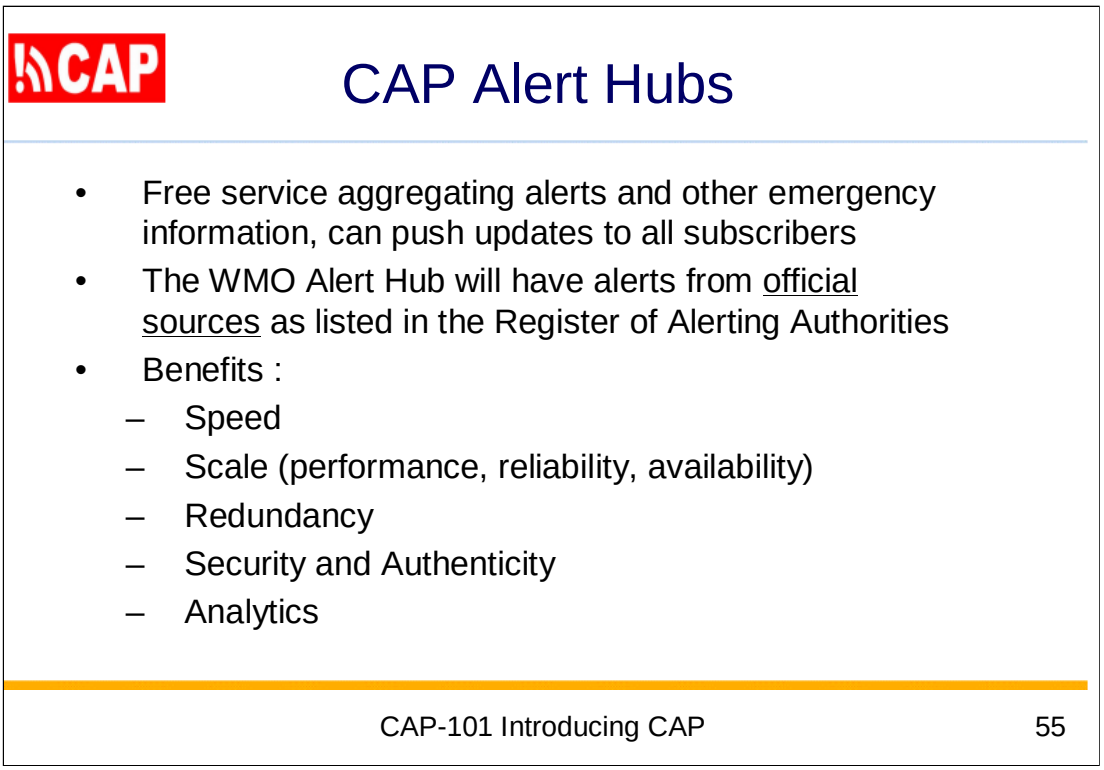


Here we see the EDIS Alert Map.

This site is unusual in that it includes potential extreme events such as "Earth approaching objects" and "Super volcanoes". These events occur infrequently, which is fortunate for life on Earth.



My last topic in this presentation is about CAP Alert Hubs.



A CAP Alert Hub is a site that aggregates CAP alert news feeds in one location, on the global cloud infrastructure. For example, the WMO Alert Hub will aggregate alerts only from alerting authorities registered in the International Register of Alerting Authorities.

The idea is that official alert publishers can put alerts on the Hub, as soon as the alert is posted online.

The benefits of such a CAP Alert Hub are:

Speed - Dissemination time is crucial for sudden-onset events such as earthquakes, tsunami, terrorists strikes, and tornadoes

Scale - The global scale dissemination infrastructure provides high performance, high reliability, and high availability

Redundancy - An additional copy of alert messages is kept elsewhere from the originator

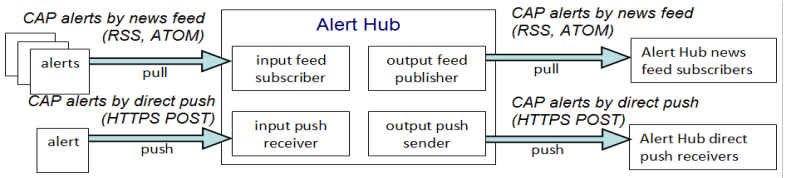
Security and Authenticity

Analytics - A centralized aggregator simplifies analysis and enables optimization of alert dissemination

It is important to *emphasize* that any of these Alert Hubs provide only a *copy* of the alert; Hubs do not have the role of an *alert originator.*

Filtered Alert Hub

- Free service offers CAP alerts filtered by location, language, and other criteria (e.g.,"official−only")
- Cloud-based: Highly Available, Reliable, Secure
- To minimize delay, sources can push alerts to the Hub, and the Hub can push to subscribers



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A prototype for the WMO Alert Hub and others is the "Filtered Alert Hub" technology. This free technology aggregates CAP alerts from sources worldwide and offers those alerts as more specific CAP news feeds, filtered by location, language, or other alert content.

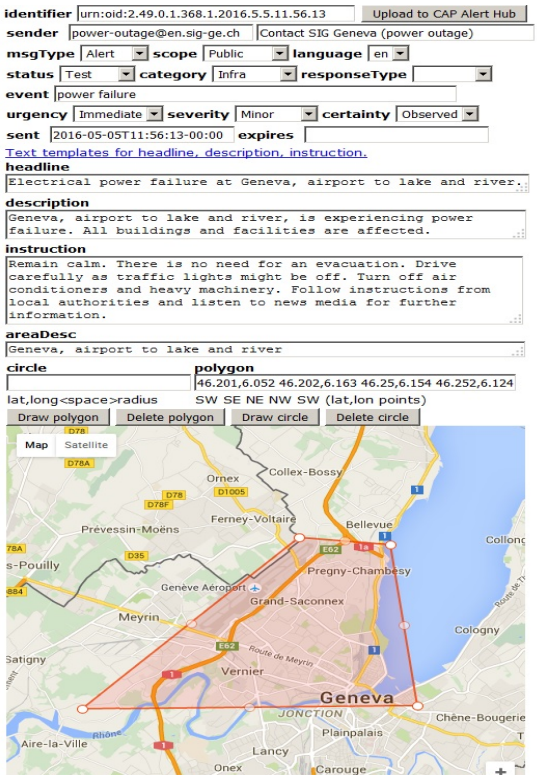
For example, there is a filtered feed for "official−only" and "high-priority only". This selects CAP messages from official sources which warn people in the alerting area to take immediate action.

The Filtered Alert Hub is cloud-based, with high levels of availability, reliability, authenticity, and security.

For updating, CAP alert feeds are normally polled periodically, typically once per minute. But, for sudden-onset events such as earthquakes, tsunami, and tornadoes, even seconds of delay could be deadly.

So, the Filtered Alert Hub allows for alerts to be pushed immediately to the hub, and pushed immediately from the hub to specific subscribers. Used this way, critical warnings can be delivered within a second or two.

Free Tool for CAP Alert Creation and Publishing



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The technology includes a web form for CAP alert creation and publishing. As shown here, the form uses simple HTML and client-side Javascript. The form can accept immediate upload of an already prepared CAP alert as well as direct editing from an empty form. The form also links to templates for common values of some CAP elements such as headline, description, and instruction.

This tool could be offered to any alerting authority that wants to create and publish CAP alerts. This free cloud-based service is of course a lot easier and cheaper for an authority than building or buying an in-house CAP editing and publishing tool.

Filtered Alert Hub http://alert-hub.org

The cloud-based Filtered Alert Hub aggregates emergency alerts worldwide. Click here for recent alerts.

This Hub allows for filtering aggregated alerts to fit a particular purpose. For example, the prototype now makes a separate news feeds containing official, public, high-priority alerts in a specific language for each country and each of 1870 cities. Click here for these feeds.

At present, the prototype gathers alerts from 20+ sources, and more are expected in the coming months. Click here for current alert sources.

Development of the Filtered Alert Hub is part of the NOAA Big Data Project. Click here for the project Wiki, and to access the free, open source software.

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Here is a screen shot of the Filtered Alert Hub web site. The page includes links to: the current CAP alerts, the available subscription feeds, the CAP sources, and the wiki page about the project.

Part of NOAA's Big Data Project

- Collaborative project with working prototype now
- Open Commons Consortium, AccuWeather, Amazon Web Services, IBM, and The Weather Company have already joined; others are welcome
- Core components are *Free Open Source Software*
- Contact Project Lead (Eliot Christian)

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At the wiki page, you would see that collaborators are developing the Filtered Alert Hub technology as part of the NOAA "Big Data Project".

Current collaborators include AccuWeather, Amazon Web Services, the Open Commons Consortium, IBM and The Weather Company. Other organizations are also welcome to join.

Core functions of the Alert Hub will be maintained as Free Open Source Software in the public domain.

I am leading this initiative. Please contact me if you know developers of cloud-based systems for emergency alerting who wish to get involved.

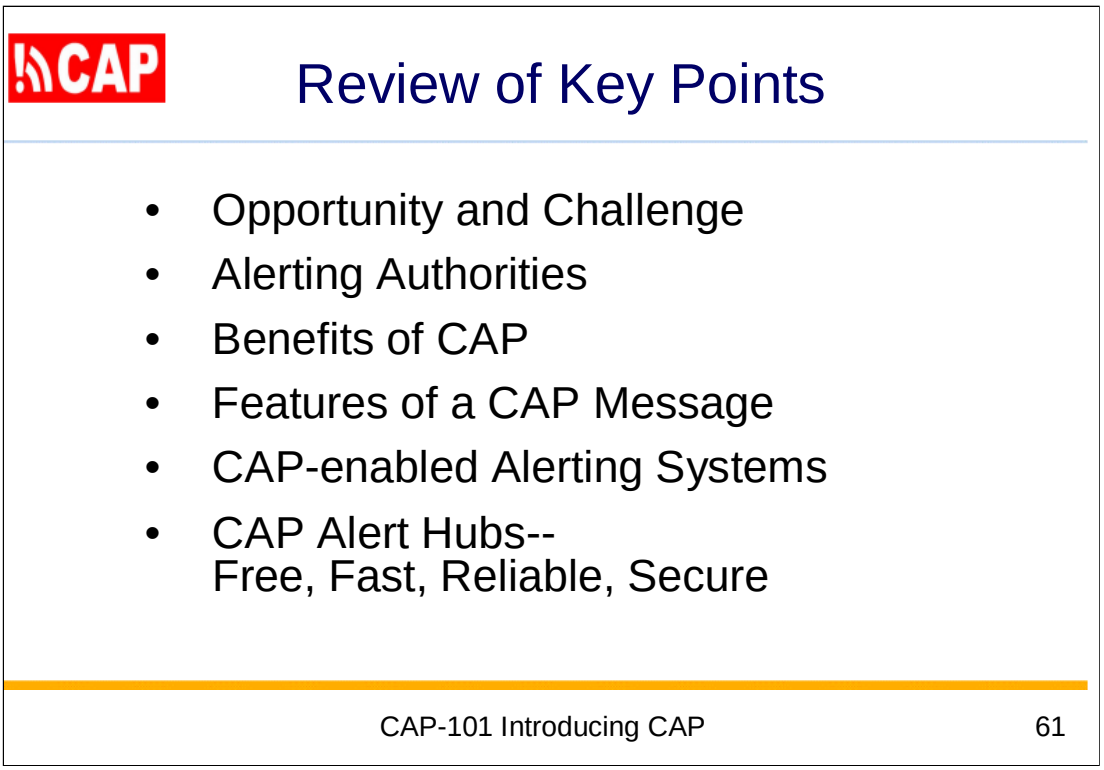
WMO Alert Hub Prototype

- WMO Alert Hub prototype aggregates alerts across feeds published by sources in the International Register of Alerting Authorities
- WMO Alert Hub prototype is based on the Filtered Alert Hub freeware

The WMO Alert Hub was proposed by the United States several years ago, and has been widely endorsed in WMO and associated commercial companies.

As I mentioned, the WMO Alert Hub aggregates CAP alerts from CAP news feeds published by official alerting authorities listed in the international Register of Alerting Authorities.

The Filtered Alert Hub technology now running supports a prototype of the WMOAlert Hub.



Before concluding, let me just review the Key Points.

A basic challenge for public alerting is the crazy patchwork of alerting systems, today--across communities, nations, and internationally. Improving the efficiency and effectiveness of public alerting requires an all-media, all-hazards approach based on standards, especially the CAP standard.

Organizations that are authorized to perform the function of alerting should be registered in the international Register of Alerting Authorities.

CAP can help assure that alerts are timely and that alerts reach everyone who needs them, and only those who need them.

CAP allows an alerting authority to activate multiple alerting systems with a single input. With CAP-enabled systems, alerts from many sources can be compiled for situational awareness so that emergency managers can fill out their "Common Operating Picture".

CAP messages contain not only text values for human readers, but coded values useful for automated processing. We looked at a "raw" CAP message in its machine-friendly XML format, and in its human-friendly format as seen on a Web browser.

I presented a partial survey of CAP-enabled alerting systems around the world.

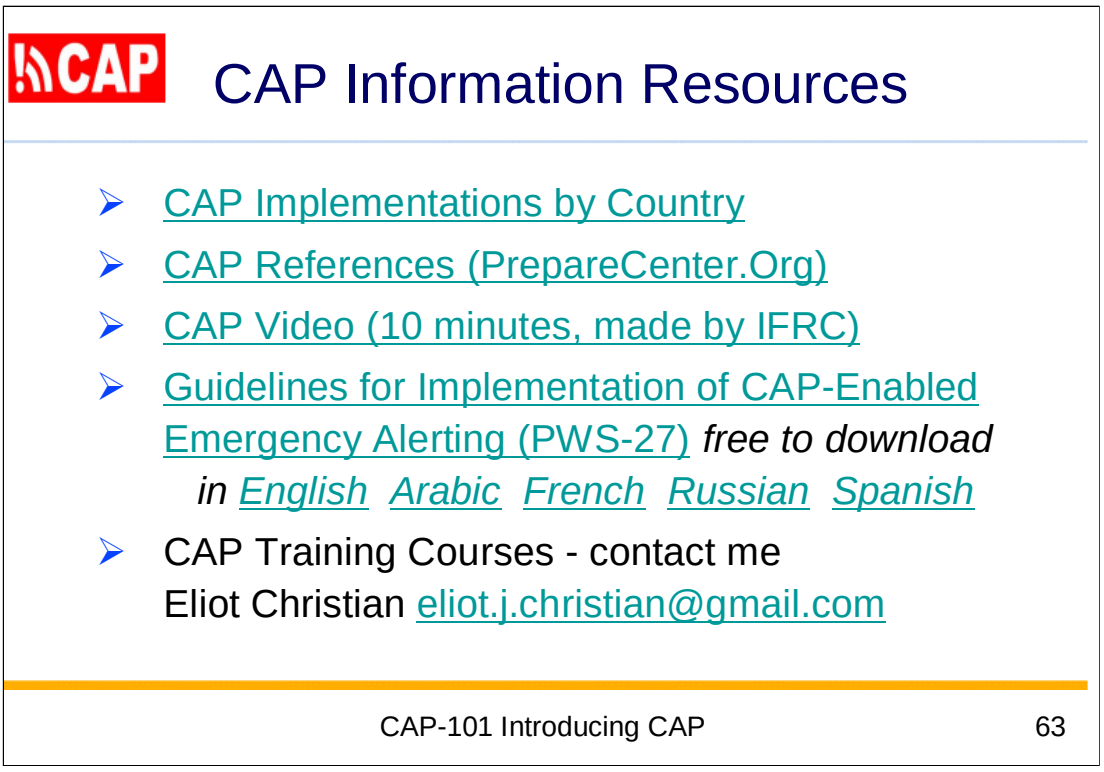
And my last topic concerned CAP Alert Hubs.

CAP Implementation Workshops

Link	Host	City	Co-sponsors
2017	Italian National Fire Corps	Rome. Italy	IAEM, IFRC, ITU, OASIS, WMO
2016	Asian Institute of Technology	Bangkok, Thailand	IFRC, ITU, OASIS, WMO
2015	Italian National Fire Corps	Rome. Italy	IFRC, ITU, OASIS, WMO
2014	LIRNEasia	Negombo, Sri Lanka	ITU, OASIS, WMO
2013	WMO	Geneva, Switzerland	ITU, OASIS, WMO
2012	Environment Canada	Montreal, Canada	ITU, OASIS, WMO
2011	WMO	Geneva, Switzerland	ITU, OASIS, WMO
2009	WMO	Geneva, Switzerland	ITU, OASIS, WMO
2008	WMO	Geneva, Switzerland	ITU, OASIS, WMO
2006	ITU	Geneva, Switzerland	ITU, OASIS

The nine CAP Implementation Workshops are good sources for CAP implementation experience and contacts.

The 2017 CAP Implementation Workshop will be 20-21 September in Rome; the 2018 Workshop will be in Hong Kong.



Here are some sources online for those who want to know more about CAP than what was covered in this presentation.

My survey of CAP Implementations by Country is summarized in the document linked here.

These and other resources are listed at the CAP References link.

Feel free to contact me about anything related to CAP.