



Effective Public Warnings and the Common Alerting Protocol (CAP)

```
<?xml version="1.0" encoding="UTF-8" >
<alert xmlns="urn:oasis:names:tc:emergency:Alerts-CAP" >
  <identifier>KLOX1339588233</identifier>
  <sender>KLOX@nwws.oes.ca.gov</sender>
  <sent>2006-10-14T10:04:11-07:00</sent>
  <status>Actual</status>
  <msgType>Alert</msgType>
  <scope>Public</scope>
  <incidents>KLOX.MA.S.0026</incidents>
  <info>
    <category>Met</category>
    <event>MARINE WEATHER STATEMENT</event>
    <urgency>Future</urgency>
    <severity>Severe</severity>
    <certainty>Possible</certainty>
  </info>
</alert>
```

○ ● ● Goals of Public Warning

- Save lives

- Reduce losses

- Alleviate fear

The measure of a warning is the change in action and attitude that results.

○ ● ● Effective Warning Systems

- Reach everyone at risk, wherever, whenever, doing whatever
- Don't raise irrelevant alarms
- Easy to use
- Reliable and secure
- Deliver *effective warning messages*

○ ● ● Effective Warning Messages

- Accurate and specific

- Action oriented

- Understandable in terms of:

- Languages and special needs

- Prior knowledge and experience

- Timeframe and instructions

○ ● ● There is no “magic bullet”

● No single system or technology can ever solve the public warning problem alone:

○ Limits of reliability

○ Limits of reach

○ Need for *corroboration*

○ ● ● Corroboration

- Most people will not act on the first warning message they receive
- Instead, they become vigilant and search for corroboration
- Only when persuaded it's not a false alarm will people transform *information* into *action*

○ ● ● Challenges

- Many different warning systems
- Different capabilities, different procedures
- Social diversity - languages, needs
- Detecting patterns in activity
- Implementing best practices

○ ● ● Opportunities

- Digital control of most warning technologies
- Internet and other data networks
- Encryption and digital signatures
- Extensible Markup Language (XML) and other content standards

○ ● ● CAP Timeline

2000 - "Effective Disaster Warnings" study published

2001 - CAP Working Group and Partnership for Public Warning form;

2002 - CAP draft specification and prototype field trials

○ ● ● CAP Timeline

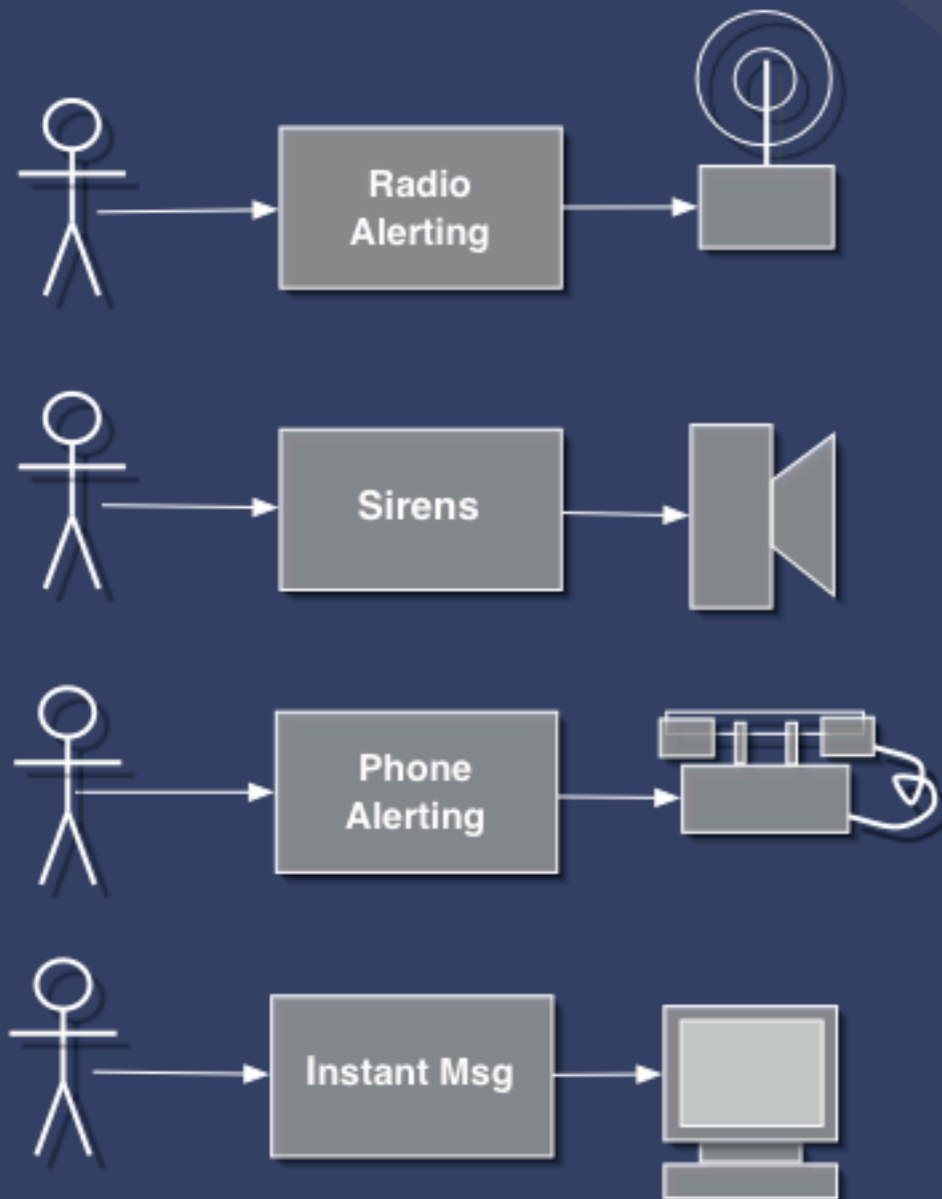
2003 - OASIS Emergency Management Technical Committee releases CAP 1.0 draft

2004 - CAP 1.0 adopted, international implementations begin

2005 - CAP 1.1 update

2006 - Broad global adoption, continuing standards advancement

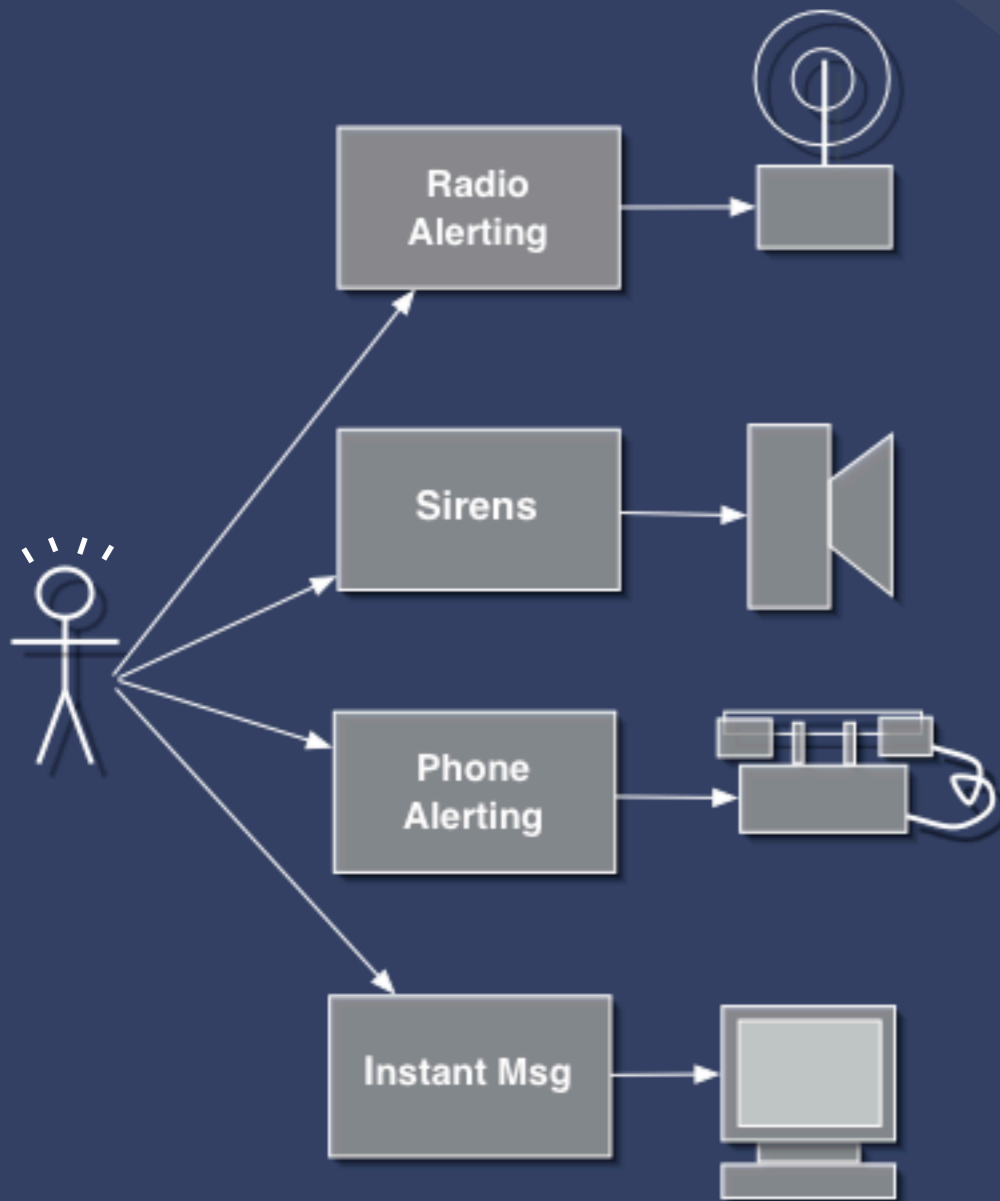
Historically...



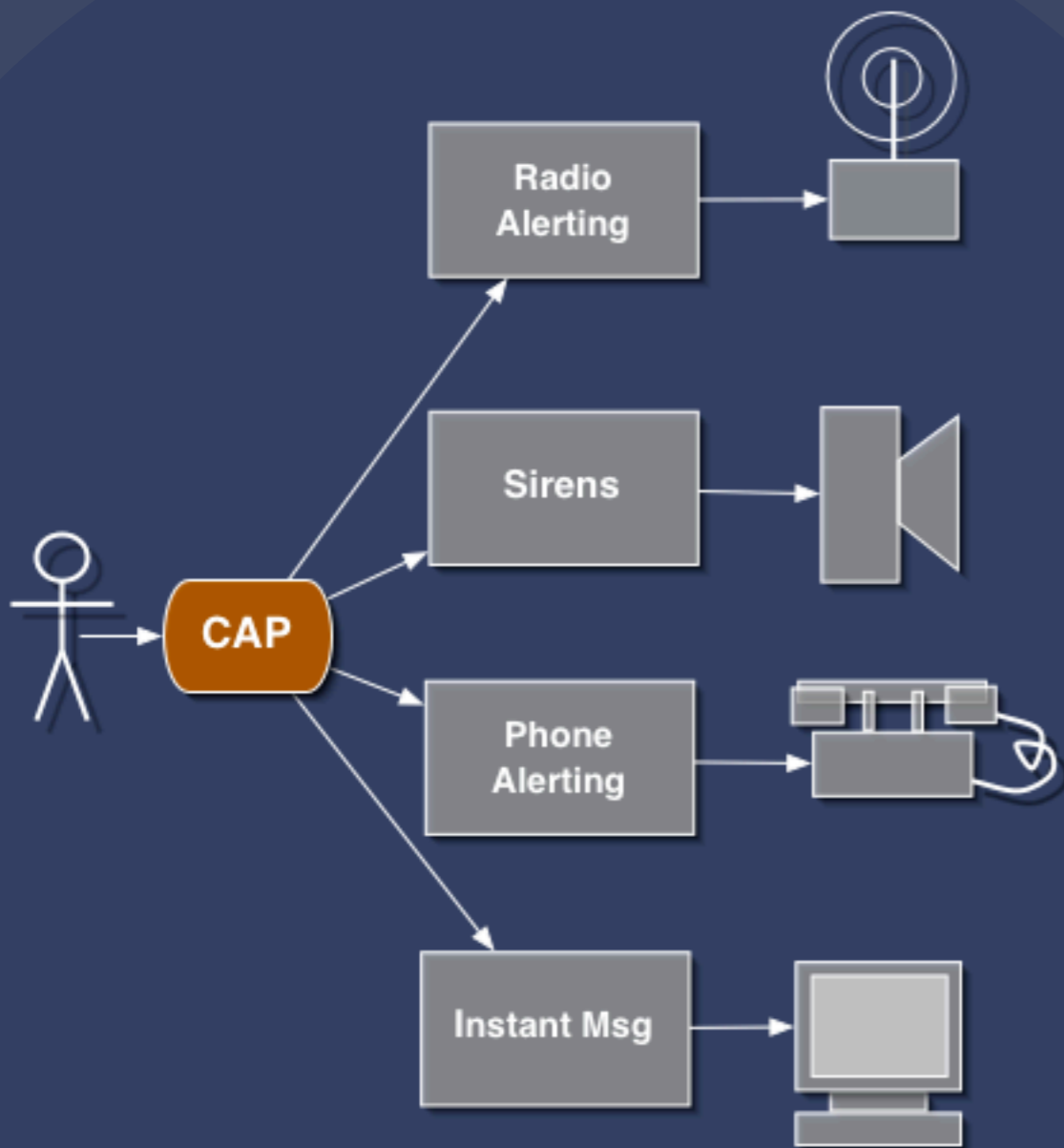
- **Multiple systems**
- **Multiple purposes**
- **Multiple operators**

○ ● ● Today's reality...

- Single originator must activate each system individually



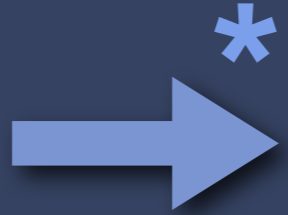
Using CAP...



- One activation triggers multiple systems
- Consistent, complete messages

● ● ● The CAP Message

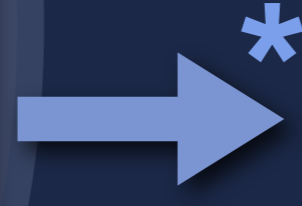
alert
Message ID
Sender ID
Date/Time Sent
Alert Status
Alert Type
Password
Operator ID
Alert Scope
Restriction
Address
Handling Code
Note
Reference ID
Incident ID



info
Language
Event Category
Event Type
Response Type
Urgency
Severity
Certainty
Audience
Event Code
Effective Date/Time
Onset Date/Time
Expires Date/Time
Sender Name
Headline
Hazard Description
Instructions
Information URL
Contact Info
Parameters



resource
Description
MIME Type
File Size
URI
Dereferenced URI
Digest



area
Area Description
Polygon
Circle
Geocode
Altitude
Ceiling

○ ● ● The Alert Block

Basic information about this message:

- Date/Time
- Sender
- Message Type & Status
- Distribution Scope

● ● ● Message Type

Describes the general purpose of this message:

Alert	Initial information about an event or hazard
Update	New information updating an earlier message
Cancel	Cancels an earlier message
Ack	Acknowledges receipt and acceptance of a message
Error	Indicates rejection of a message (explained in Note)
Draft	Prepared language or pending release authority

○ ● ● Message Status

Describes appropriate use of this message:

Actual	Refers to actual hazards or events
Exercise	Refers to simulated hazards of events, for exercise participants
Test	Technical testing, not actionable
System	Network internal messages, updates, etc.

○ ● ● Message Scope

Describes the appropriate dissemination of this message:

Public	For general delivery to unrestricted audience and the public
Restricted	For delivery only according to a specified rule.
Private	For delivery only to specified addresses.

○ ● ● The Info Block

Specifics of an event or a threat:

- Category and description
- Urgency / Severity / Certainty
- Timeframes
- Recommended action
- Supplemental information

○ ● ● Multiple Info Blocks

- Different languages
- Different instructions or timeframes for different areas
 - Phased evacuation
 - Evacuate vs shelter-in-place
 - Watch vs. warning

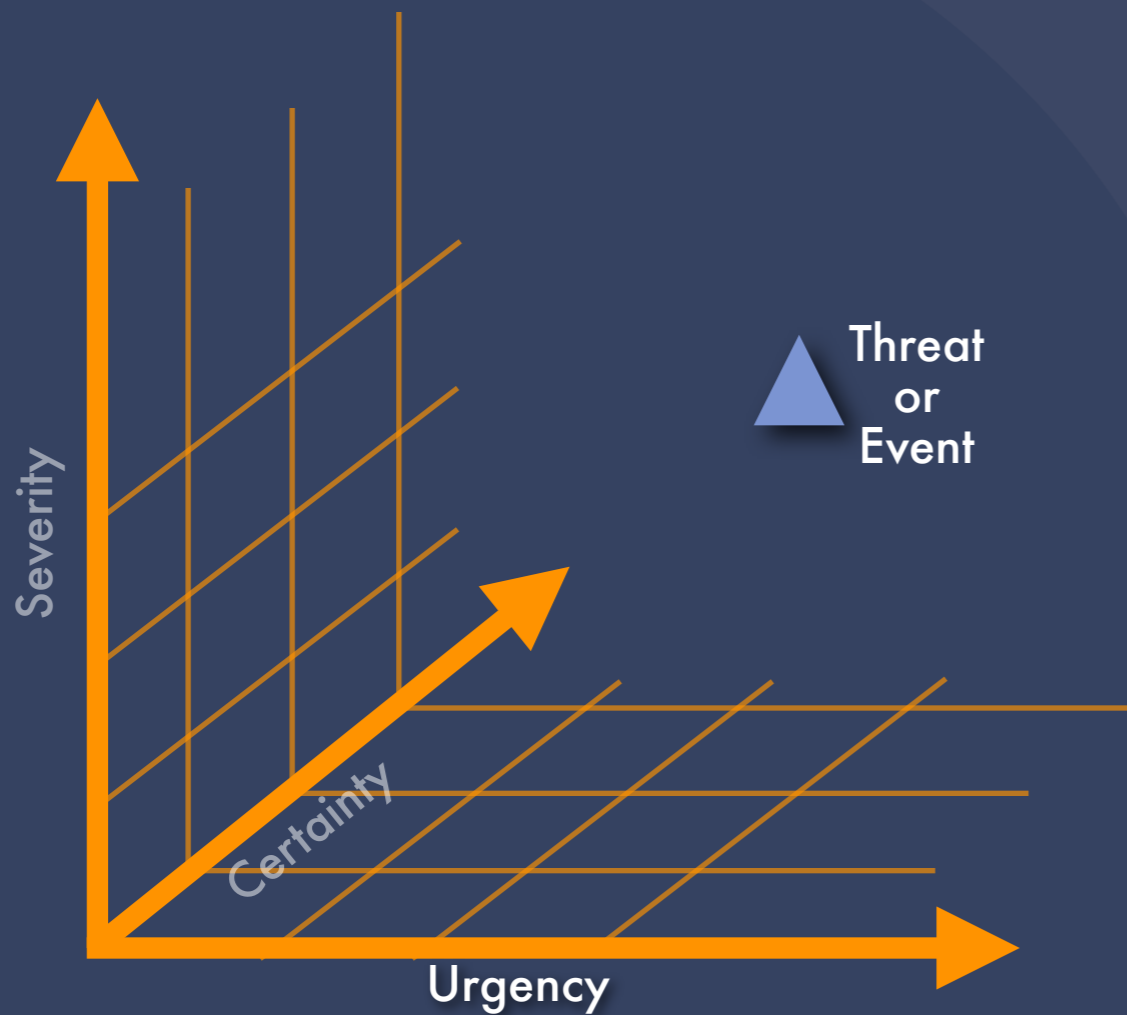


Event Category

(A perfect list is hard to find!)

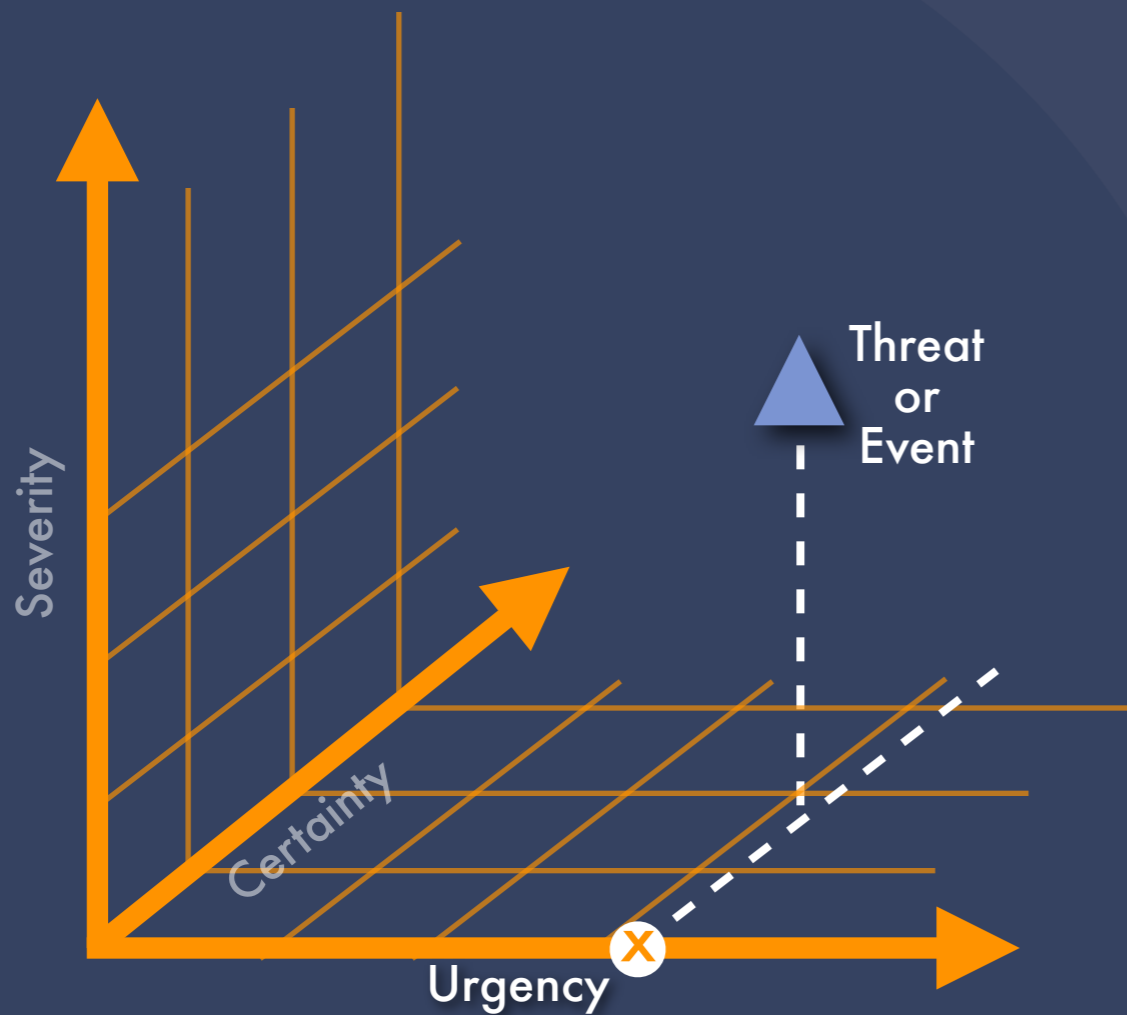
Geo	Geophysical
Met	Meteorological
Safety	General emergency and public safety
Security	Law enforcement, military, homeland and private security
Rescue	Rescue and recovery
Fire	Fire suppression
Health	Public health and medical
Env	Hazmat, pollution and other environmental
Transport	Public and private transportation
Infra	Utility, telecommunications, other infrastructure
Other	Not otherwise categorized

○ ● ● The U/S/C Model



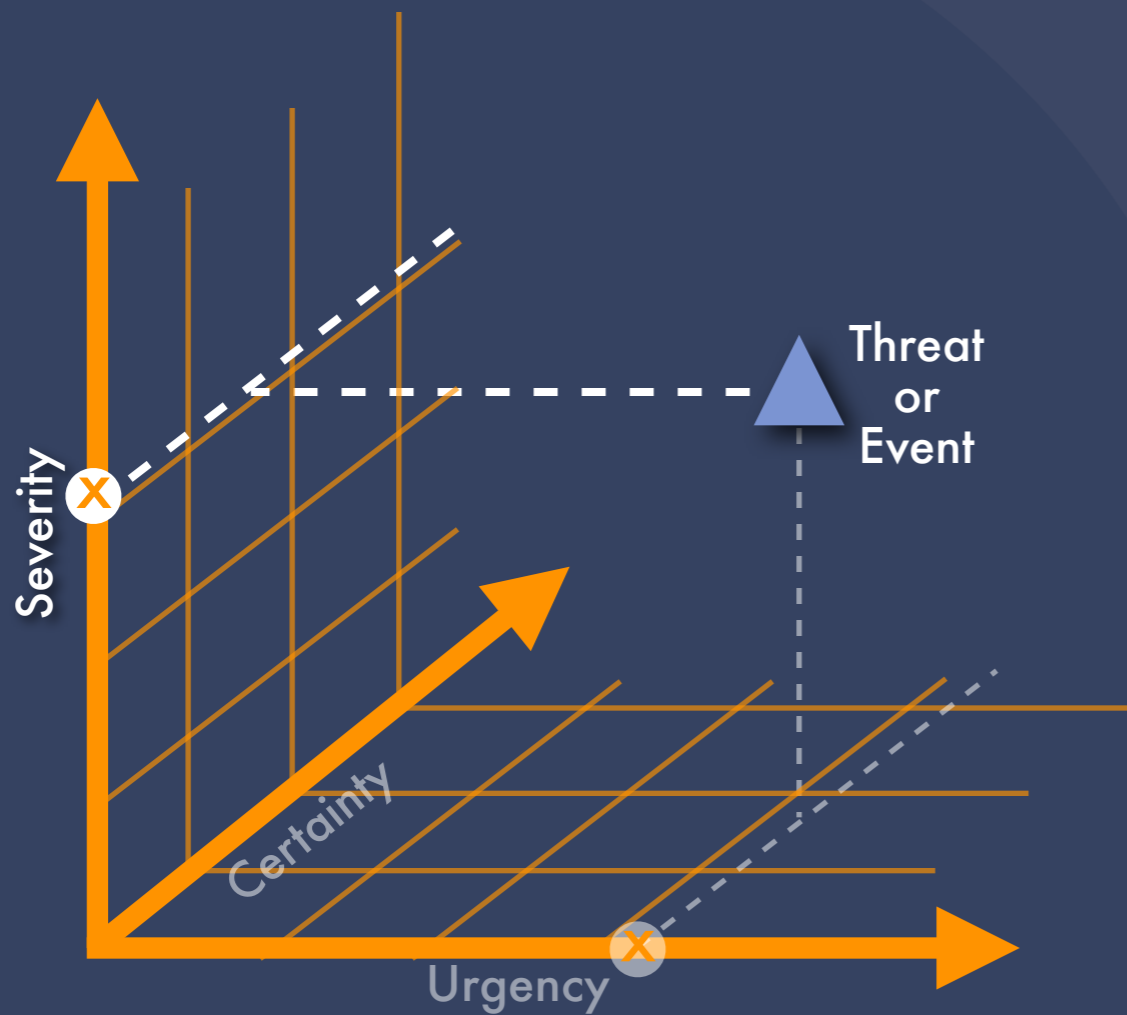
- Traditional one-dimensional model of "priority" is expanded into a "3D" model that expresses:

○ ● ● The U/S/C Model



- Traditional one-dimensional model of "priority" is expanded into a "3D" model that expresses:
 - Urgency (time)

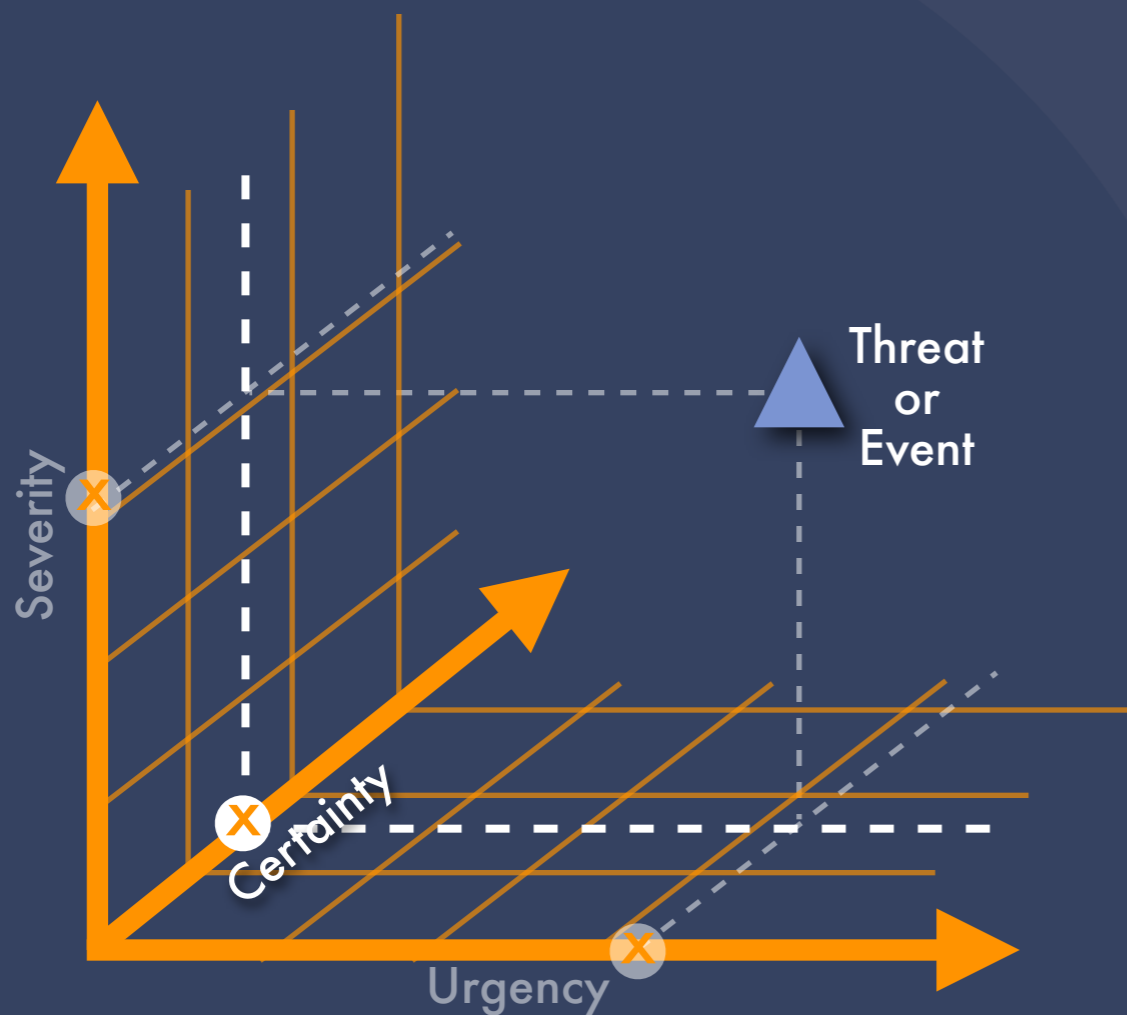
○ ● ● The U/S/C Model



● Traditional one-dimensional model of “priority” is expanded into a “3D” model that expresses:

- Urgency (time)
- Severity (impact)

○ ● ● The U/S/C Model



- Traditional one-dimensional model of “priority” is expanded into a “3D” model that expresses:
 - Urgency (time)
 - Severity (impact)
 - Certainty (probability)

○ ● ● Urgency

In the U/S/C model

Describes the time available to prepare:

Immediate	Responsive action should be taken immediately
Expected	Action within next hour
Future	Action in near future (typically 6-24 hours)
Past	Past, no preparatory action required
Unknown	Not known

Severity

In the U/S/C model

Describes the intensity of impact (if it occurs):

Extreme	Extraordinary or large-scale threat to life and property
Severe	Significant threat to life and property
Moderate	Potential threat to life and property
Minor	Limited threat to live and property
Unknown	Not known

○ ● ● Certainty

In the U/S/C model

Describes the issuer's confidence that the event will occur or has occurred:

Observed	Definitely occurred or occurring
Likely	Likely, although not certain ($p > 50\%$)
Possible	Possible but not likely ($p < 50\%$)
Unlikely	Not expected to occur ($p < 5\%$)
Unknown	Not known

○ ● ● The Area Block

Geographic target area:

- Text description and combo of:
 - GIS Polygon (area)
 - Point and Radius
 - Geographic Code
- Optional altitude and ceiling

○ ● ● The Area Block



- Geospatial description may be based on administrative, predicted or observed scope of effects
- More precise targeting means fewer irrelevant warnings ("cry wolf")

○ ● ● Multiple Area Blocks

● Multiple areas affected in same way and simultaneously:

○ Multiple flood-plain areas along a river

○ Multiple utility service zones

○ Areas with different descriptions

○ ● ● The Resource Block

- “Attachment” of other content (binary, XML, etc.)
- Audio, images, maps, etc.
- Reference (by URI) preferred
- Inclusion (Base-64 encoded) for data-broadcast application

○ ● ● The Road Ahead

- Transport contexts
- Identity and authentication contexts
- From geocodes to geospatial descriptions
- Standard of practice - expectation management
- Standard refinement (GML and EDXL integration, ITU, etc.)



Contact

for the Common Alerting Protocol project

OASIS EM TC

[http://www.oasis-open.org/
committees/emergency/](http://www.oasis-open.org/committees/emergency/)

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    <urgency>Future</urgency>
    <severity>Severe</severity>
    <certainty>Possible</certainty>
  </info>
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```

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