



United States Department of

**Health & Human Services**

Office of the Assistant Secretary for Preparedness and Response



# ***What Do Tweets Have to Do with Me?***

***Using Social Media in Emergency  
Response***

Kelly Bennett, Sara Harris, and Diana Kushner  
Fusion Cell

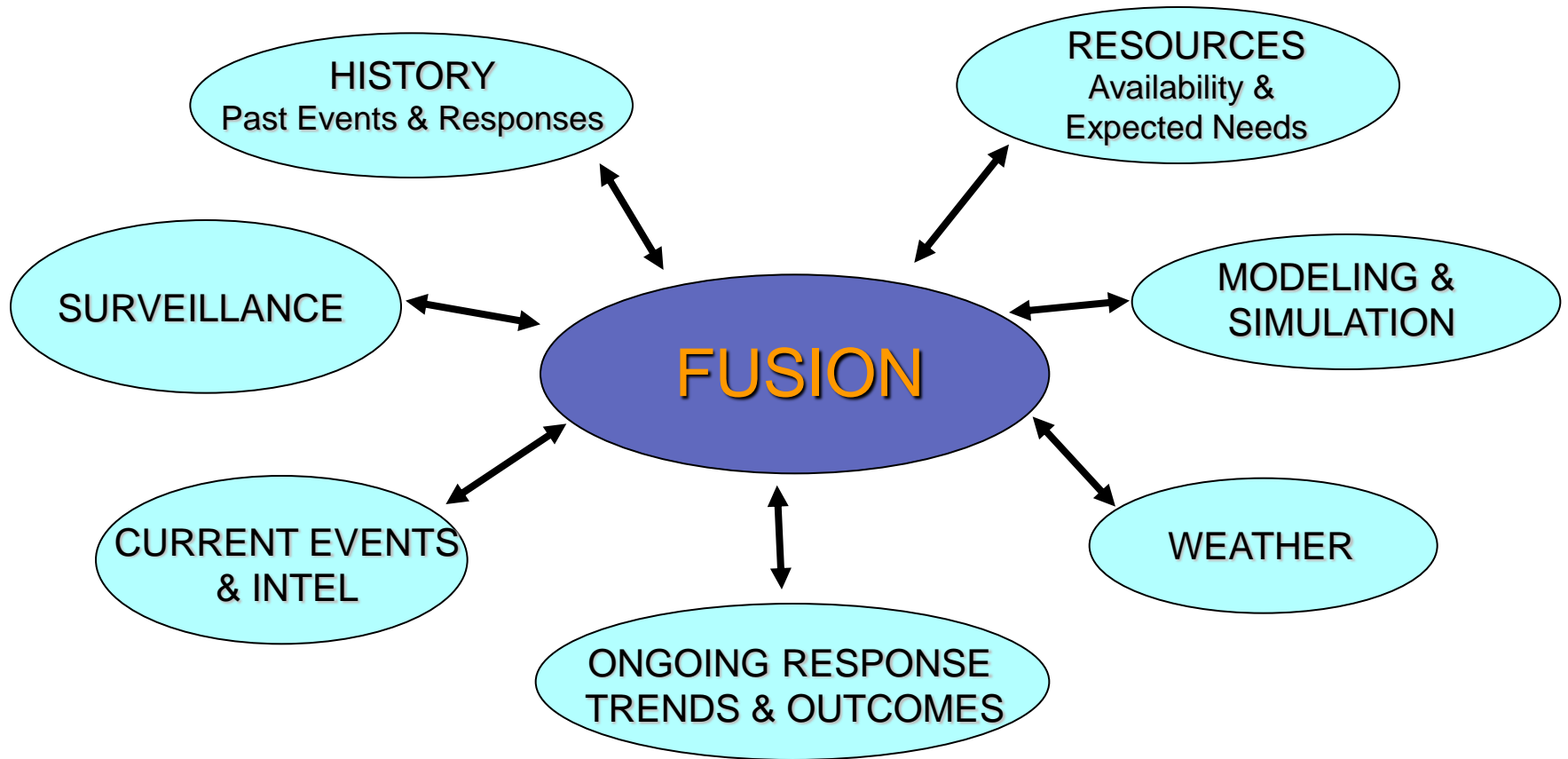


# Overview



- Who are we and what do we do?
- Why use non-traditional data?
- Preparing our social media strategy
- What tools do we use?
- Examples

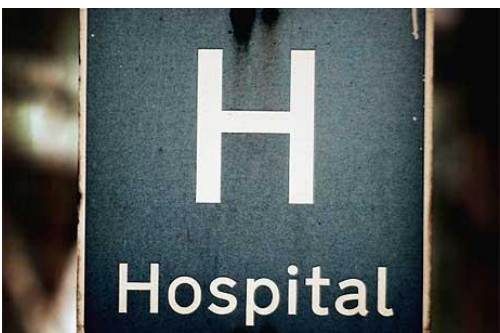
# HHS/ASPR's Fusion Cell



## THE QUESTIONS



KNOWN



UNKNOWN



SMOKE

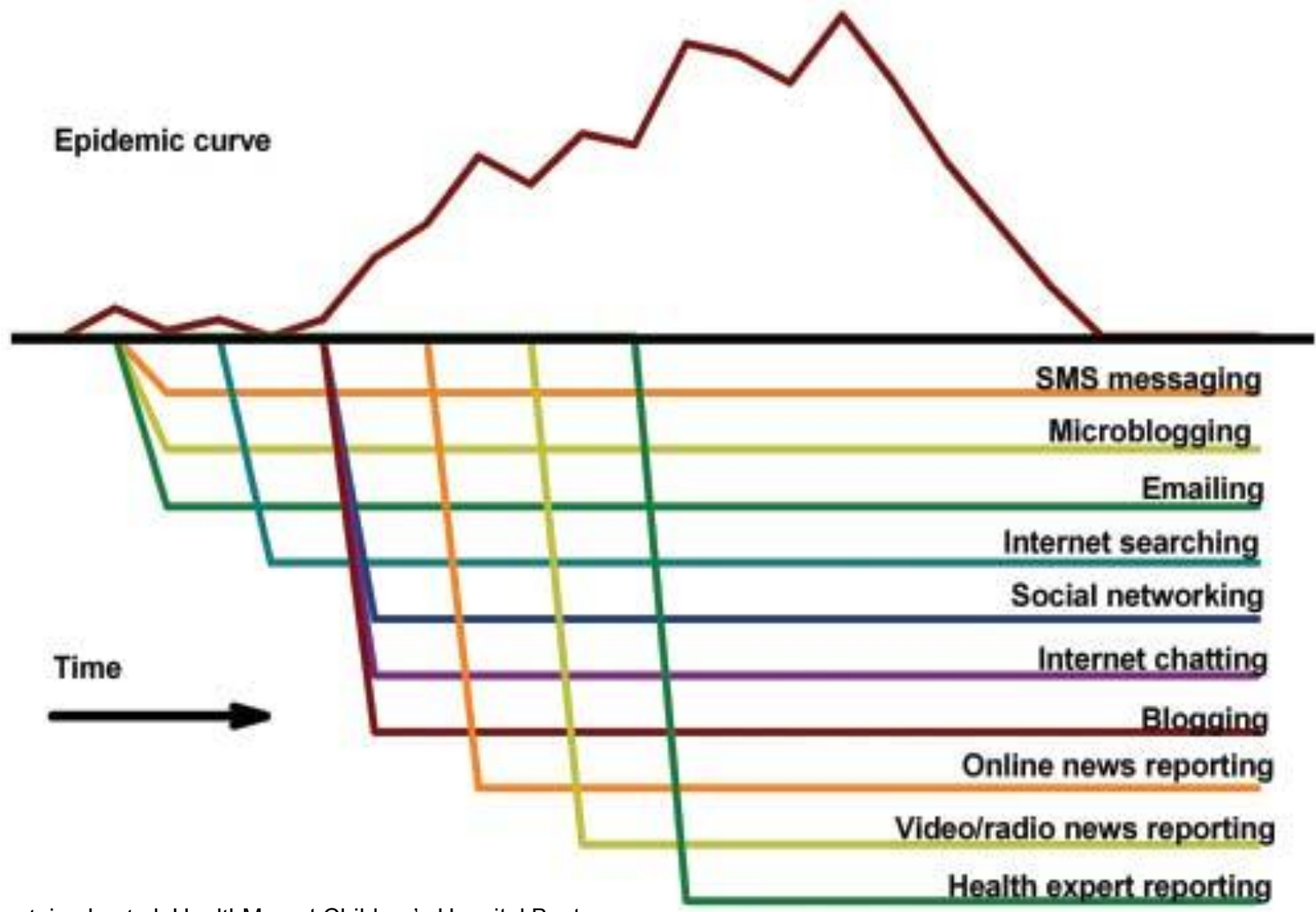




- **Traditional Sources have gaps**
  - Timeliness
  - Lack of complete picture (ex. School closures and H1N1)
  - Access to information
  - Population coverage
- **Research looks promising**
  - Twitter and Influenza - *You Are What You Tweet: Analyzing Twitter for Public Health*
  - Open Source Media and Health Surveillance - *Use of Unstructured Event-Based Reports for Global Infectious Disease Surveillance*



# Knowing Earlier = Responding Faster? **ASPR** ASSISTANT SECRETARY FOR PREPAREDNESS AND RESPONSE



Brownstein, J., et al. HealthMap at Children's Hospital Boston

*ASPR: Resilient People. Healthy Communities. A Nation Prepared.*



# Questions We are Trying to Answer



- Where might HHS assets and assistance be needed?
- How can HHS plan for potential medical and public health requests?
- Are there rumors spreading with incorrect or inaccurate health information?
  - How far has the information spread?



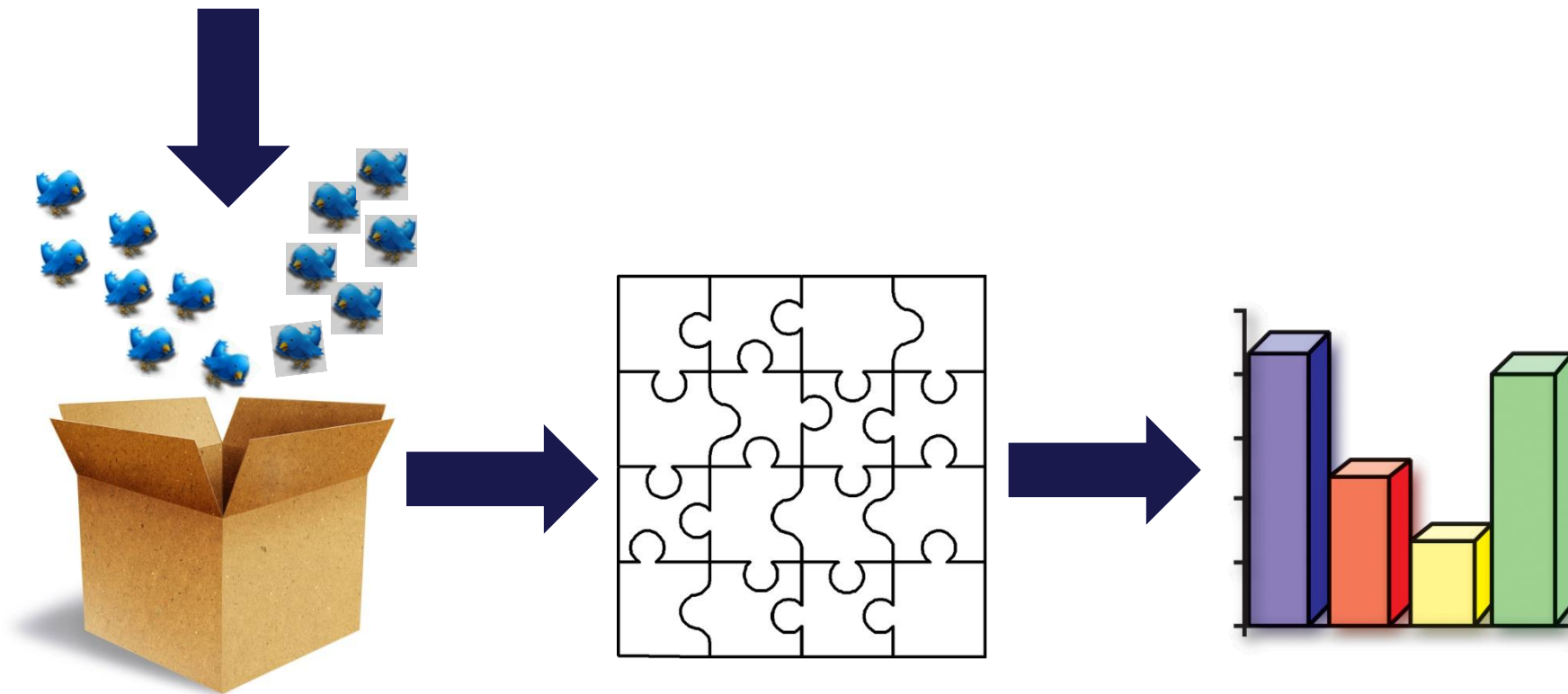
# Where Our Questions Come From



- Information Collection Plans:
  - Health Infrastructure; Medical Surge; State, Local Territory, and Tribal Coordination;  
Surveillance/Epidemiology
- Lessons Learned in Past Responses
- Dictated by the situation as the response unfolds



# The Truth





# Fusion's Stakeholders



- Senior leadership in ASPR
- Emergency Management Group (EMG)
- Public Affairs
- Incident Response Coordination Team (IRCT)  
Commander
- Regional Emergency Coordinators



# Tools We Use



## Twitter

## MappyHealth

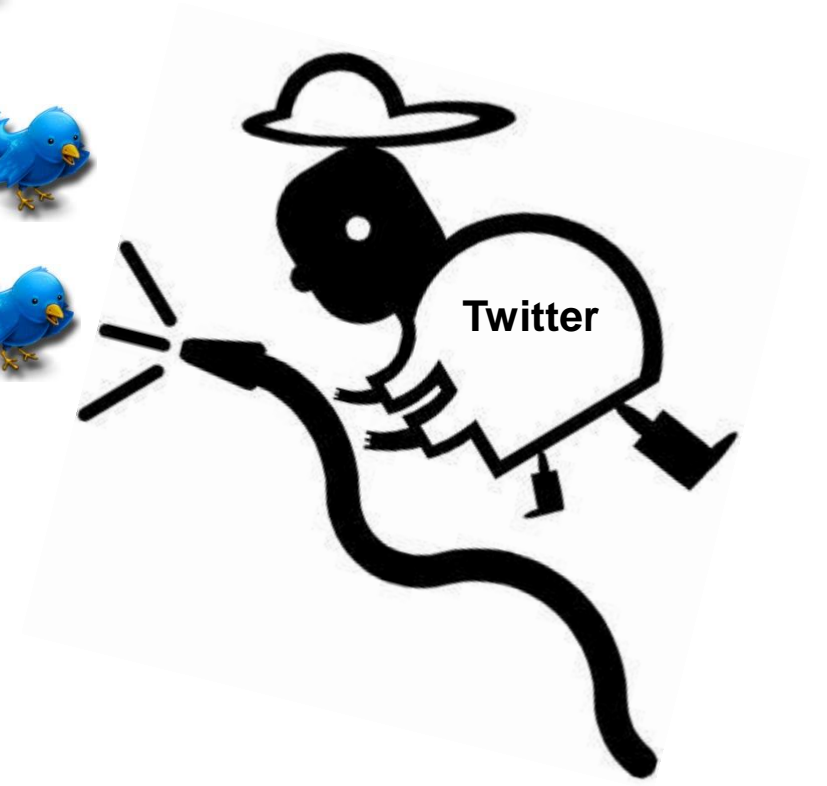
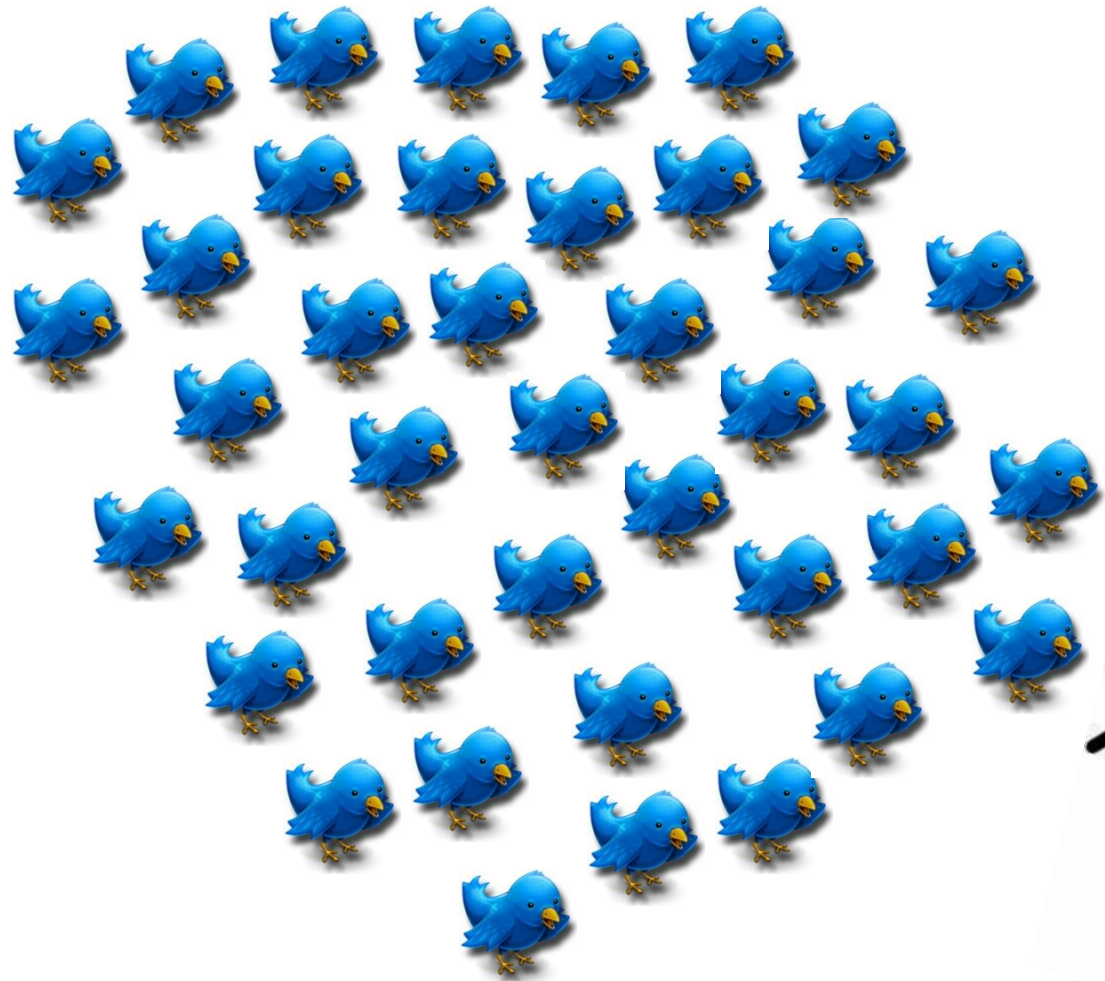
## HealthMap



# Twitter for Situational Awareness

- Real-time information
- “Citizen journalists”
- Breaking news reports pushed out on Twitter
- Government agencies, public health, nonprofits, and many more releasing information on Twitter







# What do we look for?

- Is the information from a **reliable source**?
  - Was the report made by a trusted news source?
  - Although @liarliar may be reporting honest information, information from an individual should be verified if possible
- Is the information **corroborated** by several sources?
  - Retweet ≠ corroboration
- Does the information fit into the “larger picture” for the event?
  - Is the information just more “noise” or does it improve your situational awareness?



# How We Search Social Media



## Boolean searches:

- Allow us to search beyond hashtags.
- Begin with seven generic searches used for all storms.
- Searches are dynamic and easily adjusted according to unfolding events.
- Searches focus on specific areas of concern:
  - Hospitals
  - Nursing Homes
  - Shelters
  - Elderly or disabled care

## Twitter Lists:

- List of trusted local sources of information.
- Includes local politicians, local health and emergency response departments, local news channels, local reporters.
- For prior notice events list can be formed ahead of time.
- Geography of accounts on list starts large and becomes more focused throughout event.





# Monitoring

- Put the lists and search strings into a social media display (Hootsuite, Tweetdeck, etc.)

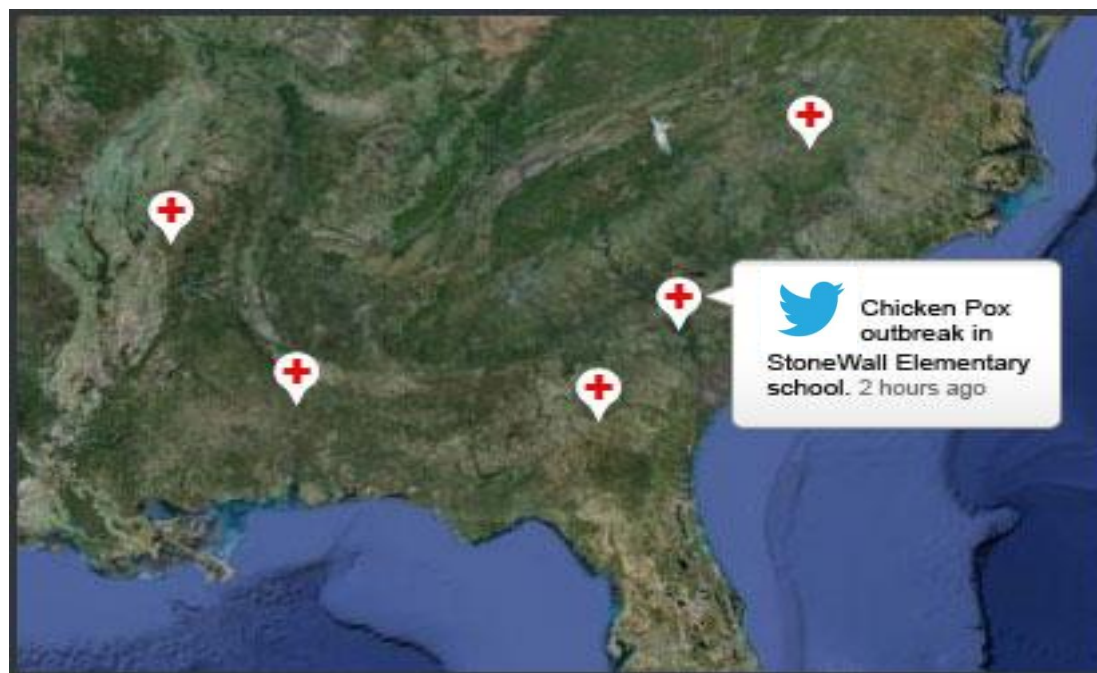
The screenshot shows a social media monitoring interface with three columns:

- Home Feed (ASPRFusion):**
  - CTDPH:** RT @GoHealthyPeople The Vaccines for Children Program provides free vaccines to uninsured & Medicaid-eligible children. 1.usa.gov/MWJGDT
  - NCIMedia:** Researchers at @UCSDHealth use tumor cells' inner workings 2 predict #cancer progression in #leukemia 1.usa.gov/M5GsAJ #CLL
  - Montreal:** RT@QOTYcontest: Queer of the Year Competition is the freaky, fab and fun LGBT Olympics. bit.ly/bart60 - tmblr.co/ZYN4yQPckd
  - TNDeptofHealth:** Most people try to cut calories by focusing on what they eat. What about what you drink? Rethink Your Drink @CDCgov. 1.usa.gov/OIDueW
  - NCL\_NCIP:** Missed our #CBITSpeaker Series last week on the Radiation Therapy Oncology Group Bioinformatics? View it now @ bit.ly/OxSiWq
  - KDHE:** #KanCare Educational Tour underway. Great information to share with #Kansas #Medicaid consumers and providers around the state.
- Mentions (ASPRFusion):**
  - MappyHealth:** Significant increase in tweets about West Nile Virus in Ohio | See the trend @MappyHealth ow.ly/cqjob #hscsm @ASPRFusion
  - MappyHealth:** Now Trending: H3N2 Swine Flu variant trending in Indiana. 4 people potentially affected via tweets captured ow.ly/cqT5 @ASPRFusion
  - Geek\_Nurse:** Now Trending: H3N2 Swine Flu variant trending in Indiana. 4 people potentially affected via tweets captured ow.ly/cqQS @ASPRFusion
  - MappyHealth:** @ASPRFusion thanks for the PM but we can't reply via DM unless you follow us. Take care!
  - redcrossmom:** @ASPRFusion it was great hearing about your work and talking with you today!
  - skram:** @gigaom: Crowdsourced science; @demickharis looks at how big data can improve medicine: ow.ly/chyoi @MappyHealth @ASPRFusion
  - davidcknight:** The DK Daily is out! bit.ly/1nTbj
- #nowtrending2012:**
  - EpiDoctor:** RT @MappyHealth Ebola outbreak in Uganda ow.ly/czZu5 #nowtrending2012 #outbreak @WHO
  - MappyHealth:** A lot of tweets about food poisoning today. Find out where and see the trend via @MappyHealth ow.ly/czYAU #nowtrending2012
  - Geek\_Nurse:** @MappyHealth: Ebola outbreak in Uganda ow.ly/czZu5 #nowtrending2012 #outbreak @WHO
  - MappyHealth:** Ebola outbreak in Uganda ow.ly/czZu5 #nowtrending2012 #outbreak @WHO
  - Geek\_Nurse:** Ebola outbreak in Uganda ow.ly/czZpu #nowtrending2012 #outbreak @WHO
  - Geek\_Nurse:** @MappyHealth: Significant increase in tweets about West Nile Virus in Ohio | See the trend ow.ly/cqjob #hscsm #nowtrending2012
  - skram:** @Geek\_Nurse @N2informaticsRN check out emoto2012.org/#topics/ - interesting take on something we've got in the works for #nowtrending2012



# Now Trending: #Health in my Community Challenge

- **Concept:** Create a web-based application that analyzes open source Twitter data for health topics and delivers “Top 5 Trending Illnesses” outputs for both a specified geographic area and the national level.

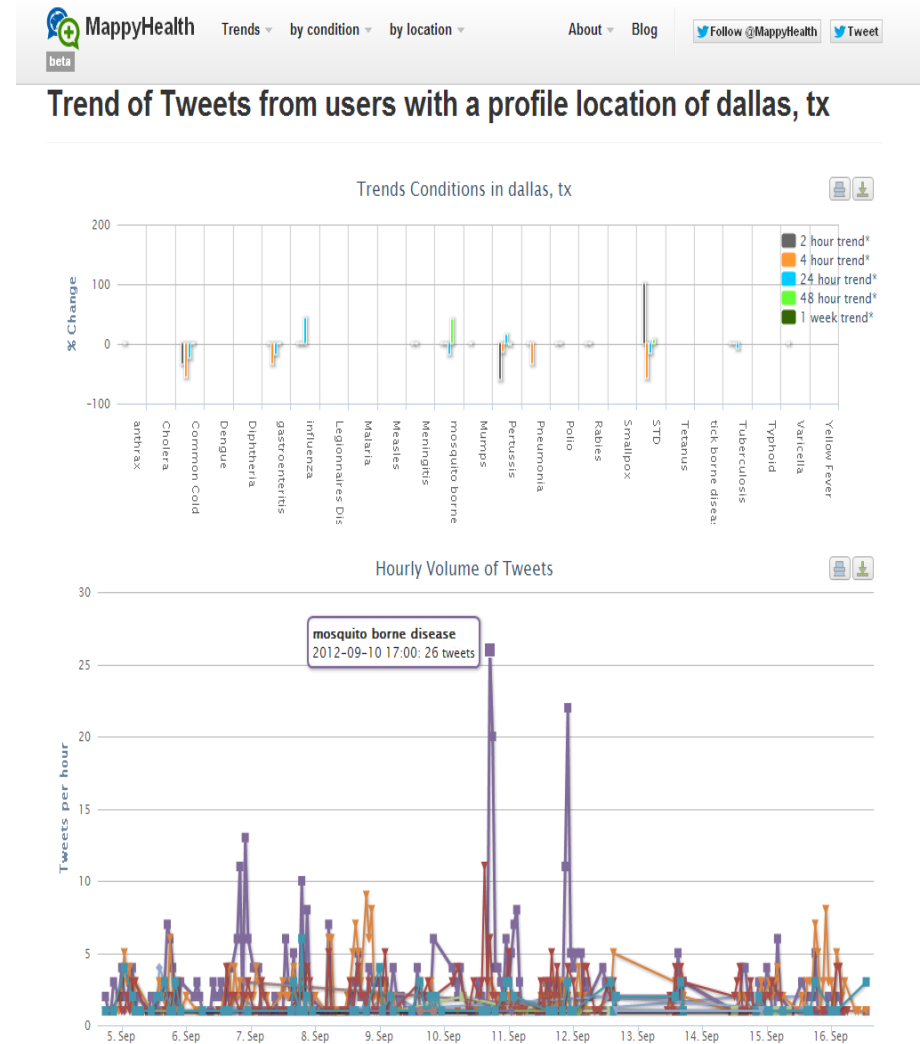




# Challenge Winner: MappyHealth

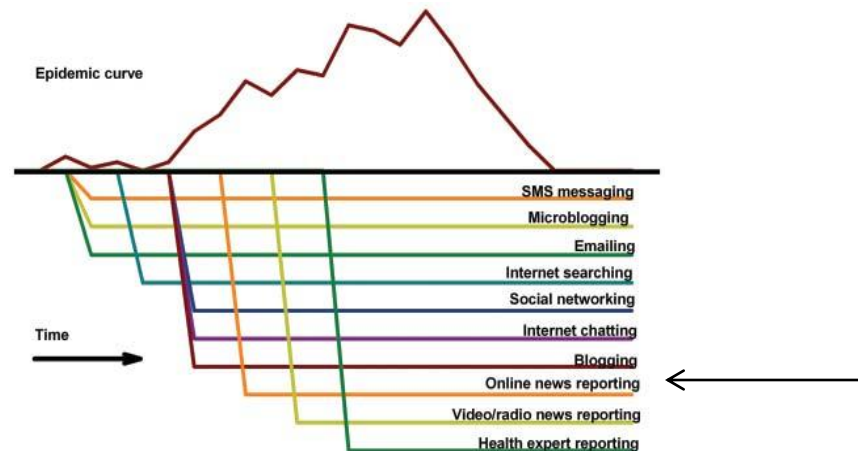


- 3 Person Team formed for Challenge (Social Health Insights LLC)
- Multiple ways to view data
- National and international data available
- Will be given to SLTT health departments to use if desired
- Tool can be used to complement traditional surveillance



# Advantages of News Media

- Insight about novel or emerging issues (ex: H1N1 reports in Mexico)
- Unofficial news reporting about a disease are available prior to official reports by an average of 12 days
  - Information communication is slowed moving through official channels
- Knowing what the public is interested in – to provide appropriate, accurate public health information to the community and correct misinformation which can be harmful to health





# HealthMap



- Website '[healthmap.org](http://healthmap.org)' and mobile app '**Outbreaks Near Me**' report real-time surveillance on numerous emerging infectious diseases and other health indicators
- Utilize informal online information sources: online news aggregators, eyewitness reports, expert reports (and Twitter reports coming soon)
- Automated process that updates 24/7/365
- Rigorous knowledge management system

# HealthMap

Global Health, Local Knowledge



Global
Local
News
About
Projects
Mobile
Donate
Feedback
English

Search  [Advanced Search](#)

Display Options:



**Outbreak Missing?**  
 Add it to the map [+](#)

**flu near you**  
[JOIN](#)

**Activity Index**  
 Low High  
 Country level  
 Province or local level

[Alerts from past week](#)
[Highlighted countries of origin for Hajj pilgrims](#)
[Coronavirus Surveillance](#)

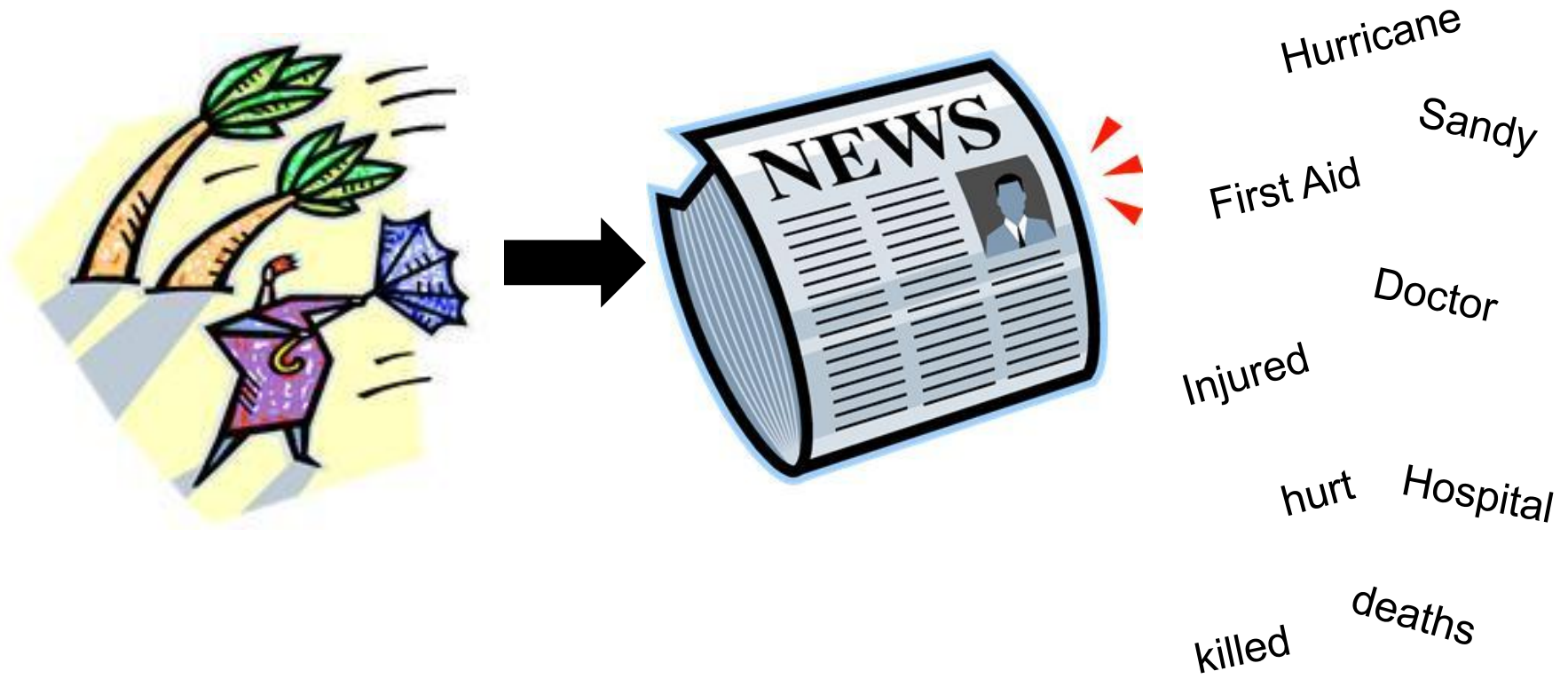
722 Alerts Now Showing

Date: 28 Nov 2012 - 6 Dec 2012 | Diseases: all | Places: all | Sources: all | Categories: all

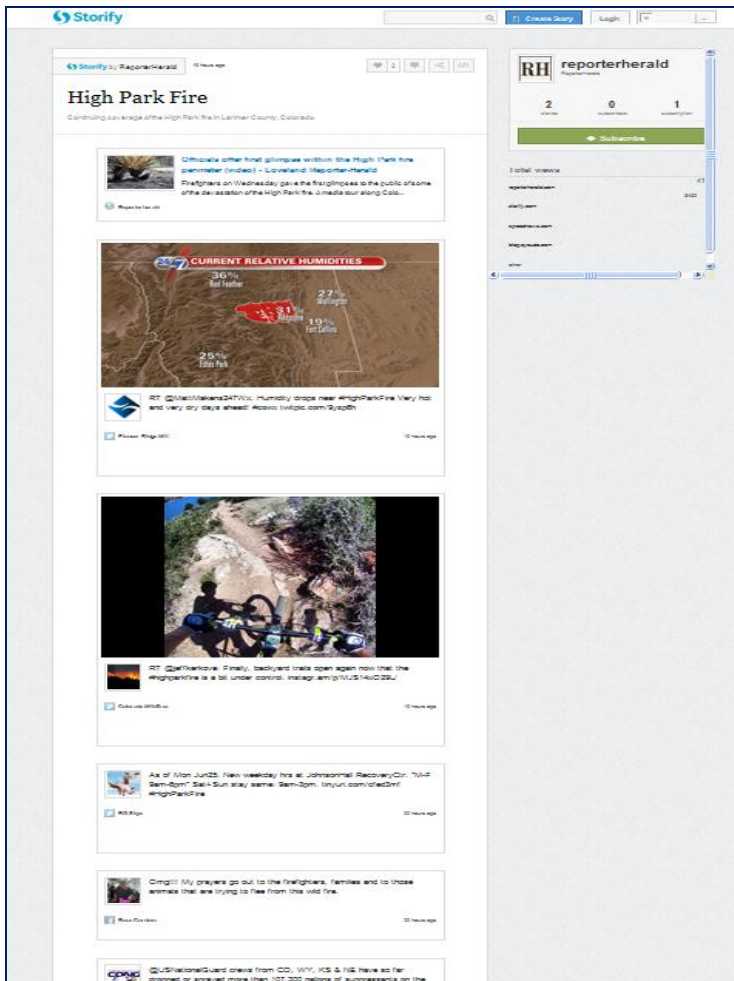
Source	Date	Summary	Disease	Location	Species	Cases	Deaths	Significance
	5 Dec 2012	Confirmed dead bus 7 months by meningitis in Santiago - Radio Bio-Bio	Meningitis	Chile	Humans			★★★★★ 1 vote



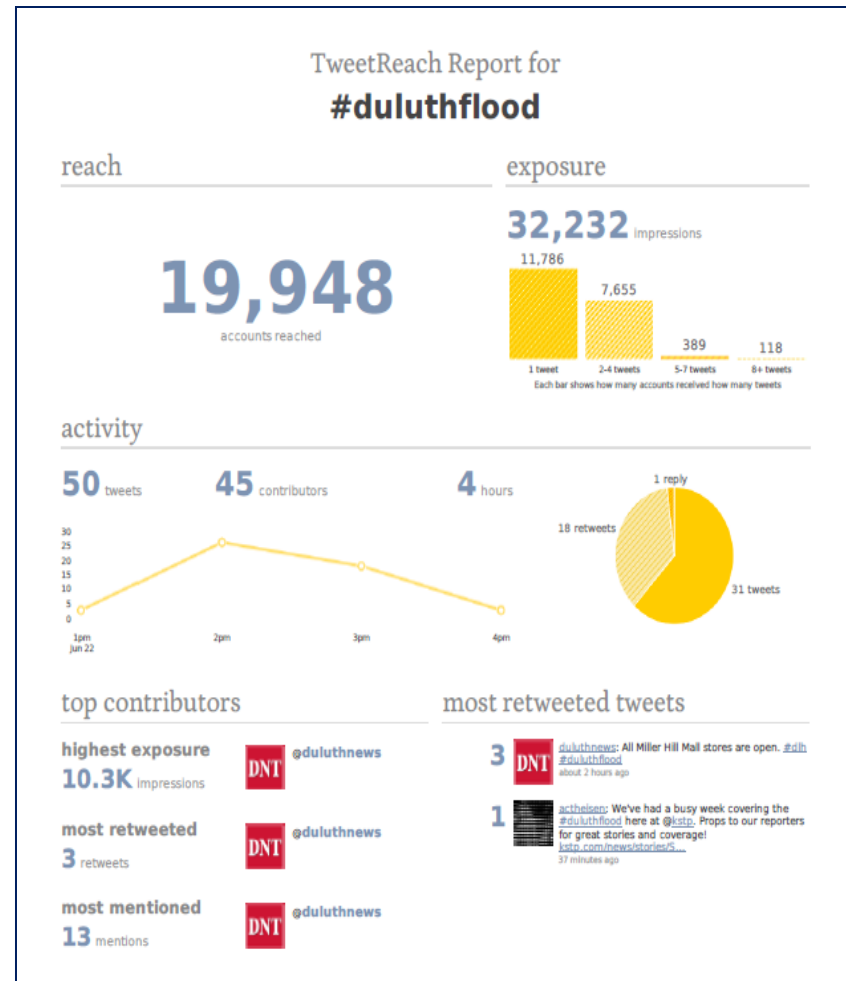
# HealthMap Hurricane Feed



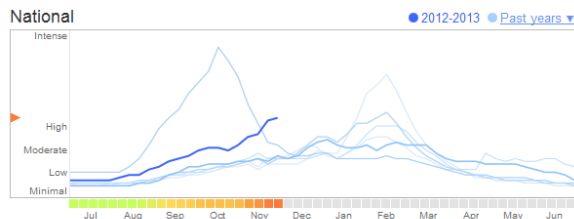
## Storify



## TweetReach

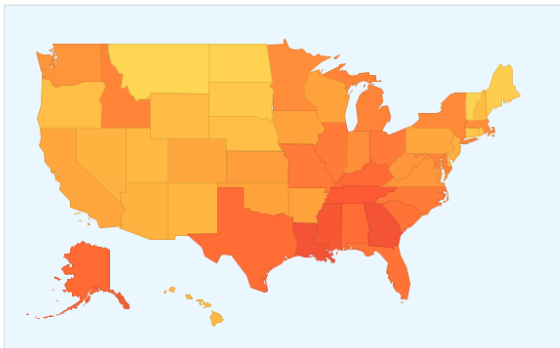


- Search trend patterns match disease incidence patterns
- Search patterns can provide an early indicator and warning of an upcoming increase in disease incidence
- Can we use search data as an input parameter for disease outbreak monitoring?

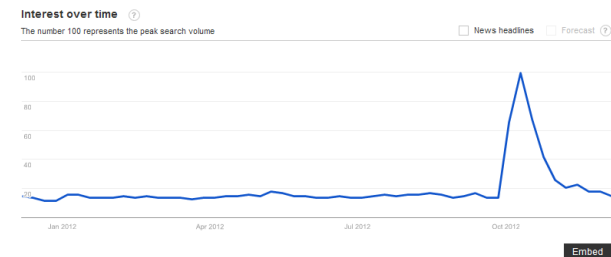


Flu

States | Cities (Experimental)

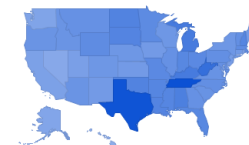


## Meningitis in US in last 12 months



Regional interest ?

Worldwide > United States



Related terms ?

	Top	Rising
meningitis symptoms	100	
viral	40	
viral meningitis	40	
bacterial meningitis	35	
meningitis vaccine	30	
symptoms of meningitis	30	
spinal meningitis	30	





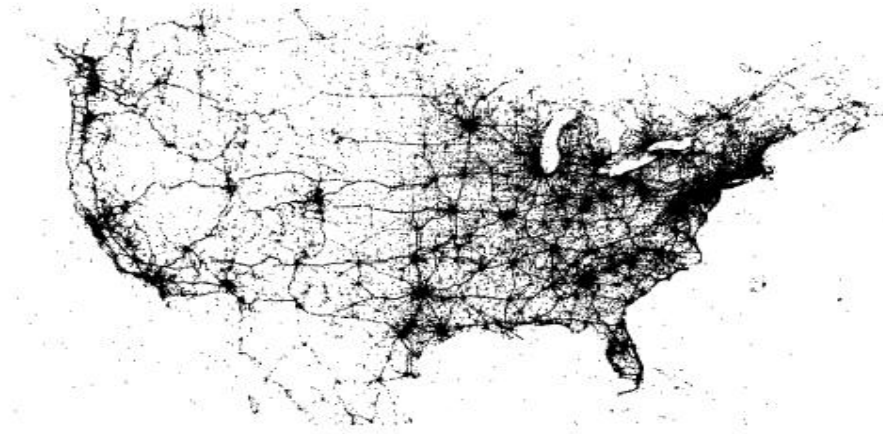
# Limitations to using News/Social Media



- During the height of an event, there can be large amounts of data and it comes quickly!
- The data is “noisy” (@No1BeiberFan would have heart attack if she saw Justin tonight #beiberfever)
- Rumors and misinformation can spread quickly

# Limitations to Using Twitter

- Twitter data is not uniform geographically



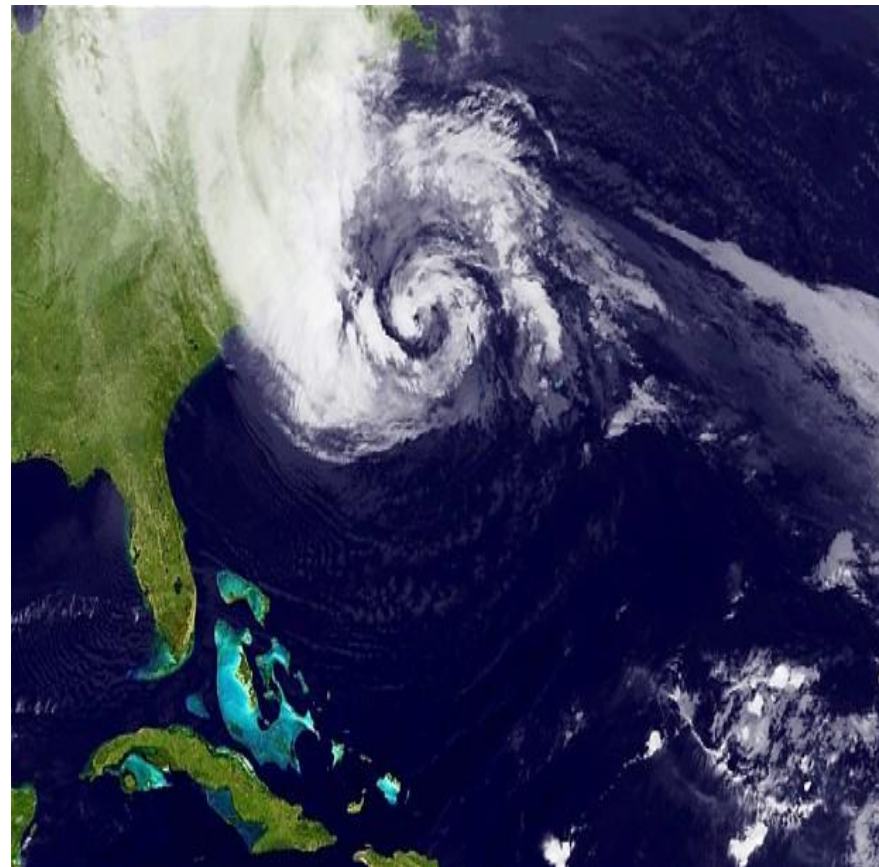
Published in a 2011 study by Cheng, Caverlee, Lee, and Sui.

- The demographics of Twitter users are not well known and do not represent the general population
- Creating baseline of Twitter data for disease surveillance is an enormous undertaking

# Fusion in Action



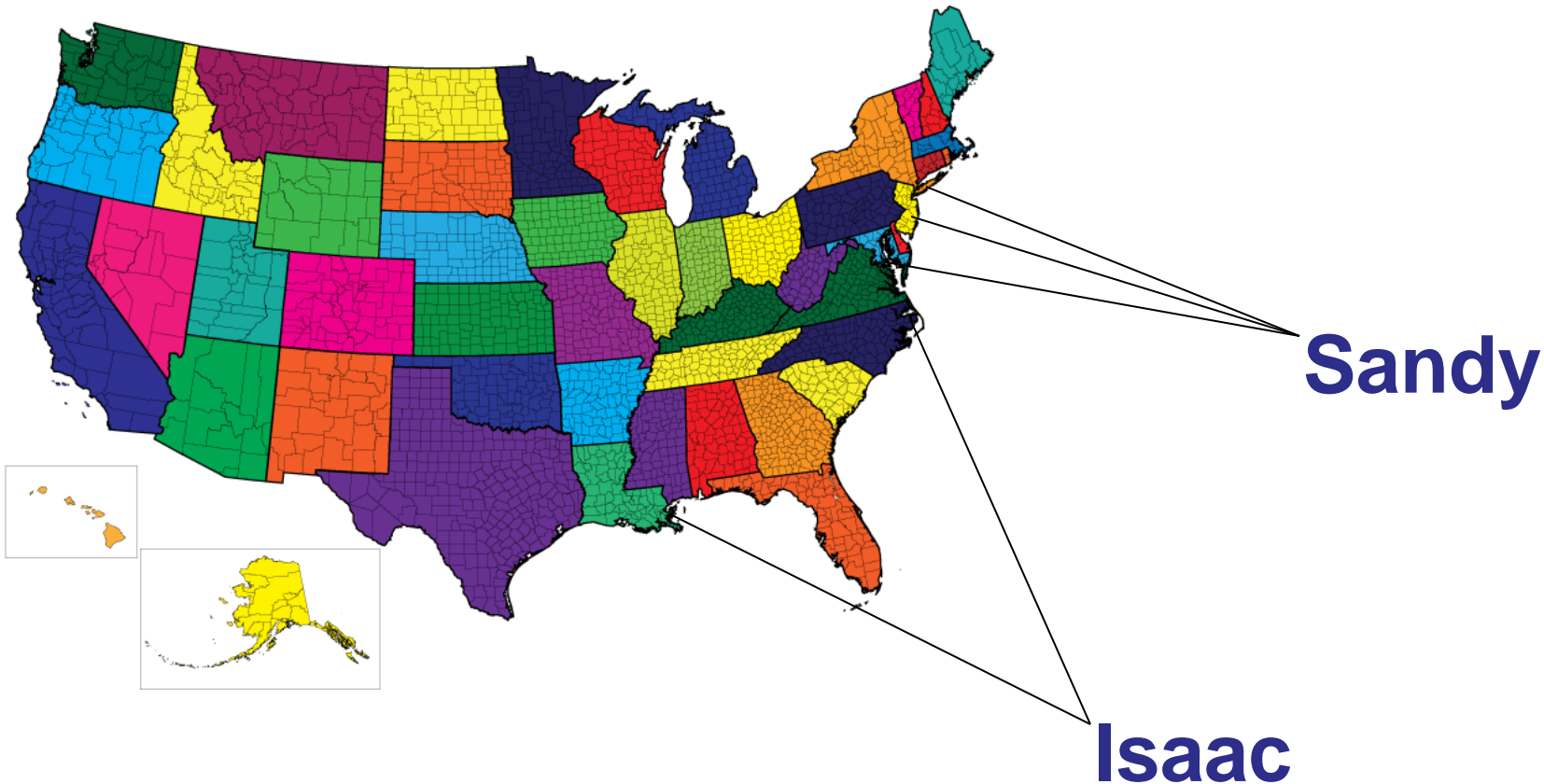
**Hurricane Isaac**  
**August 28, 2012**



**Superstorm Sandy**  
**October 29<sup>th</sup>, 2012**



# The Fusion Team Deploys



# Media as an Information Source





# Citizens are Tweeting

@publicsafety:  
#Flooding on Main  
Street between  
Elm and Oak  
Street #Isaac

@eyesontheground:  
Latest #Isaac concern:  
alligators & snakes seen  
swimming in Louisiana  
neighborhood flood  
waters



@soccermom:  
There goes the #power!  
Good thing we have a  
#generator! #hurricane

@concernedcit:  
Careful around 29<sup>th</sup>  
Street! #Power lines  
down blocking road.  
#Isaac



# Tangipahoa River Dam – Hurricane Isaac

**11:00 am 8/30/12**

**@wdsu: BREAKING: Miss. Emergency Mgmt. notified GOHSEP/Tangi. Parish gov't of imminent failure of dam at lake Tangi. at Percy Quinn State Park.**

**11:15 am 8/30/12**

**@WWLTV: BREAKING: Urgent! Parish President says those living along the Tangipahoa River have about 90 minutes to get out...**

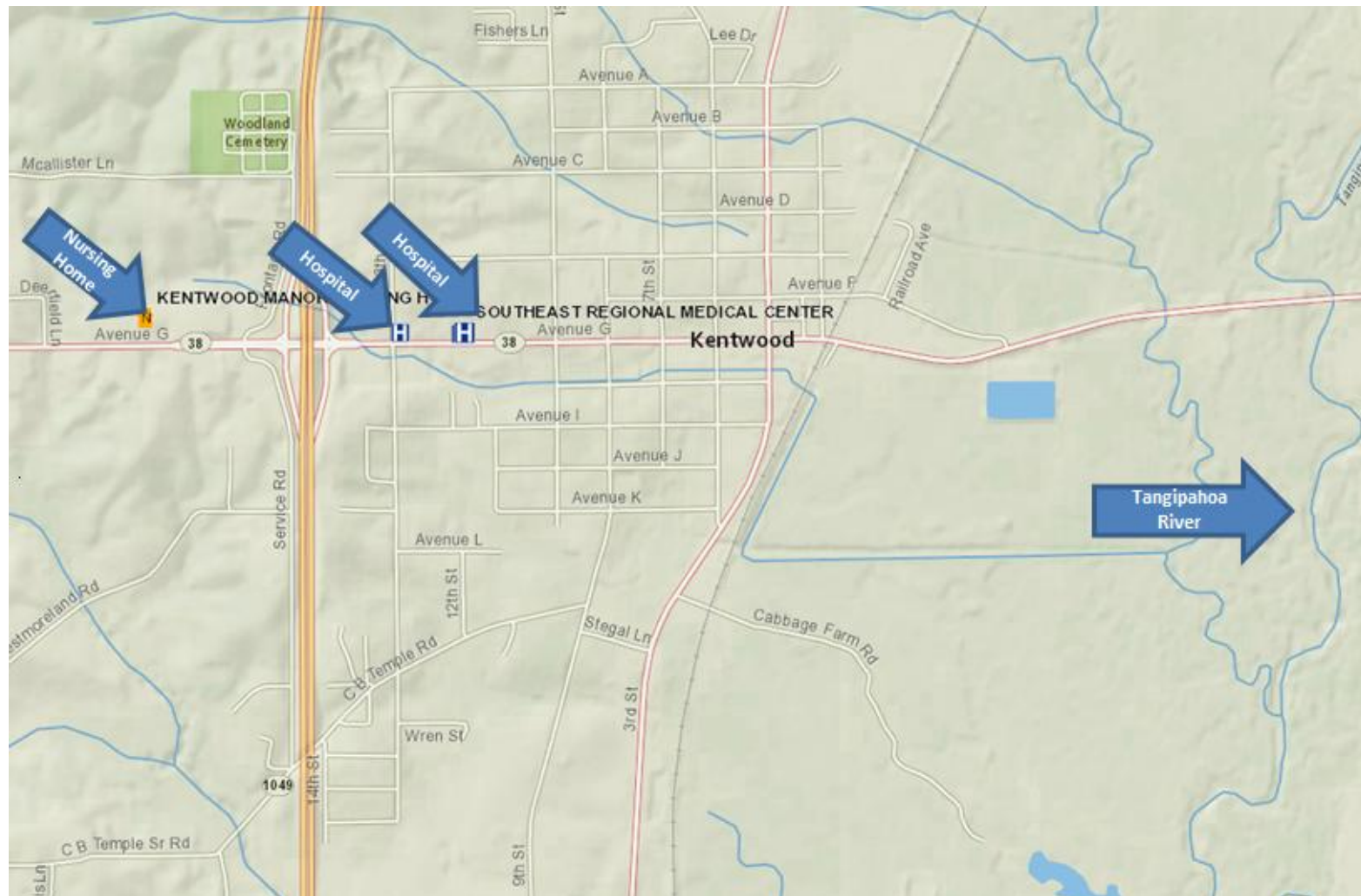


Google Earth image

**11:31 am 8/30/12**

**@WAFB: Dam failing leads to mandatory evacuation along Tangipahoa River.**

# Hospitals and Nursing Homes – Hurricane Isaac





# Grave Disinterment – Hurricane Isaac



9/4/12

@Concernedcitizen: Saw this crypt that was washed from its grave just as we got on levee to enter south Plaquemines Parish #Isaac



9/4/12

@JasonWhitely (Senior Reporter at WFAA): Tombs and caskets floating in Braithwaite, LA #lawx #Isaac



8/31/12

@WAFB: #Isaac floods Springfield Cemetery #Isaac09

WAFB News article: "Oh, it's an awful feeling seeing the graves float up. It's terrible" reported one citizen.



# Hospital and Nursing Home Evacuations – Superstorm Sandy



- 10/29/12 9:59pm: Bloomberg: [#NYU](#) hospital backup didn't work. They are in the process of moving patients. [#Sandy](#)
- 10/31/12 1:54pm: ALERT: Bellevue Hospital evacuating 500 patients. Has been on backup generators since power went [out.nyti.ms/Tn3PIt](http://out.nyti.ms/Tn3PIt) Via [@nytjim](#)

## Evacuation of Bellevue Hospital



## Evacuation of Rockaway area nursing home patients



- 10/29/12 11:50am: Apple Rehab on Watch Hill the only [#RI](#) nursing home evacuated for [#sandyri](#) so far, according to [@felicejfreyer](#) [news.providencejournal.com/breaking-news/...](http://news.providencejournal.com/breaking-news/...)



# Elderly Trapped in Highrises – Superstorm Sandy



11/1/2012 1:04pm:

If you're young/fit and in NYC, hike up a darkened high rise w/ water, power bars, toilet paper and help elderly [mojo.ly/TbJHes](http://mojo.ly/TbJHes) #sandy

11/1/2012 2:28pm:

@CoryBooker 444 mt. Prospect in Newark 15 fls. of elderly need help no back up generator or er lights. No building mngt showed to help



NYC Skyline during Sandy power outages.



# Early Warning – Norovirus (Superstorm Sandy)



## Social/News Media

11/6/12 (1:12 pm) After Norovirus Outbreak, Evacuees Being Removed From Brooklyn Shelter



## Preventative Action

- Safety bulletin on gastroenteritis sent out
- Stringent hand hygiene implementation
- Increased hand washing stations and other safety gear provided
- Isolation rooms





# Public Health Messaging



- West Nile Virus: Hurricane Isaac
  - “fema needs to be providing victims with mosquito spray those of us without power or homes are being exposed to west nile virus”
  - “@CDCgov River Ridge residents left homeless by Hurricane Issac being eaten alive exposed to #westNile @RedCrossSELA @fema NOT HELPING US!!”
- Mental Health: Superstorm Sandy
  - New York Daily News: “children all across Coney Island, Brighton Beach, and Red Hook, living in homes without power, heat, and hot water, have become anxious, depressed, and frightened due to the radical change in their lives”

# Carbon Monoxide Poisoning – Superstorm Sandy

Three taken to the hospital after carbon monoxide poisoning caused by a backup generator (NBC Washington)

#Sandy claims first 2 Lehigh County victims---one of carbon monoxide poisoning from generator and one from hypothermia. (WFMZ.com)

One person is dead and seven others hospitalized with carbon monoxide poisoning caused by a generator overwhelmed them inside their Chambersburg home last night (NJ.com)

## Continuous Messaging



ASPR @PHEgov

30 Oct

CO poisoning can be deadly! Use generators safely. Place them outside, 25 feet away. @CDC\_DrCPortier go.usa.gov/kN1 #Sandy Expand



ASPR @PHEgov

7 Nov

Never run a generator or other gas powered engine inside. CO fumes can kill. Need to stay warm? Find a shelter. rdcross.org/MHxlp #Sandy Expand



Dr. Chris Portier @CDC\_DrCPortier

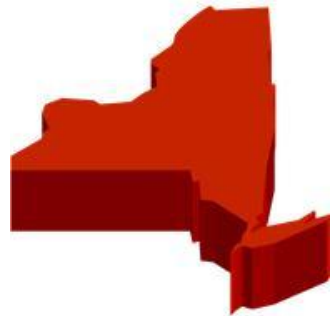
9 Nov

Protect yourself from CO poisoning. Never use generators, grills, or similar devices indoors, incl. garages! #Sandy go.usa.gov/Dtd

Retweeted by ASPR

Expand

# Open Source Fatality Tracking – Superstorm Sandy



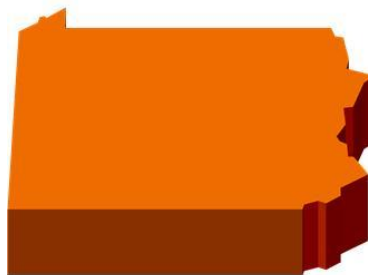
## **New York:**

- Drowning
- MV accident
- Tree falling
- CO poisoning
- Fatal falls
- Medical equipment without power



## **New Jersey:**

- Fatal accident while clearing debris
- Tree falling
- CO poisoning
- Hypothermia
- Medical equipment without power



## **Pennsylvania:**

- Tree falling
- CO poisoning
- House/electrical fire
- Hypothermia



## **Maryland:**

- Tree falling
- MV accident

Social media monitoring during disasters has as many twists and turns as a roller coaster.



Seaside Heights, NJ Casino Pier Roller Coaster





# Evolution of a Search: Superstorm Sandy



## Starting Searches:

- (Sandy OR hurricane) AND shelter
- (Sandy OR Hurricane) AND "nursing home"
- (Sandy OR hurricane) AND hospital
- (Sandy OR hurricane) AND (sick OR injured OR death OR dead OR fatality OR killed OR died)
- #sandy OR #snoreastercane OR #frankenstorm
- (Sandy OR Storm OR Hurricane) AND (snow OR cold)
- (CO OR "Carbon monoxide") AND (poisoning OR generator) AND (Sandy OR Hurricane)



# Evolution of a Search: Superstorm Sandy



Beginning of Storm	First Week of Response	Sustained Response	Recovery
<ul style="list-style-type: none"><li>• Started with 7 general search strings.</li></ul>	<ul style="list-style-type: none"><li>• Added searches for home health and mobility</li><li>• Added searches for elderly population in distress.</li><li>• Updated searches to account for Athena</li><li>• Updated searches to account for evacuation stories.</li></ul>	<ul style="list-style-type: none"><li>• Added specific shelter searches</li><li>• Made previous searches more geographically specific</li></ul>	<ul style="list-style-type: none"><li>• Continued Monitoring of search streams</li><li>• Ad-hoc requests from leadership</li></ul>



# Evolution of a Search: Superstorm Sandy



(Sandy OR hurricane) AND hospital



**First Week**

(Sandy OR hurricane) AND hospital -birth -hero -baby -babies



**Sustained Response**

("New York" OR NY OR "New Jersey" OR NJ OR Connecticut OR CT OR Brooklyn OR BK OR Manhattan) hospital AND patients -birth -hero -baby -babies

## At Wrap-Up of Monitoring:

20 Search strings  
Searches focused on:

- Facility status
- Shelter status
- Federal response
- Mobility/Home Health
- Cold
- Carbon Monoxide



Brooklyn special needs shelter staffed with DMAT Team.



# How We Passed Up Information



- Smoke Report
  - Background
  - What is it/Location
  - So What
  - Social media source including:
    - Medium (Twitter, news report, YouTube video, etc.)
    - Source
    - Date/time
    - Content





# Takeaways



- Figure out what questions/situations in your job could be addressed with information from social media
- Experiment with different questions and approaches
- Don't be afraid to change up your searches
- Document “successes”





# Contact Fusion



Email: [fusion@hhs.gov](mailto:fusion@hhs.gov)

Website:

[www.phe.gov/about/opeo/fusion/Pages/default.aspx](http://www.phe.gov/about/opeo/fusion/Pages/default.aspx)

Twitter handle: @ASPRFusion



# Questions?

