



HAZRUNOFF

PROJECT

Social Media an Alerting Tool for Chemical Incidents and Flood Events?

Public Health England
CEDRE Workshop
27th Novembre 2019



Funded by
European Union
Civil Protection
and Humanitarian Aid

Public Health England.

Who we are?

Part of the UK Department of Health leading on the protection and promotion of public health.

The Centre for Radiation, Chemical and Environmental Hazards (CRCE) provides advice on human health effects from chemicals and radiation in the environment.

CRCE is a Category 1 Responder to chemical incidents.

CRCE Wales is based in Cardiff and provides advice to Wales and Ireland. Also acts as a WHO Coordination Centre for chemical incidents worldwide and has been involved in European maritime research for several years.



Protecting and improving
the nation's health



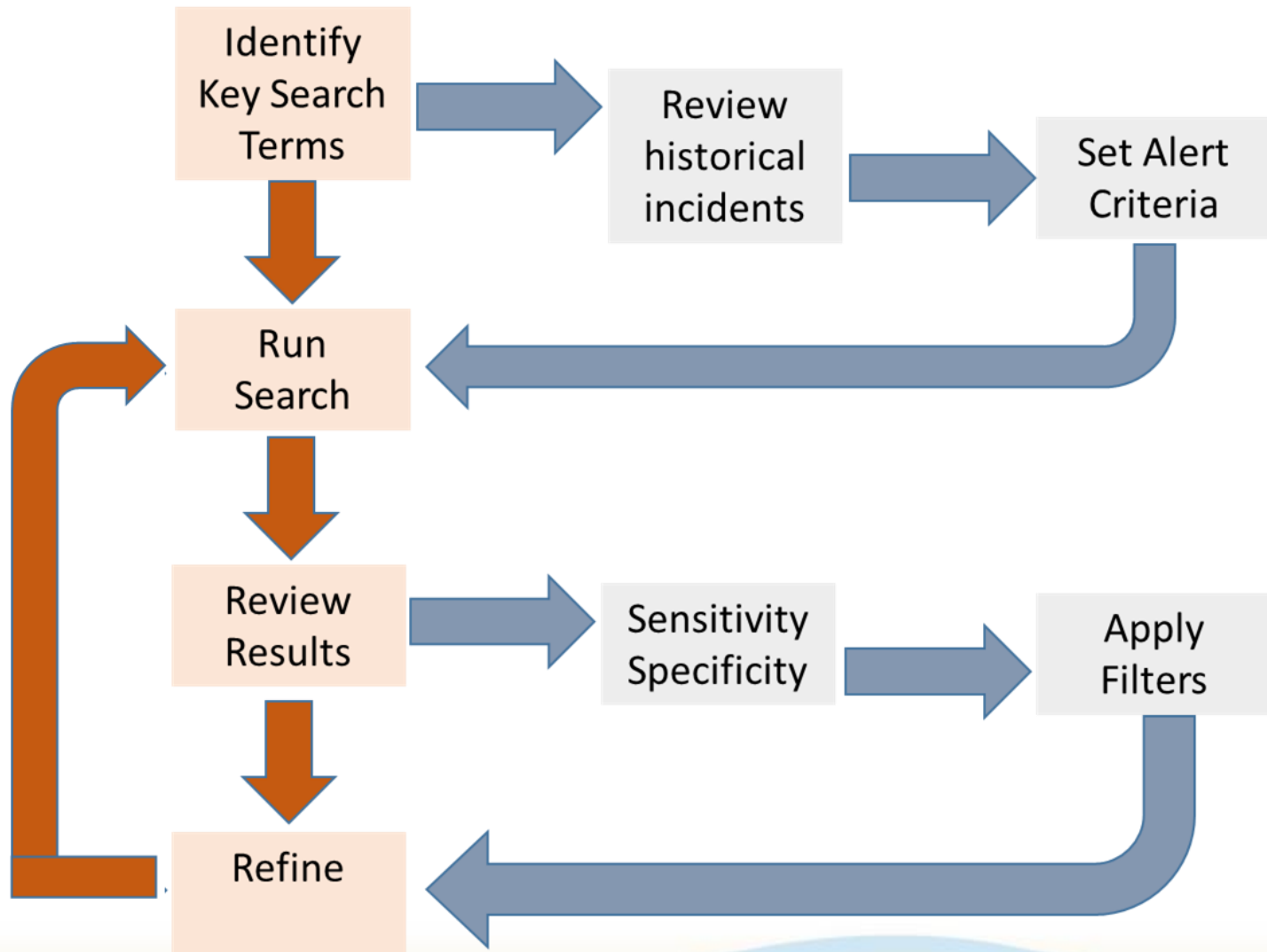
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Key Objectives

- Evaluation of social media and internet systems for early alerting of incidents
 - Develop an algorithm with potential application in social media platforms
 - Define search terms relevant to Hazmat and Flooding incidents
 - Assess terms using web and social media platforms
- Response communication protocols
 - Drafting of warning and informing messages
 - Assess impact during incident or exercise.



Algorithm



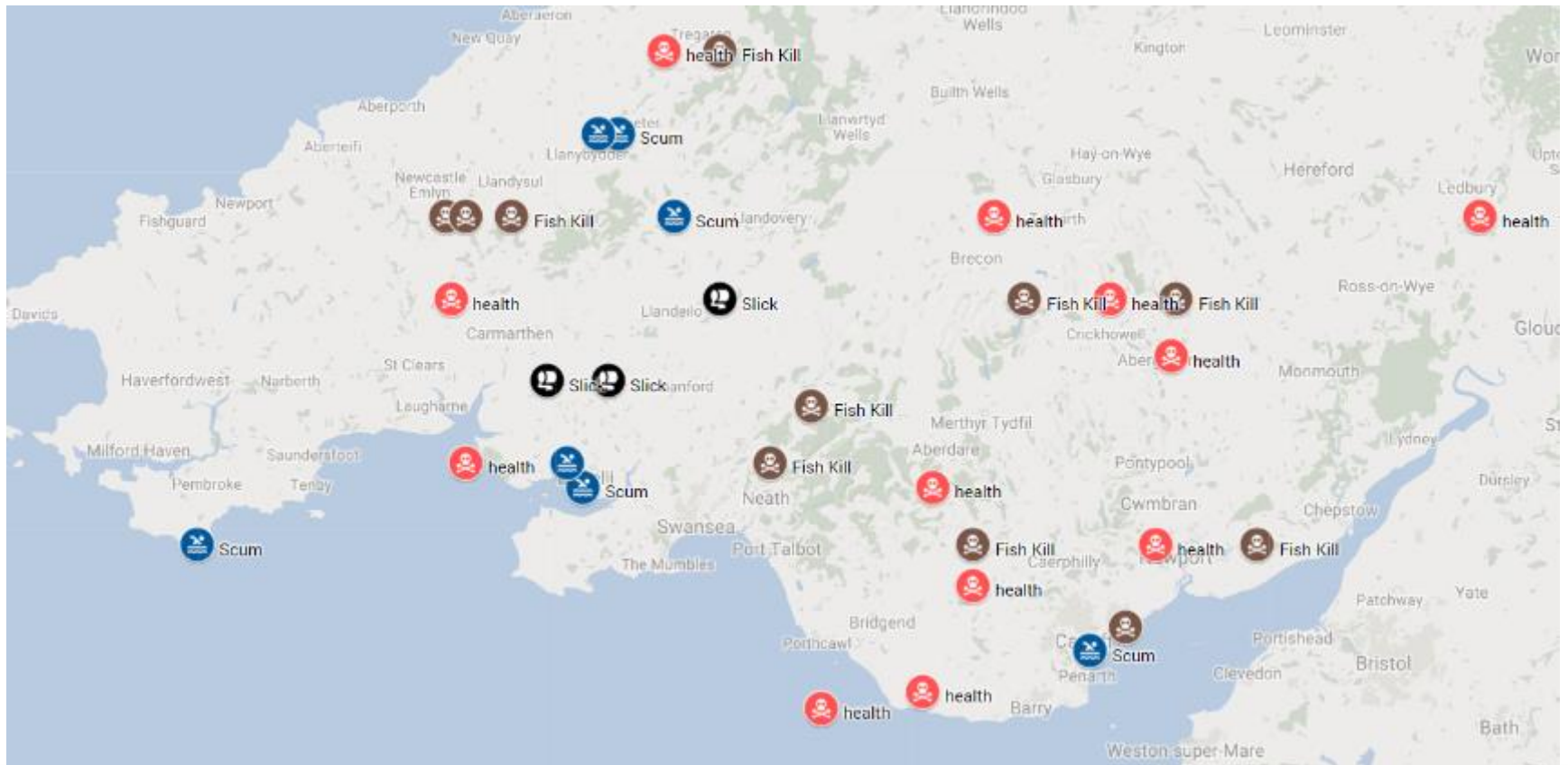
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Identification of Key Search Terms

Reviewed incidents for inland, estuarine and coastal waters (2014 - 2018) to develop search terms



Identification of Key Search Terms

Incident Type	Key Words
Slurry	Fish Kill / Agricultural Pollution / Odour / Silt / River / Lake / beach
Oil Spill	Sheen / Odour / Slick / Staining / river / lake / canal / beach
Chemical	Discoloration / Gas cloud / Odour / Haze / Fish Kill / River / Lake / Health
Blue Green Algae	Algal Bloom / Scum / Lake / Dock / Canal / Health / Swimming
Fire	Smoke / Plume / Odour / Ship / Dock / Health
Vegetable Oil	Fats / Grease / wax / Odour / Beaches / Dogs / Pets
Flooding	Pollution / Health / Damage / Disease

Used to develop Boolean search term for use in social media platform



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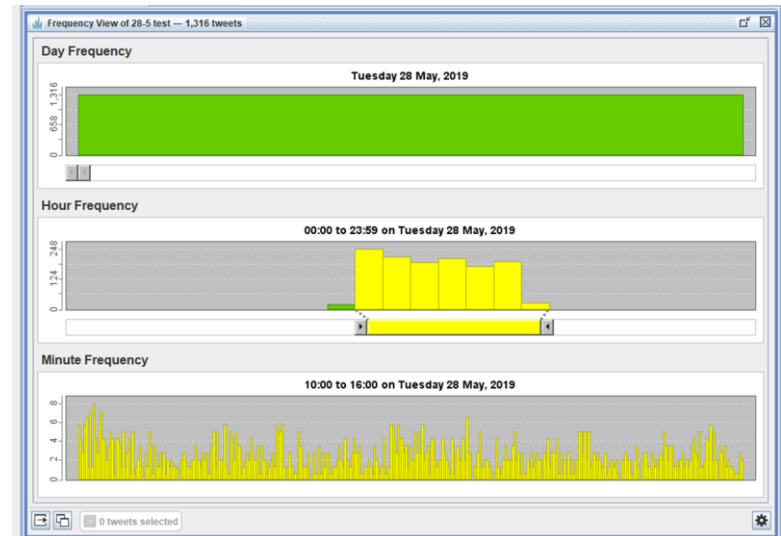
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Free Social Media Search Tools

Tweet deck provides “**live**” posts for searches of key terms within defined geographical locations

COSMOS collects data for **retrospective analysis** for a range of parameters – frequency / numbers, key words, sentiment, location.

Both useful but have **limitations for real time alerting.**



Commercial Products and Services

Typically applied for marketing

+ve's

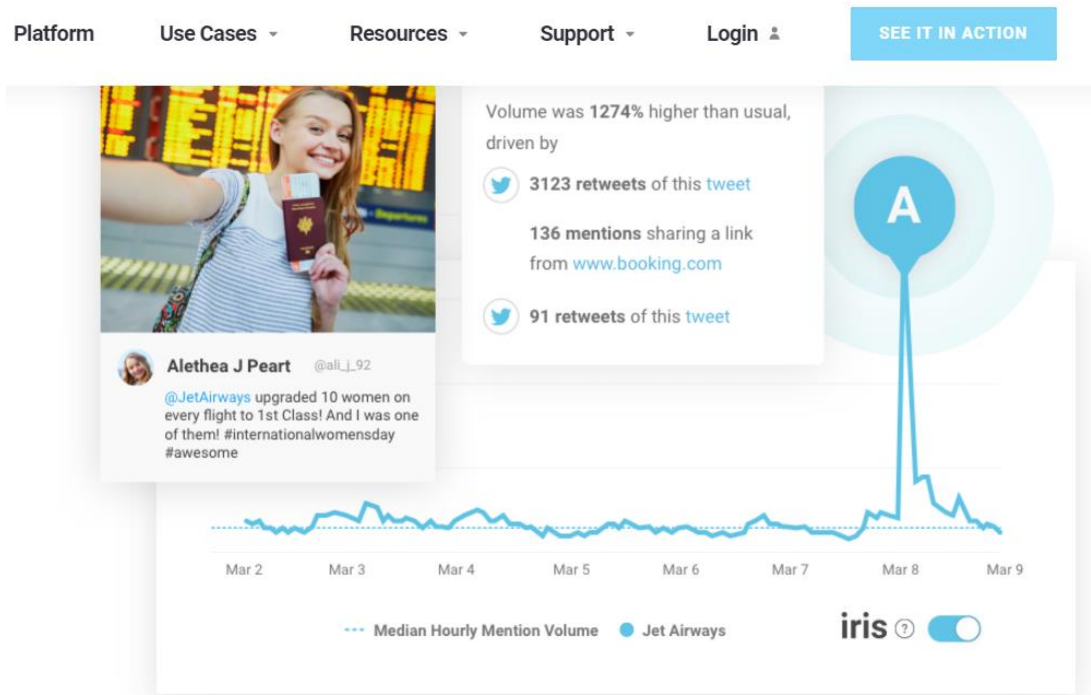
User defined search terms and multiple filters.

Searches multiple platforms.

Real-time display to multiple users

Alerts when detecting increased traffic

Full technical support



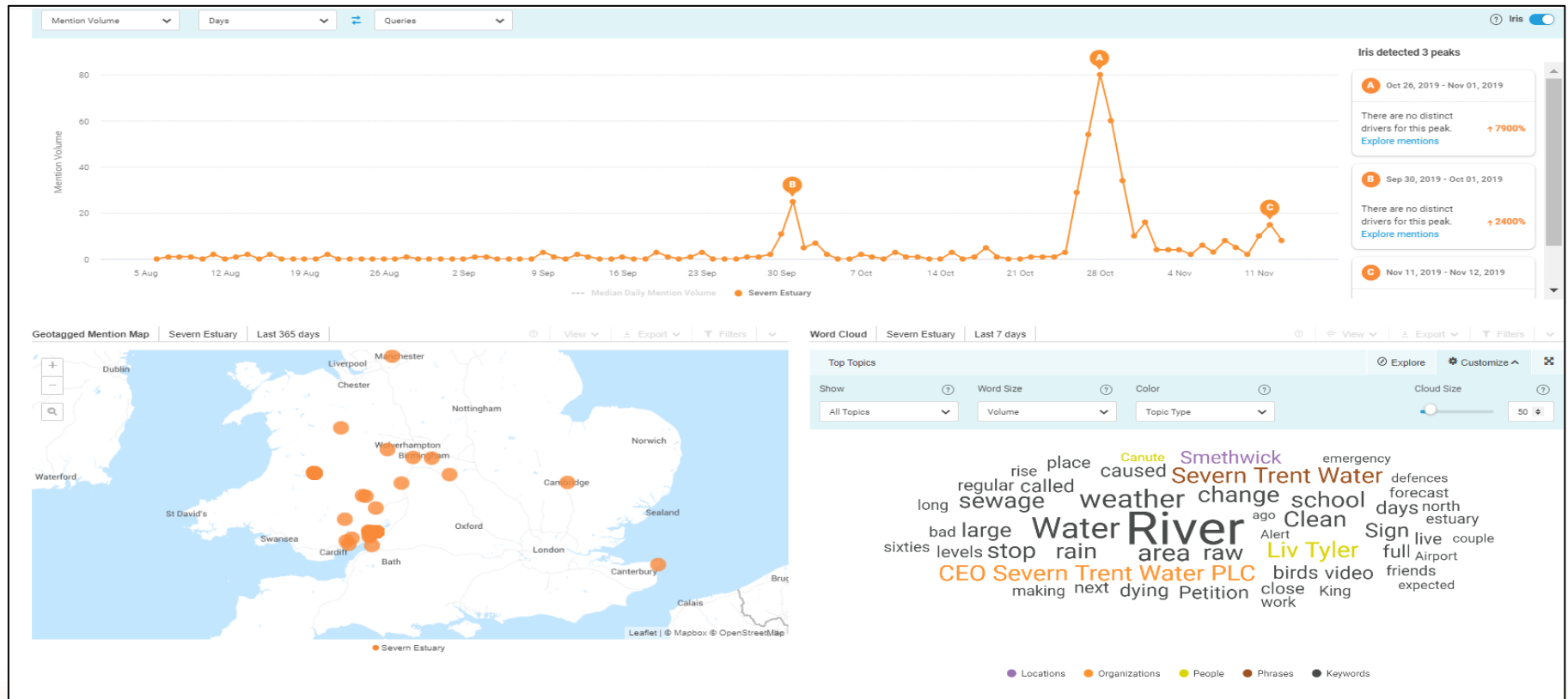
-ve's

Annual subscription

Pilot Study <https://app.brandwatch.com/project/1998271132/homepage>

Multiple search strings.

Real time dashboards filters for language, types of media sites, authors geographical locations.



Methodology

Edit Query "Pollution Test"

Language: [English](#)

[Examples](#) | [Operators](#) | [Locations](#)

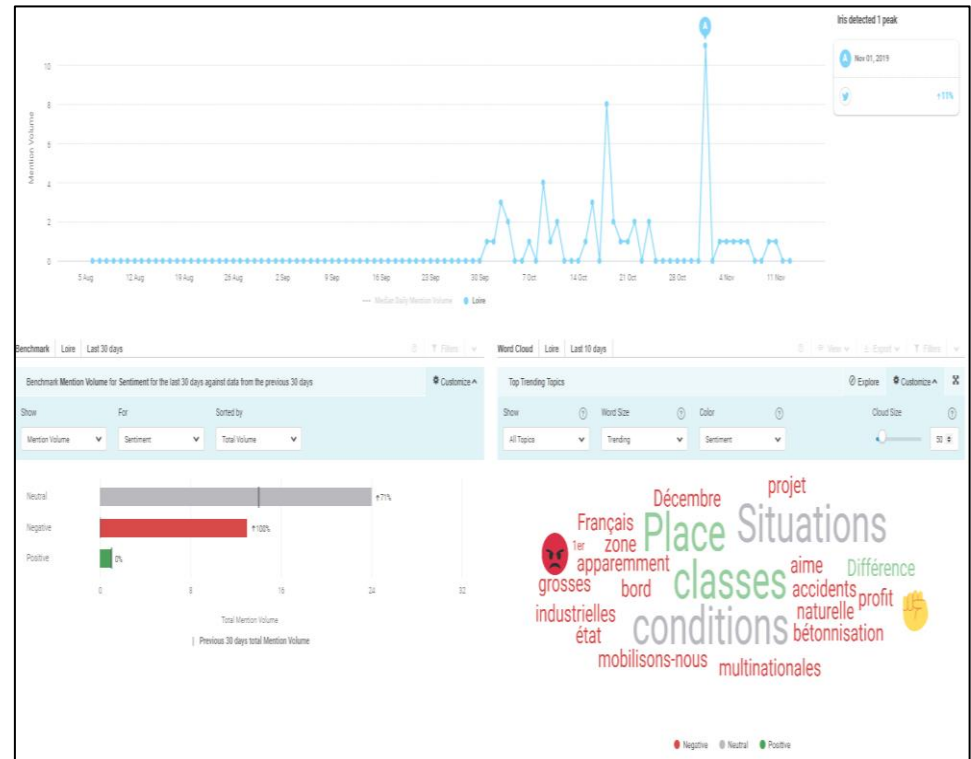
```
1 ((river* OR beach* OR estuary* OR canal* OR ocean* OR lake* OR dock* OR sea OR marina* OR harbour* OR shore* OR ship* OR boat*) AND (chemical* OR Sewage* OR slurry* OR algae NOT plastic*) AND (pollution* OR incident* OR accident* OR spill* OR fish-kill*)) country:uk)
```

Operated from August 1st to October 31st

Searched for pollution and flood events in UK (inc. Severn Estuary).

Set up same searches in partner countries

Reviewed one real time and one historical incident for impact of response agency messages



Results – How well does it perform?

	Search Term met	Search Term not met	
Incident Identified	25 True Positive	175 False Positive	200
No Incident Identified	15 False Negative	4.5×10^8 True Negative	4.5×10^8
	40	4.5×10^8	4.5×10^8

Specificity (Noise removal) = 100%

Sensitivity (True incidents) = 63%

PPV (true Vs False incidents) = 12%

Incident Alerts

25 UK incidents identified.

10 incidents matched with response agency alerts

All major incidents were identified.

Missed 15 incidents notified to agencies (minor incidents).

Found additional 15 not recorded on agency databases (minor incidents).

Identified a number of international incidents / threats e.g. harmful algae in Brittany

Date	Incident	Posts	Source	Time
5 and 6/8/19	Pollution in River Sheppey Devon	13	News 5, Twitter 8	Post event
11/8/19	Incident on Worthing Beach East Sussex	57	News 54, Twitter 3	12:00
11/8/19	Pollution in River Frome Somerset	7	News 6, Twitter 1	12:00
25/8/19	Incident on Frinton / Clacton beaches. Essex	100	News 99, Twitter 1	15:00
28/8/19	Incident at Pontins Burnham on sea. Somerset	5	News 5, Twitter 0	Post Event
22/9/19	Sewage in River Ilkley Yorkshire	4	Twitter 3 news 1	14:39
23/9/19	Dead Whale washed ashore Northumberland	77	News 77	
26 - 27/9/19	Chemical Release Minehead Sewage works Somerset	7 6	News 7 & 6	15:24
26 - 27/9/19	Sewage in River Hogsmill Yorkshire	4	News 4	Post Event
30/9/19	Sewage warning for beaches Cornwall and Devon	3	News 3	09:18
23 - 24/10/19	Red Tide - skin rashes (Algae)Cornwall	8	News 8	Post Event
26-10-19	Slurry Pollution River Teifi Wales	2	News 2	Post Event
30-10-19	Blue Green Algae in lake Wales	2	Twitter 2	17:00
25 - 27/10/19	Flood Alerts Wales	335	335 Twitter	13:00

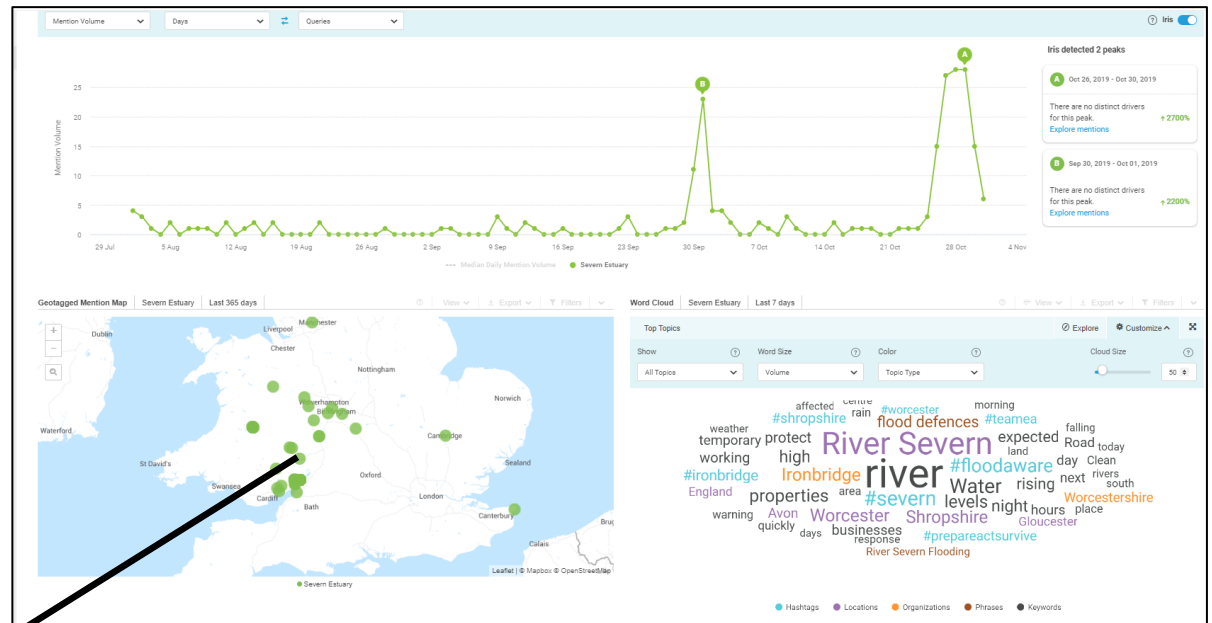
Useful information

Images and videos from public

Conditions “on the ground”

Timestamps

Geolocation



Impact of PH messages – Essex Beach Incident

Busy beach during August bank holiday.

Beachgoers reported breathing difficulties following swimming / contact with sea water.

Police, ambulance and fire service attended. Public warned to stay out of the sea.

PHE further advice via local authority / NHS 111- shower and drink fresh water.

Multiple persons attended local hospital.

All affected persons recovered overnight.

Cause unknown – MCA - no evidence of spillage from vessels. Possibly marine algae – unconfirmed.



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Impact of PH messages – Essex Beach Incident – Day 1

Police scramble to Essex beach as people left 'struggling to breathe' [standard.co.uk/news/uk/frinto...](http://standard.co.uk/news/uk/frinton...)



Police scramble to Essex beach as people left 'struggling to b...
Emergency services have scrambled to a seafront in Essex after receiving several reports of beachgoers coughing and struggling to standard.co.uk

1 6:05 PM - Aug 25, 2019



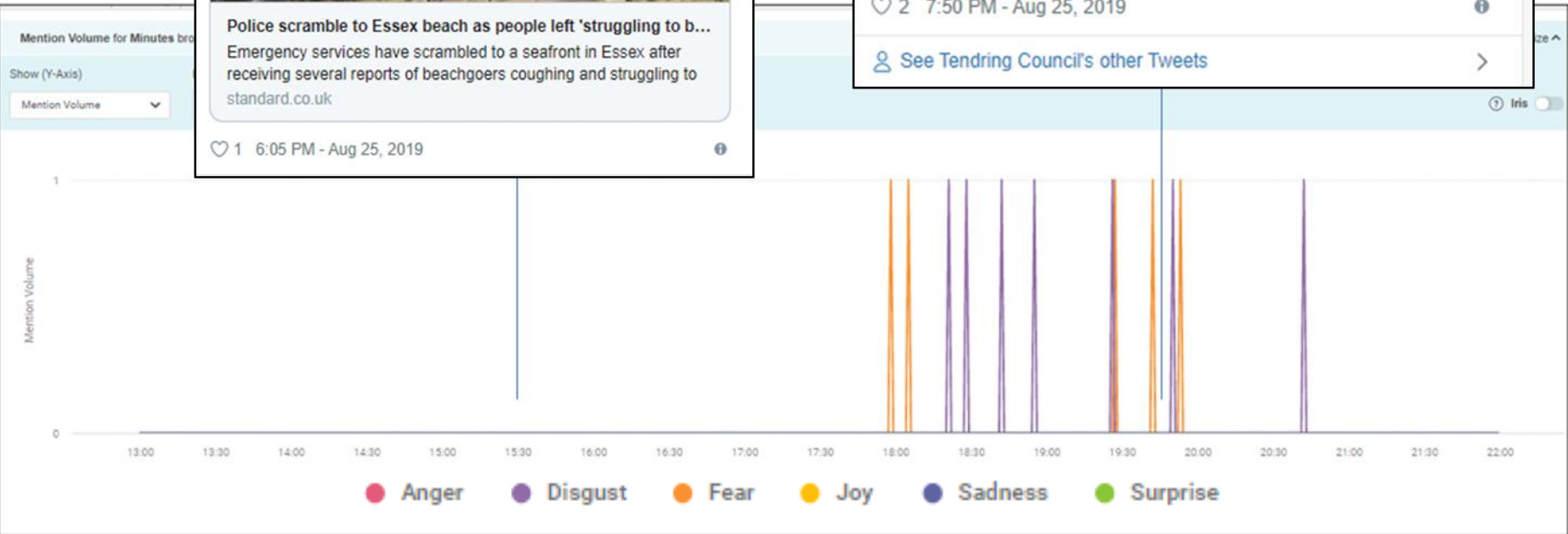
Tendring Council
@Tendring_DC



For the latest on the incident affecting Frinton & Walton, please see here: essex.police.uk/news/news-and-...
Advice from @EastEnglandAmb is: - Wash/change after leaving sea
- Drink fresh water
- Call 111 if still concerned.
Patients have found symptoms improved after leaving the water.

2 7:50 PM - Aug 25, 2019

See Tendring Council's other Tweets

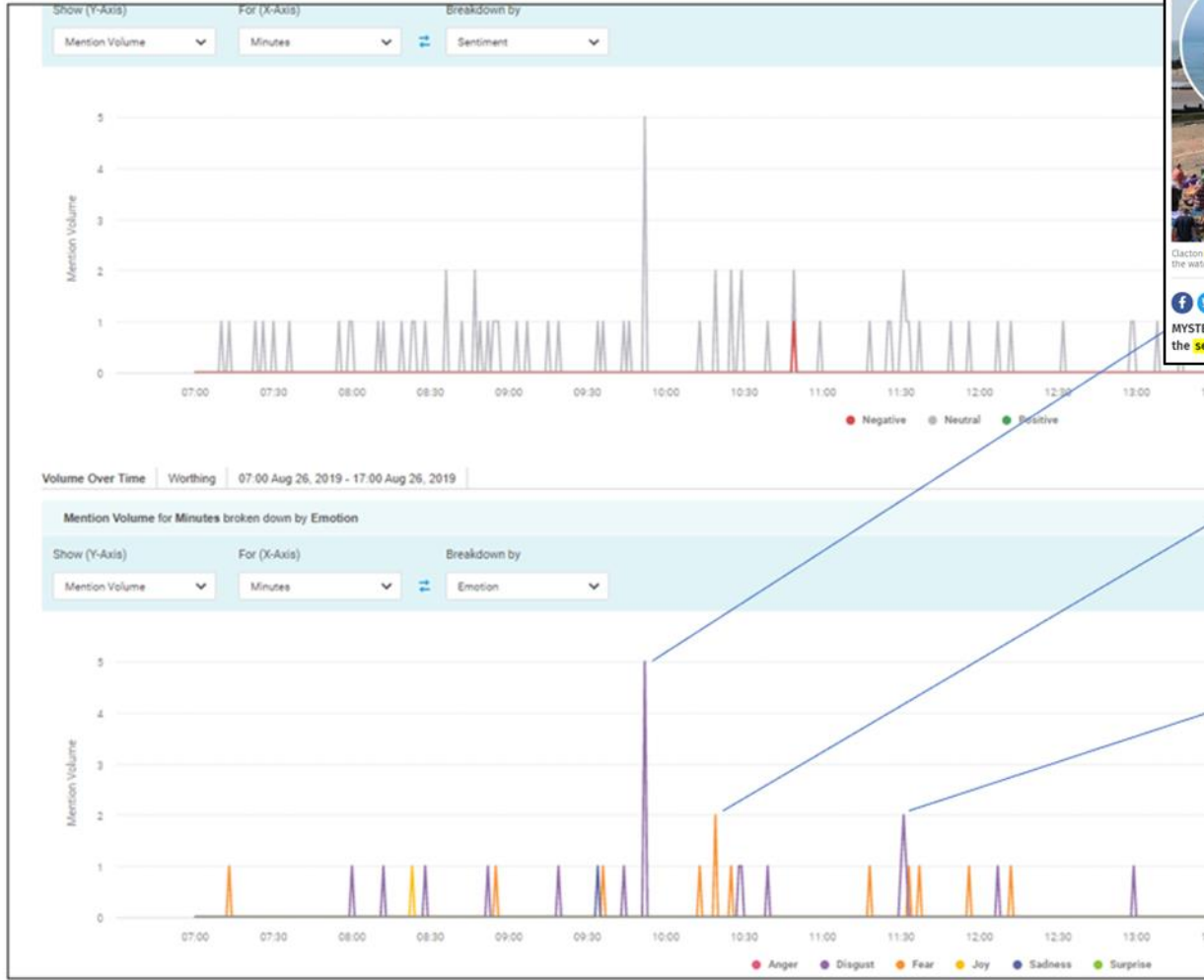


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Essex Beach Incident – Day 2



News

Everything we know after children fell ill after swimming in sea off north Essex coast

Most read Commented

When is someone going to investigate this? Two weeks ago Worthing beach was evacuated for same reason. Previously Beachy Head. SOMETHING is going on. Joint the dots. What is happening? Frinton-on-Sea: Police called as beachgoers left 'struggling to breathe' bbc.co.uk/news/uk-englan...

BBC NEWS

Beachgoers left 'struggling to breathe'

Emergency services were called after people at a beach in Essex reported havin

bbc.co.uk

News

Tourists reassured the south Essex sea is safe after concerns raised along coast

By Matthew Critchall

Most read Com

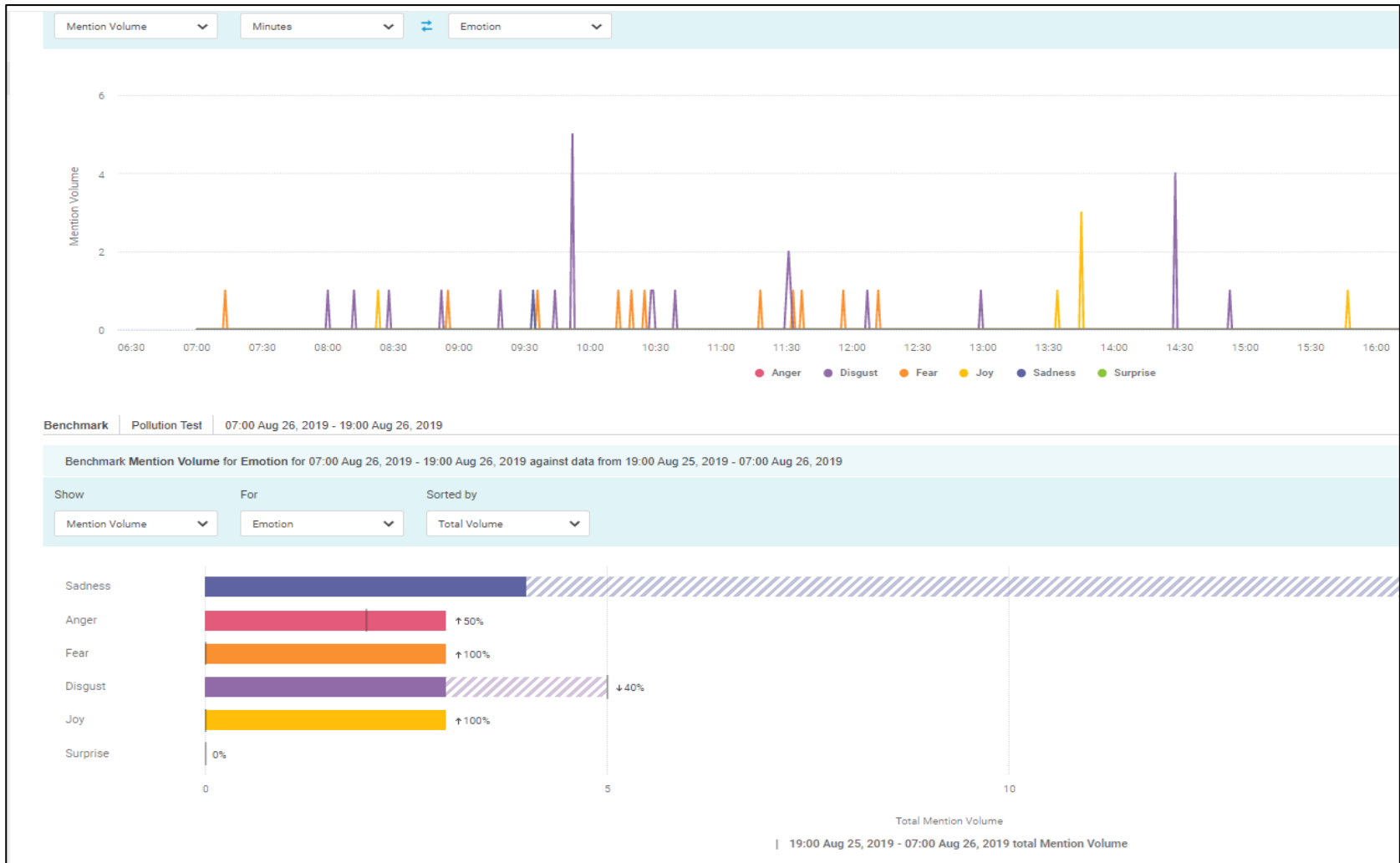
Safe - Southend Essex

Tourists and sunseekers have been reassured the sea around south Essex is safe after concerns were raised along the Essex coast.

7 comments

Get involved with

Essex Beach Incident – Day 2



Conclusion - Social media can be useful but as part of the emergency response arsenal not as an alternative.

Alerting

High Specificity – low false negatives and **can identify incidents.**

Moderate Sensitivity – Can miss incidents.

Low Predictive ability - Can mis-identify non-incidents.

Positives - Real time data. Images and videos from affected areas

Limitations – Incidents often reported after onset of event, low levels of geotagging (<10%) limiting tracking potential. Cost.

Search terms very important - filter “noise” but identify incidents

Messaging - Emotion and sentiment generally neutral or negative. Some uncertainty on the accuracy of the AI algorithms.

Full report will be available from project website

<http://www.hazrunoff.eu/results/>



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