HAZRUNOFF

PROJECT

Can we use Social Media as an Alerting Tool for Chemical Incidents and Flood Events?

Public Health England
Final Workshop, Loures
27th May 2020

Funded by
European Union
Civil Protection
and Humanitarian Aid

Public Health England. Who we are?

Part of the UK Department of Health and Social Care

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

CRCE Wales is based in Cardiff and provides advice to Wales and Ireland.

Also a WHO Collaboration Centre for chemical incidents worldwide and has been involved in European maritime research for several years.

Public Health England

Protecting and improving the nation's health

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Key Objectives

- Evaluate social media and internet systems for early alerting of flooding and pollution 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
- Assess impact during incident or exercise including use of health messages

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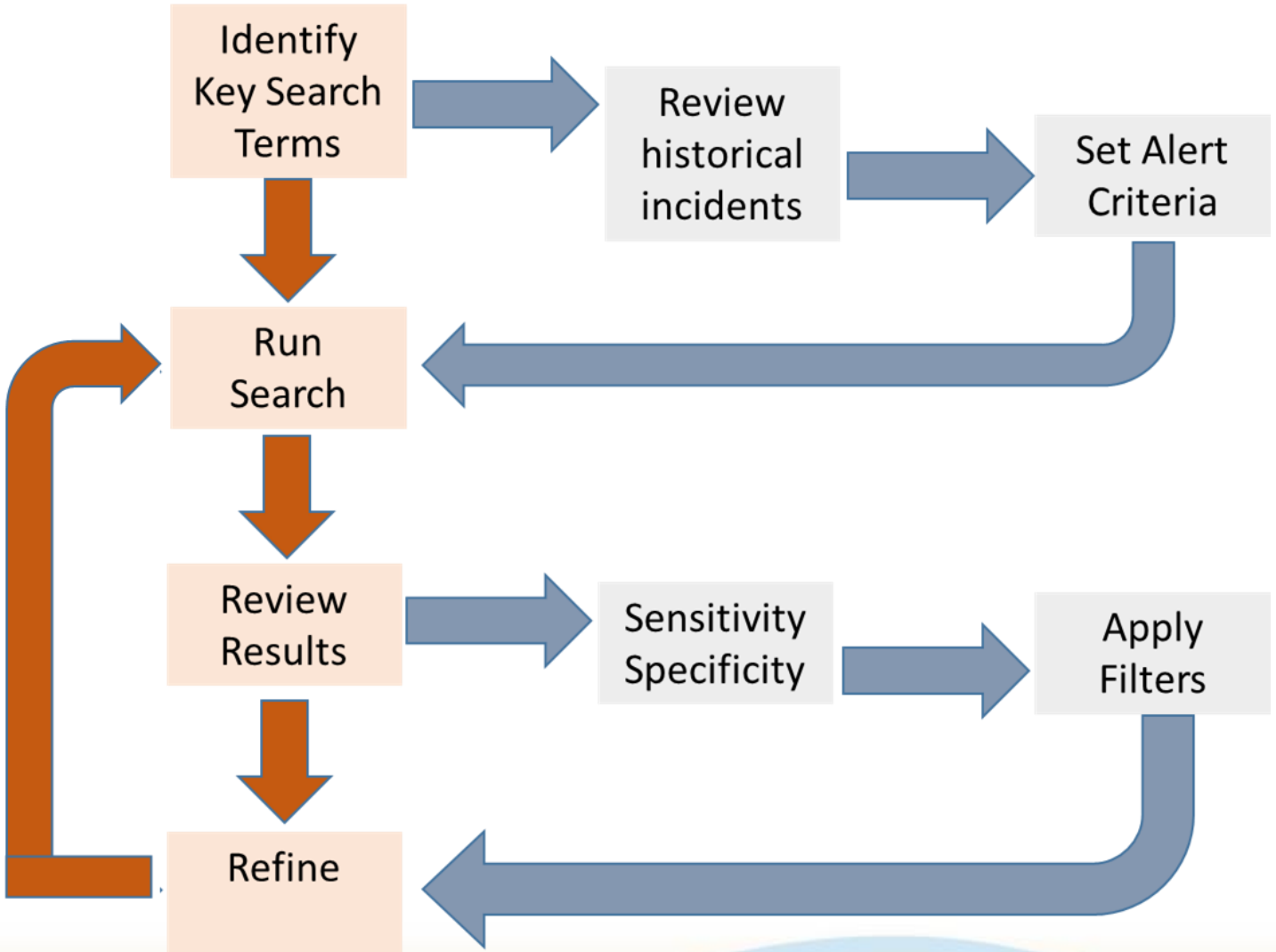
Algorithm



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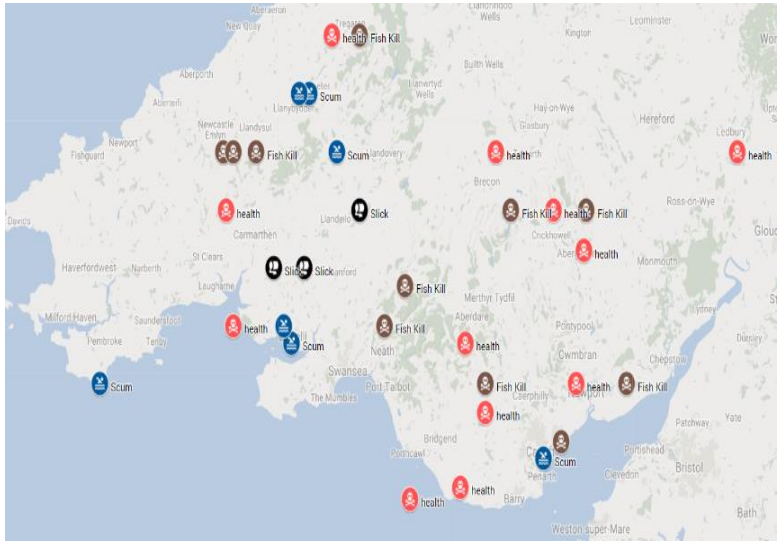
Identification of Key Search Terms



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

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

Used in conjuction with Boolean Operators (AND, OR, NOT etc) for use in social media platform

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Pilot study

Edit Query "Pollution Test"

Language: English Examples | Operators | Locations

```
((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 to November

Multiple search strings

Real time dashboard filters for language, types of media, authors, geographical locations

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

Used the commercial social analytics package

Brandwatch

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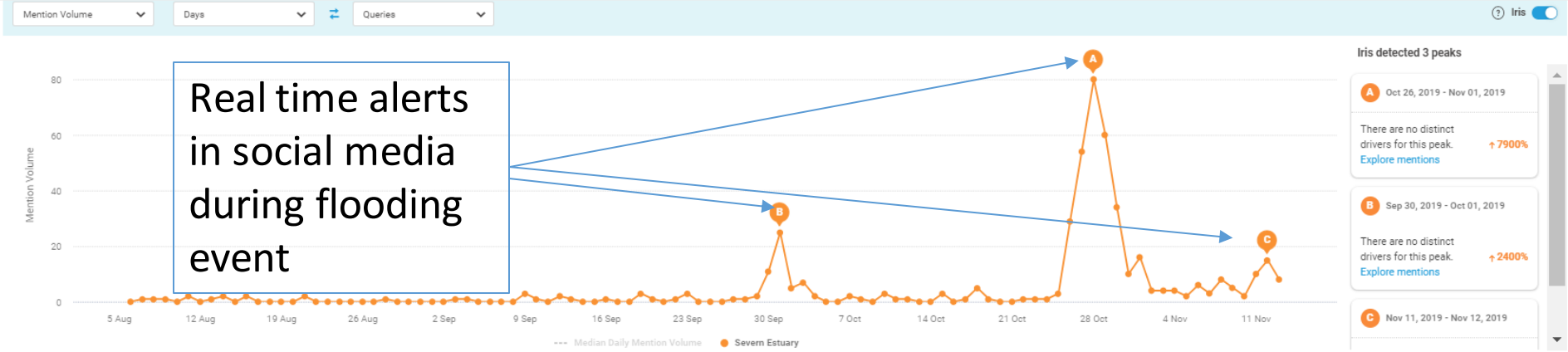
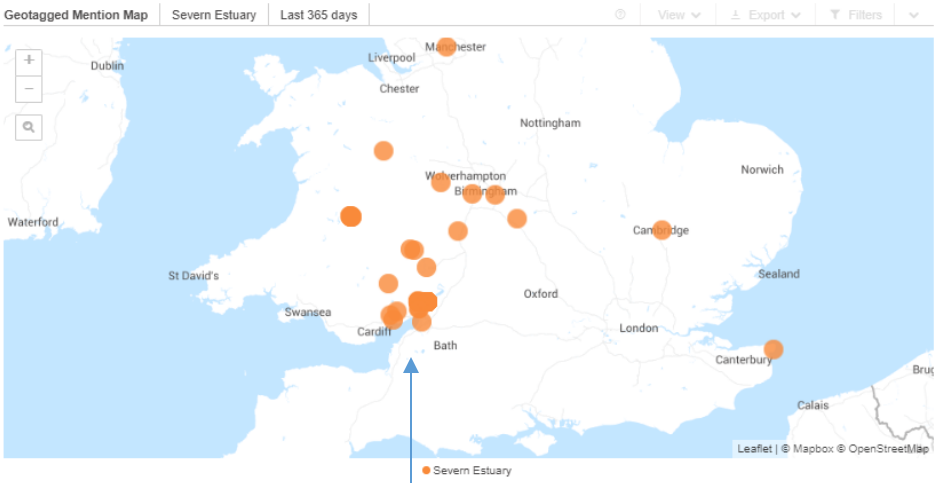
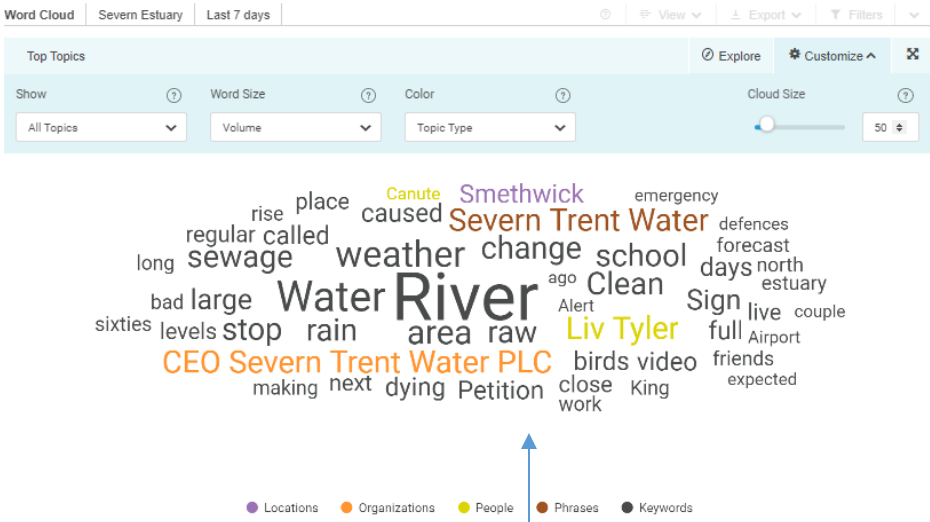




Geographical mapping of social media activity



Word cloud of trending terms

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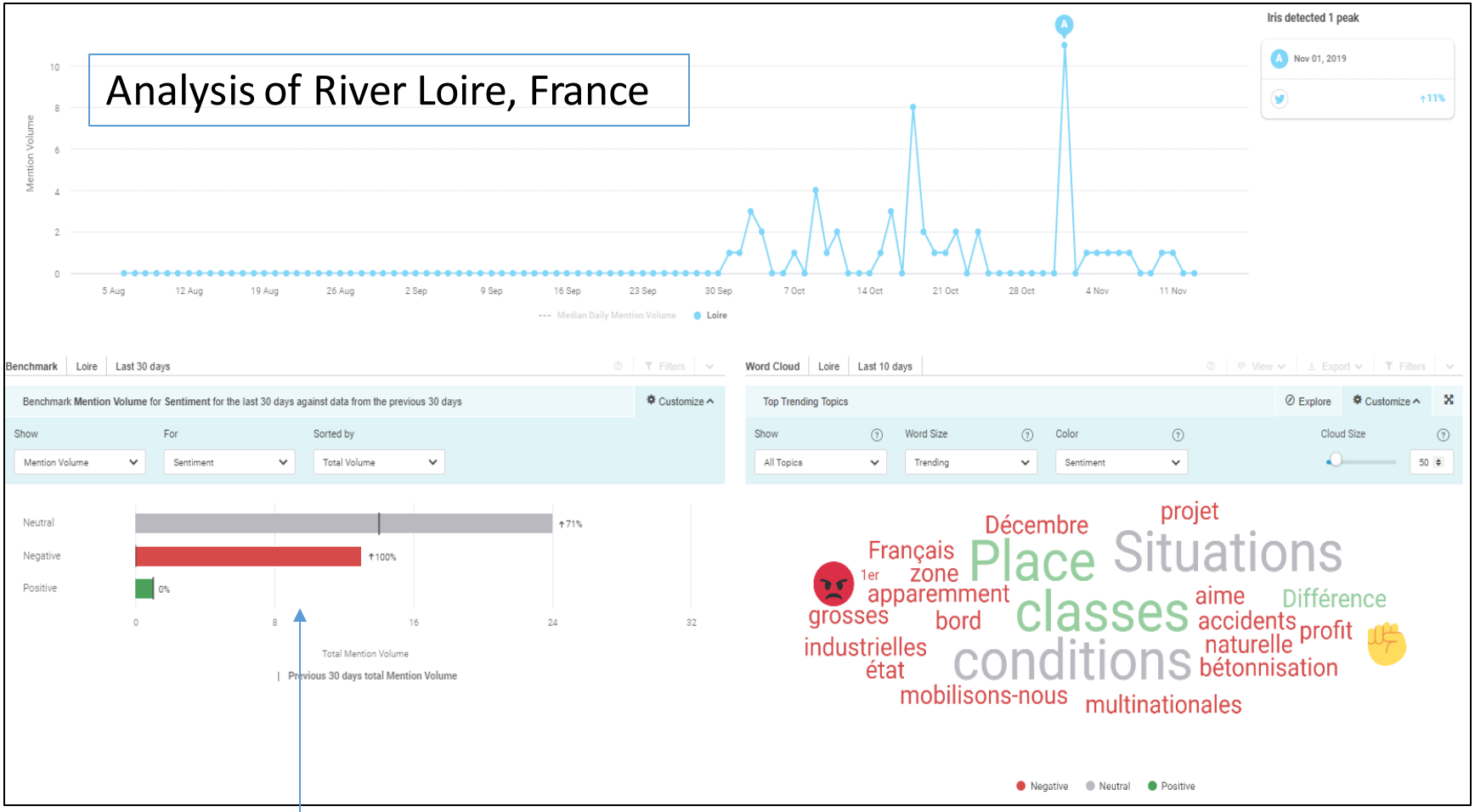
Analysis of River Loire, France



Sentiment analysis showing negative response to flooding event

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Results – How well does it perform?

	Search Term met	Search Term not met	Total
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%

- The proportion of social media data that did not meet the search definition and were removed

Sensitivity (True incidents) = 63%

- The proportion of social media tweets that met the search criteria that were relevant

Positive Predictive Value (PPV) = 12%

- Can mis-identify incidents

In summary, the tool was good at removing "noise" but a large proportion of tweets that met the search criteria were actually not relevant

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Can it detect incidents?

- During the study period the tool correctly identified and alerted us to 25 actual UK incidents
- 10 incidents matched with response agency alerts
- All major incidents were identified.
- Found additional 15 not recorded on agency databases (minor incidents)
- Identified a number of international incidents / threats e.g. harmful algae in Brittany
- However, it failed to detect 15 minor incidents that were notified to agencies

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

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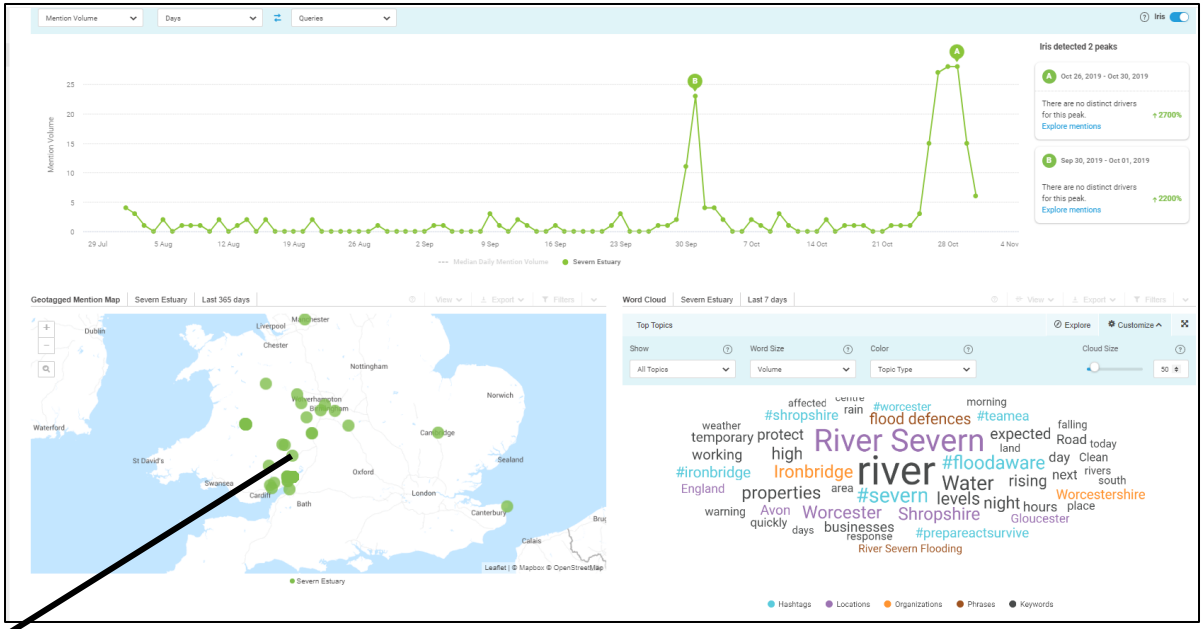
Useful details

- Images and videos from public
- Conditions “on the ground”
- Timestamps
- Geolocation



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Essex Beach Incident (August 2020)

- Beachgoers reported breathing difficulties following swimming / contact with sea water.
- Police, ambulance and fire service attended. Public advised to stay out of the sea.
- Health advice issues to shower and drink fresh water.
- Multiple persons attended local hospital.
- All affected persons recovered overnight.
- Cause unknown? Spillage? Marine algae?

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Frinton beach incident: Police advice to avoid the sea

26 August 2019 Share

Test were taken offshore to discover the

News > UK > Home News

Beachgoers left struggling to breathe after mystery incident at Essex seaside

A mother said one of her daughters told her it 'hurt to breathe in' while the other was 'gasping and couldn't form words'.

Vincent Wood | @wood_vincent | Sunday 25 August 2019 19:53 | 14 comments

A warning tape is set at the beach in Frinton, Essex, as emergency services received several reports of people coughing and struggling to breathe. *(PA Wire/PA Images)*

Impact of health messages – Day 1

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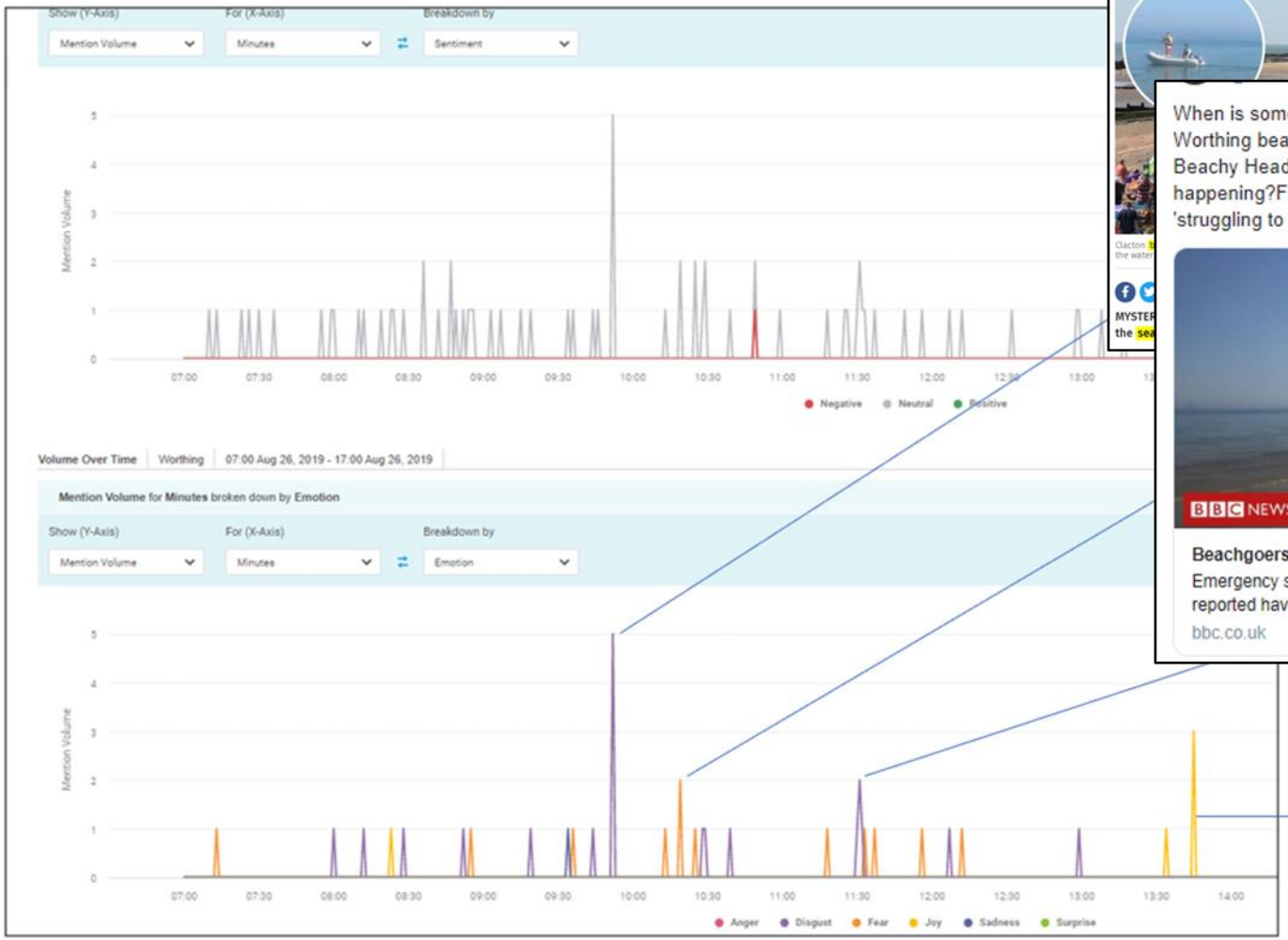
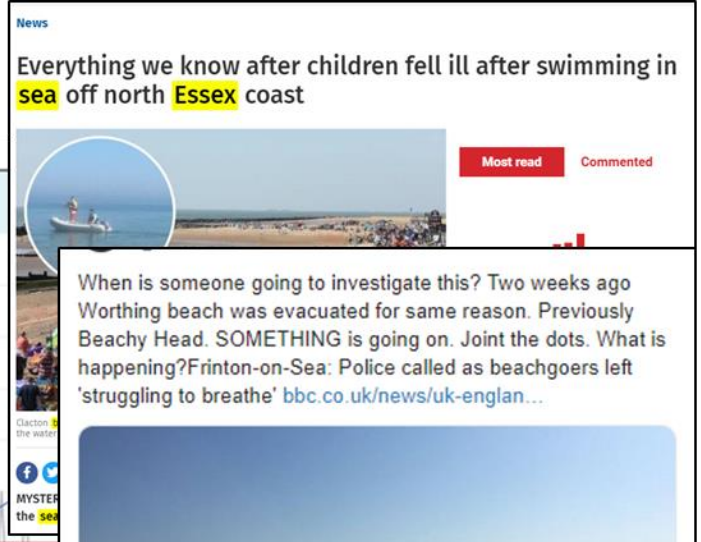
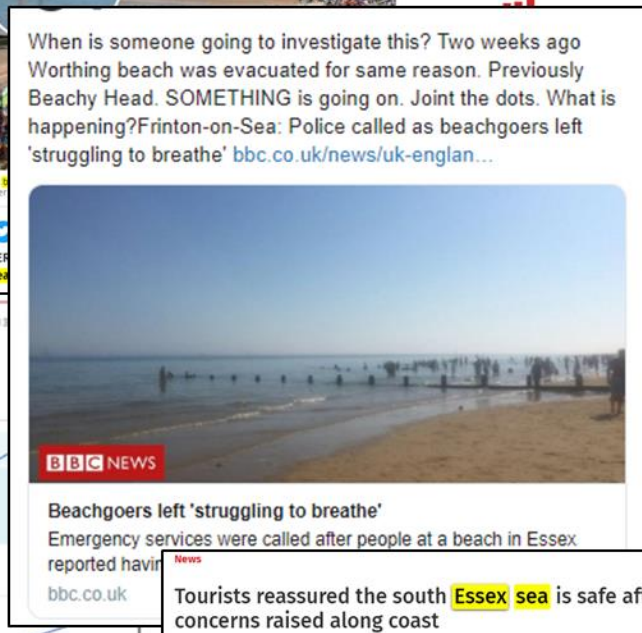
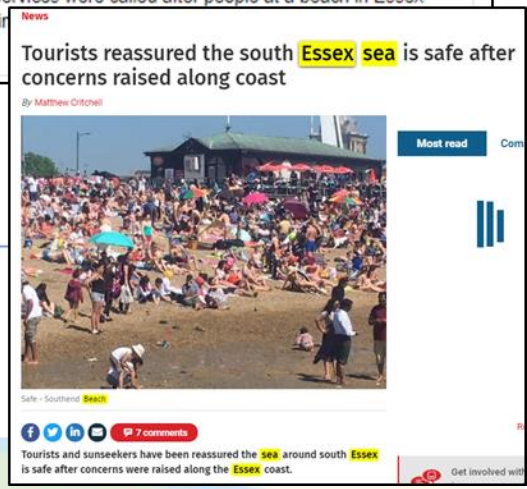
Essex Beach Incident – Day 2









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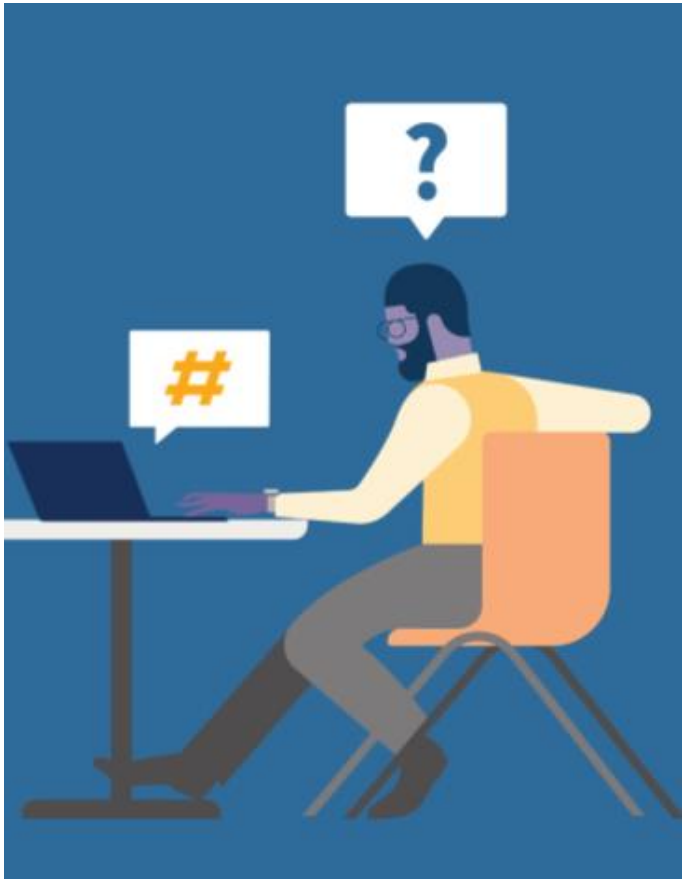
Conclusion

- Social media alerting can be useful as part of the emergency response but not as an alternative
- Search criteria important in helping reduce noise
- Tools available to improve detection and alerting but can still miss identify incidents and events
- Can provide real time data, images and videos from affected areas
- Most social media data is not geotagged which limits tracking potential
- Sentiment analysis has potential and study was able to pick up emotional responses to incidents. Some uncertainty on the accuracy of the algorithms used by the tools
- Full report will be available from project website http://www.hazrunoff.eu/results/



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