

DEVELOPMENT OF A MODEL TO EARLY DETECT FOOD SAFETY CRISES CONSEQUENCES

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1. INTRODUCTION

PAST FOOD SAFETY CRISES

- **1987. BSE scandal.** Destruction of nearly 4.5 million cattle only in the UK¹.
- **1999, 2008. Dioxins crises.** Many tons of animal products recalled².
- **2013. Horse meat scandal** in UK. Although not affecting public health, it raised concerns about food quality. Great media coverage of the scandal.³
- **2003 – 2014. HPAI (High Pathogenic Avian Influenza) outbreaks.** Estimates of global loss run into billions of euros. It caused around 800 human deaths⁴.

All these crises have in common a great media coverage. The information reported by media and other platforms influences consumer's opinion and behaviour.



Automatic scanning of the news content and other online information (e.g. social networks) allows a quick assessment of the social impact of the food outbreak



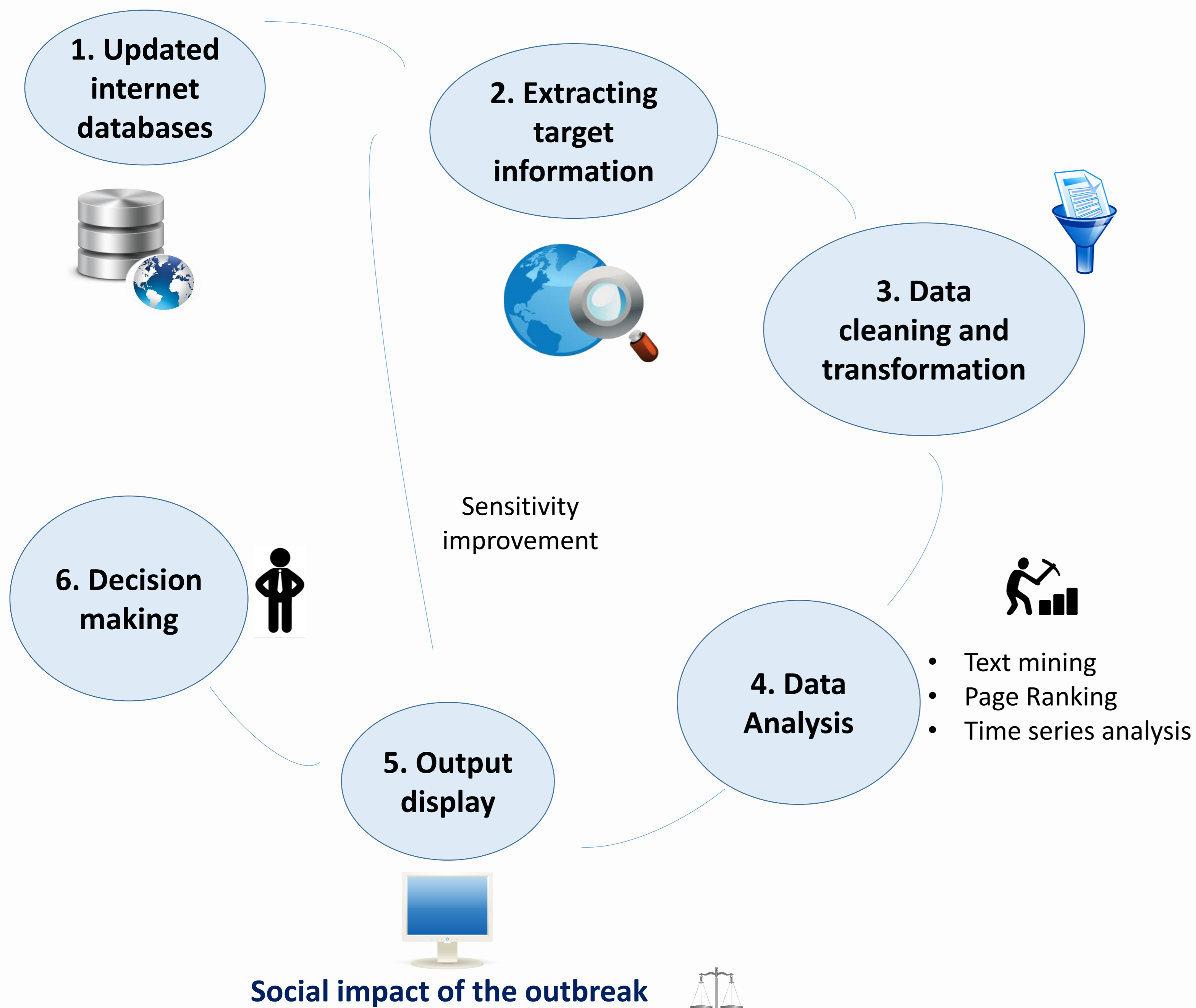
This information can be used to improve communication strategies and decrease the impact of a food crisis



2. OBJECTIVE

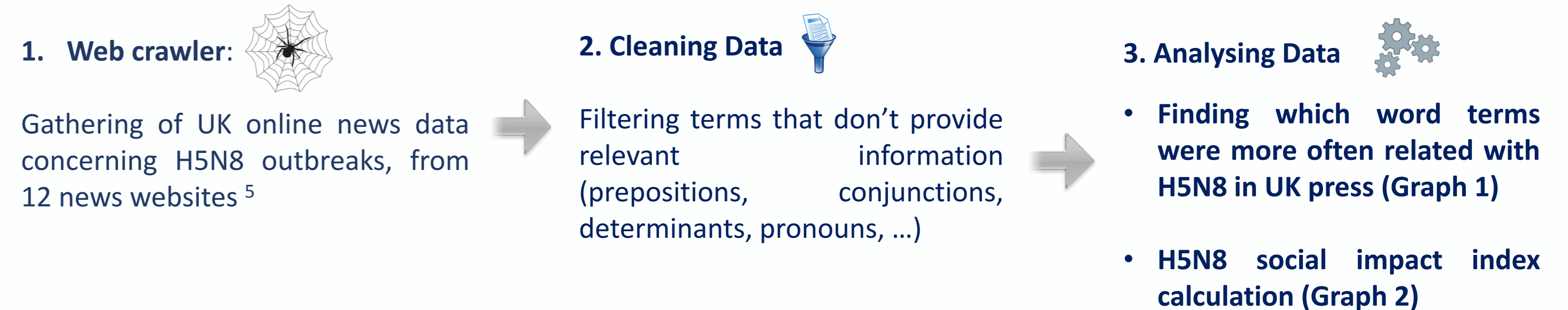
Development of a tool to **early assess the social impact** of a food safety crisis.

3. METHODOLOGY



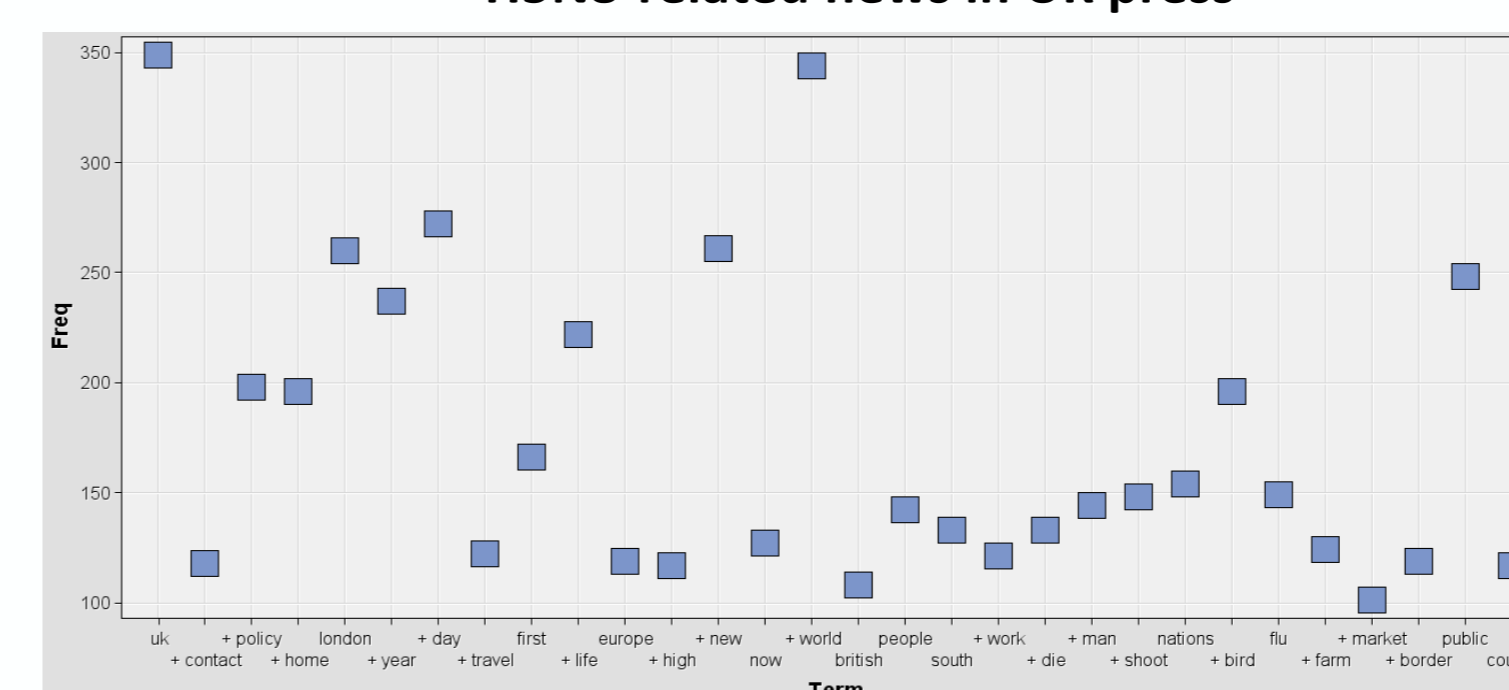
4. CASE STUDY – HPAI H5N8

Assessment of the **social impact** of the **HPAI H5N8 outbreaks in UK** - online news content analysis by **text mining techniques** (SAS® software)

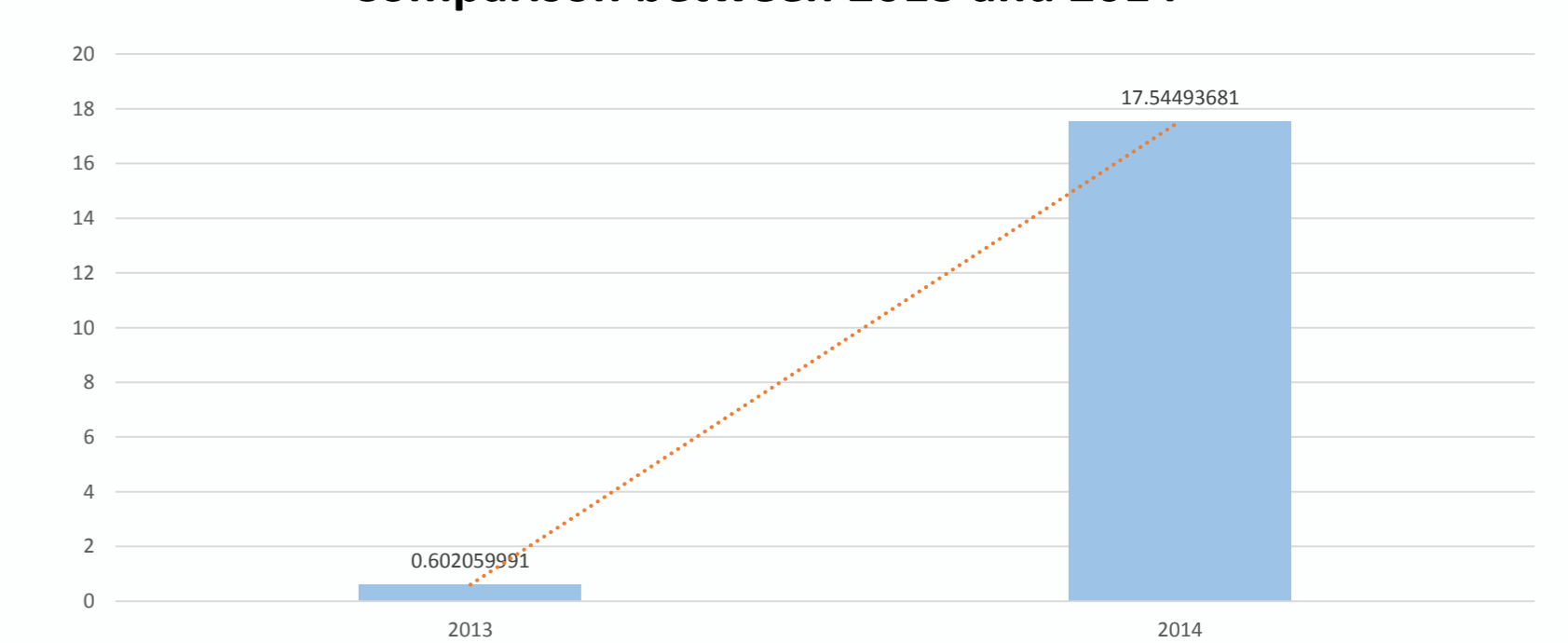


Results

Graph 1. Frequency of word terms in H5N8-related news in UK press



Graph 2. H5N8 Social impact index (SII) in UK – Comparison between 2013 and 2014



Graph 1- Frequency of word terms in H5N8-related news in UK press. Online news from *The Times*, *The Independent*, *The Sunday Times*, *The telegraph* and *Farmers Guardian* websites about H5N8 were evaluated as a whole. Only words that presented a frequency ≥ 100 are represented. Meaningless terms were filtered and not considered. The terms that presented the highest frequency were *UK*, *world*, *day*, *London*, *new*, *public*, *year*, and *life* (freq.>200), which are not likely to cause a high level of alert.

- Number of news websites where H5N8 word term is present (n)
- Number of H5N8 related news in each news website (f_j)
- Relevance of each webpage (p_j). The most visited websites in UK present a higher weight, since they reach more people and then have a bigger impact on consumers.

Graph 1. Frequency of word terms in H5N8-related news in UK press.

This analysis allows the understanding of the **word terms that were more often related with H5N8 in UK online news**. It was **not detected** a high frequency of terms associated with social alert (as *deaths* or *illness*, for instance). These results were expected, because although H5N8 is a new strand of HPAI in Europe (excluding the outbreak in Ireland in 1983) and new hazards are more likely to cause social alert past outbreaks of HPAI showed that the **zoonotic potential** of this virus is **low**. **For these reasons, H5N8 is not reported by the media as dangerous to human health, not causing a high level of social alert.**

Graph 2. H5N8 Social impact index (SII) in UK– Comparison between 2013 and 2014

The social impact index depends on the number of media sources that report the outbreak, the news frequency about the topic in each media source, and the weight of each media source. The **social impact index was higher in 2014 because in 2013 H5N8 outbreaks did not occur in Europe**, and consequently weren't reported in UK news. As displayed in Graph 1, the word terms more frequently associated with H5N8 in UK news weren't related with social alert terms, and the great media coverage of this topic in 2014 is probably due to high impact in economy that HPAI outbreaks can cause.

Information of the frequency of negative terms is to be included in this index in the **future**, to increase the sensitivity of the model. Also, including data from social networks (e.g. *twitter*) will allow to understand the truly social alert impact of an outbreak.

5. CONCLUSIONS

- + **Text mining techniques applied to outbreak news are a innovative and useful method to early assess the social impact of a disease outbreak**
- + **Allows improvement of communications strategies** which may decrease the impact of the crises
- + **Decision support tool**
- + Can be **customized** regarding food stakeholder needs and goals (detect consumer trends, for instance)
- Needs to be **refined to improve sensitivity**
- **Human validation** of the results is needed and can be **time-consuming**

References

1. Brown, Paul et al. Bovine Spongiform Encephalopathy and Variant Creutzfeldt-Jakob Disease: Background, Evolution, and Current Concerns (2001). *Emerging Infectious Diseases*. Vol. 7, No. 1
2. European developments following incidents with dioxins and PCBs in the food and feed chain (2015). Hoogenboom, R., Traag, W., Fernandes, A. & Rose, M. *Food Control* 50.
3. Rasko, David A. Origins of the *E. coli* Strain Causing an Outbreak of Hemolytic-Uremic Syndrome in Germany (2011). *The New England Journal of Medicine*.
4. O'Mahony, PJ. Finding horse meat in beef products—a global problem (2013). *Q J Med* 2013; 106:595–597.
5. Explored UK news webpages: <http://www.thetimes.co.uk/tto/news/>, <http://www.independent.co.uk/>, <http://www.thesundaytimes.co.uk/>, <http://www.telegraph.co.uk/>, <http://www.bbc.com/news/>, <http://www.theguardian.com/uk/>, <http://news.sky.com/>, <http://metro.co.uk/>, <http://www.yorkpress.co.uk/>, <http://www.thesun.co.uk/sol/homepage/>, <http://www.farmersguardian.com/>, <http://www.farming.co.uk/>