

Institution: University of Sussex		
Unit of Assessment: 11 – Computer Science and Informatics		
Title of case study: Enabling better-informed government, public and private sector decision-making around social media content and public safety		
Period when the underpinning research was undertaken: 2012 – 2019		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
David Weir	Professor of Computer Science	1991 – present
Jeremy Reffin	Research Professor	2011 – present
Simon Wibberley	Research Fellow	2014 – present
Andrew Robertson	Research Fellow	2010 – 2011, 2014 – 2019
Period when the claimed impact occurred: 2014 – 2020		
Is this case study continued from a case study submitted in 2014? N		
1. Summary of the impact <p>Research by the Text Analysis Group (TAG) Laboratory at the University of Sussex has contributed to increased governmental and third sector organisational capacity to process and acquire knowledge from social media and other digital platforms, at a time when maintaining up-to-date awareness of these channels' use and trends is of increasing importance. Through the development of a versatile software platform, the co-founding with the think tank Demos of the Centre for the Analysis of Social Media (CASM), and the creation of CASM Technology LLP, the lab's research has increased understanding and enabled better-informed analysis and activity within these organisations, which has also benefitted the public and stakeholder groups they serve, on both a national and international scale.</p>		
2. Underpinning research <p>The TAG Lab was co-founded by David Weir, winner of the Kuroda prize 2014, and Jeremy Reffin; from its outset, the laboratory was designed to cultivate a cyclical interaction between fundamental and applied research. This has occurred through: (a) fundamental research within the field of natural language processing (NLP) and machine learning to create new, generic capabilities to analyse large, unstructured corpora of text; and (b) the integration of these and other data scientific methodologies into a technology platform, Method51, to make them accessible, usable and useful to researchers with backgrounds outside of NLP and data science. As TAG Lab researchers engaged in 'research-in-the-wild', the central importance of the document classification problem became apparent. TAG Lab researchers produced two publications in this area: [R1], which addressed the significant challenges associated with domain adaptation, and [R2], which proposed methods that address the need to trade off precision and recall. The findings and insights arising from both of these works directly informed the design and implementation of Method51.</p> <p>A second body of research was dedicated to understanding the form and method whereby the capabilities conferred by machine learning and NLP could be made available to the wider research community, especially with a view to address the specific problems posed by social media research, and the questions such research was being used to answer. This research suggested that the deployments of NLP best suited to this research needed to (i) include bespoke models trained to specific datasets, (ii) be used and understood by subject matter experts on the content being analysed, and (iii) be trained in agile and iterative ways [R3, R4]. This was achieved through the adoption and further development of the open-source DUALIST framework. These insights were then incorporated into Method51, driving further technical work on NLP classification and the platform itself [R5, R6].</p>		

The third body of research has been cross-disciplinary and collaborative, through CASM, with other academics at the University of Sussex and elsewhere, and with the think tank Demos. TAG Lab and Demos researchers worked together to integrate data science with social science, to develop the wider social scientific methodological framework that Method51 should be used within. This began in 2013 with research funded by: the ESRC [G1], which enabled the team's first attempts to conduct attitudinal research on social media; The Open Society European Policy Institute [G2]; and attitudinal research regarding immigration, funded by the Joseph Rowntree Foundation [G3]. Since 2014, the TAG Lab has also received funding from: the Technology Strategy Board/EPSC [G4] to collaborate with the polling company Ipsos MORI to further develop methodological and ethical frameworks; the Open Society European Policy Institute [G5] to apply and extend a framework for electoral participation; and the Police Knowledge Fund [G6] to analyse online hate speech and offline hate crime data.

In 2015, TAG Lab members created Method52, a professional software platform based on the Method51 underpinning research, which is maintained and developed through CASM Technology LLP.

3. References to the research

- [R1] Danushka Bollegala, David Weir and John Carroll (2013) Cross-Domain Sentiment Classification using a Sentiment Sensitive Thesaurus. In IEEE Transactions on Knowledge and Data Engineering (TKDE) 25(8). DOI: <https://doi.org/10.1109/TKDE.2012.103>
- [R2] Matti Lyra, Daoud Clarke, Hamish Morgan, Jeremy Reffin and David Weir (2013) High Value Media Monitoring With Machine Learning, Using machine learning to drive cost effectiveness in an established business, in Künstliche Intelligenz 27(3), Springer-Verlag. DOI: <https://doi.org/10.1007/s13218-013-0255-2>
- [R3] Simon Wibberley, David Weir and Jeremy Reffin (2014) Method51 for Mining Insight from Social Media Datasets. In Proceedings of the 25th International Conference on Computational Linguistics. System Demonstration. (COLING 2014). <https://www.aclweb.org/anthology/C14-2025>
- [R4] Simon Wibberley, Jeremy Reffin and David Weir (2013) Language Technology for Agile Social Media Science. In ACL 2013 workshop on Language Technology for Cultural Heritage, Social Sciences, and Humanities <http://aclweb.org/anthology/W/W13/W13-2705.pdf>
- [R5] Thomas Kober and David Weir (2015) Optimising Agile Social Media Analysis. In 6th Workshop on Computational Approaches to Subjectivity, Sentiment & Social Media Analysis (WASSA 2015). DOI: <http://dx.doi.org/10.18653/v1/W15-2906>
- [R6] David Spence, Christopher Inskip, Novi Quadrianto and David Weir. (2019) Quantification Under Class-Conditional Dataset Shift. The 2019 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining ASONAM 2019. DOI: <https://doi.org/10.1145/3341161.3342948>

Indicators of research quality:

Weir was awarded Association for Mathematics of Language (SIGMOL) inaugural S.Y. Kuroda Prize, 2014: "the territory that was opened by the work of Joshi, Shanker, and Weir has fostered an enormous body of research in computational linguistics and natural language processing."

Research funding:

- [G1] ESRC. Towards a Social Media Science: Tools and Methodologies, PI: David Weir, 04/13-09/14, £78,207
- [G2] The Open Society European Policy Institute. EU sentiment tracker: understanding Europeans' attitudes using social media, PI: David Weir, 01/13-09/13, €28,200
- [G3] Joseph Rowntree Foundation. Using Twitter to Understand attitudes to immigration & immigrants in the UK, PI: David Weir, 11/13-12/13, £3,000
- [G4] Technology Strategy Board/EPSC. In the Hands of the Analyst: Unlocking the value of social media for professional market research, PI: David Weir, 09/14-08/15, £44,418
- [G5] Open Society European Policy Institute. Getting out the Vote, PI: David Weir, 03/14-05/14, €12,000

[G6] Police Knowledge Fund. Policing Hate Crime: modernising the craft, an evidence-based approach, PI: David Weir, 09/15-03/17, £225,072

4. Details of the impact

The impact of the TAG Lab's work has been through identifying opportunities where public and commercial benefits can be gained through the ability to analyze large amounts of unstructured textual data. This has given new capabilities to governmental and non-governmental organisations to interrogate big data sets from social media in ways which were previously impossible.

Demos. This is evidenced emphatically by the Demos think tank, which co-founded CASM with the TAG Lab, University of Sussex. Polly Mackenzie, Chief Executive of Demos, describes the partnership with the TAG Lab, the founding of CASM, and deployment of Method52, as critical to the organisation's capacity to interact with and understand the online world, and therefore of huge significance to Demos' development as an effective think tank.

"CASM was set up as a unique capability in the UK: with the University of Sussex's partnership, we were the first think tank unit to be able to produce policy-focused research into these new and exciting spaces." [S1]

Mackenzie directly attributes the partnership with CASM to Demos' ability to operate effectively within this online world and, as a consequence, gain research intelligence and insight which would not otherwise be possible:

"Method52 is the technology allowing Demos to meaningfully interact with the online world, to listen and understand, and to cut through the noise in a manner that remains best in class in UK civil society. Since then, our work with the Cabinet Office, Home Office, Metropolitan Police, Foreign Office as well as a range of academic funding bodies and private sector partners has enabled new, impactful public-facing research on issues as diverse as gambling, democracy, extremism and disinformation. Our work has been cited in hundreds of news sources, including dedicated media partnerships and the embedding of our technology in the BBC, the Daily Telegraph, the Times and Irish Times, Buzzfeed and others, and our joint technology suite has led to work presented to MPs and civil servants including evidence in the Houses of Commons and Lords. Our work would have been impossible without the partnership with the University of Sussex." [S1]

Beyond enhancing Demos' organisational capability and capacity to fulfil its mission as an independent think tank, CASM's technology has also been deployed to provide insight and intelligence to the benefit of those organisations and governmental bodies working in partnership with Demos.

A comprehensive yet not even complete list of projects which deployed Method52 provided by Demos [S2] shows the wide range and scale of settings in which the technology has been used to provide intelligence and insight to a diverse range of stakeholders. These range from providing insight into anti-Muslim content on Twitter to the Mayor of London's policing and crime summit (2017), providing intelligence on Russian influence operations on Twitter (2017) and using social media analysis to explore attitudes to the EU (2014). [S2]

Method52 has also been deployed with significant and sustained benefit by other organisations who have worked in partnership with CASM Technology LLP. These include:

Global initiative (GI). Global Initiative is an international NGO based in Geneva who are using Method52 to develop more reliable ways of tracking illegal wildlife trade. [text removed for publication], a senior Analyst at Global initiative confirms that the tool developed by Global Initiative using Method52 has given their analysts increased capacity to understand and track illegal international wildlife trade:

“What we do have is an increasingly reliable ability to find more instances of illegal trading with less bias than any of the other methods and tools that people are using as far as we are aware.” [S3]

Another capability of Method52 which [text removed for publication] sees as particularly beneficial for Global Initiative is being able to share data: “One thing which we are currently working on is the development of a dashboard which allows us to share results with partners which could include other NGOs or academics or even possibly law enforcement. The aim is to use the tool’s detections as a data foundation to shift this illegal trade off mainstream platforms” [S3]. This tool – currently in development by Global Initiative using Method52 – is being deployed on an international level, with results being shared with Interpol as well as other international bodies [S3].

Institute for Strategic Dialogue (ISD). The international reach and significance of the technology for international NGO communities is also exemplified by ISD, an independent, non-profit organisation dedicated to safeguarding human rights and reversing the rising tide of polarisation, extremism and disinformation worldwide. ISD uses Method52 to “fundamentally inform and enable” their ongoing work to better understand these issues, which in turn underpins their contributions to public policy development, as well as their educational and civic action programmes. ISD CEO Sasha Havlicek outlines a key example:

“In relation to mapping hate speech online... our research has been used by both local authorities and by national governments to inform their policy responses. This is evidence-based policy making in action. We have done this with local government in the UK, regional government in Australia and with the national governments of New Zealand and Canada. And we have also built a hate tracking capability with CASM to map hate actors and their activities online in the US... We are essentially building a new joint capability – perhaps the most advanced capability in existence in the civic sector – for the discovery and identification of malign information operations in order to be able to inform the public as well as policymakers. Furthermore, we are doing that with data that is of a social science standard – because of CASM – so that it can be used as a basis for public policy and is accurate enough to inform operational response.” [S4]

Further benefits from the ISD’s deployment of Method52 [S5] include:

- 1) providing weekly insight to over 200 civil society organisations in the USA in the lead up to the US 2020 elections; Havlicek confirms that “this enabled those groups to respond both protectively in terms of facing those threats, but also proactively so they could more effectively mitigate disinformation. This meant that 200 organisations, some of them large-scale, were able to better manage the threat and respond in new ways as a result of the intelligence we were able to share with them.” [S5]
- 2) acquiring intelligence which informed its submission to the Department for Digital, Culture, Media & Sport (DCMS) for its online Harms White paper consultation [S5] as well as the ISD consultation on the EU Digital Services Act [S6].

Havlicek adds that the tool has been mission critical to the successful operation of their organisation:

“Method52 forms the essential tech basis from which we gain insight into hate and disinformation online. This helps us to fulfil our core mission of tracking extremism, terrorism, hate speech and disinformation... Method52 is the best resource available for monitoring this set of threats in my professional opinion. It is the key tool which enables us to provide critical research and policy briefing to governments and civic partners... We have evaluated and used other tools as well as M[ethod]52 but... they don’t allow researchers to interrogate the data in ways that give us significant confidence in the quality of our results.” [S4]

Broadcasting and journalism. As well as benefiting the organisations applying its technology in their professional practice, Method52 is supporting civil society on an international scale through increasing transparency and insight into trends of broader public interest and relevance. For example, broadcasters have used the technology as a source of balanced insight into challenging topics, and to provide new content for audiences in the form of intelligent and informed social media analysis of those topics.

Among the wide range of broadcast media (including newspapers) using Method52 in this way [S7] is the BBC, whose senior Producer [text removed for publication] confirms its value to broadcasters:

“As programme makers, this technology is useful in that it gives us ideas and insights into trends that are happening and it gives us a sense of perspective and scale when we are interested in covering a particular topic.” [S8]

Examples include BBC Click’s work with CASM to analyze online abuse during the 2019 general election, which culminated in the 30-minute ‘deep dive’ episode ‘The Outrage Election’. The collaboration sought to analyse over 5 million Tweets to identify how much of the discussion involved personal attacks on candidates; the Method52 NLP “classifier that was trained for this purpose was eventually able to identify insulting and abusive Tweets with an accuracy of 71%.” [S9] (pp4-5). The research was also used by the BBC “to show how misinformation is spread, including how the Coronavirus has been exploited on media platforms by particular political groups, in this case far right groups. We were able to show the audience how misinformation happens, [and] how there were spikes at certain periods.” [S8]

The technology’s ability to provide reliable researched content for output is of crucial benefit to broadcasters and journalists, as it enables them to “make sense of the noise”. [text removed for publication] explains:

“The Internet is here to stay and there is a lot of noise out there so it is useful to have something which puts this noise into some sort of understandable form. This sort of research backs up content and gives us useful figures and numbers which is very helpful to be able to show. It is always useful to have some academic research which helps to put things into context and give a sense of scale. This research is also picking up the subtle ways that misinformation is conveyed and that is extremely valuable.” [S8]

5. Sources to corroborate the impact

[S1] Testimonial from Polly Mackenzie CEO Demos (Dec 2020)

[S2] List of Demos projects which have used Method52 as a core component of their research methodology

[S3] Testimonial from [text removed for publication], a senior analyst at Global initiative (Dec 2020)

[S4] Testimonial from Sasha Havelick CEO, Institute of Strategic Development (Dec 2020)

[S5] List of projects in which ISD has deployed Method52

[S6] DCMS White paper consultation prepared by ISD which used Method52

<https://www.isdglobal.org/wp-content/uploads/2019/12/Online-Harms-White-Paper-ISD-Consultation-Response.pdf>

[S7] Selection of broadcast and newspaper output which has deployed Method52 provided by CASM technology LLP

[S8] Testimonial from BBC producer [text removed for publication] (Dec 2020)

[S9] The Outrage Election: A CASM Investigation Conducted with the BBC. Josh Smith, DEMOS (Dec 2019) <https://demos.co.uk/wp-content/uploads/2019/12/The-Outrage-Election-11.12.19.pdf>