EVIDENCE REPORT
No 122

Policy Anticipation, Response and Evaluation

Tracking Research and Policy Conversations in Online Spaces

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March 2015

The IDS programme on Strengthening Evidence-based Policy works across seven key themes. Each theme works with partner institutions to co-construct policy-relevant knowledge and engage in policy-influencing processes. This material has been developed under the Policy Anticipation, Response and Evaluation theme.

The material has been funded by UK aid from the UK Government, however the views expressed do not necessarily reflect the UK Government's official policies.

AG Level 2 Output ID: 555

TRACKING RESEARCH AND POLICY CONVERSATIONS IN ONLINE SPACES

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First published by the Institute of Development Studies in March 2015

IDS is a charitable company limited by guarantee and registered in England (No. 877338).

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Abbreviations

ANGONET	Arusha NGO Network
API	application programming interface
CDN	Change Detection and Notification (Google)
CSO	civil society organisation
DFID	Department for International Development
HANCI	Hunger and Nutrition Commitment Index
IAVC	Integral Assistance to Vulnerable Children
KACA	Kilimanjaro AIDS Control Association
LVC	Lake Victoria Children
MT	modified tweet
NIHEP	Ni Hekema Pekee Organisation
NGO	non-governmental organisation
RTM	real-time monitoring
TMT	The Mango Tree Orphans Support Trust
PANITA	Partnership for Nutrition in Tanzania
URL	uniform resource locator

Acknowledgements

We would like to thank Vocus, Meltwater and Tableau for their permission to use screenshots of their respective software packages in this report.

Introduction

The Institute of Development Studies (IDS) is engaged in a major four-year programme entitled Strengthening Evidence-based Policy, funded by the UK Department for International Development (DFID). Central to this programme is the production and communication of policy-relevant research findings. Monitoring the effectiveness of research communication can be challenging, but it is essential in order to assess the influence of research-based evidence on policy decisions in the real world. The sheer number of different actors and activities involved in global knowledge-sharing is vast, so the terrain is extremely complex. Even deciding what to monitor and how to go about it can be less than straightforward, and when this has been determined, weak or limited monitoring data can still be a significant obstacle. However, changes in online communications over recent years present new opportunities for monitoring. Social media in particular have begun to change not just how research is communicated but the way that audiences interact with the communication process. Audiences are no longer merely passive recipients of knowledge, and social media are increasingly being used to communicate specific messages arising from within research evidence. In the past this was often done to support campaigning and advocacy work, but it is rapidly becoming a feature of routine communication activities even where there is no explicit advocacy component.

This paper attempts to address some of the challenges of monitoring by exploring opportunities presented by online and social media. In particular, we develop a prototype tool for monitoring and visualising some of the ways that research messages are communicated in online spaces.

1 Justification

1.1 Framing policy messages

We refer to 'framing' as the process by which people develop a particular conceptualisation of an issue or reorient their thinking about a problem (Chong and Druckman 2007). Luntz (2007) was arguably the first researcher to systematically use the concept of framing as a campaign tool, where it was found to be useful in the strategic application of information to influence policies and actions of those in positions of authority, through activities such as lobbying, campaigning and awareness-raising. Luntz's key proposition is that human communication is about delivering messages that are effective for a given audience; where the way in which a programme frames a problem defines the limits in which it can be taken up by those audiences. In fact, shaping terminology is now thought to be critical to determining which ideas and interests are noted and which are not (Roe 1991). According to Pollard and Court (2005: 14) 'whether sparking a trend or creating a vantage point within a long-running discussion, the key is to coin phrases and ideas that have resonance within a particular social context.'

Sumner *et al.* (2011: 8) explored shifts in policy-framing as 'changes in the way that policymakers understand a problem or the possible responses to it'. The number and type of competing voices operating within the same environment may in part determine whether a frame is effective. A highly competitive environment is one in which a large number of alternative positions on an issue are expressed. In international development, one such example is the field of hunger and undernutrition.

1.2 The context of hunger and undernutrition

Nutrition is receiving growing attention within the international development community, as demonstrated by a range of international events, such as the Nutrition for Growth Summit and the commitment to launch the Global Nutrition Report during the Second International Conference on Nutrition in November 2014. The Hunger and Nutrition Commitment Index (HANCI) is an example of an intervention that uses framing to present the issues of hunger and undernutrition as matters of political commitment, rather than as one of technical capacity. Based at IDS, HANCI is an annual index that ranks governments in terms of their political commitment to tackling hunger and undernutrition. In so doing it aims to help change the way in which these issues are portrayed and debated in the media and in policy circles. It also encourages changes in opinion as to how the problems of hunger and nutrition should be tackled. The first assumption underlying the HANCI approach is that framing these issues as matters of national political commitment is likely to capture the attention of civil society and policymakers. The second assumption is that issues of political commitment, hunger and nutrition also become aligned with other policy debates around accountability and government responsiveness, thus increasing their importance for politicians, non-governmental organisations (NGOs), civil society organisations (CSOs) and nutrition advocates.

A leading partnership of the HANCI programme is the Partnership for Nutrition in Tanzania (PANITA), which is a multi-sectoral working group supporting major national nutrition programmes in Tanzania. HANCI programme staff work with core PANITA CSOs in a series of capacity building workshops to produce key messages that might prove useful in the fight against hunger and undernutrition in Tanzania. The aim is that the CSOs will engage local media, conduct consultations, and run outreach events in which advocacy messages are disseminated and debated with policy elites. The intention is to encourage these elites (politicians and civil servants) to take ownership of the advocacy messages, promote these in relevant policy forums and build wider support for policy change.

The use of social media is not commonplace among some of the PANITA members, but is used by the wider PANITA network to inform broader policy debates around hunger and nutrition. As yet, the extent to which social media have been effective in framing hunger and undernutrition as a political issue is relatively unknown.

We conclude this section by arguing that framing is an increasingly important concept for development, especially for those interventions that undertake advocacy and lobbying as part of their core activities. The application of the concept of framing may help evaluators to understand 'what' it is that might be tracked when monitoring a given intervention. We now move on to discuss a method that may address 'how' to track messages in practice.

1.3 Tracking policy messages

Information-sharing and public debate are frequently used as proxy indicators for assessing levels of audience engagement. According to Behague *et al.* (2009), debate is a desirable characteristic of an evolving system of knowledge capable of fostering and harnessing critical insight for complex change. Arguably, while the use of online and social media is now widespread in research communications, the use of tools to track online information is still often quite limited. For example, monitoring the effectiveness of online publishing is frequently limited to tracking download statistics and using what are often fairly modest surveys to determine the extent to which users have 'engaged' with publications, workshops and other programme activities. These indicators are static and focus on individual users or entities to monitor change. It may be that tracking messages is more important than focusing on single entities. If it is possible to devise a tool that monitors messages – rather than single users or entities – then our potential for learning may be vastly increased.

Whether in print or online, research evidence is published with the hope and expectation that people will read it and hopefully act on it, and perhaps use it to inform discussions that ultimately impact on policy and practice. As part of this publication process, therefore, efforts are made to build awareness of published research outputs among particular audiences. Whether described as communications, marketing or uptake theory, this awareness-building increasingly involves the production of an additional number of more concise online documents, whose purpose is to summarise, describe or merely signpost a key research and evidence report. Such supporting documents come in a variety of forms, including abstracts, summaries, briefings, blogs, Facebook posts, tweets, email notifications and news releases. In many cases these secondary documents may themselves trigger some debate, particularly in social media spaces, and this debate often helps to further publicise the research itself. This debate also serves to build on, refine, contextualise and reframe the research ideas and findings in ways that the original authors may not have predicted. In this way publication of the main report, plus supporting documents and posts, is the beginning of an electronic dialogue in which the internet (and especially its social media component) is employed as a debating platform through which interested audiences publish their own reactions to the evidence.

Having carried out an appropriate communications plan, in which the supporting documents are carefully targeted at specific groups of stakeholders, this electronic dialogue becomes an important step in the policy engagement process. The ensuing debate draws in more and more people, including, ultimately, those who work in the spaces where policy decisions are made and/or implemented. The aim of this paper therefore is to explore, in a modest way, how these onward debates in online and social media might be tracked, mapped and analysed, and how this might benefit the process of communicating research and evidence.

2 Methodology

2.1 Basic approach

Before explaining our approach it would be helpful to define some terms. 'Online media' and 'social media' are often used in a variety of different ways. Here we use online media to refer to any documents that are publicly available on the internet. Social media are really subsets of online media. They are a range of internet-based applications that 'build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content' (Kaplan and Haenlein 2010: 61). In contrast to the early years of the World Wide Web, the defining characteristic of social media applications is that they provide the functionality for relatively quick and simple self-publishing and two-way communication. They are therefore very much associated with the notion of public electronic dialogue. Popular social media applications include Facebook, Twitter, LinkedIn, Instagram and Pinterest.

Initially it was hoped that we could develop a methodology to observe the way that concepts are reframed in online spaces over time. Drawing on techniques from text analytics and natural language processing, this plan would involve focusing on words and phrases used in an initial research and evidence publication to describe particular concepts or frames, and then attempting to follow how these phrases evolve as they are discussed and reframed in online or social media spaces. However, it soon became apparent that this is problematic. First, references to relevant online items (social media posts, blogs, e-discussion contributions or web articles) related to the original research report need to be discovered through searches. Second, analysis of the content of these documents is required in order to observe changes in wording, as concepts are reframed. The difficulty is that the more the wording within subsequent documents changes, the less likely it is that those documents will be found by an initial search, because the search terms are less likely to appear in those documents. This in turn means that these documents will not be available for any kind of textual analysis. Using this approach, only documents that retain strong references to the original report are likely to appear in the search. Put simply, the moment a frame changes significantly it becomes much harder to find any online references to it, or to accurately attribute its origin.

This problem need not be so challenging were it not for the fact that the initial search is not a trivial exercise. The huge volume and variety of material that constitutes the internet can be a major challenge to any attempt to carry out comprehensive online searches.

Given the limited scale of this study therefore it was concluded that a more useful way forward would be to focus on developing an approach to searching for relevant social media (and related) documents and visualising these data in formats that are conducive to further analysis. Our plan consisted of two main steps:

1. **Searches:** using search algorithms to identify online and social media 'objects' (blogs, Facebook posts, tweets, news articles and so on) that refer to particular concepts expressed within published outputs from the IDS Evidence-based Policy programme
2. **Visualisations:** developing novel approaches to displaying and mapping the search results over time in order to contribute to a deeper understanding of the behaviour of different actors within the research uptake process.

We decided to use HANCI as our main case study but beforehand, as a way of testing our approach, we carried out a few initial searches on news stories such as the current Ebola crisis in West Africa, and a small number of IDS outputs, including *A Review of Strategic Foresight in International Development* (Bingley 2014) and the *Governance and*

Development blog entry ‘Handbags and tear-gas – profit versus the moral right to protest in Hong Kong’ (Hossain 2014).

It became rapidly clear that searching and tracking material on the internet and in social media is complex. Every search is unique and the volume of search data varies enormously depending on what is being searched for. In the case of research reports, a range of factors are likely to influence the degree to which the original publication is followed by any visible electronic trail. The reputation of the authors and their institutional affiliations, the extent to which the publication has been actively promoted, the general level of interest in that particular field of research or the number and size of competing voices (such as other research publications or media stories) are some of the factors that may influence the amount of attention that a research report may receive at the time of publication.

2.2 Searching online and social media spaces

A key decision was also which software to use for carrying out the searches, processing and analysing the resulting data and visualising the results. There are many different approaches to online searching and the following types of application were all explored for this study.

2.2.1 Search engines

Since the early days of the World Wide Web a long line of search engines have been developed for the purpose of searching online content, including Lycos, WebCrawler, Alta Vista, Yahoo, Ask Jeeves, Bing and Google, to name just a few. Since 2001 Google has largely dominated the market. Innovations in spidering technology (which continually indexes millions of web pages) gave Google an early advantage, making it one of the fastest and most comprehensive search applications. Google also excelled in software ergonomics, pioneering the use of a very simple and intuitive single text box user interface, at a time when many rivals still used complex, form-based search screens. Despite Google’s ubiquitous presence though, many different search engines currently exist, and many of these are specialised for particular subjects or types of data.

Despite their differences, however, most search engines tend to be optimised for the task of finding and signposting links (URLs), rather than for the kind of continuous harvesting and tracking of results required for this study. For example, Google Alerts, which is Google’s own content Change Detection and Notification (CDN) service, will automatically deliver lists of URLs corresponding to user-specified searches, and in principle this might therefore have met the requirements of the study. However, Google Alerts does not search social media links and the information that accompanies each link is somewhat limited, the expectation being that if the user wants more information he or she will follow each individual link to its corresponding source on the web. It is therefore less useful for carrying out an overall analysis of the results of an entire search and so less useful for time-based search tracking.

2.2.2 Citation metrics

Citation metrics applications, such as Scopus (Elsevier), Web of Science (ISI Web of Knowledge), PubMed and Google Scholar, help to quantify the impact of individual research articles on the basis of how often they have been cited in other online documents. Designed primarily for academia, they are typically optimised for recording the number of times an article is cited by other academic articles. Citation metrics applications do not generally attempt to search the entire internet but are restricted to searching their own indexes of scholarly literature, which primarily consist of academic journals, plus a quantity of academic books and grey literature. Therefore, the strength of these applications tends to be their ability to capture academic citations of both specific articles and also their authors. They are generally less suited for searching the online and social media worlds beyond academic publishing and they are also less optimised for searching for ideas or concepts buried within the actual text of online content.

2.2.3 Alternative metrics

The rise of the Open Access movement and its critique of traditional academic citation indices such as the Thomson-Reuters ISI Impact Factor (Chan, Gray and Khan 2012) helped stimulate the development of alternative citation metrics. Such 'altmetrics' as they are sometimes known include online article views and downloads, references in data and knowledge bases, and mentions in social and news media. Leading commercial products such as Plum Analytics, Altmetric and ImpactStory combine these various alternative citations into visualisations that provide an instant rudimentary analysis of the level of public interest in an article. These applications are extremely impressive and useful tools for the research world, but as with traditional citation metrics the emphasis is on tracking articles, not concepts within the content of those articles, and coverage is again limited to the application's own indexes which, though vast, are always finite. Indeed, at the present time, there seems to be an eagerness on the part of some application developers to increase the range of subjects and materials that these applications index, but this is an enormous task (Research Trends 2014).

2.2.4 Media monitoring applications

There exist an increasing number of powerful applications designed to monitor the output of print, broadcast and online media. Largely concerned with supporting corporate public relations (PR), these applications include products such as Vocus, Meltwater, Scup and Tempero. As commercial operations, these are often effectively hybrid applications insofar as they frequently deliver their services via a combination of software and human expertise. Application programs are installed and operated by users, while advisory staff provide additional functionality via helpdesks or by constructing searches on behalf of users or even by providing bespoke, specialist consultancy services in support of user-specified PR campaigns.

These programs provide the user with visual 'dashboards', comprising a collection of graphic representations of particular monitoring activities. They also frequently provide 'sentiment analysis' which attempts to approximate the overall 'emotional' response of audiences to particular outputs, using text analytics techniques that are applied to the content of tracked documents or posts generated by readers. By aggregating the results from all the individual responses, sentiment analysis attempts to provide a rough estimate of, for example, the extent to which an audience 'likes', 'dislikes' or is indifferent to a commercial product or corporate brand, or even in the case of this study, the content of a research report. However, experimenting with 'sentiment analysis' in Meltwater and Vocus suggested that, for all but the simplest situations, this can be a somewhat crude and even unreliable measure, no doubt valuable for marketing departments trying to assess the broad attitude of their customers to specific products, but not so useful for identifying more subtle nuances, attitudes or beliefs within debates about research evidence.

2.2.5 Open source and low-cost tools

While alternative metrics and media monitoring applications are often highly sophisticated and relatively expensive commercial software applications, a large number of comparatively inexpensive and sometimes free-to-use, open source tools also exists. Less sophisticated than their more costly rivals, and hugely variable in terms of robustness or reliability, these smaller-scale applications often provide a more limited, but nonetheless useful range of functions. Hootsuite, TweetDeck and Twitonomy are three of many such applications dedicated to Twitter. The first two are essentially dashboard systems, enabling users to monitor multiple Twitter feeds simultaneously, while Twitonomy is primarily an analytics tool. Applications like Klood and Klout perform a similar function, but for a wider range of social media. Bit.ly is a well-known URL-shortener, designed originally to allow users to shorten URLs so that they require fewer characters when included in Twitter messages. However, it also offers a number of social media tracking functions. Other applications provide the kind of

search functionality for social media that has hitherto been largely the preserve of traditional internet content. TweetBeep, for example, is in effect a GoogleAlerts for Twitter, allowing users to set up Twitter searches that then run continuously and autonomously.

Many of these kinds of applications reply on API (application programming interface) technology. An API is a set of protocols, routines and tools for building software applications, and they have been increasingly developed for commonly used platforms such as Twitter and Facebook. They are in effect gateways into the data structures of these platforms, enabling third-party programmers to construct their own applications to use Twitter and Facebook data. This technology enables independent programmers to build a wide variety of low-cost, free or open source software applications. This has in turn spawned a number of low-cost linking programs that enable programmers to harness the power of an API and extract real-time data from a social media platform and feed it into an entirely different application (Brown 2014). Examples of this type of program include Zapier and the aptly named IFTTT, an acronym of the phrase 'If This Then That'.

2.3 Steps towards building the prototype

In this section we describe how we designed and built a basic prototype real-time monitoring and visualisation system, using some of the applications described in the previous section. We also describe how we tested this system using five different sources of search data.

It became apparent that many of the search and monitoring applications described above offered useful functions, but without modification, none appeared capable of generating exactly the right kind of search data for this study. An additional consideration was cost. Many of the more powerful applications are also expensive, and although free-to-use, stripped-down versions of the software are frequently offered for a trial period in order to attract the interest of potential customers, the reduced functionality of these demo versions made it difficult to assess the extent to which they might fulfil the needs of the study. So after exploring the different options, the pragmatic decision was made to use the two media monitoring applications, Vocus and Meltwater, for which IDS possessed site licences, in combination with an additional low-cost application, Zapier.

The reason for this combined approach was to use media monitoring to enable broad searches across a wide range of content, while using Zapier to facilitate more in-depth searches on one specific social media platform: Twitter. The latter was a way to exploit Twitter's tendency to generate relatively simple and concise content and usage data.

Thus Vocus and Meltwater were used to search a wide range of online sources, including websites (particularly news and media sites), blogs, public e-discussion fora and social media (including Twitter, Facebook, LinkedIn, YouTube, Instagram, Mendeley and others). Zapier on the other hand was used to generate search results containing a range of Twitter-specific data, including tweet content, the author of each tweet, the author's profile (a short self-description provided by each Twitter user) and the number of Twitter followers for each author. Crucially the data also contain variables indicating whether each recorded tweet was original or a retweet of someone else's tweet, or even a so-called modified tweet (that is a retweet in which the content has been edited).

In all cases the date of each search result was also recorded, so that all the searches could be plotted on a timeline, indicating the chronological sequence in which each item in the search results originally appeared online. In general, the older an online item is, the harder it is to find and therefore the less likely it is to appear in search results. Applications differ in terms of how they address this problem, with many imposing different limits on the ages of different types of content that can be searched. In addition, because social media are still relatively new technology, the volume of users and outputs is rapidly increasing, making comparisons between time periods hard to assess. For these reasons it was decided to

focus searches on the period between September and November 2014, which coincided with the run-up to the launch of the 2013 HANCI report on 18 November 2014.

2.3.1 Vocus/Meltwater searches

Successfully retrieving results in online searching is a question of precision and recall against overall retrieval. 'Precision' refers to the number of retrieved instances that are relevant, while 'recall' refers to the number of relevant instances that are retrieved. More simply perhaps, in engineering terms, online searching is a classic signal-to-noise ratio problem: a successful search harvests the greatest quantity of relevant material (the signal), while eliminating the greatest quantity of irrelevant material (the noise).

The best search results are often achieved using carefully tested Boolean search strings. (A Boolean search is a technique for improving the relevance of search results by using a combination of keywords with operators such as AND, NOT and OR). In practice, fine-tuning these searches is often an iterative, context-dependent and application-specific process. The search terrain is also constantly changing as people upload new documents to the internet or make new comments on social media.

In our study, for example, the fact that HANCI is a common name for Turkish restaurants across the world proved to be a particular challenge. The number of relevant search results relating to the Hunger and Nutrition Commitment Index was consistently dwarfed by the number of irrelevant references to Turkish dining. Constructing a Boolean search string that eliminated most of these references, while retaining references to HANCI as in the index (many of which of course also refer to food) proved complicated. After working with advisors at Vocus and Meltwater, however, and carrying out a number of test searches, a search string was created that seemed to generate the cleanest context-relevant media monitoring search results for Hunger and Nutrition Commitment Index-related material:

> ("HANCI" OR "IDSNutrition" OR "HANCIndex" OR "Hunger and Nutrition Commitment Index") AND ("hunger" OR "nutrition" OR "development" OR "poverty" OR "malnutrition")

In the case of Zapier, the solution to the search problem was rather different. For a number of reasons Twitter lends itself well to monitoring and tracking. Twitter content tends to be very concise and focused. Tweets are famously limited to a maximum of 140 characters, while Twitter user profiles are limited to just 160 characters. In addition, hashtags (keywords or phrases prefixed with a '#' symbol) are central to the way Twitter is used: they are the standard device used for both searching and for ensuring that one's own tweets are linked to particular topics.

For this study therefore, our approach was to experiment with a number of hashtags during the design of the automated Twitter searches using Zapier. In our tests Zapier did not appear to handle combined or Boolean searches particularly well, so instead, a number of separate Zapier searches ('Zaps') were trialled, each using different hashtags: #HANCI, #IDSNutrition and #HANCIndex. The IDS Communications team were chiefly responsible for publicising the 2013 HANCI report and they too had encountered the Turkish restaurant problem when using the #HANCI hashtag. They therefore adopted #HANCIndex instead. Not surprisingly, therefore, this hashtag also seemed to generate the best search results from Zapier.

Initially, however, both the general media monitoring searches (Vocus and Meltwater) and the Twitter-specific (Zapier) searches generated a slightly more homogenous range of results than anticipated. The number of results from people or institutions with direct links either to IDS or to the operation of the HANCI project itself seemed to be significantly greater than those from other people or institutions, suggesting that social media debates around HANCI tended to take place quite close to home. In particular, relatively few of the results appeared

to come from individuals and organisations in developing countries. To try to shed some light on this observation, we decided to explore the social media capacity of some of the key stakeholders in the policy engagement process for HANCI.

2.4 Social media and CSOs in Tanzania

In addition to its relevance at the global level, HANCI has an important role to play in policy debates within specific countries of the global South. As an example of this, during this study we monitored the work between HANCI and PANITA (the Partnership for Nutrition in Tanzania), a partnership of 165 CSOs concerned with hunger and nutrition in Tanzania. Having previously worked with PANITA to gather primary evidence to feed into HANCI, the HANCI team worked with them in the second half of 2014 to learn from and document the experiences of PANITA members who were actively using the index for country-level advocacy purposes (their aim being to share the learning from Tanzania with advocacy organisations and networks in other countries).

Our challenge therefore was to try to understand both the capacity of these CSOs to engage in social media, and their potential appetite for engaging specifically with HANCI-related debates. We therefore carried out a basic analysis of the PANITA membership, using data supplied by PANITA, listing all the member organisations and related details such as major activities and contact details, including website addresses, area of focus, geographical coverage and target population.

Our investigation revealed that the total number of PANITA member organisations that have functioning websites is only 23. It seems reasonable to assume that if an organisation does not have its own website it is unlikely to make very active use of social media or the internet as a communication tool. If true then this suggests that no more than 23 PANITA member organisations could reasonably be expected to engage in this type of activity to any significant degree.

Also by examining the ‘major activities’ data in the PANITA membership spreadsheet, and in particular by looking for specific keywords or phrases, it is possible to make a plausible assumption about the extent to which any of these 23 organisations considers influencing the process of policy change to be a priority. This was important to track for the study because an explicit interest in advocacy, policy engagement or campaigning would make it more likely that an organisation would engage with social media on the subject of HANCI.

For this exercise, an initial scan of the major activities generated two short lists of keywords. List 1 consists of words and phrases that, it could be argued, are associated with policy engagement, while List 2 contains ‘weaker’ words and phrases; that is, words which *may* be associated with policy engagement, but may equally be associated with less relevant activities such as public education or corporate PR.

Table 2.1 PANITA keyword list

Keyword list 1	**Keyword list 2**
Advocacy	Promotion
Lobbying	Participation in ‘national building activities’ [*sic*]
Campaigning	Communication
Policy	
Influence	
Awareness-raising/creation	

It would seem reasonable to assume that if an organisational record does not contain any of the List 1 keywords (and only refers to List 2 keywords in the context of unrelated activities), then the organisation probably does not significantly engage in any of the activities that would normally be associated with policy engagement (though of course this does not take into account the possibility of individuals operating beyond the apparent capacity or remit of their organisations). The results of the analysis are shown in Table 2.2. The key finding is that from an original list of 165 organisations, a maximum of eight may, realistically, be expected to engage significantly in activities related directly to the policy engagement goals of HANCI. These organisations are: SCF Tanzania, Mzeituni Foundation, Ni Hekema Pekee Organisation (NIHEP), Lake Victoria Children (LVC), Integral Assistance to Vulnerable Children (IAVC), The Mango Tree Orphans Support Trust (TMT), Kilimanjaro AIDS Control Association (KACA) and the Arusha NGO Network (ANGONET).

An examination of each of the 23 websites suggests that the majority are little more than ‘brochure sites’; the online equivalent of corporate brochures, consisting of a small number of static web pages. In addition, all but the most basic websites tend to have their own search facility, yet Table 2.2 also indicates that only two of the 23 websites are equipped with one. This suggests that for the remaining organisations, online engagement, particularly via social media, is probably not a significant part of their normal work.

To sum up, the likely conclusion is that few if any of the current PANITA member organisations make systematic use of social media or the internet for policy engagement. This in turn suggests that few social media contributions from these organisations would be expected to appear in HANCI-related search results, which may explain why PANITA organisations, at least, did not feature in our search results.

This is perhaps not entirely surprising. Many of these organisations are small and often primarily focused on serving the needs of mostly rural Tanzanian communities, where social media are unlikely to be a current priority.

Table 2.2 PANITA membership table

PANITA member organisation		Website	Engaged in influencing policy change?		Area of focus	Website's own search reveals references to HANCI?
			Yes/No	Relevant keywords in organisation record		
1.	SCF Tanzania	www.sachita.org This URL doesn't work. The actual site seems to be: http://tanzania.savethechildren.net/	✓	Advocacy (Promotion)	Nutrition, health, education, food security, social protection, women's welfare, child welfare and community development work.	✓
2.	Mzeituni Foundation	www.mzeitunifoundation.org This URL doesn't work. The actual site seems to be: http://envaya.org/fmzeituni/	✓	Advocacy Raising Awareness (Communication)	Nutrition, health, education, social protection, women's welfare, child welfare, agriculture, water and sanitation, community development work and civic education.	No search facility
3.	Ni Hekema Pekee Organisation (NIHEP)	http://nihekimapekee.blogspot.co.uk/	✓	Advocacy	Nutrition, health/maternal, neonatal and child health, education, agriculture, women's welfare and child welfare.	No search facility
4.	Lake Victoria Children (LVC)	www.lakevictoriachildren/LVC This URL doesn't work. The actual site seems to be: https://envaya.org/lakevictoriachildren_lvc	✓	Advocacy (Promotion)	Nutrition, health, education, agriculture.	No search facility
5.	Integral Assistance to Vulnerable Children (IAVC)	www.iavczanzibar.org This URL doesn't work. The actual site seems to be: https://envaya.org/IAVC/home	✓	Advocacy	Nutrition, education, child welfare and community development.	No search facility

(Cont'd.)

Table 2.2 (cont'd.)

PANITA member organisation		Website	Engaged in influencing policy change?		Area of focus	Website's own search reveals references to HANCI?
			Yes/No	Relevant keywords in organisation record		
6.	The Mango Tree Orphans Support Trust (TMT)	www.themangotree.org	✓	Advocacy	Nutrition, education, water and sanitation, food security, social protection, child rights and community development work.	No search facility
7.	Kilimanjaro AIDS Control Association (KACA)	www.envaya.org/kaca	✓	Advocacy Lobbying	Nutrition, education, agriculture, water and sanitation, women's welfare, child welfare, social protection, community development work.	No search facility
8.	Arusha NGO Network – ANGONET (the sheet refers to COMECA, but this is probably an error).	www.angonetz.org	✓	Advocacy Policy Analysis Awareness creation	Nutrition, education, agriculture, food security and community development work.	✓
9.	Longido Community Integrated Program (LOO CIP)	www.loocip.org This URL doesn't work. The actual site seems to be: http://loocip.com/loocip-water-project/	?	(Participation of communities in various national building [*sic*] activities)	– *NA* –	No search facility
10.	Baraka Goodhope Orphan's Development (BAGODE)	www.envaya/bagode.com	?	(Promotion)	– *NA* –	No search facility
11.	AIDS Control & Community Development Organization (ACCODEO)	www.envaya.org/ac?codeo	?	(Promotion)	– *NA* –	No search facility
12.	Muwwe Women/Youth Poverty Reduction Organization	http://envaya.org/muwoyoporo	?	(Promotion)	– *NA* –	No search facility

(Cont'd.)

Table 2.2 (cont'd.)

PANITA member organisation		Website	Engaged in influencing policy change?		Area of focus	Website's own search reveals references to HANCI?
			Yes/No	Relevant keywords in organisation record		
13.	Lindi Non Governmental Organization Network	www.envaya.org/lingonet	x		– *NA* –	No search facility
14.	Mtwara Economic Development Initiative (MEDI)	http://envaya.org/medi	x		– *NA* –	No search facility
15.	Umoja Wa Wawezeshaji Kioo (KIOO)	www.kioo.org	x		– *NA* –	No search facility
16.	Kiota Women's Health and Development (KIWOHEDE)	www.kiwohede.org	x		– *NA* –	No search facility
17.	Bantu Community Development Centre (BACODECE)	www.envaya.org/bacodece.com	x		– *NA* –	No search facility
18.	Huruma AIDS Concern and Care (HACOCA)	www.hacoca.org	x		– *NA* –	No search facility
19.	Union of Non-Governmental Organisations (UNGO)	www.ungo-tz.org This URL doesn't work. The actual site seems to be: https://envaya.org/ungo	x		– *NA* –	No search facility
20.	Elimu Community Light (ECOLI)	www.elimu-tz.org	x		– *NA* –	No search facility
21.	Karatu Development Association (KDA)	www.kda-karatu.org	x		– *NA* –	No search facility

(Cont'd.)

Table 2.2 (cont'd.)

PANITA member organisation		Website	Engaged in influencing policy change?		Area of focus	Website's own search reveals references to HANCI?
			Yes/No	Relevant keywords in organisation record		
22.	Tanzania Pastoralist Community Forum (TPCF)	www.tanzaniapastoralist.org	x		– *NA* –	No search facility
23.	Monduli Orphans Project (MOP)	www.mopjuu.com	x		– *NA* –	No search facility
24.	Huruma Vision Tanzania	www.hurumavisiontanzania.org Website does not appear to exist.	– *NA* –			– *NA* –
25.	Pemba Rapid Development Organisation (PRADO)	www.pradopemba.org Website does not appear to exist.	– *NA* –			– *NA* –
26.	Irrigation Training and Economic Empowerment Organisation (IRTECO)	http://eco-ventures.org/irteco Website does not appear to exist.	– *NA* –			– *NA* –

2.4.1 Other media in Tanzania

Despite these findings, we made a modest attempt to stimulate social media activity around HANCI in Tanzania. A training workshop for journalists was convened in September 2014, as part of a HANCI project to encourage greater parliamentary engagement by Tanzanian media on HANCI-related issues before the Tanzanian general election in 2015. At this workshop we offered to commission journalists to write articles on HANCI-related themes. Two journalists, Rosemary Mirondo and Edward Qorro, took up the offer and each wrote an article. To avoid any suggestion that we were attempting to compromise editorial independence by buying news coverage for HANCI, the task of finding a willing publisher was left entirely to the journalists themselves. In September and October both articles were indeed published. Rosemary Mirondo's piece appeared under the title 'Dar still grapples with malnutrition' in *The East African* (Mirondo 2014), a weekly online news publication focusing on economic and political issues in the region, and Edward Qorro's piece 'Dar scores high marks on nutrition' appeared in *The Citizen* (Qorro 2014), a leading Tanzanian English language news site.

At the time of our analysis, in November, little evidence could be found that either publication had directly stimulated any social media activity. Searches based on the content of the articles failed to find any related online documents or posts. The published version of Rosemary Mirondo's piece indicated that there had been two tweets of the article, but no evidence of this could be found independently. However, in mid-December 2014, two months after the article was originally published, Qorro's article appeared to have been picked up by a number of other online African news sites, including *Tanzania Today*, *PressTZ*, *Trending Newsroom* and Africa.widmi.com. Unfortunately this occurred too late to appear in any of the online searches used to test our prototype real-time monitoring system. However, it was encouraging, not least because it contradicted the commonly held assumption that news cycles are invariably brief.

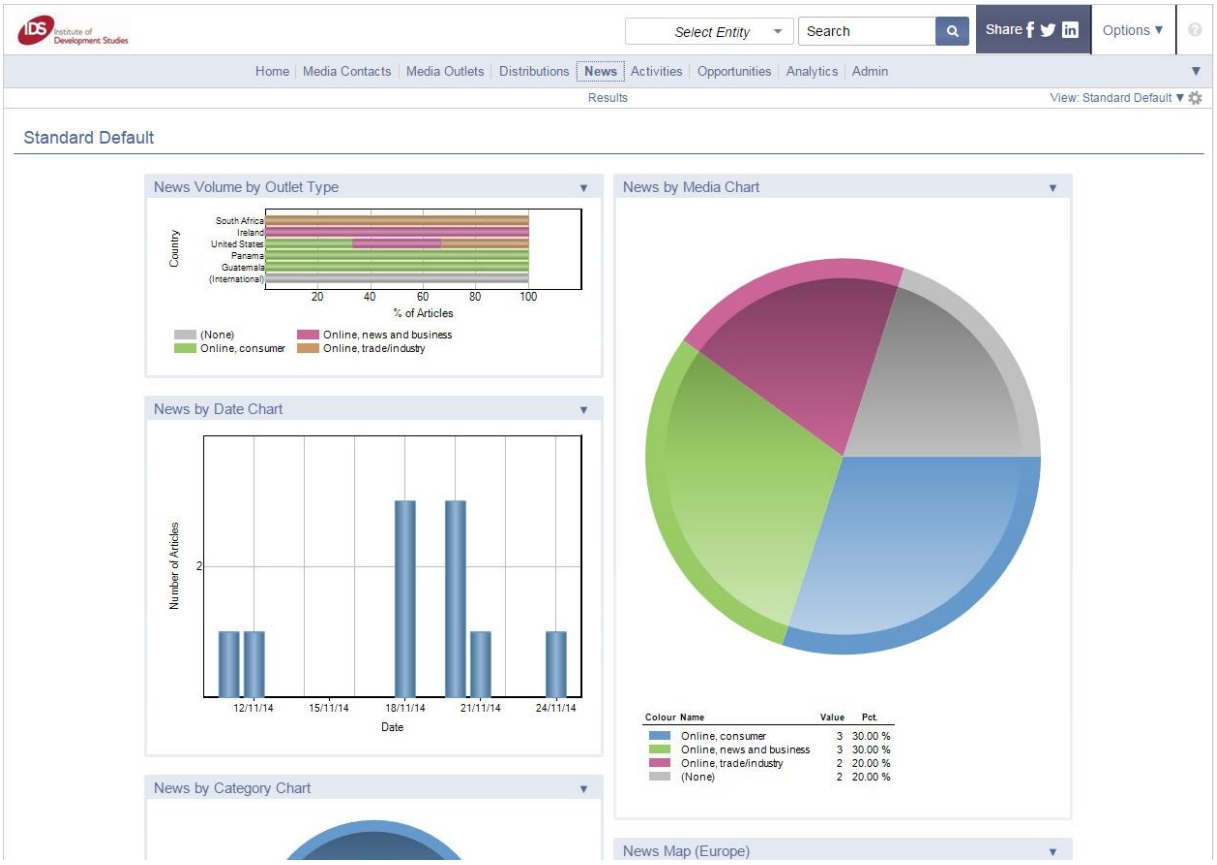
2.5 Visualisations

As a next step, and in light of the PANITA experience, we decided to concentrate on mapping the data that we had been able to generate through Vocus, Meltwater and Zapier. These three applications can each export search results in spreadsheet form, which can then be read by other applications in order to generate maps, graphs and other visualisations. Being highly sophisticated applications, Vocus and Meltwater are also fully capable of generating their own visualisations, as Figures 2.1 to 2.3 demonstrate (using HANCI search data).

Some typical visualisations from Vocus, including various types of charts, graphs and geographical maps are shown in Figures 2.1 and 2.2.

Figure 2.3 shows similar visualisations generated for the same HANCI search, but this time using Meltwater instead of Vocus.

Figure 2.1 Vocus visualisation using HANCI search



Source: Authors' own.

Figure 2.2 Vocus visualisation using HANCI search

Source: Author's own.

Figure 2.3 Meltwater visualisation using HANCI search

Source: Author's own.

The range of visualisations that Vocus and Meltwater produce is impressive and meets a variety of needs, particularly for visualising brand awareness or market penetration of products. However, neither application produces precisely the kind of chronological visual presentations envisaged by this study. Zapier, moreover, has no functionality at all for generating graphical displays. We therefore decided to use Tableau, a leading commercial data visualisation application, to design bespoke visualisations for this study.

2.6 Developing a prototype real-time monitor

A prototype real-time monitoring (RTM) system was designed and built, for the sake of this study, as a three-stage process:

1. The search results are exported from Vocus, Meltwater and Zapier in CSV (comma-separated values) or spreadsheet format.
2. The export files are cleaned and formatted according to the requirements of Tableau.[1]
3. The cleaned files are read by Tableau, and the resulting visualisations are created using the Tableau drag-and-drop user interface.

Five different export files were produced from five HANCI searches, differentiated in terms of search time periods, data types, search applications and/or search strings:

[1] For our study this work was carried out manually. However, for further development of the prototype, the data cleaning and formatting could be easily automated by coding relatively simple routines in, for example, Visual Basic.

Table 2.3 HANCI searches

Search	Application	Type	Data	Period
1.	Vocus	Boolean*	News and social media	11 April 2013–27 November 2014
2.	Meltwater	Boolean*	News media	28 January 2014–8 December 2014
3.	Meltwater	Boolean*	Social media	3 November 2014–3 December 2014
4.	Zapier	Hashtag: #HANCIndex	Twitter	17 November 2014–25 November 2014
5.	Zapier	Hashtag: #nutritionlive	Twitter	29 November 2014–13 December 2014

*Boolean search string: ("HANCI" OR "IDSNutrition" OR "HANCIndex" OR "Hunger and Nutrition Commitment Index") AND ("hunger" OR "nutrition" OR "development" OR "poverty" OR "malnutrition")

The specific IDS configurations of Vocus and Meltwater made it more practical to combine the news and social media searches in Vocus (Search 1), while carrying out separate news media and social media searches in Meltwater (Searches 2 and 3).

In a fully developed real-time monitoring application, two or more of these five spreadsheet files could be combined to enable richer data visualisations. But for the prototype the best results were achieved by keeping the files separate. In addition, because Vocus, Meltwater and Zapier all generate slightly different search results and employ different data structures it was felt that useful insights might be generated by comparing the visualisations produced using the different applications.

A future version of the real-time monitor could also incorporate other data into the visualisations, in particular the dates of key research publications and events. In the case of HANCI, three key events in the latter half of 2014 were significant for this study:

1. Publication of *The Hunger And Nutrition Commitment Index (HANCI 2013): Measuring the Political Commitment to Reduce Hunger and Undernutrition in Developing Countries*, **IDS Evidence Report 78,** 24 June 2014 (te Lintelo *et al.* 2014)
2. Publication of *The HANCI Donor Index 2013: Measuring Donors' Political Commitment to Reduce Hunger and Undernutrition in Developing Countries*, **IDS Evidence Report 99,** 18 November 2014 (Lakshman and te Lintelo 2014)
3. E-discussion on *What needs to happen NOW to end global malnutrition?* organised by the Global Nutrition Report on 3 December 2014 (GNR 2014)

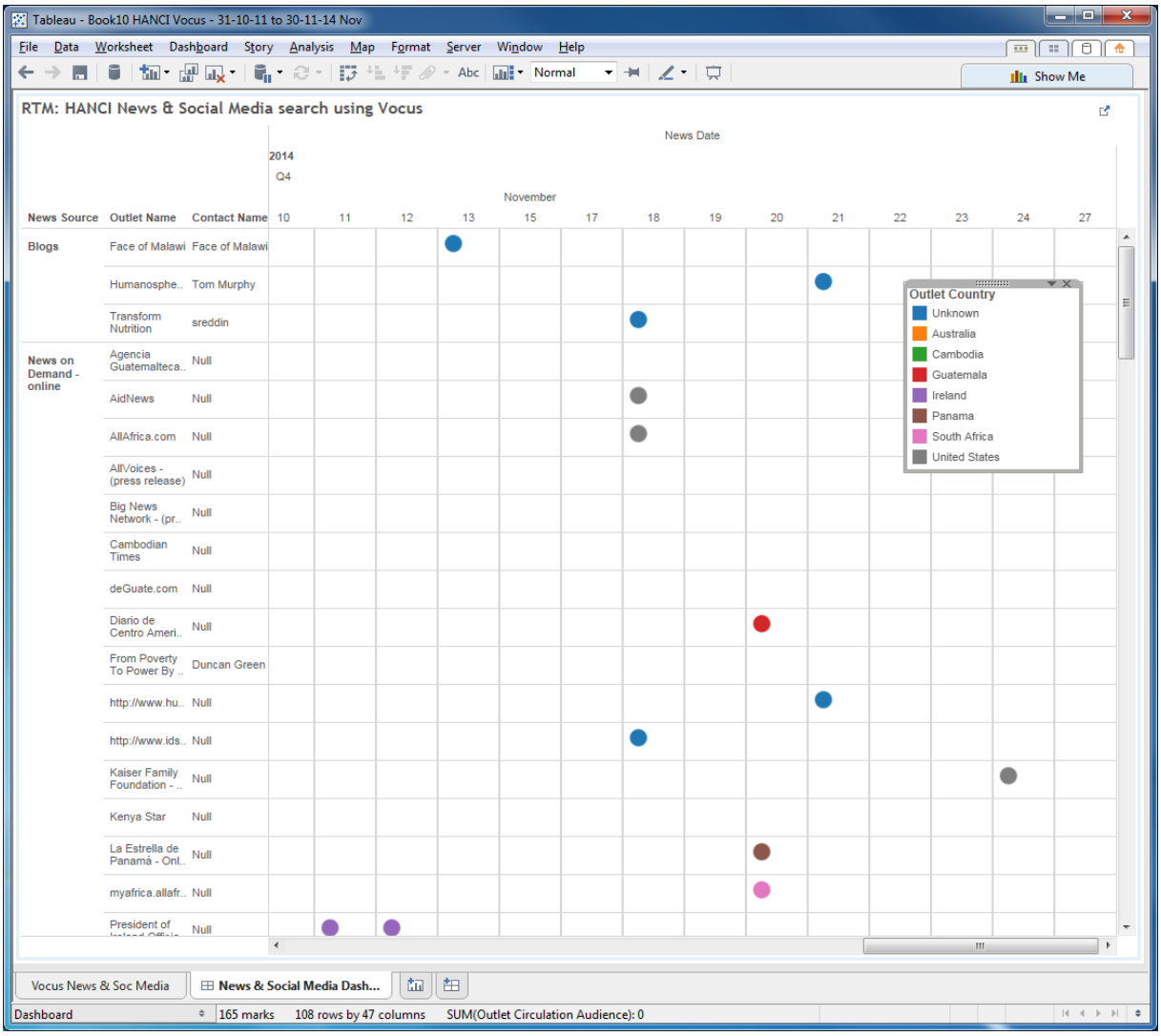
The next few sections present the visualisations achieved using these five different searches.

2.6.1 Search visualisation 1

This first search, carried out using Vocus, was the broadest in terms of data types and time period (more than 18 months). It searched all the standard social media platforms (such as Facebook, Twitter, LinkedIn, YouTube and Instagram) as well as the full range of Vocus-indexed news websites. The 18-month search period was chosen partly because IDS acquired Vocus several years ago (and therefore had amassed several years of relevant data), and partly because in principle Vocus makes it relatively easy to cover a wide variety of data types in one search, which increases the likelihood of finding search results over a longer period. That said, there were some slight idiosyncrasies in the way Vocus dealt with the IDS data. In particular, although the news data and Twitter data covered the entire 18-month period, the Facebook data only covered the final three months of this period.[2]

[2] Because this search was so broad it resulted in an extremely large visualisation, which is easy to view on a screen but difficult to show in its entirety in print. The X-axis (time) is necessarily long, in order to cover an 18-month search period broken down by

Figure 2.4 Partial view of RTM Vocus data visualisation field



Source: Authors' own.

Vocus handles news sources and social media sources slightly differently. Consequently the Y-axis has not one, but two field names for the identifiers: Outlet Name and Contact Name. Outlet Name works well for news sources but not for social media, while the reverse is true for Contact Name. Also in this visualisation, the data points are colour-coded by country, according to the key in the top-right corner of Figure 2.4. The search data from Vocus only provide country values for news data, not social media data, so all social media data are coloured blue to signify that the country of publication is unknown.

As Figure 2.5 shows, a customisable roll-over window enables a range of additional information to be displayed whenever the cursor lands on individual data points. This is particularly useful for presenting key text such as headlines and the first few lines of content. However, in this particular search many of the more quantitative data fields were empty. So, for example, there were no data about circulation figures for news outlets or follower

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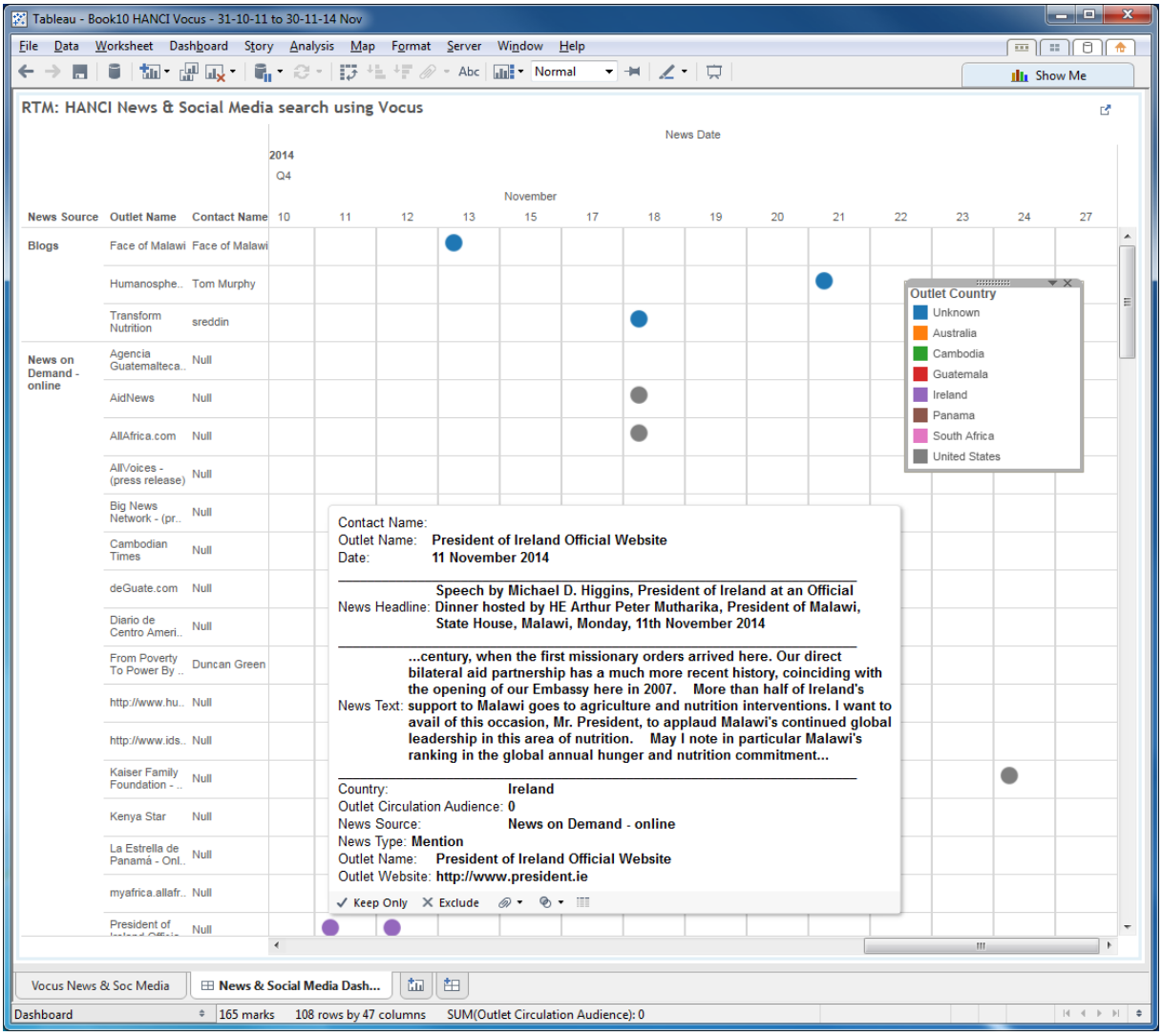
individual days. By default Tableau only shows days that contain data, so all 'empty' days are hidden. This reduces the length of the axis, but of course also creates a distorted 'topological' display, which can make it harder for the user to visualise the true significance of the spread of data because, in effect, the impression is that data are more evenly spread throughout the period than is actually the case. The Y-axis consists of identifiers of all the authors (individuals or organisations) of contributions picked up by the search. The fact that the search included both news and social media means that this axis is also very long, so Figures 2.4 and 2.5 show only particular sections of the whole visualisation.

numbers for Twitter. When present, such data often provide a crude but useful indicator of the influencing capacity of a particular organisation or individual. Without this, it is difficult to differentiate between the relative significance of different data points in the visualisation; a tweet from the Irish president or a major international news outlet cannot, at a glance, be distinguished from a tweet by a member of the public.

Figure 2.5 Partial view of RTM Vocus data visualisation field showing roll-over window



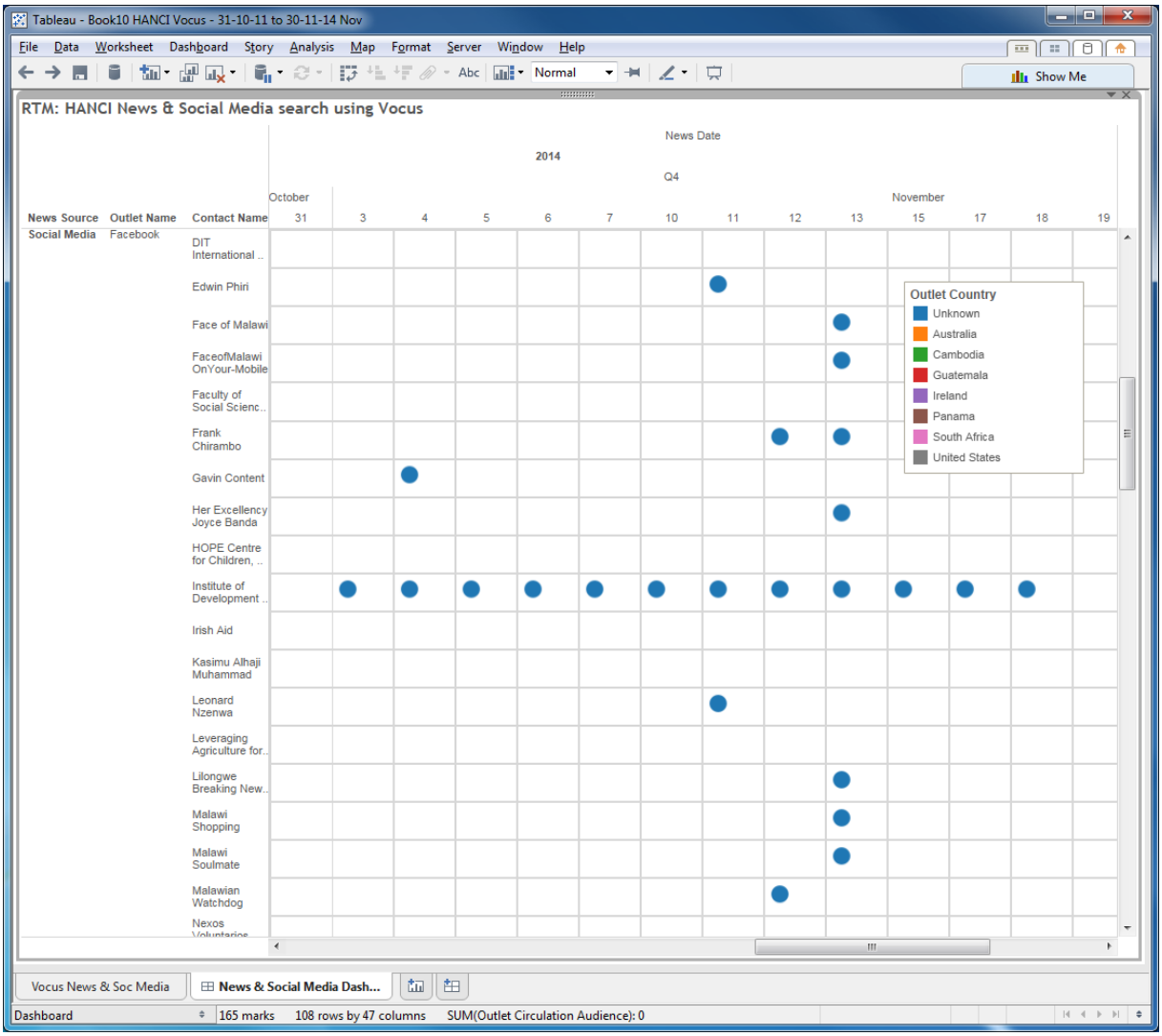
Source: Authors' own.

Overall, this type of comprehensive display most closely resembles some of the standard visualisations provided by media monitoring applications such as Vocus and Meltwater, but it is probably one of the least useful in terms of the goals of this study. This visualisation is so broad that it can make it difficult to infer possible causal links between different data points (i.e. whether a particular document or post may have been inspired or informed by an earlier document or post).

Nonetheless this search did provide some interesting data patterns that suggest some *apparent* correlations between different publication activities. For example, as the top three rows in Figure 2.4 show, from a total of 167 items only three were classified as blogs. If this pattern were confirmed for other research publications it might suggest that external blogs

may not be a significant communication medium for this kind of publication. However, Vocus only knows about the blogs that it has indexed, so it is perfectly possible that HANCI did indeed feature on other blogs that simply were not picked up by the original search. Also the boundary between what constitutes a blog and what constitutes a so-called news site is becoming increasingly blurred in the online world, so it could be argued that some of the news results in the search might be equally well described as blogs. This is surely true, for example, in the case of *From poverty to power*, an influential Oxfam blog by Duncan Green, which Vocus categorises in Figure 2.5 as a news source, not a blog. Manual re-categorisation would easily resolve these issues as they arise, but ideally it would be desirable to have consistent categorisation standards in place to avoid the need for manual intervention.

Figure 2.6 Partial view of RTM Vocus data visualisation field showing Facebook data



Source: Authors' own.

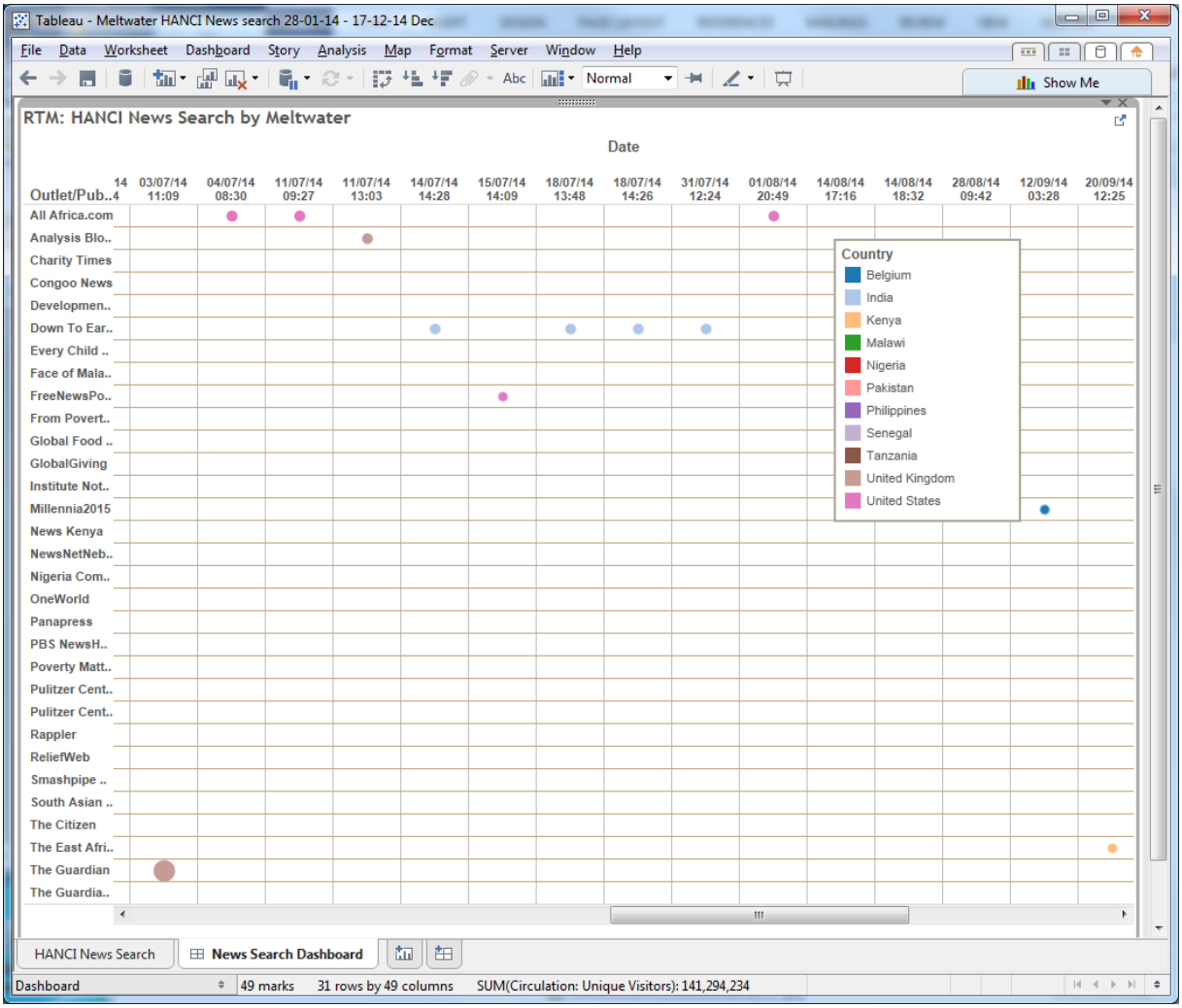
Another interesting observation is the marked spike in Facebook activity on the 13 November (Figure 2.6). In the months prior to 12 November there are very few Facebook posts: between zero and two per day (many of which are from the IDS Facebook page itself, and therefore in a sense 'do not count'). On 13 November this jumps to ten posts, mostly from Malawian Facebook accounts. This was no doubt triggered by comments from Irish

President Michael Higgins, during his opening remarks at the Second International Conference on Nutrition (ICN2) in Rome, during which he praised Malawi for its performance on HANCI. What is particularly interesting about this is that, in publicity terms, it was largely a social media event; there was very little identifiable news media coverage of this event. This helps to underline the significance of social media as an important communications medium in its own right.

2.6.2 Search visualisation 2

A news media-only search for the second visualisation was carried out using Meltwater. Despite the fact that Vocus and Meltwater both carry out essentially the same function, there are considerable differences between both the structure and content of the search data they generate. Meltwater data contain fewer fields than Vocus, but the fields generally seemed to contain more useful data, and the structure was easier to work with. For example, Meltwater provides circulation information (based on webstats data for page views and unique visitors). We were able to use these data to vary the size of each data point in order to present an instant crude visual indication of the relative influence of each news source. So the large light brown circle in the lower left corner of Figure 2.7 is conspicuously bigger than the other data points because this data point represents *The Guardian* newspaper website, which has a very large online audience compared to the other sources.

Figure 2.7 Partial view of RTM Meltwater news media visualisation field

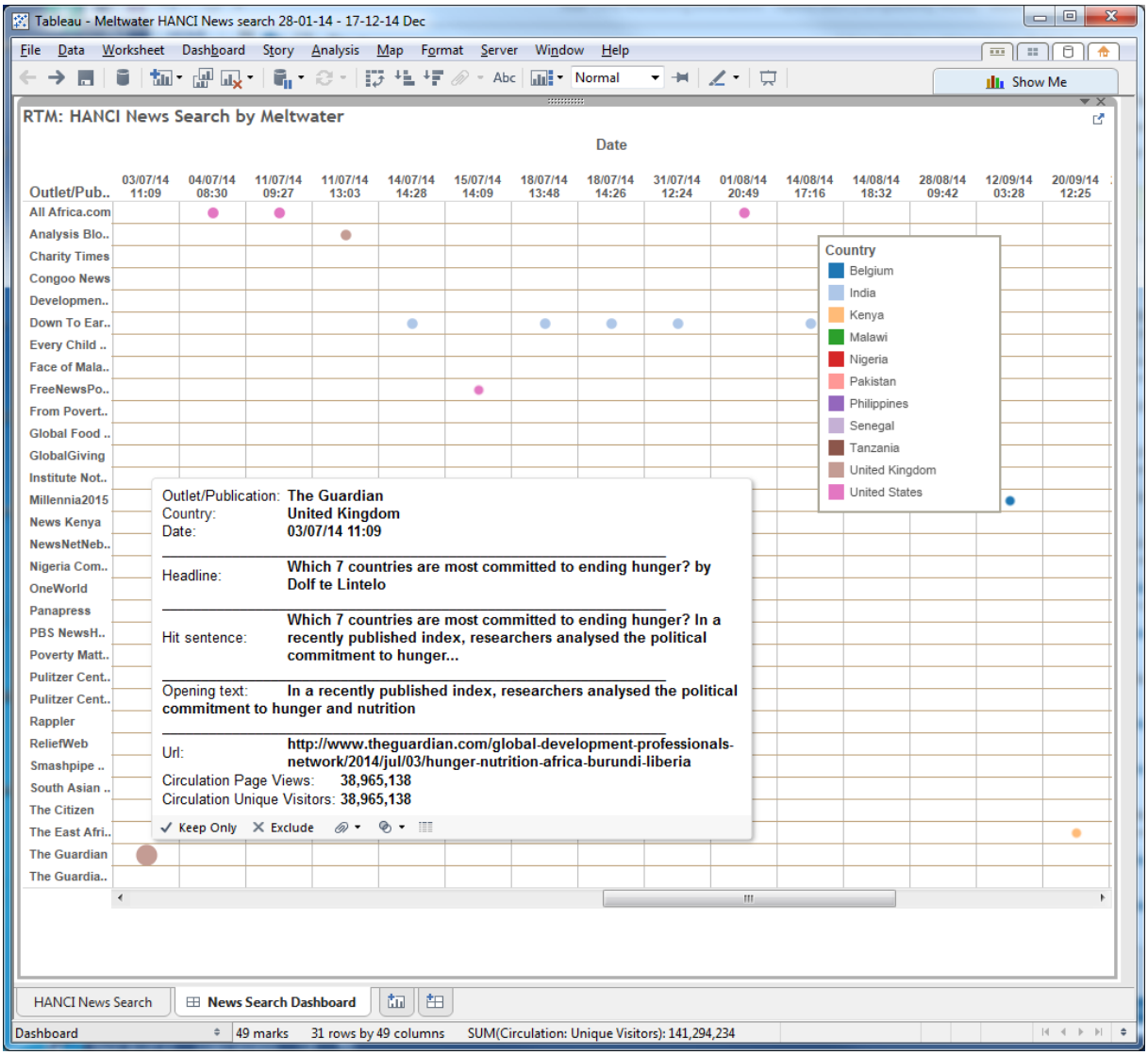


Source: Authors' own.

The main differences between the Meltwater and Vocus news search data are the news sources themselves. Vocus identified 16 online news sources and Meltwater identified 31. Yet despite the fact that both searches were carried out using exactly the same Boolean expression, the two searches only found two common news sources: AllAfrica.com and Duncan Green's blog, *From poverty to power*. Not surprisingly therefore, the detailed pattern of news media activity in the two searches is slightly different (which merely proves that not all news organisations cover the same stories). But in broad terms the patterns share the same two peaks in media activity (July 2014 and November 2014), which correspond to the publication of the two major HANCI reports referred to earlier. In common with traditional news cycles, these peaks are quite short in duration, lasting no more than a few days.

The richer data in the Meltwater search results allowed more data to be displayed in the roll-over window (Figure 2.8). However, as with the Vocus data there is still no obvious way, apart from manual analysis of the content, to consistently infer relationships or 'paths' between different data points.

Figure 2.8 Partial view of RTM Meltwater news media visualisation field showing roll-over window

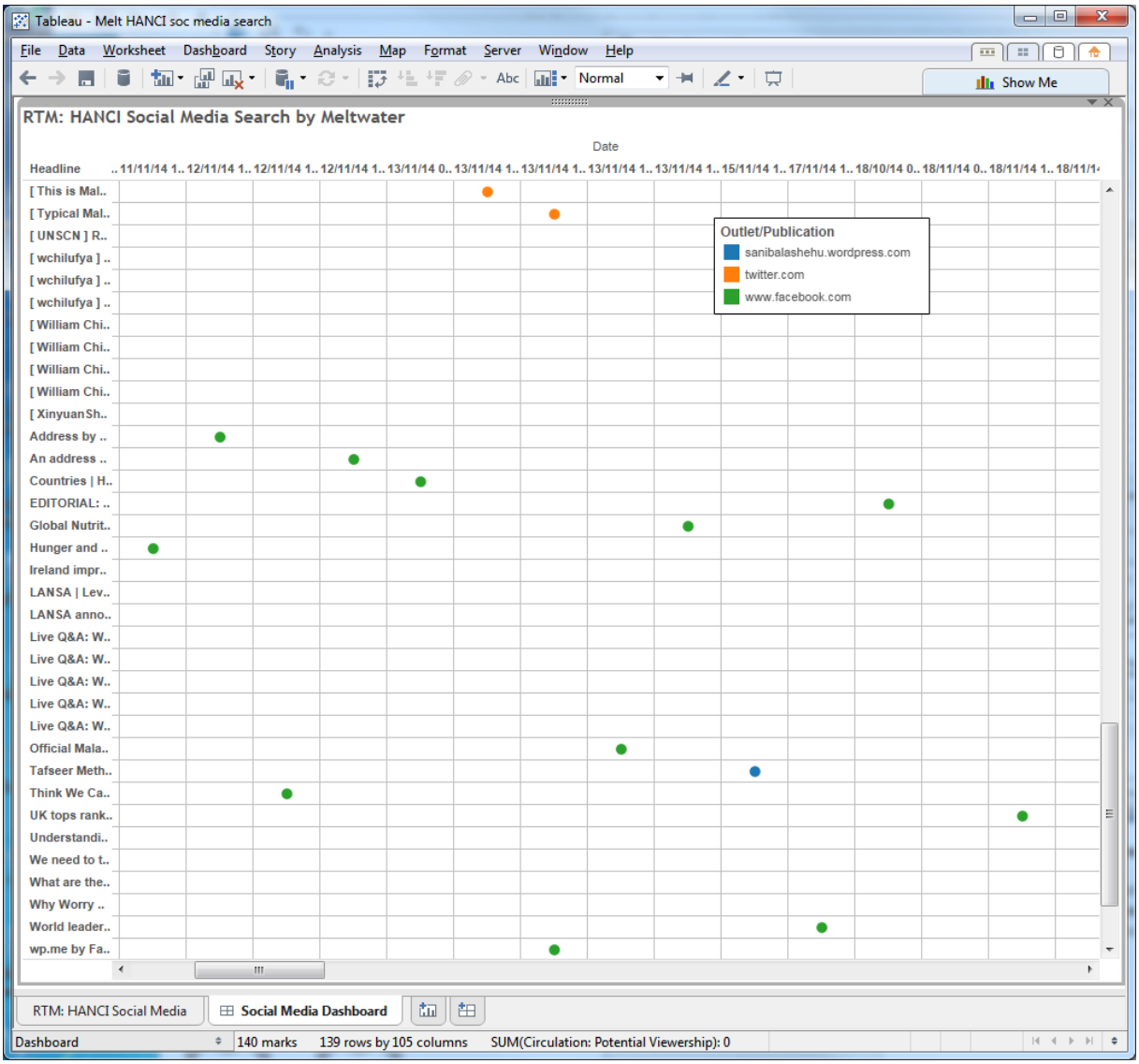


Source: Authors' own.

2.6.3 Search visualisation 3

To complete the comparison between the Vocus and Meltwater visualisations, a social media-only search was also carried out using Meltwater. Inexplicably, the Meltwater search data did not appear to contain any identifiers for authors or institutions. Instead it simply classified all items under their respective platforms; so for example, all tweets appeared under Twitter.com and all Facebook posts under Facebook.com. Consequently the Y-axis in Figures 2.9 and 2.10 is populated with the headline of each post, rather than with the identity of the individual or organisation responsible for publishing it.

Figure 2.9 Partial view of RTM Meltwater social media visualisation field

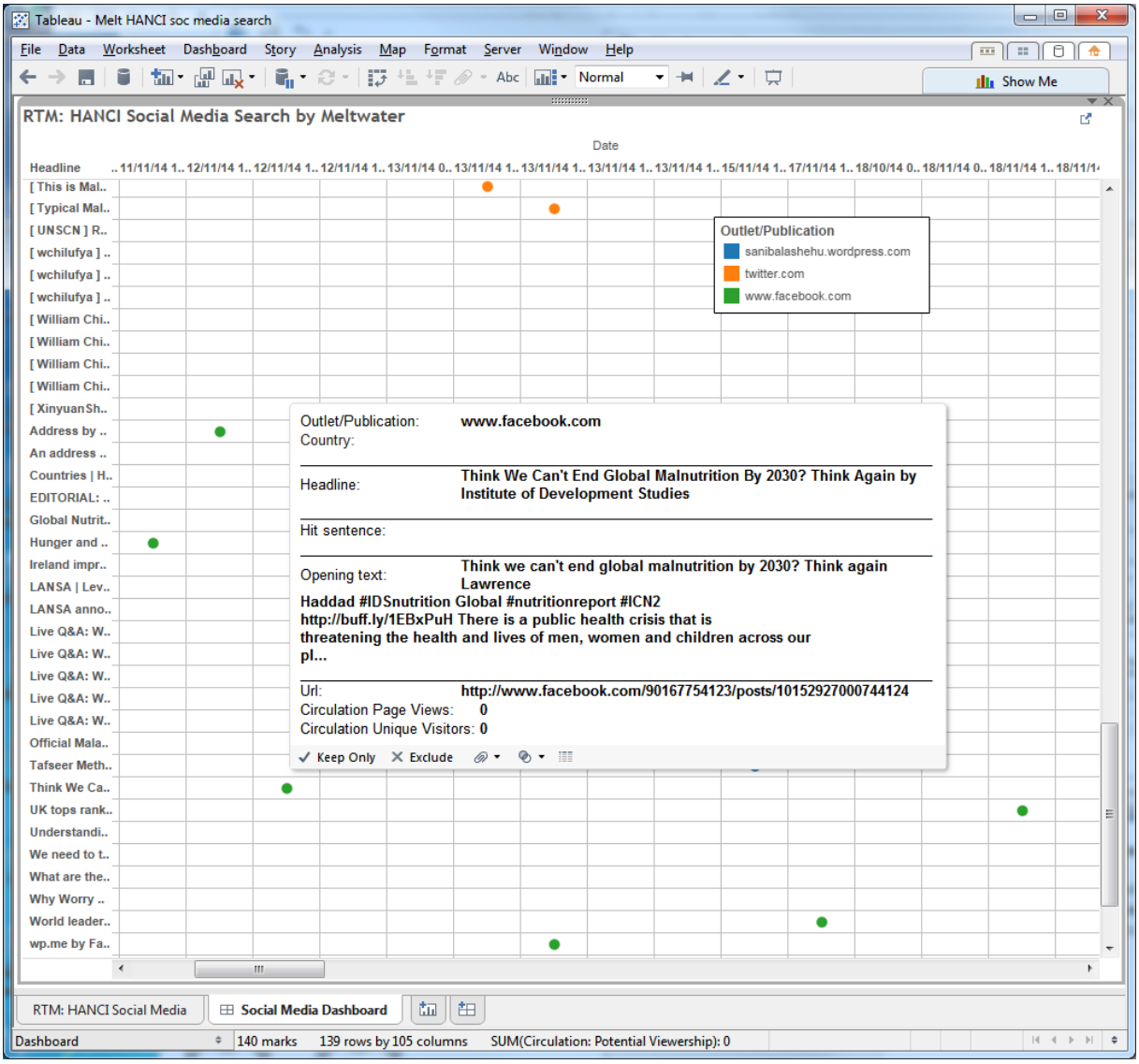


Source: Authors' own.

The search also contained no data relating to circulation (e.g. number of Twitter followers). So as with the Vocus search there is no way to discern the relative popularity of different social media publishers and, once again, this suggests that Meltwater, like Vocus, treats news media searches and social media searches rather differently. This distinction between the two types of media again proved troublesome for blogs. The news media visualisation (Figure 2.8) featured the Duncan Green blog, while the social media visualisation also featured a blog: Sanibalashehu's Weblog (the blue data point in Figure 2.9). So the question of whether a blog is a news medium or a social medium appears unresolved. This is

potentially more than just a problem of semantics if it means that search applications arbitrarily list different blogs in different types of search results.

Figure 2.10 Partial view of RTM Meltwater social media visualisation field showing roll-over window



Source: Authors' own.

2.6.4 Search visualisation 4

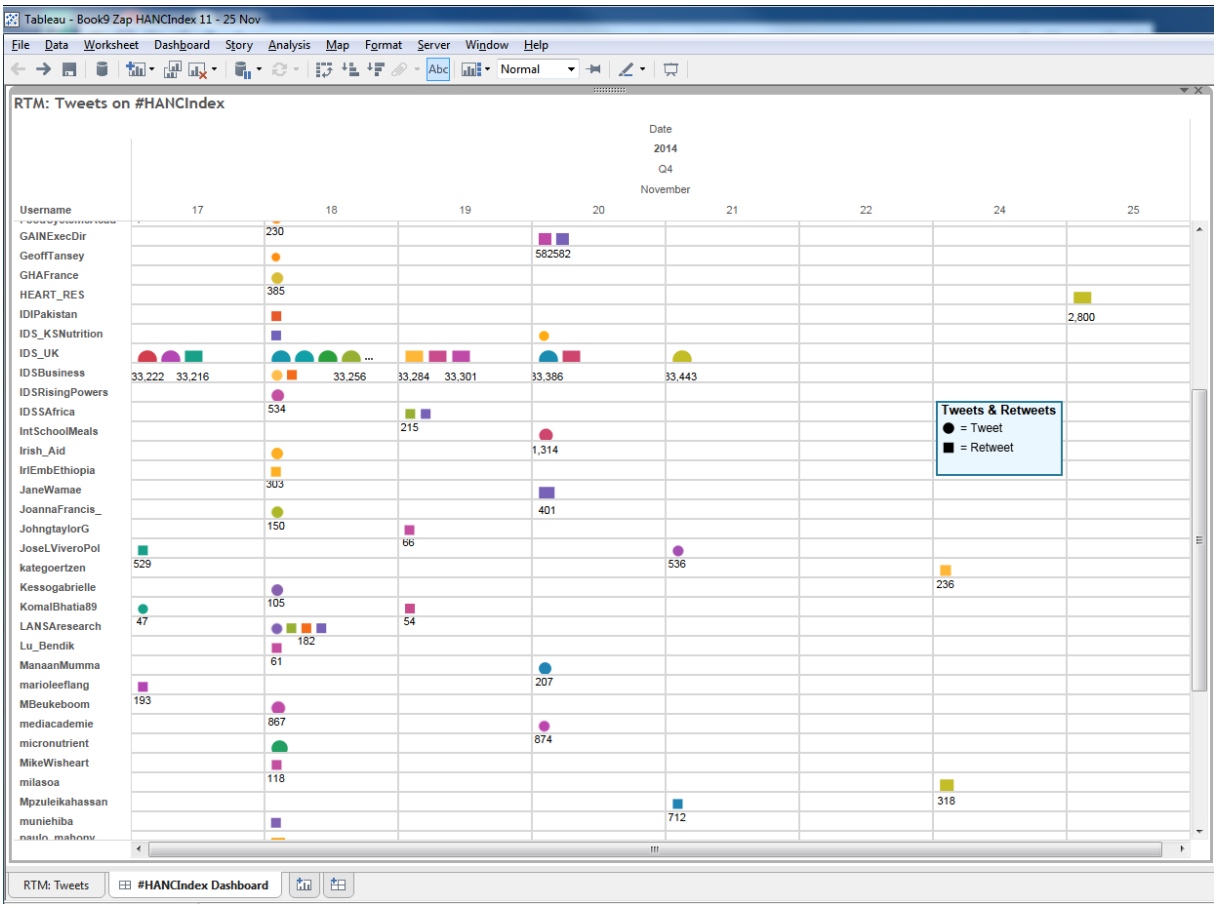
The final two visualisations were much more focused. Searching only Twitter data, they both employed a Zapier search on a particular hashtag over a short period. By focusing in this way it was possible to construct visualisations that came much closer to the aims of the study because we were able to display chronological pathways of data where individual messages were picked up and re-sent by subsequent authors.

In the case of the fourth visualisation, the hashtag was #HANCIndex, and the search period was just the eight days between 17 and 25 November 2014, which was the period surrounding the publication of the 2013 index on 18 November. The #HANCIndex hashtag was used by the IDS Communications team for all Twitter messages sent as part of the publicity campaign to promote publication of the index. The main visualisation is shown in

Figure 2.11, together with a small key indicating that an original tweet is represented by a circle, while a retweet (a copy of a tweet re-sent by a subsequent Twitter user) is represented by a square.

This visualisation also uses the number of Twitter followers as a proxy indicator for the popularity (and thus in crude terms, the potential influence) of each Twitter user. A label showing the number of followers is displayed next to each data point. This number is also used to vary the size of each data point: small data points indicate relatively few followers, while large data points indicate many.[3]

Figure 2.11 Partial view of RTM Zapier #HANCIndex visualisation field



Source: Authors' own.

[3] To show the visualisations in print, the X-axis is divided into days, which in some cases means the data are truncated because of space restrictions. By changing the units from days to hours, however, this view is easily expanded to display all data points and labels.

Crucially Figure 2.12 shows an accompanying menu that colour-codes each original tweet. All data points sharing the same colour are therefore retweets of a single original tweet.

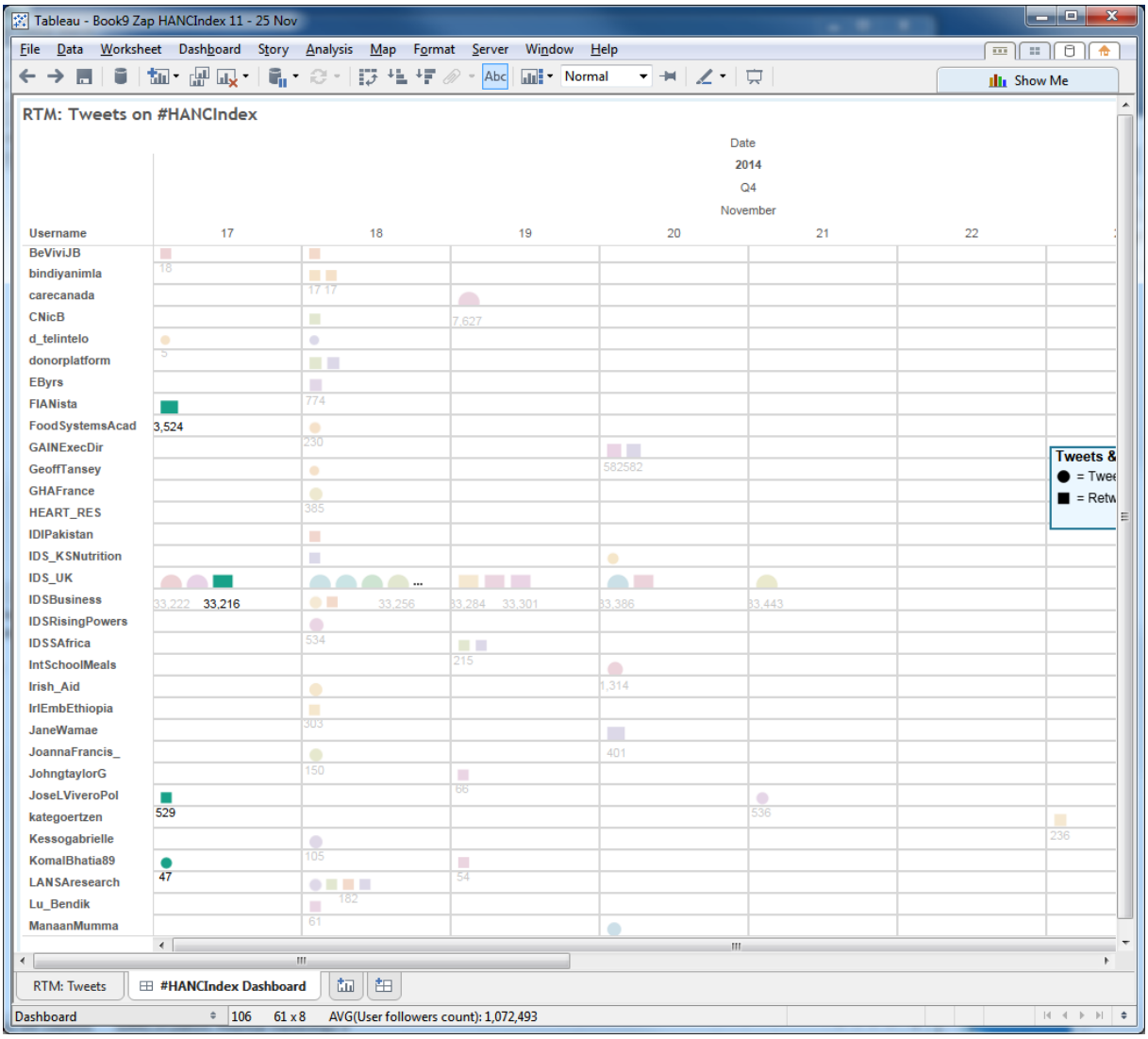
Figure 2.12 RTM Zapier visualisation tweet menu

Source: Authors' own.

When the user selects a tweet from this menu, the main visualisation screen highlights this tweet and all its associated retweets to show the chronological thread of relayed messages. The highlighted blue-green data points in Figure 2.13 show an example of this, where an original tweet by KomalBhatia89 on 17 November was retweeted by JoseLViveroPol, IDS_UK and FoodSystemsAcad on the same day.

One interesting observation is that the majority of Twitter threads were comparatively short, both in duration and in terms of the number of retweets. Retweets typically occurred within a few hours of the original tweet. Many were not retweeted of course, but when they were, they were typically retweeted between one and three times. This finding supports the work of other researchers. For example, in their work on Twitter path analysis, Zhang, Jansen and Chowdhury (2011) found that most tweets are read within one-and-a-half to four hours of being sent.

Figure 2.13 Partial view of RTM Zapier #HANCIndex visualisation field showing Twitter thread

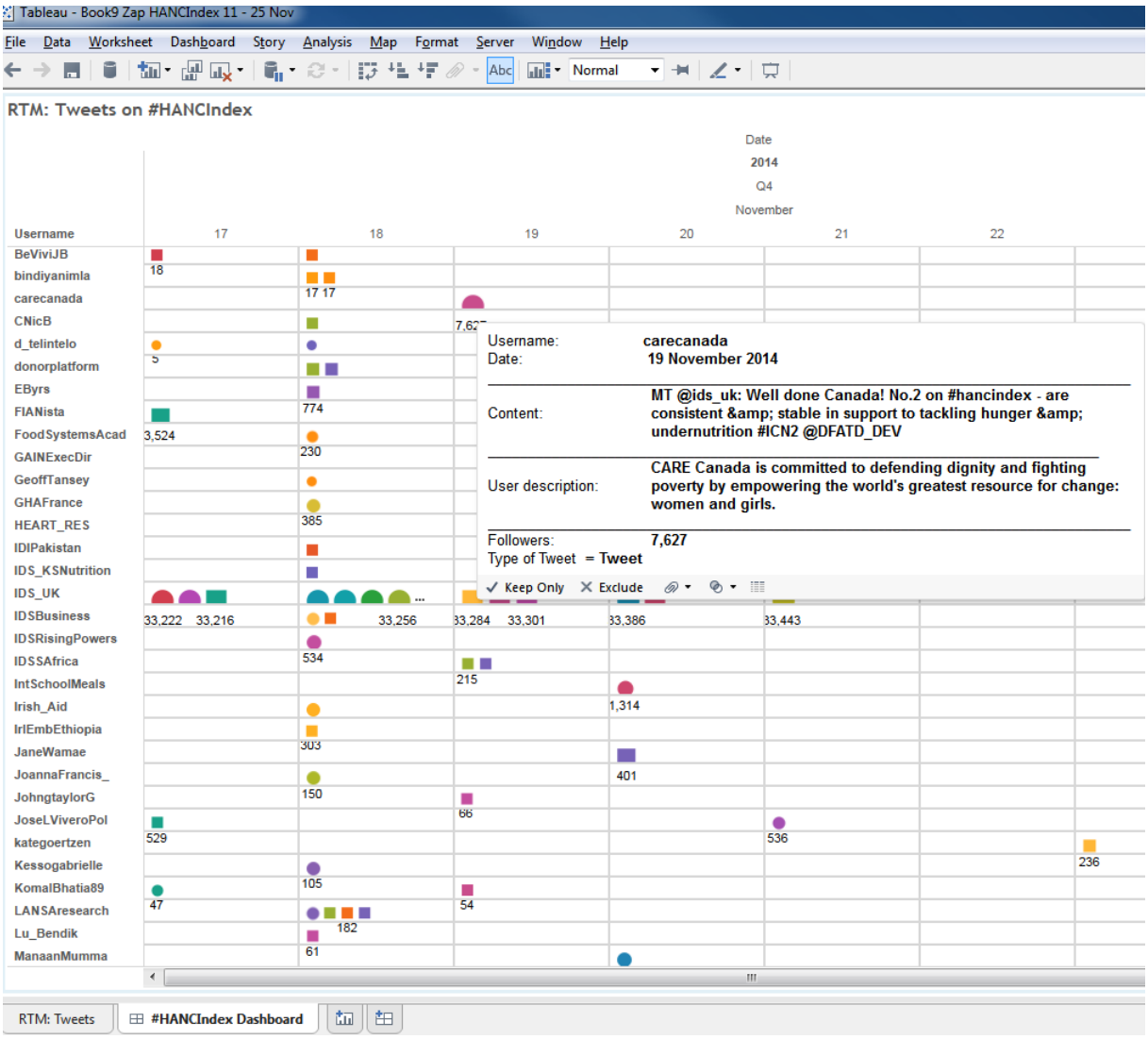


Source: Authors' own.

As Figure 2.14 shows, the roll-over window provides the following useful information for each data point:

- Twitter user-name
- Date
- Content of the tweet
- The Twitter user's profile
- Number of followers
- Flag to indicate whether this is a tweet or a retweet.

Figure 2.14 Partial view of RTM Zapier #HANCIndex visualisation field showing roll-over window

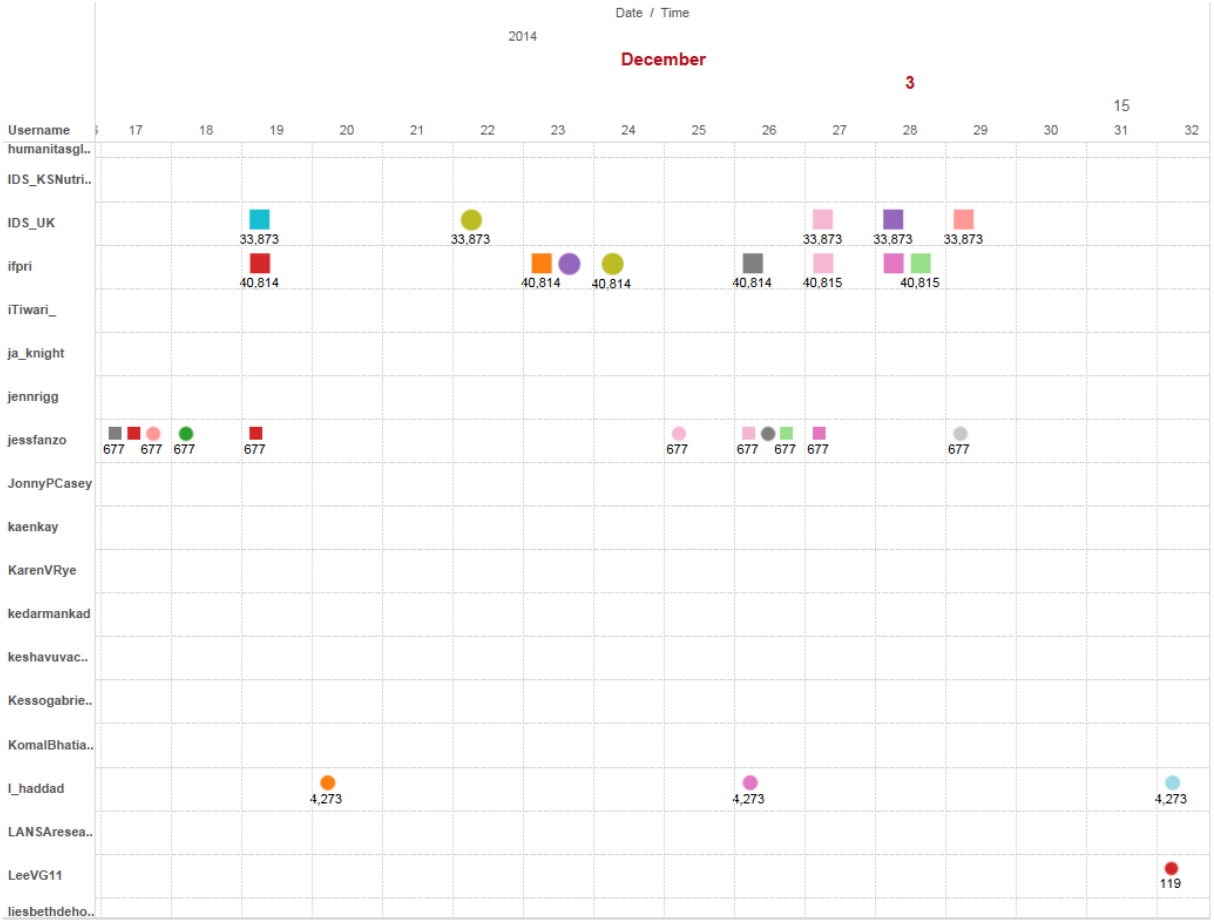


Source: Authors' own.

2.6.5 Search visualisation 5

This final visualisation used the same approach as the previous one, the difference being that this time the search used the hashtag: #nutritionlive. This was the hashtag chosen for the Global Nutrition Report's Twitter-based e-discussion, *What needs to happen NOW to end global malnutrition?* that took place on 3 December 2014.

Figure 2.15 Partial view of RTM Zapier #nutritionlive visualisation field

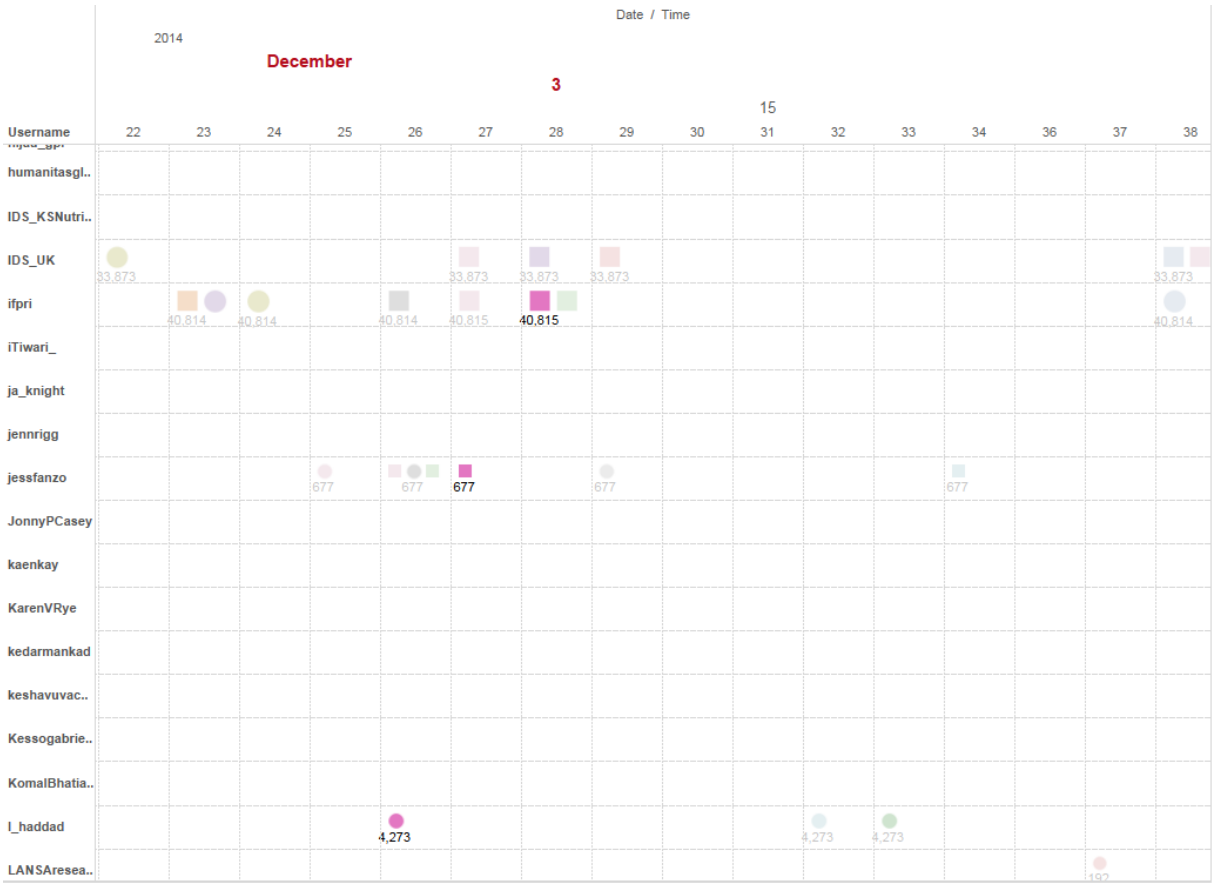


Source: Authors' own.

Clearly an online debate is a different type of event from the publication of a report, but the Twitter activity was actually rather similar to the previous example, albeit more structured. The debate was informed by an expert panel comprising five nutrition specialists and the event was framed around three specific questions. The search indicated that the #nutritionlive hashtag was used from 1 December until at least 13 December, though most of the activity of course took place on 3 December. There were more than 100 participants, approximately 340 contributions, of which approximately 70 were original tweets, with the remainder being retweets. This was interesting in itself because it shows that most contributions were not offering new opinions so much as re-broadcasting existing ones. This is common Twitter behaviour and is of course one of the reasons why Twitter is favoured by marketing, advocacy and lobbying organisations: Twitter is a social amplifier which can, in the right circumstances, dramatically multiply the size of the audience for any given message.

As with the previous example, the visualisation was especially useful for distinguishing different tweet-retweet threads, as the example in Figure 2.16 shows. In this case a tweet from one of the panellists, l_haddad, was retweeted first by jessfanzo, then ifpri, then (outside the view in Figure a.16) Xinyuan Shang, swrajitsarkar, Chuti_MPH, GosaviGayatri. The figure shows that this all happened in the space of 15 minutes.

Figure 2.16 Partial view of RTM Zapier #nutritionlive visualisation field showing Twitter thread



Source: Authors' own.

What this approach does not achieve, however, is any kind of automatic analysis of how ideas and opinions evolve from one data point to the next. Only retweets, exact copies of the original tweet, are automatically linked together. Modified tweets, where a retweet has been edited before sending, are not detected using this approach, so cannot be linked by the software. However, in principle this feature could be built into this approach because the Twitter API uses the variable 'MT' to record the fact that a tweet is a modified version of an earlier tweet. The problem that we encountered was that the MT (modified tweet) data did not appear to be consistently recorded by the Zapier searches.

Even if this technical problem were solved, however, this approach would not automatically record the situation where a user writes an entirely new tweet as a result of reading an earlier tweet from someone else. So tweets that conceptually do indeed form a common thread would still not necessarily be identified as such by this system. Achieving this would still require some kind of natural language processing or software-based text analytics.

From a software ergonomics perspective, the ability to highlight groups of data points belonging to the same thread would be enhanced if the system also drew lines to connect the points on screen. This proved too complex within the particular approach taken with Tableau, but it should be achievable with the development of a bespoke real-time monitor interface. A relatively simple routine could be written to generate the required Cartesian coordinates that could then be linked together automatically.

Table 2.4 Visualisation summary

Visualisations	Main points
1. Vocus (news and social media)	• Largest range of data sources • News and social media data handled differently, so difficult to visualise together • Lacking useful descriptive data • No proxy indication of relative popularity (potential influence) of each source • Difficult to visualise relationships between different data points • Possible correlations observed between data and real-world events
2. Meltwater (news media)	• More descriptive data (e.g. webstats for each source) • Able to show proxy indication of relative popularity (potential influence) of each source • News sources differ from Visualisation (1), despite similar search • Difficult to visualise relationships between different data points • Possible correlations observed between data and real-world events
3. Meltwater (social media)	• Lack of differentiation between different sources (most presented as either Twitter.com or Facebook.com) • No circulation data for each source • No proxy indication of relative popularity (potential influence) of each source
4. Zapier #HANCIndex (Twitter)	• Targeted search on a single Twitter hashtag • Only shows Twitter data • Able to show proxy indication of relative popularity (potential influence) of each source • Shows tweets and retweets, so shows chronological paths of information • Roll-over window displays useful data, including user profile of the author of each tweet
5. Zapier #nutritionlive (Twitter)	• Targeted search on a single Twitter hashtag • Only shows Twitter data • Able to show proxy indication of relative popularity (potential influence) of each source • Shows tweets and retweets, so shows chronological paths of information • Roll-over window displays useful data, including user profile of the author of each tweet • Provided a useful visual description of an electronic debate

3 Conclusion and next steps

A key goal of this study was to explore the possibility of developing software applications to assist in the analysis of research influence pathways by using data gathered from social media. The qualified conclusion is that the development of such applications is indeed feasible with current technology, but significant challenges exist. In spite of these challenges, however, even a limited or incomplete application could be a very useful tool to complement and support more labour-intensive manual approaches and human expertise.

3.1 Challenges

Any approach of this kind relies on the quality of the data to which it is applied. The quality of the data, in turn, depends on the quality of the search methodologies used to find them. Whether searching traditional web pages, online news sources or social media, the challenge is to be able to search large sections of the internet, which is arguably the largest, most complex, most diverse and in some sense, the most disorganised repository of human knowledge yet created. This can make the search process difficult because in our case we are searching the internet not to locate a single document or piece of information, as one might when carrying out a routine Google search, but to find a broad collection of data that, if correctly interpreted, could describe a conceptual path through which a piece of research evidence influences events in the real world. In addition, trying to make sense of what constitutes a citation record in the disorganised and organic landscape of the online world is itself a challenge. Online searches produce uneven results, partial data and often a complete absence of authoritative metadata. This is made even more challenging in the case of social media because user behaviour is characterised by immediacy and informality and tends not to routinely adopt uniform referencing practices.

The ‘signal-to-noise’ problem, where one strives to maximise the number of relevant search results while minimising the number of irrelevant results, has already been discussed. This can be made more difficult when searching for social media references to research publications because of an additional issue, which might be termed the ‘Goldilocks’ problem. During the early stages of this study for example, test searches were carried out using many different types of applications, but often the number of social media references to particular research publications was vanishingly small. So the ‘signal’, to use the engineering metaphor once more, was extremely faint. This was often the case even when the publication in question had impressively large numbers of downloads. So despite the fact that plenty of people were downloading publications, few were apparently willing to comment about them online. By contrast the ‘noise’ was often huge. We referred earlier to the vast number of social media references to the Turkish restaurants bearing the name ‘HANCI’, but this was true of many other searches too. This problem often persisted even with the most painstakingly designed and tested Boolean search expressions. The reason for this is fairly obvious. At any one moment, the total number of irrelevant online references (noise) concerning food, nutrition, developing countries or even the word HANCI, may be at least one or two orders of magnitude greater than the number of context-relevant (signal) references to the same thing. So generating a collection of useful data that is neither too small, nor too large (nor too noisy) can be difficult and very hard to predict because every search is unique.

As discussed earlier, using standard search engines to search the internet may be a good way to search a very large volume of online material, but the actual quality of the data produced by such an approach can often be extremely thin and jumbled. More useful searches are therefore generally better attempted using the type of intermediary search applications described above. However, regardless of the type of application used, these searches are always limited by the amount of material available to the application itself. Citation metric, alternative metric and media monitoring applications only search the

materials that they have already indexed. Similarly, applications that carry out searches via the API gateways of particular social media platforms will, by definition, only search material specific to those platforms. This is not necessarily a problem for many routine searches, but the type of real-time monitoring search required for this study is more of a forensic search: one is essentially searching for *any* evidence from *anywhere* on the internet. So to be truly effective, this approach needs to be able to bring together several different search techniques at the same time. In software terms of course, this means being able to harness the power of several normally separate and distinct software applications.

Finally, whether one considers traditional news media or online social media, news cycles tend to be brief. References to particular research concepts tend therefore to come in bursts. A news cycle appears when a particular report is published, or a conference takes place or some other newsworthy event occurs, and then it quickly disappears again. It may be some time before a related news cycle occurs again. As the Twitter-based visualisations showed, it may be possible to track threads within a specific news cycle, but making the much more useful, longer-term links between related news cycles over much greater timescales may be a good deal more challenging.

3.2 A viable application?

Despite all these caveats, it is our belief that a useful application could indeed be developed to help track pathways of influence in online spaces. At the simplest level for instance, a basic approach similar to the one described in visualisations (4) and (5) could be useful where the search space is small and clearly defined. One such example might be a long-running e-discussion forum. By restricting the entire data pool to nothing more than contributions to a specific discussion, the search problems described above virtually disappear. At the same time, an established, long-term discussion forum may run for sufficient time for real-world changes debated at a later point in the discussion to be linked back to debates about evidence earlier in the discussion.

A more ambitious and powerful approach could be developed too. As stated earlier, one essential aspect that this study did not explore in any detail is the use of software to aid in the process of analysing text. Such functionality would seem to be a prerequisite for any system that claims to be able to track how ideas evolve between different documents over time. However, this need not necessarily require sophisticated technology for natural language processing. For example, an application such as Meltwater records the extent to which each individual search result matches the Boolean search expression that elicited it. So it records, for example, which keywords from the Boolean expression match a particular search result. If a series of searches were carried out using similar but not identical Boolean expressions it should be possible to identify context-relevant items in subsequent searches that share keywords common to more than one Boolean expression. In this way, subsequent messages could be analysed using a relatively simple pattern-matching technique.

Such an approach might not be feasible for large online documents, but would be relatively simple to apply to a medium such as Twitter, which uses short, simple messages. The 140-character limit for an individual tweet, together with the use of hashtags and retweeting, increases the likelihood that successive Twitter messages will contain similar words and expressions when referring to similar concepts. At a basic level, Visualisations (4) and (5) above show how Twitter message threads can be tracked in real time. Obviously these examples relied on extremely simple pattern-matching: a retweet is practically identical to the tweet from which it is copied. But by using modified tweet data, which are available via the Twitter API, together with pattern-matching across successive similar – but not identical – searches, it should be possible to use Twitter to plot how ideas are apparently changing over time.

Twitter is of course a relatively crude communication tool. A limit of 140 characters does not allow much space for the development of an argument. But Twitter users frequently embed links to longer documents in their tweets. Identifying Twitter paths and then examining the documents they link to could be one way to enrich the exploration of these social media pathways. Of course Twitter activity does not take place in isolation. The first three visualisations described above demonstrate how any given news cycle often consists of related activities simultaneously occurring across several different news and social media platforms. Having plotted an 'ideas pathway' across a Twitter space, these visualisations show how easy it is to observe similar context-related activities in other online spaces during the same time period.

The 160-character limit of the Twitter user profile, and the consequent tendency for Twitter users to use hashtags and keywords in their profiles, means that it too can be searched and analysed using a similar, pattern-matching approach. Using this data would mean that ideas pathways could also easily incorporate data about who the Twitter users are, their countries of origin, their interests, professions and institutional homes. Thus it would be possible to visualise not only the chain of ideas, but also the kind of people engaging at different points along that chain.

An additional set of data that could help to complete this picture is the webstats data relating to the primary research publication. Using free web analytics software such as Google Analytics, it is possible to show the number of downloads and page views for the initial research report over the same time period as the news and social media search data. When successive news cycles coincide with increased publication downloads this is further evidence (albeit circumstantial) to link successive news cycles together to suggest an evolution of ideas, rather than a series of random, unconnected events.

The visualisations explored in this study are all essentially linear timelines. However, having plotted these pathways against time, the pathway data can then be used in other interesting ways. For example, the data could be used to generate social network maps. Such maps would show the links between different authors (individuals or institutions) in the social space, together with their relative popularity (their ability to influence) and how strong the links between them appear to be. The more frequently two different authors have referred to each other's material for example, the stronger the link between them would appear on the map.

One important consideration in the development of this type of application however, is the question of cost. The prototypical visualisations produced for this study were created using Tableau, a leading commercial data visualisation program. This is not a cheap piece of software. However, its role in this study was to help explore what kind of RTM application might be feasible and also to gain some initial sense of the ergonomics of such an application. In other words Tableau was used as a rapid prototyping tool. Were a real RTM application to be developed, the visualisation component would not be implemented in Tableau but would instead be written using an appropriate coding language. The same would also be true of the data-processing routines required to convert search data into visualisation data. So the cost for this part of the application would lie in the software development process itself. Depending on how this work was funded, this component of the software could, in principle, be offered as a free-to-use, open source application.

In terms of the search interface for such an RTM application, where a search is restricted to social media platform APIs (for example when searching Twitter or Facebook data), this part of the application could also be coded without requiring any third-party application. For broader online search functionality, however, this would be less straightforward. Powerful applications such as Scopus, Alt Metric, Vocus or Meltwater are not cheap, but much of their value lies in the fact that their searches employ their own, meticulously indexed databases. It is hard to identify cheaper alternatives that can provide equivalent quality search data. For

example, a 2008 study that compared Scopus, Web of Science, PubMed and Google Scholar, concluded that although Google Scholar is free, it 'offers results of inconsistent accuracy' (Falagas *et al.* 2008: 338). The authors went on to say that 'Google Scholar, as for the Web in general, can help in the retrieval of even the most obscure information but its use is marred by inadequate, less often updated, citation information' (*ibid.*).

A truly versatile RTM application, capable of drawing together a wide range of search data, would therefore probably require an additional third-party application to provide much of the search functionality. While this might not be a problem for many Northern organisations, it might prove unaffordable for some less well-resourced organisations in developing countries. It is possible, however, that the nascent but powerful functionality being developed in some of the altmetrics tools could provide some of the solution. Our desired approach to tracking policy debate across online media is clearly not where these tools currently operate, but it is conceivable that bespoke methods to track differing types of usage and different types of digital object across multiple platforms in customised ways might potentially be performed by these applications.

Overall, however, this study suggests that it is both useful and practical to develop a software application to monitor social media and public online spaces in order to assist in the analysis of the influence of research evidence on real-world decisions. Such an application has the potential to help analyse how ideas are framed and reframed through public debate.

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