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Alternative data sources: using digital and social media to inform management decisions in your library.

Introduction

When we think about data in library and information service management terms, we tend to think about facts and statistics relating to library operations. Data are indeed things you know to be true about the library in terms of statistics relating to usage of the library and its resources. Such statistics can often be generated through automated systems, but can also be generated through other means such as observation (e.g. physically counting people who are using the library). These outputs would be regarded as typical quantitative data in respect of analysis of them, but libraries themselves can generate an equal amount of qualitative data through asking for feedback about the library, which would invariably return opinions or perceptions from people. Such qualitative data can also be regarded as 'fact' in data terms with feedback, comments, perceptions and opinions being the reality of those that generate it. Library and information service managers and administrators use these types of data every day, and the collection of usage statistics and requests for feedback about services are commonplace to inform planning and service development. In this respect the collection and analysis of these types of data are embedded in the general performance measurement and continual improvement activities of the library, and the current quality and performance measurement literature provides evidence of this trend (Cervone, 2018).

However, this chapter will look at some slightly different approaches to data collection for library management and, in doing so, will identify several alternative digital sources of data which can be used to inform strategic and operational library management decisions. The chapter will begin by looking specifically at how a huge range of library related data can be obtained through web-based and social media channels and platforms. The chapter will focus on how such data can be analysed in order that library managers can use it in a performance measurement and service development environment.

Libraries and social media

Library and information professionals are no strangers to social media and have made effective use of it for many years now, often being the pace setters and pioneers for innovative use of social media in a professional capacity. The 2014 white paper *Use of Social Media by the Library* identified four distinct areas in which libraries are using social media in order to operate and engage with users: marketing and promotion; collection management; outreach; teaching and learning. The paper also suggests that libraries and librarians were experimenting with social media usage in the mid-2000s, before it became a mainstream tool for library operations round about 2012 (Taylor & Francis, 2014). Phil Bradley, a well-known library and information commentator and social media expert, reflects how he first discovered social media by accident in 2005 and began to collect and collate social media platforms on his own website, as he felt that they might be of some use to the information profession. Then within a week, after just one mention on his blog, he was getting 50,000 hits a day, which is when he realised that there was a really large seismic shift in the way that the internet was evolving as a means of generating and disseminating information (Bradley, 2015). This example demonstrates the enthusiasm, uptake and early adoption of social media by

information professionals. I certainly recall my own excitement as a Further Education Learning Resources Manager at discovering Facebook and Twitter in 2007 and thinking how such tools, along with the emerging 'smart' hardware, had the potential to transform how we carried out many library operations. As change agents and having mastered the move to digital information resources, I would argue that library and information professionals in general were not afraid to try these new technologies out and have continued to make full and effective use of social media platforms ever since. Librarians have been particularly high-profile users of social media for marketing and publicity purposes. Patel and Vyas (2019) identify several such marketing and publicity purposes: promotion of events, exhibitions and services; to advertise collections and resources; to highlight subject specific resources; promotion of training and instructional events. Similarly, social media is well used by libraries for intentional engagement activities to connect with existing users and potential non-users, and also with the wider community in which the library is located.

Library and information professionals have used social media tools to collaborate with colleagues across their institutions, sectors and networks, and have been quick to adopt and include social media and web-based platforms in their library teaching and learning activity. This can include using social media platforms as an information resource and also the teaching of social media literacy.

Social media terminology

The term social media is still frequently used, and people understand it to mean several different things. For many it refers to tools and platforms such as Blogs or wikis, or microblogging platforms such as Twitter, or specific social networks such as Facebook, LinkedIn, Instagram and TikTok. However, the term 'social media' was actually adopted along with the expression 'Web 2.0', which tried to convey the second iteration of the general World Wide Web, when web functionality and control became far more user oriented to point where internet users were able to generate web based content themselves for others to interact with. 'Social media' became the acceptable description for any online platform which allowed users to exchange content, ranging from opinions, news and views to digital objects such as music and video files. However, the current parlance refers to Web 3.0 or even Web 4.0 which suggests that the capabilities afforded by the internet and associated connectivity have moved even further on. The classic 'social media' tools identified above are so called because of the social elements of interaction with others that they afford. However, the Web 4.0 world in which we currently live includes many more online collaborative tools which can be used for social and educational interactions, both of which are key to library and information services. As e-citizens we no longer question notions of streaming video and audio, or hosting and collaborating in the Cloud, or accessing and interacting with our networks via a whole range of apps, which we access through our ever developing smartphones and tablets. Social media and Web 2.0 were indeed transformative but Web 3.0 and Web 4.0 offer library and information services so much more, and this includes access to data.

Whilst I have just suggested that social media is no longer an appropriate term to use when discussing the current digital environment, I will however continue to use it. It has longevity and is still meaningful to those who use it, and no doubt it will continue to be used and will continue to mean current collaborative digital platforms.

What sort of data are we talking about?

Much of the literature about libraries and social media use talks about 'engaging with users' and how social media enables this. At a very basic level the simple metrics generated by things like the number of likes, followers, tweets, retweets, shares, etc. (all common parlance in social media terms) can give libraries an idea of the numbers of individuals potentially engaged in their social media platforms. A study conducted in Canadian academic libraries in 2015-16 involved analysing their social media usage data with regard to user engagement and looked specifically at the influence that their social media platforms had over an eight month period (Winn, Rivosecchi, Bjeerke and Groenendyk, 2017). This influence was all measured quantitatively through analysing engagement data associated with specific Facebook posts and the number of 'likes' and shares' associated with particular posts, and similarly the number of 'likes' and 'retweets' which were generated from particular tweets.

This kind of data is available to all library and information services who want to measure the uptake of their social media and potential user engagement. However, this is only really demonstrating engagement with social media and not necessarily providing data about library operations or engagement with other library services and resources. What libraries really need to do is to be able to use social media data in order to measure engagement with specific strategic outcomes and objectives, such as 'increasing use of a particular resource' or 'increasing attendance at library-based events'. It may well be that a specific social media campaign can contribute to or influence the success of a wider marketing and publicity initiative, and the actual messages, posts and tweets, as referred to above, would invariably be part of such a wider campaign (e.g. to increase resource usage or attendance at events). But how do we use the data to inform decisions about these? In order to answer this, it is useful to look in a bit more detail at the different roles that social media plays in library and information marketing and publicity.

Data from social media marketing activity

Marketing is one of the first library management activities in which social media was effectively used and applied across a range of library and information sectors. In the early to mid-2000s when social media emerged, its first and primary use was a social one as a platform on which users could connect and engage with each other (hence the label). However, very quickly, many industries and organisations adopted social media platforms as a channel through which to promote and publicise (and effectively sell) products and services (REF). Commercial marketers were quick to realise the potential benefit of being in 'mass-market' space and over time social media became a regular platform for marketing and publicity activity. Libraries in the higher and further education sectors were also early adopters of Web 2.0 and social media platforms and had begun to use them for similar activity, informing customers about opening hours, collections, resources, exhibitions, etc., and other library sectors soon followed.

However, this chapter is not about the mechanics of social media, but about the data that can be generated through social media and digital platforms and used by the library service to inform decisions. Therefore I will not be focusing on specific platforms (e.g. LinkedIn, Twitter, Pinterest, Blogspot, etc.) and how they can be used for marketing and publicity purposes, but will focus on the types of data that might be generated through this activity, and where this fits in with library strategy and operations. However, there is a blurring of these boundaries, in that the data generated

from social media marketing activity then actually informs library social media marketing activity. To better understand this, it is useful to look at the 'marketing cycle', as identified by Allan (2019, 53):



Figure 1: The marketing cycle

With regard to this marketing cycle, much of the activity that libraries and librarians are involved in is the 'Promotional activities' section of the cycle. This is the part where the marketing messages are delivered and where the campaign comes to life, both physically (e.g. through posters, flyers, banners, etc.) and digitally (e.g. through digital screens, web pages and of course social media). There is much literature available celebrating good practice in this particular area, and it will come as no surprise that there are many case studies available which share good practice in libraries using social media to full effect in their promotional activities (Potter, 2012; Dryden, 2014; Hicks, 2014). However, from a data perspective, and data-driven decision making in particular, it is the sections of the marketing cycle entitled 'Market research', 'Measure outcomes' and 'Evaluate and review' where social media has the more significant role. In his evaluation of social media presence in libraries and information organisations, Cervone suggests that for social media data to have any value it needs to be able to "help discover what people want from and care about in relationship to the organisation [and to] understand what is happening in response to our social media messages and provide meaningful information that can be used as evidence in taking action" (Cervone, 2017, 3). In other words, in order for it to lead to decisions being made, social media data needs to inform our market research and our measurement and evaluation respectively.

Social media data for market research

As briefly discussed above, levels of user engagement (or at least engagement with users who use social media) can be evidenced through the more quantitative 'uptake' data (e.g. likes, likes per tweet, retweets, etc.) and this is powerful data with regard to informing us as to the 'reach' and potential influence of our social media work. However much social media data is qualitative, in so much as it is the narrative that is found in comments, tweets, and replies to tweets, and threads can provide insight into our library and information users, their perceptions, experiences and their expectations. It is here that market research can take place and by engaging your library users in dialogue through social media, you can generate really useful and meaningful data. It might be that library users might comment or respond to a piece of publicity, or even comment on areas of library activity that they are happy or unhappy with. In all these instances your library users are telling you a little bit about themselves, their behaviours and their experiences.

In these cases, more sophisticated data analysis techniques are required which effectively takes us into the realms of data science and big data analytics in particular, especially if you are in the fortunate position of having large amounts of qualitative social media data to analyse. Some of the key data analysis techniques which are often applied to social media data analysis include: Natural language processing, which simply put is the process of a computer extracting meaningful information from natural language input, as you would expect to find in social media outputs; Text analytics, which involves the study of word frequency distributions, pattern recognition, and tagging; and, Sentiment analysis, which brings together natural language processing and text analytics in order to identify and extract subjective information in source materials, such as social media (Batrinca and Treleaven, 2015).

This type of social media data analysis is likely to be unfamiliar territory to many working in library and information services, but there are many techniques and tools available to help social scientists (into which category information professionals fall) analyse qualitative social media data. In his very accessible blog post, Wasim Ahmed suggests that a simple application is that of text analytics, which can include using sentiment analysis, to place bulk social media posts into categories of a particular topic, such as positive, negative, or neutral. He goes on to say that other methods, such as social network analysis, can help to analyse online communities and the relationships between them (Ahmed, 2017).

Being able to group or code library users' thoughts, perceptions and opinions with regard to sentiment can start to provide real insight into what they want from their library and information services. Such market research data can then hugely complement data that might have been obtained from other more traditional methods, such as surveys or focus groups. In that case the market research intelligence is validated, but in other cases you might get insight from user communities that have been more difficult to engage with previously. Or, it might be that your users who have engaged with social media have different requirements and expectations, and through your application of text analytics and data analysis you have been made aware of this.

There are many online platforms and applications available which enable big data analysis of social media, but for the novice librarian, trying their hand at data science qualitative methods such as thematic analysis, which is simply 'a method for identifying, analysing and reporting patterns within data' (Braun and Clarke, 2006, 79), can be used to manually to label social media posts. It could be as simple as taking a selection of tweets or comments and manually highlighting the themes that come

out within them. Alternatively, to keep things simple you might just copy and paste all your text into a Microsoft Word document and search for particular strings of characters in order to identify trends or sentiments. Similarly generating word clouds from your social media text could allow you to visualise your data. Even performing this data analysis in a rudimentary way can enable deeper insight and it is the deeper analysis of this data that then may provide you with your market research intelligence. Ultimately the conversations, comments and general user activity in a library's social media environments can feed into the marketing cycle not just in providing insight, but also in continuing the dialogue with users throughout the different stages of the cycle.

User engagement data and dialogue (outcomes measurement & evaluation)

Potter suggests that good marketing involves a continuous dialogue with your users or customers (Potter, 2012, xiv). Therefore, continuing with the marketing theme, it is appropriate to look at where social media can be used effectively with the other parts of the marketing cycle that I identified above, those of outcomes measurement and evaluation. I would suggest that both activities involve some kind of dialogue and engagement, which could be realised through social media. There are several ways in which the impact of a particular marketing and publicity campaign can be measured. These include obtaining metrics on how many times a web page has been viewed or trying to ascertain how a library user heard of a particular service or resource. In many cases data can be used and analysed in order to measure the impact and outcomes of a particular campaign. For example, if the outcome of a campaign was to increase the number of library users or visits from a particular demographic then user registration data or headcount data might be used to demonstrate this. Similarly, if the intended outcome of a campaign was to increase the usage of a specific e-resource, then usage statistics could be used in order to evidence the achievement (or not) of the outcomes. These would obviously be quantitative measures, but they could easily be complemented by some qualitative data obtained through social media channels.

Data mining is the practice of uncovering patterns and other valuable information from large data. If you were to do some data mining around given search terms across your social media channels (e.g. associated with your campaign and in social media posts which mention your library) then you may well realise a whole dataset that had previously gone unnoticed. Performing similar sentiment analysis or text analytics as identified in the market research phase, would allow the surfacing of any qualitative data generated through social media that could validate the outcomes measurement and indeed the evaluation of a piece of library marketing. For example, as well as being able to statistically prove that your e-resources usage has increased, you may be able to back this up with data generated through comments and posts about your e-resources on your library Facebook site, or responses to your tweets in which you have publicised your particular e-resources. The important thing to note here though is that the data collection and analysis is done in a timely fashion in line with the publicity campaign.

Service improvements and customer services

The use of social media for generating dialogue with library users need not be exclusive to your marketing activity. Indeed, speaking and listening to their users is something that library and information services need to do all the time, not just for marketing but also for service evaluation and quality assurance. Library user surveys, focus groups, UX methods, suggestions, comments and complaints forms are all commonly used methods for engaging with library users. Such methods

might be regarded as 'traditional' in that they are very visible and tangible. Even if your library user survey is being carried out online, or you use an online suggestion form, these engagement activities are deliberate in that they are intended to be part of a dialogue and as such form part of your service evaluation cycle. All of these methods are well used in library and information services across all sectors, and each can generate rich quantitative and qualitative data which is then used to evaluate service delivery and inform service developments.

Imagine if you were then able to supplement this data with what people are saying about your service when you haven't formally asked them through a survey or a comments card. Imagine if you could simply hear what your users are saying whilst they chat in the café or in their reading group discussions. Social media can partly achieve this and add further to what is already a potentially very rich data set. People often say they visit social media to 'be in the same place as their customers' or to 'hear what people are saying about [a given topic]'. You can do this with social media. However, there is no point in simply 'being in the same space as your users' unless you are going to engage with them and act upon the conversation that you have. Engagement might occur through publicising your services, resources and events on social media, or through your strategic approach to timed tweets and posts. The dialogue happens when you engage with the responses to such activity or just by 'listening in' to what users might be saying on social media. It might be that a particular Facebook post about an event has generated some conversation between library users about other events that they might like to see in your library. It is this type of dialogue, which you hadn't even asked for, that could very well prove to be important intelligence about your users' requirements and expectations. Once you are aware of this you might want to apply data mining and data analysis techniques to all of your social media channels. Again, you might consider analysing such data sources by particular sentiments or character strings in order to focus on specific themes or issues.

Altmetrics

I could not really discuss social media and libraries without at least a mention of Altmetrics. In some ways it might have been appropriate to commence the chapter by introducing the fact that working with social media metrics and data is nothing new to library and information professionals in that they have been championing and taking responsibility for bibliometrics and more recently Altmetrics for quite some time. However, Altmetrics, which makes use of social media data, is not actually concerned with decision making, at least not by library and information professionals, which is my justification for leaving it until this point in the chapter, although it is certainly worth a brief discussion.

"... altmetrics (short for 'alternative metrics'), [is] an approach to uncovering previously invisible traces of scholarly impact by observing activity in online tools and systems" (Priem, 2014, 263).

Altmetrics has emerged from traditional bibliometrics as the sources of metrical data about research and scholarship have expanded to include the web and social media. Showers (2016) suggests that the current abundance of all metrics around research and scholarship can be traced back to libraries' original interest in being able to demonstrate the impact of research and scholarship (e.g. through journal impact factors, etc.). Nowadays altmetrics have become increasingly popular as a means of scholars and institutions measuring the impact of their work, alongside bibliometric techniques. Libraries (mainly research and academic libraries) are at the centre of the development of altmetrics,

as indeed they were at the centre of developing bibliometrics, in that librarians play a role in helping to support scholars and researchers in their understanding and measuring their impact (Showers, 2016, 62).

The relevance of altmetrics to this chapter lies in the 'alternative' sources that altmetrics makes use of - what we are referring to as 'social media'. In his book *Altmetrics: a practical guide for librarians, researcher and academics*, Andy Tattersall goes into some detail as to how altmetrics work and what the role of the librarian is in the collection and analysis of altmetrics. He lists many sources of alternative metrics and categorises them into: Social networks (e.g. Facebook, Google+, LabRoots, LinkedIn, Mendelay, ResearchGate, Twitter, etc.); Collaborative platforms (e.g. GoogleDocs, Hivebench, etc.); Audio and video channels (e.g. Audioboom, Explain Everything, Mixcloud; Vimeo, YouTube, etc.); Infographic and visualisation platforms (e.g. F1000Posters, Figshare, Impactstory, Slideshare, etc.); and, Blogging and informal methods of communication (Tattersall, 2016). The point here is not to simply list the vast (and ever increasing) amount of altmetric sources available but to see it in the context of the work of the library and information professional, as they not only need to be aware of these sources, but need to know how to collect and analyse altmetric data for the purposes of scholarly communications. This is aided in part by Altmetric.com, an organisation whose primary function is to focus on article level altmetrics in order to support the library and research communities in demonstrating the impact of research (Adie, 2016). They do this by providing up-to-date information from a wide range of social media, including many of those listed above. Altmetric.com fully monitors 17 platforms in total including reference management tools such as Mendeley and many other sources including Wikipedia, LinkedIn, Facebook, Google+, Twitter and YouTube. Altmetric.com focus on the qualitative analysis of the web and social media platforms, applying text analysis and sentiment analysis to their data in order to better understand what people are saying about research and how they feel about it.

Such work uses data-driven approaches and academic library departments have been quick to develop scholarly communications and research support teams, whose role it is to manage and interpret this altmetric data alongside the bibliometric data that they had traditionally taken responsibility for. Whilst altmetric data might not necessarily inform library-oriented decisions, knowledge and understanding of how the data is generated and what it means, particularly qualitative altmetric data, are essential competencies for library and information professionals. This now includes knowledge and skills in some of the data science techniques of textual analysis and sentiment analysis as discussed above. For those involved in scholarly communications and research support, being able to analyse altmetric data in order to support the research activity of their institution is a key emerging skillset, and one that is transferable to analysing the library's own alternative digital data sources

Web-based analytics

Whilst the main focus of this chapter has really been about qualitative data sources drawn from social media, plenty of quantitative data can also be generated from web and digital sources. Therefore, to bring the chapter to a close it is appropriate to briefly discuss potential web-based library analytics. Analytics have become increasingly commonplace within the library and information service environment. Showers suggests that libraries, along with archives, museums and galleries, find themselves ideally placed to exploit the full potential of analytics, as "they have long

been familiar with the potential of statistics and data for informing everything from service development to measurement of impact and value” (Showers, 2015, xxv).

Analytics refers to the discovery and communication of what data actually means. In a library sense it would be about using the analysis of library-generated data to tell a story, or provide evidence of something, both of which can lead to decision making. A good example of an analytics service is Google analytics, which provides an analysis of website data, including the number of people who visit a website, where they are located and how they have accessed the website. Libraries have lots of data available to them, including website data, but also things like usage statistics, gate counts, head counts, etc. Much of this can be analysed at different levels, such as by user type or demographic. The resultant analysis would therefore be regarded as analytics and how such data informs decisions has very much been the focus of this book. It would therefore be fitting to conclude this chapter by looking at a framework which was developed some years ago in order to measure the web impact (that is data about website and social media usage) of cultural heritage institutions, a category into which many library and information services fall. The framework uses a variety of web metrics and is presented as a case study example of public sector institutions making the most of the web based and social media metrics that they have at their disposal in order to inform decision making and service development (Stuart, 2015). The framework uses four main categories: Data collected internally (e.g. by the institution itself); Data collected externally (e.g. by a social media platform); User behaviour (evidence of web activity); and, User traces (evidence of engagement with web platforms and social media):

	User Behaviour	User Traces
Internal	<ul style="list-style-type: none"> • Page views • Hits 	<ul style="list-style-type: none"> • Comments • Feedback • Contributions
External	<ul style="list-style-type: none"> • Google searches • Traffic rank • Social media views 	<ul style="list-style-type: none"> • Web mentions • Inlinks/URL citations • Facebook likes • Social network friends

Figure 2: Web metrics tools and methodologies used in David Stuart’s case study on the web impact of cultural heritage institutions.

User behaviour in terms of web analytics is effectively the number of visits to a web site or a particular page. Google Analytics is a commonly used tool for measuring web page user behaviour, and such tools can be used to track when, where and how a particular web site or web page was accessed. For example, detailed analytics could provide metrics telling you when a particular web page was visited by someone using a particular type of device from a specific location. As well as providing a picture of where users are located and how and when they are accessing your site, such metrics can also inform decision making. For example, you might want to analyse whether a page is getting a particular amount of traffic from a particular demographic. Is it because the content is extremely useful, or perhaps because users cannot find their way through the web pages? Either way such analysis could inform your decisions about your web page development. Such analytics are

usually kept internally to the organisation, but external user behaviour analytics can also be used in order to analyse your web impact. This might involve using an externally provided global web traffic service which will provide comparisons of web traffic between different organisations or different types of organisation. This could effectively provide you with data about how your library's website is performing as compared to another 'competitor' organisation, which would be very valuable in a market research context. Other external user behaviour analytics would include services such as Google Trends which provide metrics and data about what subjects and topics people are searching for rather than which particular websites they are searching.

Social media views can also be used as external user behaviour metrics, but they effectively only provide you with usage data. However, user traces can provide more detailed analytics as to how users are engaging and such activity resonates with the application of altmetrics, as discussed above. Comments provided by users on library blog platforms would be an example of such engagement, whilst social media metrics (external) can provide rich data as to your overall web impact. This can include metrics about 'likes', 'shares', 'follows', 'retweets', etc. but the analysis of these as metrics does require some understanding of social network analysis. Most social media platforms have their own analytics tools, which you can use although you may need to invest some time in learning how to use them effectively. Similarly, there are many other tools available for analysing metrics and generating big data across multiple social media platforms (e.g. Sendible, SEMRush, Awario, etc.).

Ultimately, using a web impact framework allows you to join up your users' digital behaviours and digital traces, providing a fuller picture of how they are engaging (or not) with your library's digital presence.

In summary

This chapter has provided some discussion as to how digital and social media platforms can provide alternative sources of data to library and information services, in order that service level decisions can be made and validated. In particular, the chapter has introduced text analytics and sentiment analysis as means by which library and information professionals may use their social media data in order to conduct market research and measure and evaluate the effectiveness of marketing campaigns. The use of similar data and analysis can also be applied to library customer service activities. These techniques are associated with the data science discipline, but as library and information roles emerge and develop in the 21st century, there is a need for library and information professionals to become more proficient in data-oriented work and some simple introductory techniques have been suggested during this chapter. Altmetrics and web analytics can also provide alternative sources of data for decision making, but as most library and information environments have highly visible social media presence, the analysis of social media data would be a good starting point for developing data mining and data analysis skills.

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