

Assessing social media use by community groups using social network analysis

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Abstract: Community participation in planning is generally considered crucial for the delivery of positive outcomes; however, the network structure that can be created by a community group using social media and who participates in the network are not widely understood. This paper explores the use of social media, specifically Twitter, by two community groups. In the context of this study, community groups are self-created and organised groups of citizens that form to oppose a proposal to amend planning controls for a specific site. Utilising the research technique of Social Network Analysis (SNA), this paper seeks to visualise the community group networks, as well as understand the connectedness and clustering of the networks. For the two community groups investigated, it was found that they do not attract large numbers of friends and followers on Twitter and key stakeholders play a passive listening role in the networks.

Introduction

Community participation in planning is generally considered crucial for the delivery of positive outcomes. While the literature acknowledges the formation of community groups and their intended goals (Dear 1992), knowledge of the network structures that can be created by community groups using social media and who participates in the network are not widely understood. By visualising their social media networks, we can gain an understanding of who their networks consist of and what keeps them working towards common goals (Innes 2005). Dempwolf and Lyles (2012) argue that although planning literature has begun to deal with network based research, the work is underdeveloped. While Innes (2005) advises that future research should consider linkages between stakeholders, the information content that flows through networks, who benefits from power in the network and what network patterns emerge and their productivity. This paper explores the use of social media, specifically Twitter, by two community groups in their opposition to proposed changes to planning controls in Sydney. In the context of this study, community groups are self-created and organised groups of citizens of various sizes that form to oppose a proposal to amend planning controls for a specific site or precinct. These groups usually try to sustain ongoing communication with the responsible planning authorities outside of the formal consultation periods or avenues. Traditional communication channels used by community groups include face-to-face meetings, letters, petitions and telephone calls (Dear 1992). In recent years, some community groups are now employing social media platforms, such as Facebook and Twitter to open up an additional communication channel. This paper firstly presents the results of applying Social Network Analysis (SNA) to two community group social media networks and then provides a discussion on applying SNA to social media data, as well as the limitations of using SNA. The paper then concludes that social media networks led by community groups do not attract large numbers of followers on Twitter, furthermore, key stakeholders and decision makers with larger numbers of followers, including politicians and government agencies, play a largely passive listening role in the networks.

Framing the Research

Healey (1993) refers to a shift from a modernist to a post-modernist view of planning as the communicative turn in planning theory, where formal community engagement is undertaken during the planning process. This shift is described by Harris (2002) as a re-orientation from technical planning models towards a more interactive understanding of planning activity. Others have further developed the area of communicative planning and added terms such as deliberative planning (Forster 1999) to facilitate practical and timely participation and planning through consensus building (Innes 1996) as a form of negotiation and mediation in planning processes. The appearance of social media in recent years has potentially introduced another channel to facilitate communication planning practice.

In the multi-disciplined field of urban planning and Internet enabled communications, much of the discussion has centred on the potential capacity to facilitate community participation and consultation (Evans-Cowley and Hollander 2010). More recently, focus has shifted to the role of social media as a way of engaging citizens in the planning process, with a focus on online forums and Facebook

(Afzalan and Muller 2014; Afzalan and Evans-Cowley 2013). The use of social media can be broken into two separate groups of Government-initiated and Citizen-initiated social networks (Evans-Cowley 2010; Evans-Cowley and Hollander 2010). Citizen-initiated social networks focusing on planning issues form the majority of social networks found by Evans-Cowley (2010) and typically were organised to oppose a proposed development or draft plan.

Hampton and Wellman (2003) describe citizen-initiated social networks as communities consisting of far-flung kinship, workplace, friendship, interest group and neighbourhood ties that form to provide networks of sociability, support and control. Hence, Hampton and Wellman (2003) argue that communities are not geographically defined groups, but loosely bounded networks. Furthermore, Hampton and Wellman (2003) argue the Internet has neither weakened nor transformed communities; rather it has enhanced existing relationships, thus the utopian and dystopian claims the Internet will drastically alter communities remains largely unrealised. Essentially, most online contacts are with the same friends, family, colleagues and neighbours that were in contact before the emergence of the Internet. However, it provides additional opportunity to communicate and sometimes replaces face-to-face and telephone contact.

To gain a better understanding of whether collective action can be assisted by the Internet, Hampton and Wellman (2003) conducted an extensive study of an Internet enabled community with access to email distribution lists, called Netville. This case study demonstrated that computer mediated communications were useful in reducing barriers to collective action. Hampton and Wellman (2003) conclude the Internet intensifies the volume and range of community relations, rather than reducing or transforming them into an online only community.

More recently, Afzalan and Muller (2014) found that social media did not create a collaborative communications process in isolation, but integrated well with other communication methods. Moreover, Kavanaugh et al. (2007) found that an individual's use of the Internet within community groups increases over time and so does their level and types of involvement in the group. Hence, social media can provide a platform to quickly launch a community group's campaign and distribute information to a wide audience. Recent literature on social media found it being used as a supplementary communication channel, that is being mobilised to support the traditional mechanisms of community opposition (Williamson and Ruming 2015; Afzalan and Muller 2014).

Johnson and Halegoua (2014; 2015) identified the use of social media, particularly Facebook, would be beneficial to neighbourhood communication, access to information, and participation, but also found mismatches between the perceived affordances of social media and the neighbourhood context. Essentially, people are willing to experiment with or use social media to communicate with neighbours about neighbourhood matters, but also encountered hesitations about using social media including the need for pre-existing neighbourhood ties and issues with accessibility.

It is acknowledged that recent social media studies have not returned results as positive as Hampton and Wellman (2003). To contribute to this growing area of research, this paper focuses on of two community groups social media use to provide a snapshot of who in the community is participating on social media and to what extent.

Social Network Analysis in planning literature

Dempwolf and Lyles (2012) note the use of SNA in planning literature is rare. The research that has been conducted under the broad banner of urban and environmental planning includes: Investigating opportunities to use social ties through dispersed low income housing (Kleit 2001), relationships between multi-organisational partnerships and community leaders (Provan et al. 2005), examination of participation as a network structure phenomenon in a redevelopment project (Holman 2008), evaluation of social relationships in collaborative planning processes (Mandarno 2009), the role of planners in natural hazard mitigation (Lyles 2014) and the role of social networks in self-organised communities (Afzalan and Evans-Cowley 2013). Dempwolf and Lyles (2012) argue that SNA research may have a positive influence on public participation in the planning process, and has the potential to uncover the presence of complex formal and informal relationships involving a wide array of stakeholders.

The literature has found several advantages of using SNA, including being a useful tool for evaluating community participation as a social capital builder (Mandarno 2009). Social capital refers to the value found within social networks. Social capital tends to be an intrinsic and instrumental notion of social

networks. Research of social capital focuses on network structures such as strong and weak ties and dense clustering in a network. SNA can also reveal how internal and external factors influence participants capacity to build networks and understand the network structures (Mandarno 2009; Provan et al. 2005), however, simply increasing the network involvement is not an efficient strategy, due to added complexity (Siegel 2009).

Notwithstanding, Innes and Booher (2002) argue the diversity and interdependence of stakeholders can be leveraged to produce better outcomes in planning processes. Conversely, SNA research can be constrained to micro-level relationships due to the complexity of collecting inter-organisational data. Moreover, difficulties can be encountered when communicating SNA concepts to community leaders (Provan et al. 2005; Mandarno 2009). Dempwolf and Lyles (2012) argue that understanding the complexity associated with the diversity and interdependence of actors in a network is a challenge. Furthermore, although planning literature has begun to deal with network issues regarding the knowledge contained within networks and how the structure of networks enables or inhibits individuals, the work is underdeveloped.

Afzalan and Evans-Cowley (2013) found that although community groups believe online activities have the capacity to inform others of neighbourhood issues, their online activities are rarely used for these purposes. Innes (2005) advises that future research should consider linkages between actors and the information content that flows through networks. While Afzalan and Evans-Cowley (2013) argues that in order to gain an understanding of online community activities, researchers also need to analyse the role of key members and their face-to-face or on-the-ground activities with community groups.

These challenges are further amplified by Baum (2005) arguments that few planners' jobs require or allow interaction with community groups, and as a result, few planners are sufficiently involved to understanding the perspective and structure of community groups. Planners that do work with these groups tend to engage with readily accessible individuals rather than trying to understand the full extent of the community, organisations and institutions involved. Dempwolf and Lyles (2012) challenge planners to work at multiple spatial scales to engage with more precise definitions of community and place. SNA provides a framework and methods to visualise communities as relational networks separate from their geographic locations.

The case studies

The two case studies in this paper are based on community groups operating in Sydney, which are opposed to proposed changes to site specific planning controls.

Bronte Returned and Services League (RSL) Club

The Bronte RSL Club in the eastern suburbs of Sydney ceased operations in 2012 and sought to engage a property developer to redevelop the site as a mixed use - retail, registered club and residential building (Inspire Planning 2012). This is a common occurrence in Sydney, as Peacock (2013) reports "declining membership and rising real estate prices are seeing clubs deciding to sell their valuable properties to developers". To progress the proposed redevelopment of the Bronte RSL site, the property developer firstly lodged a development application, which was rejected by Waverley Council and the Joint Regional Planning Panel (JRPP) as the proposed building envelope was considerable in excess of the permissible planning controls (JRPP 2013). Subsequently, the developer lodged a rezoning application, known locally as a planning proposal, to increase the statutory building height from 13 to 20 metres and increase the floor space ratio from 1:1 to 2.1:1. The planning proposal was refused by Waverley Council on the basis that the proposal was inconsistent with Council's urban design analysis and inconsistent with the current neighbourhood centre zoning (Waverley Council 2013). The refusal was then reviewed by the Planning Assessment Commission (PAC) and the proposal was found to have strategic merit (PAC 2014). Waverley Council agreed to progress the planning proposal through to public exhibition, with several amendments in line with community concerns. Post exhibition the planning proposal was lodged with the Department of Planning and Environment for a final decision and was refused in March 2015 because the proposal is not identified as a priority for urban renewal, is not close to public transport and is inconsistent with the neighbourhood centre zoning (DP&E 2015).

Harold Park Raceway

In 2009, the NSW Harness Racing Club Ltd (the Club) lodged a rezoning application with the City of Sydney Council to change the current land use for the Harold Park paceway and former Rozelle tram sheds to facilitate its urban renewal. The 10.5 Hectare Harold park site is situated 2.5 kms from Sydney central business district in Sydney's inner western suburbs. The planning proposal consisted of rezoning the site from special use to a mixed use zone and introduced various building heights up to 36 meters for high density residential buildings. The proposal also included the dedication of 3 Hectares of land for open space and the adaptive reuse of the heritage listed tram sheds (City of Sydney 2009). The rezoning of the site was finalised in December 2011 and was subsequently sold to a property developer. The site is progressing through staged development applications and is currently under construction.

Although both case studies have followed the statutory rezoning processes, including community participation, the local communities perceived the opportunities for participation to be inadequate and formed community groups to facilitate further participation in the design and decision making processes. Social media was adopted by both groups as a supplementary means of communicating. Both case studies are consistent with the urban consolidation paradigm that has been pursued in Sydney for the past 30 years (Ruming et al. 2012), with a strong emphasis over the past decade (DP&I 2013).

Case study Twitter followers

The Save Bronte group has a high percentage of individuals following them (71%) and a significant representation by both State (9%) and local politicians (4%), see Figure 1. The primary reason for this is the development being opposed by the community, the State member and local politicians. Effectively, these three elements joined together in their opposition to the planning process being reviewed and progressed by a State planning agency. The group has been active on social media since November 2012, has attracted 220 followers and made over 2,000 tweets. While most individuals are most likely to be local residents, the limited information available on Twitter cannot confirm this in all cases.

For the Harold Park group, 36% of followers are individuals and 19% are other community groups. Other groups with significant representation were journalists (11%), State (8%) and local (16%) politicians (Figure 1). This development represented a fundamental change to the suburb within which it is located, as the long standing horse racing facility ceased operation. The group commenced using social media in February 2012, has attracted 76 followers and made 200 tweets in 3 years.

Overall, the relatively small Bronte RSL redevelopment site is reflected in the mostly individual, potentially local followers, conversely, the large Harold Park site attracted a more diverse array of followers, including significant numbers of politicians, journalist and other community groups.

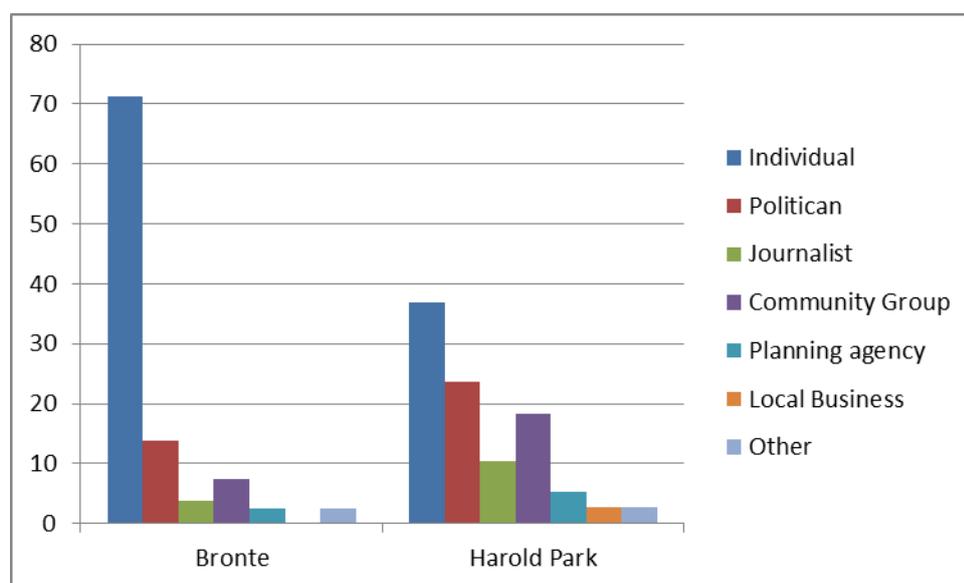


Figure 1 - Community group social media participants

Methodology

Utilising the research technique of Social Network Analysis (SNA), this paper seeks to visualise the structure of community group social media networks, as well as investigate the connectedness of the networks. SNA is a quantitative analysis of relationships between individuals and organisations. By analysing social structures it is possible to identify important individuals and group formations (Prell 2012:22). SNA does not consider individuals as a unit of analysis, but rather a set of individuals and their relationships. Wellman (1998) argues analysis of network structures offers a comprehensive approach to understanding the allocation of resources in a social system. Borgatti and Foster (2003) note growth in SNA research is based on the digitisation of everything, increased computing power and the free availability of large databases holding data.

Two distinct network types can be identified using SNA. The ego centred network consists of a network structure with a focal actor and a set of alters, who have ties to the ego. These networks are usually referred to as personal networks. Secondly, full networks are a collection of actors and ties that are not driven by a focal actor (Wasserman and Faust 1994:42).

Social networks can be represented in mathematical or graphic form (Prell 2012). This paper seeks to describe social networks in graphic form. The network measurements include the analysis of degree (number of network connections), tie strength and community detection methods.

Data Collection

Twitter data was collected directly from the Twitter application programming interface (API) using the TAGSv6 and Friends and Followers Google spreadsheets created by Hawksey (2011; 2013). The data was then manually converted into network data files, and finally, network analysis was performed using Gephi visualisation software (<http://gephi.org/>).

Twitter is a service that allows people to publish short messages on the Internet and is commonly referred to as microblogging. Twitter allows people to subscribe, known as following other people they are interested in. Twitter enables users to broadcast messages using hash tags (#) and send direct messages using the '@' symbol, however direct messages are still publically available (Java et al. 2007; Borgatti et al 2013:260). Java et al. (2007) considers the Twitter follower structure to be a social network. Moreover, Twitter is a directed social network, as someone who is followed by another Twitter user may not necessarily follow that user. Huberman et al. (2009) defines a friendship as two or more direct messages between Twitter users. By this definition, Twitter social networks are a fraction of the size of the dense friends and followers networks that can be observed. However, Huberman et al. (2009) also argues that although Twitter following may not define a social relationship, the number of followers may determine the role and importance of a person within a network. Accordingly, a person with a higher number of followers has a stronger communication function than someone with a small number of followers.

A major consideration for research design using network analysis is bounding the set of people and organisations to be included in the study. In some instances a clear boundary will appear around the study group, in others it is not so clear. The chosen boundary is primarily based on the research question(s), but is also based on two sets of actors; the egos personal network and their alter egos, which the ego has ties with. This does not imply the network does not have ties to the outside world. In the real world most groups have fuzzy boundaries. A common approach to approximating the network boundary is snowball or respondent driven sampling, when survey's or interviews are being used to collect data (Borgatti et al. 2013:33-34).

In this instance, the Twitter network boundary is clearly marked by the immediate friends and followers of the community groups Twitter account. However, the researcher has also chosen to take a sample of friends and followers of the community group's followers. This approach was taken to allow the capture of all retweeting activities and to investigate how far this activity reaches through the network. This represents two degrees of separation from the community group. An artificial boundary must be set for social media data as the social networks are theoretically infinite.

Results of network structure analysis

This section presents the network structures of the two case studies. Network graphs for five case studies can be viewed at www.wewilliamson.com.

The following graphs are a visual representation of community group Twitter networks. In the graphs, a network consists of points which represent a person or organisation and is referred to as a node. A connection between two nodes is represented by a line and commonly referred to as an edge or vertices (Wasserman and Faust 1994:94). Various characteristics of the nodes and edges, such as size, shape and colour, can be used to communicate information about the nodes and the relationships among them (Borgatti et al 2013:100).

The graphs in Figure 2 are the result of loading raw twitter data into Gephi and applying the Force Atlas 2 layout algorithm, which is a force-directed layout algorithm that transforms raw data into a network graph. The nodes with the highest degree have also been enlarged to identify their location within the network. High degree nodes are important for mobilising the network and bring other stakeholders together. However, as high degree nodes must exert significant energy to maintain a large number of ties, their ties are often weak. Hence, high degree nodes can be trusted to use their links to diffuse information and potentially mobilise the network, but there is no guarantee that they can significantly influence those they are connected with (Prell et al 2009).

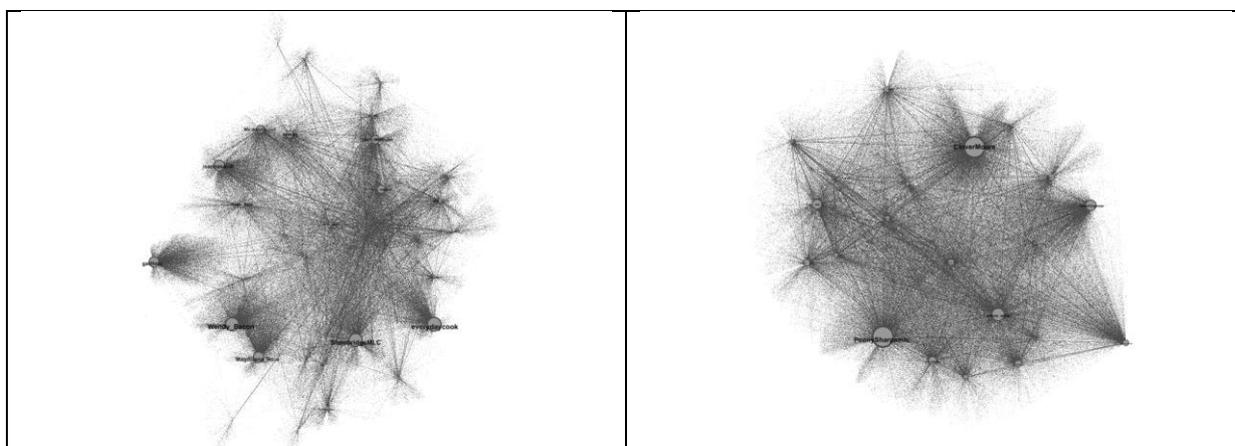


Figure 2 - Degree (left: Bronte, right: Harold Park)

There are various network structures depending on the network type, including *small world*, *village*, *opinion leader* and *hierarchical* networks (Lyles 2014). The networks depicted in Figure 2 most closely resemble the opinion leader structure. Lyles (2014) analysis of network structures concludes that opinion leader network structures limit opportunities for discourse and joint problem solving. Notwithstanding, the opinion leader network structure seems a logical fit for community groups who are typically led by a small number of people who are seeking to distribute their ideas and opinions.

While Figure 2 provides an overall view of the network structure, Figure 3 represents the network of high degree nodes with all other nodes filtered out. Essentially, Figure 3 identifies the nodes that have the potential to influence the network, due to their highly connected status. From a Twitter perspective, if these nodes tweet or retweet a message, it will be distributed further across the network. They are the bridges or information brokers to sub-groups within the broader network. The node labels in Figure 3 are mostly state and local politicians, journalist, local newspapers and individuals. The community group Twitter account does not appear in either of these graphs, as their degree is insignificant compared to the high degree nodes in the network. Essentially, the Bronte community group is positioned in the vacant centre right location and the Harold Park community group is positioned in the vacant centre left location in Figure 3.

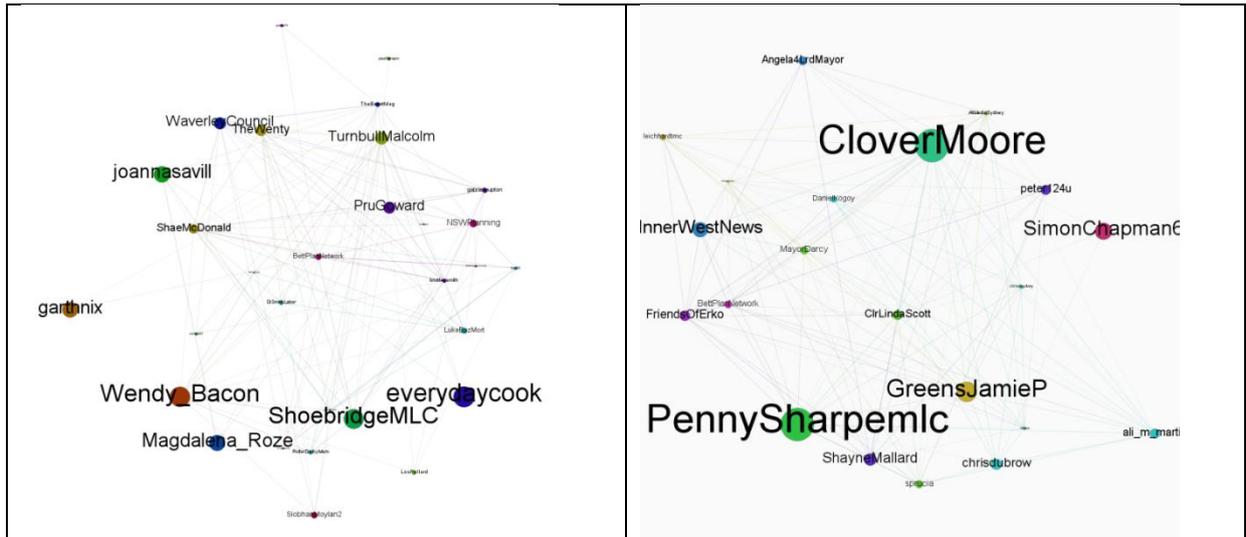


Figure 3 - Filtered Degree (left: Bronte, right: Harold Park)

Tie strength is displayed in network graphs by line thickness, which represents the portion of communications that has occurred between the nodes (Borgatti et al. 2013:112). Tie strength is closely associated with social capital, which refers to the value found within social networks and typically focuses on network structure attributes such as strong and weak ties and dense clustering of nodes (Wellman and Frank 2001). The graphs in Figure 4 expose the strongest ties in the network, which also identifies the core network of the community group. By default, these are the people that are using the network on a regular basis. In both networks in Figure 4 the strongest ties are centred on the node that is the community group’s Twitter account, which plays the role of providing regular information, suggested activities and behaviours to its close ties, which are in some cases the high degree nodes identified in Figure 3. However, the majority of direct interactions are between low degree nodes. This suggests the strong ties are being formed and maintained between community group members, while weaker ties are trying to be maintained with high degree nodes.

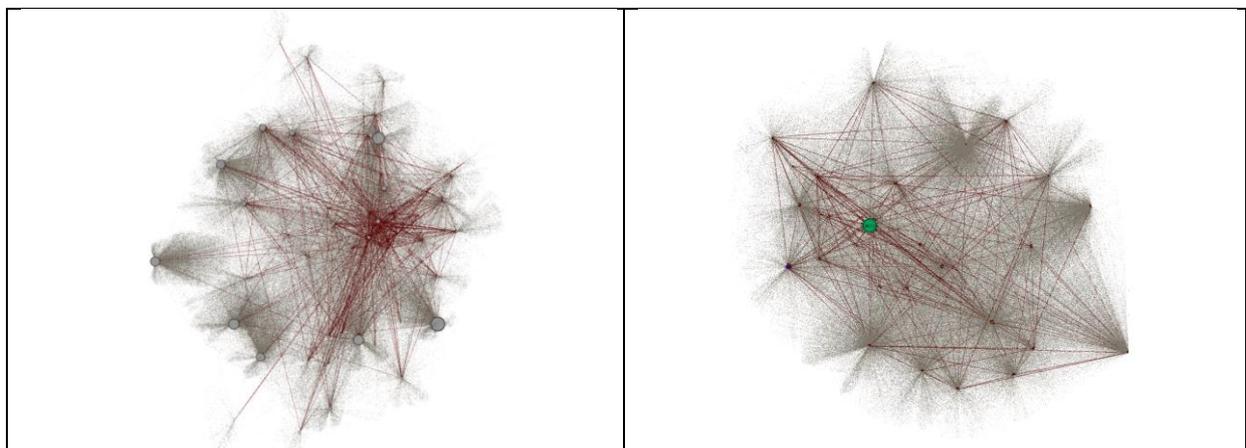


Figure 4 - Strong and weak ties (left: Bronte, right: Harold Park)

Figure 5 is the network with a filter applied to remove all nodes that have not sent a tweet. The pattern of ties clustered around the community group Twitter account and the other nodes that have actually sent a tweet is a very close match with the strong ties in Figure 4. This represents the people who are directly communicating with each other and promoting the opinions of others. The nodes in Figure 5 are potentially building social capital within the community group.

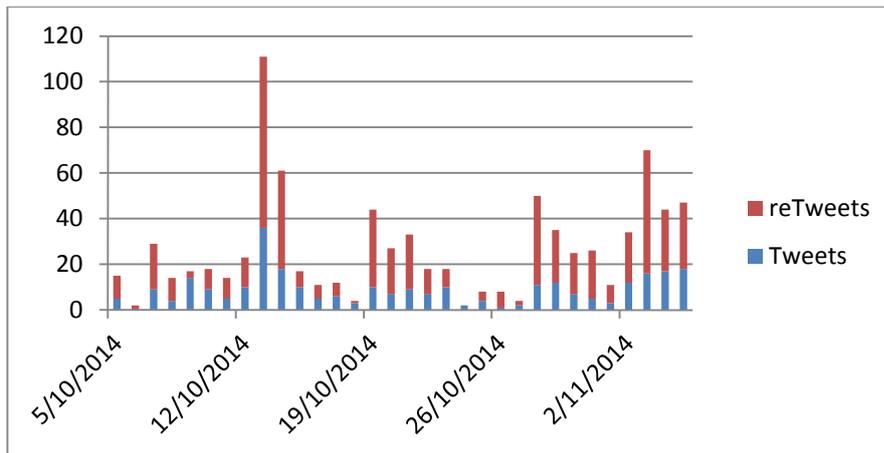


Figure 7 - Retweet activity during public exhibition

The Green nodes in Figure 8 are the nodes that may have seen a retweet during this time, while the red nodes did not. The activity is concentrated in the centre right portion of the network where the node that is the community group’s Twitter account is located. This is a logical finding as the community group was communicating daily that the public exhibition was in motion and how people can make a formal submission. This graph also highlights which high degree nodes were not passing on the messaging. The nodes across the top of the network including the local council, the NSW Department of Planning and Environment, the Minister for Planning, a state member of parliament and 2 local newspapers did not tweet or retweet during this time. High degree nodes across the bottom of the network, being another state member of parliament, two individuals with significantly high connections were also silent.

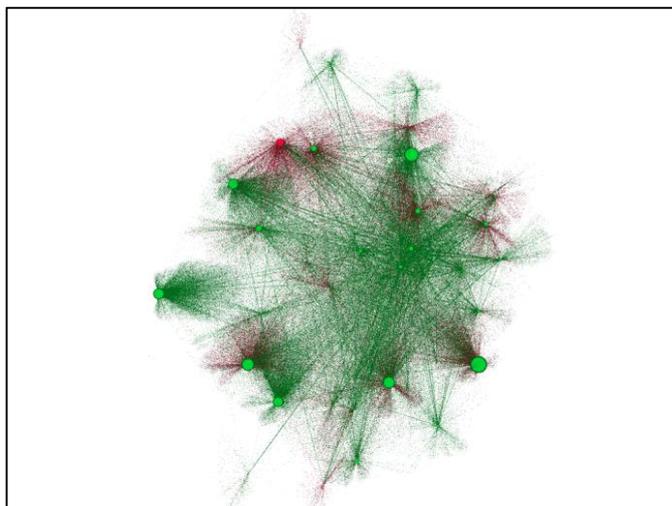


Figure 8 - Retweets (Bronte case study)

The nodes that did actively retweet during this time were individuals, a local journalist and the Better Planning Network (BPN). The BPN is a volunteer-based organisation founded in 2012 in response to the NSW Government’s proposed planning reform package. The BPN claims to have affiliation with over 470 community groups across the State. This analysis suggests that although key stakeholders are connected to the network the community group has built on Twitter, they are passive listeners and do not necessarily promote the ideas and opinions that the community group is trying to distributed across the network.

Discussion: using network analysis to assess social media use by community groups

Using social network analysis to understand participation within community group networks

The community group social media networks attract key stakeholders, such as politicians, planning authorities and local governments, who mostly have a significant following on Twitter. Additionally, journalists, news agencies, local business and other community groups are well represented. However, it was found that the community groups are led by a small number of active people, with a low number of followers, in an opinion leader network structure. This analysis shows that even during the most important time periods in the planning process, numerous key stakeholders in the network did not participate. Social media gives a community the opportunity to participate throughout the planning processes regardless of when the statutory consultation period occurs. This is not new as community groups have traditionally used letters, petitions and telephone calls to facilitate ongoing participation. However, although social media provides an almost instant communication channel that is open for all interested parties to view, it seems the NSW planning system only adheres to the statutory consultation period with little evidence of the community groups' ongoing efforts being used in a more collaborative or consensus building form. The results in this paper suggest that participation is largely being pushed by the community group with little response from key stakeholders. Further research on the perceived role of stakeholders and decision makers who link into a community group's social media network, but chose not to actively participate during key time periods would be beneficial.

Using social network analysis to understand network structures of community groups

A highly centralised network is characterised by a few individuals holding the majority of connections with others in the network. Lyles (2014) advocates that centralised networks are good for building support for collective action, however, they are not so good for problem solving. A more decentralised structure provides better access to resources and stakeholders. Nonetheless, the goal of a community group is to generate collective action, thus the network structures found in this analysis seem appropriate. Furthermore, SNA illustrates the networks' strongest ties are concentrated on the community group's Twitter account and suggests there is social capital being generated within this segment of the social network as group members generate opinions, distribute information and support each other's activities.

Adoption of social media by community groups

The Harold Park and Bronte community groups commenced using social media in 2012. Each community group's social media profiles are followed by other community groups. This suggests that these groups are observing each other's actions and potentially emulating them for their own cause. This echoes Mergel (2013)'s suggestion that the key to the rapid diffusion of social media by local governments in the US can be attributed to the free and open nature of social media, and the fact that practices of others can be openly observed and emulated. It is difficult to identify social media use by community groups in Sydney prior to 2012, however, since 2012, numerous short and long term examples can be found.

Positioning within a network, subgroups and bridges

Holman (2008) concludes that local groups could use network data to visualise themselves in a network to determine where contacts with others playing the role of information brokers or bridges could improve communications. Access to this kind of network visualisation may provide greater ability to influence network members and feed their own ideas and opinions into the network with greater effectiveness. An affordance of social media is the ability to harvest network data and visualise such networks with a view to describing the network structure and significant subgroups. SNA highlights power positions within networks by identifying relationships between organisations and their positions in the network, including who are the bridges that may distribute information more broadly.

SNA techniques can be taken a step further to demonstrate participation at important points in the planning process. The network graphs demonstrate that politicians, journalists and other community groups play an important bridging role, as does highly connected individuals who can increase the networks' reach to their followers. While the community group's Twitter accounts may not attract large numbers of friends and followers on Twitter, their combined network can become large and during periods of high tweeting and retweeting activity, information and opinions can be distributed to a significant number of people.

Sample population being measured

The network graphs in this paper appear to present a comprehensive snapshot of the community groups being investigated, however, it must be noted that the use of social media by community groups is a sample of the group and does not necessarily represent the entire group or a comprehensive audit of all the connections they are pursuing. Community groups are also a relatively small percentage of the local community that is not considered to be representative of entire community, their opinions often reflect the attitudes of a small self-organised minority who research issues and coordinate the group's contributions to the planning process (Dear 1992; McClymont and O'Hare 2008). Notwithstanding, network graphs generated from social media data reveal a wealth of information about community groups that is difficult to gather by any other means.

Limitations of social network analysis

Wellman (1983) states that SNA cannot provide an understanding of human agency and its influence upon communities, thus a complete understanding of community groups and their associated networks needs to be undertaken using a combination of research techniques, including qualitative methods. SNA gives researchers the ability to capture a snapshot of a network and identify who has the power to promote ideas and opinions across the network, however, qualitative methods are also required to gain a better understanding of how the community group network functions in terms of information flows and why stakeholders and decision makers are listening in.

Conclusion

Undertaking analysis of social media networks can provide useful information about community group network structures, including the stakeholders the community are choosing to connect with. Furthermore, the use of SNA in participatory planning research could promote network thinking by providing links between real world case studies and planning research. The network graphs presented in this paper could also be a valid tool for planners to use to gain a better understanding of how community groups are operating and who they seek to engage with. In summary, this paper contributes to the small amount of literature on the use of SNA in planning research by investigating social media networks created by community groups in opposition to site specific changes to planning controls.

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