Abstract

This paper examines the role and potential risk of artificial intelligence (AI) powered automated social media accounts in participatory planning processes and broader themes of community well-being. The rapid growth and massive uptake of social media has resulted in a surge in public interest to engage with others around key land development topics. Due to the low cost and high potential engagement, planners and policymakers have been quick to open electronic channels of participation to inform the decision-making process. Doing so has created an opportunity for subversion from groups with alternate and possibly nefarious interests. Anecdotally, we have found that automated social media accounts have been used to further inflate the voice, and therefore influence, of subversive groups in the land development and planning process. While scholars have begun to examine how tech-savvy social media users are manipulating political discourse through the medium of Facebook and Twitter, a dearth of research has yet sought to examine the potential harm that such manipulation could cause to online planning processes and resulting community well-being. This project seeks to explore the risks that social media manipulation might pose to online community discourse around land development and planning topics. To begin to gauge this risk, this paper reviews the theoretical and empirical literature on the topic and makes recommendations for future research to measure and analyze the threat to Twitter community well-being posed by AI.

Keywords: Social Media, Social Bots, Participatory Planning, Twitter Community Well-being, Artificial Intelligence, Literature Review

Introduction

Social media has changed the way in which people engage with urban issues[1] by providing a digital landscape in which people can share their opinions on decision-making in real-time, ask questions, and actively participate in discussions around key areas of interest. Consequently, there has been a surge in public interest in using social media to engage with others around key place-based issues (Evans-Cowley, 2010; Kleinhans et al., 2015). Policymakers and planners have recognized the value of such systems to engage a wide variety of stakeholders and inform decision-making processes at a low cost (Williamson and Parolin, 2012). In doing so, they have also created an opportunity for subversion from groups with alternate and possibly nefarious interests (Bessi & Ferrara, 2016; Brachten et al., 2017; Hegelich & Janetzko, 2016). While public opposition to planning projects or "NIMBY-ism" (Not In My Backyard) is not a new concept, social media has created an additional avenue for such expression (Williamson and Ruming 2017). Artificial-intelligence (AI) powered automated social media accounts could be used to further inflate the voice, and therefore the influence of subversive groups in participatory planning processes.

Urban scholars have looked to internet-enabled communities to foster better discussions and debates around community visioning and planning (Mitchell 1995; Evans-Cowley and Hollander 2010; Hollander, et al. 2016). Research has focused on how political processes of urban planning, design, and development can benefit from online community engagement and dialogue, extending the work of communicative planning scholars like Forrester (1999) and Innes and Booher (2010). While the movement of community planning

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[1] Examples of such urban issues include discussing the need for improved parks, better sanitation, more responsive police, or priorities for public schools.

processes onto online platforms has occurred as prophesized, discussions of the risks of such a move have overlooked the influence of social media manipulation, NIMBY movements and discourse around local planning issues (Williamson and Ruming 2017). Instead, concerns have focused around the digital divide between community members, and the lack of human touch with online exchanges (Afzalan and Evans-Cowley, 2015). While scholars have begun to examine how political discourse may be manipulated through tech-savy social media users and/or AI on Facebook and Twitter, no research has yet examined the potential harm that such manipulation could cause to online planning processes or community well-being. This project studies the risks that AI-powered social media manipulation poses to online community discourse around urban policy and planning topics, with particular focus on Twitter as a platform[2].

The following research questions guide our exploration of the roles and risk of AI in online communities:

1) What are the risks of AI-powered social media accounts on online planning processes and community well-being?

2) What strategies can be employed to mitigate the identified risks to planning processes and community well-being?

The paper begins with a review the theoretical and empirical literature on social media and community well-being, followed by an exploration of how social media has been used in planning processes. The risks of discourse manipulation on social media as a result of nefarious users and AI-powered automated social media accounts are then identified and evaluated. The paper concludes with a series of recommendations for future research, and urban planners and

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[2] Twitter's unique open API and widespread ability to be used by bot operators makes it an especially useful platform to explore in this study.

communities to reduce the risk of manipulation of online planning processes by AI-powered social media accounts.

Understanding Social media

As a popular communication platform, social media serves as one online channel for exchanging ideas, sharing personal thoughts, and spreading political and breaking news (Tsou et al., 2013). Social media enables users to create and rapidly share information through internet-enabled mobile devices and computers, which considerably shortens the time between events occurring and the news being shared on social media. In addition, users can respond to new information in real-time, enabling them to arrange their activities and communications adaptively (Tsou et al., 2013). Social Media also has a spatial dimension as third parties, such as academic scholars, are able to geolocate some social media users by sensing their smartphone locations (Qian et al., 2017), or according to their behaviour of sharing (Ying et al., 2014) and social circles (Feng and Qian, 2014).

A number of social media platforms exist, supporting interactions between individuals and the creation of interest-based online communities, including Facebook, Twitter, Myspace, Weibo, Instagram, TikTok, Tublr, and LinkedIn. This research focusses specifically on Twitter due to the public nature of interactions on the platform. Twitter was launched in 2006 as an online micro-blogging service (Tsou et al., 2013). Twitter users write or share a status messages with their "followers" on Twitter, with original written messages called "tweets" and re-shared messages called "retweets" (Twitter, 2010). The most unique services in Twitter are prefixing keywords by a hashtag "#" to link a tweet to a broader category of tweets and to emphasize the theme of message. Users can also use "@" in the tweets to tag someone else's Twitter account. Tweets provide large amount of information for researchers to trace, monitor and analyse. Twitter subsequently provides researchers with access to an abundance of low-cost data from

which they can better understand human communication (Miller 2011) and behaviours (Perreault and Ruths 2011; Lee et al., 2011).

Social Media and Community Well-being

The notion of a community has long existed as a geographic concept relating to the people who live in close proximity. Gusfield (1975) writes that a community is not only defined by geography or territory such as town, neighborhood or city, but also defined by human relationships unbound by traditional spatial parameters in the physical world. Since the mid-twentieth century, researchers have observed that the numbers of communities that were developed by interests and relationships was greater than that by territory or locality (Durheim, 1964; Ch'Ng, 2015). McMillan and Chavis (1986) argue that an individual's sense of community is shaped by the presence of feelings of membership, influence, reinforcement and shared emotional connection. Our review of McMillan and Chavis's (1986) work reveals that: 1) membership is the sense of belonging; 2) influence is the feeling that someone makes impact on a group or members; 3) reinforcement is the fulfillment of needs; 4) shared emotional connect is a shared faith coming from those members who have similar experiences, locations and shared time. While originally intended to be applied to physical communities, these traits are increasingly evident in online environments, as individuals seek to connect with others in new and novel ways using ICTs, such as Twitter.

Ch'Ng (2015) conducted a quantitative study to analyze Twitter data by searching hashtags from tweets so as to understand the forming pattern of Twitter communities. He observed that communities were able to form within Twitter through common ideology or common judgement of ideology. Twitter communities are formed relationally, which is to say that they are created through the internal cohesion of members engaging in online discussions and defending against their collective position with other conflicting communities (Ch'Ng,

2015). Ch'Ng (2015) also found that the influence in Twitter is bottom up, from individual members to groups. Once ideas from individuals form and evolve to that of groups, other individuals in the wider Twitter community may also be influenced through corresponding and related topics. Adopting social media as the channel to release planning related information may be able to help build up the sense of Twitter community by cultivating feelings of membership, influence, reinforcement and shared emotional connection (McMillan and Chavis, 1986). Creating tweets to promote topics targeting specific groups of citizens or residents is the first way to build up the feeling of belonging among the Twitter community. Retweeting or tweeting popular planning stories and news articles provides Twitter users the chance to feel that their voice may have an impact on others. Positive discourse on Twitter has the opportunity to shift users' feelings of fulfillment which allow them to believe they share opinions with others and together their needs can be accomplished. Such a process can be used to shape discourse on a topic in a positive or negative direction, including the discourse around major planning decisions, or online planning processes.

Community well-being has been defined by several researchers as a set of multidimensional values including environmental, cultural, health, psychological well-being, subjective well-being, work, economic, and education (Bagnell et al., 2017, Phillips and Wong, 2017, Musikanski et al., 2020; Hollander, et al. 2016). Musikanski et al. (2020) assert that individual well-being can influence community well-being. Several studies have found that individual well-being on social media could be directly impacted by a user's use of subjective well-being language (Yetim el al., 2014; Gerson et al., 2016; Tay and Diener, 2011; Sirgy 2011; Yetim, 2011). Tay and Diener (2011) further argued that the fulfillment of perceived societal needs increases an individual's sense of community. Yetim et al. (2014) found that those individuals were more likely to continue positive networking in their community and to increasingly trust that they belonged to a community if their needs were met.

Tweets not only have power to build up people's sense of community on Twitter but also reveal our vulnerability to being manipulated. The impact of individual's subjective and psychological well-being on their Twitter community varies depending on the content of their tweets. The risk to online communities is associated with the information manipulated by other intentional interventions. In the case of planning, a manipulated discussion could mislead public decisions and in turn distort the feelings of an entire Twitter community. Thus, the question for protecting the Twitter community's well-being becomes: how do we identify the content and source of original ideas? Furthermore, what are the threat models that we need to consider when evaluating the impact of automated social media accounts on public discourse?

Social media and planning practice

In the last decade social media has become the latest tool in the participatory methods used by urban planners to engage with different resident groups and stakeholders on urban issues. Multiple studies of social media use in planning practice have focussed on online forums, Facebook, and location-specific Web 2.0 applications, and have concentrated on the opportunities and usefulness of such platforms to foster communities' involvement in decision-making (Evans-Cowley & Griffin, 2011; Fredericks & Foth, 2013; Williamson & Parolin, 2013; Wilson et al., 2017). In recent decades urban planning scholars have trumpeted the opportunities offered by social media such as the capacity to enhance information sharing and dialogue (Evans-Cowley & Conroy, 2006; Fredericks & Foth, 2013; Williamson & Parolin, 2012), build social capital (Afzalan & Evans-Cowley, 2015; Mandarano et al., 2010), and provide planners with insight into communities and their interests (Arribas-Bel et al., 2015; Firmstone & Coleman, 2015; Hanzl, 2007). Social media has also been framed in the urban planning literature as a logical extension and technologically driven expansion of the

communicative and participatory planning paradigm promoted by Healey (2003) and Innes (1995).

Social media represents a significant departure from the methods of public engagement and participation traditionally employed by urban planners. Where historically planners would retain power to control the process of consultation (e.g. timing, issues covered, location, etc), social media and other Web 2.0 platforms empower communities to have a greater level of autonomy in how and when they engage with spatial issues relevant to them (Evans-Cowley, 2010; Wilson et al., 2017). Reflecting the high potential for engagement with diverse and disparate communities in real time combined with the low cost of social media, local authorities and planning departments rapidly created social media accounts, particularly Twitter and Facebook, to expand their channels of participation in planning processes (Firmstone & Coleman, 2015; Fredericks & Foth, 2013; Williamson & Parolin, 2012). Many communities are also now using social media as a means of expressing their concerns and building bottom-up traction for action and coalescing with other individuals around place-based issues and formal urban planning processes (Evans-Cowley, 2010). Reflecting this, social media use in urban planning systems can both citizen/business initiated, and government initiated (Evans-Cowley, 2010; Williamson & Ruming, 2015).

<u>Citizen and business initiated social media use</u>

Communities have wholeheartedly embraced social media as a new way to engage with each other and local planning authorities on urban issues (Ertiö & Bhagwatwar, 2017; Lin & Geertman, 2019). While most social media platforms can be used by communities to engage with urban issues, online forums such as Facebook have proved particularly successful because of their capacity to structure interactions into self-joining 'groups', rather than open and more anonymous platforms such as Twitter. Citizen-led social media groups are often formed in opposition to a development proposal or plan (Evans-Cowley & Hollander, 2010; Williamson

& Ruming, 2015). Case studies in Toronto (Ontario, Canada) and Austin (Texas, USA) show that local planning authorities may be totally unaware of such social media groups' existence, or in UK case studies, local authorities may be aware but disengaged with the discussions on such pages (Evans-Cowley & Hollander, 2010).

The degree to which individuals or groups engage with local issues and planning processes through social media varies significantly. Individual engagement with planning issues through social media may be as simple as "following" or "liking" a group or page focussed on a particular issue, or may include more involved interactions such as commenting, sharing content, or organising in-person interactions. For example, a community in Helsinki, Finland was inspired by an activist's post on Facebook and used Facebook to organise and run a 'Pop-up Cleaning Day' to encourage community action on overconsumption and waste (Horelli et al., 2015). A study of a Facebook book group used by local residents in North Ryde in Sydney, Australia also found some evidence of mutual discussion surrounding a proposed master plan for a local precinct (Williamson & Ruming, 2015). However, the study concluded that the "North Ryde Precinct Residents Discussion" Facebook group was predominantly used as a "noticeboard, rather than a platform for discussion and debate" (Williamson & Ruming, 2015, p. 56).

Although some events described above involved physical face-to-face interaction, they were implemented through the internet. The extent of either individual or group engagement in online activities were likely determined by their personal or group motivation specific to that event. That motivation might bring people who have similar interests together and which may reflect the culture of the corresponding online community. Just as citizens have embraced social media in their advocacy, so has just about every other form of organization (Chalmers, William, and Alexander Shotton 2016; Tresch and Fischer 2015). Businesses in particular have been the focus of several political science studies, where numerous case studies have shown

the effectiveness of social media as a tool for advancing business interests in political decision-making systems, such as planning systems (Ranchordás 2017; Brown 2016).

<u>Government initiated social media use</u>

Studies of local planning authorities in the United States and Australia show that actual use and levels of engagement through social media by local planning and development authorities are uneven (Evans-Cowley & Conroy, 2006; Williamson & Parolin, 2012). While social media has the capacity to support two-way dialogue and peer-to-peer network interactions, empirical studies (Evans-Cowley, 2010; Williamson & Parolin, 2012) have repeatedly found that government planning authorities have a tendency to reduce social media to a "top down information dissemination channel" (Fredericks & Foth, 2013, p. 246). For example, planning authorities use Facebook or Twitter accounts to share information with their followers regarding events, the timing/location of face-to-face consultation events, and upcoming projects in the local area, rather than encourage a multidirectional dialogue between stakeholders and planners on a specific issue or project (Evans-Cowley & Conroy, 2006; Williamson & Parolin, 2012).

The interest and limited adoption of more multidirectional online dialogue between planning authorities and communities suggests the need for a better understanding of the role AI plays in online participatory planning processes. McCarthy (2007, n.p) defines AI as "the science of making intelligent computer programs, which is related to the similar task of using computers to understand human intelligence". AI is already used by social media platforms to control the creation of content, suggest friends you may know and want to connect with, and determine the most relevant advertisements to show individual users (Kietzmann et al., 2018). AI developed by the planning system has the potential to support streamlining communication with individuals on basic planning issues through chatbots, and support rapid

sentiment analysis of social media posts relevant to a specific development proposal (Araujo, 2018; Hangya & Farkas, 2017).

The conservative use of social media by urban planners is explained by scholars and practitioners as the result of a number of challenges, including concerns of political implications, privacy, and confidentiality (Fredericks & Foth, 2013), high time cost of moderating and managing social media accounts (Afzalan & Evans-Cowley, 2015), and a lack of skills or knowledge regarding how to effectively use the quantum of data and types of information generated from social media in planning processes (Evans-Cowley & Griffin, 2011; Williamson & Parolin, 2013). Planners have historically been slow adopters when it comes to ICT (Klosterman, 1997; Klosterman & Landis, 1988), and the above suggests that social media is no exception to this.

Risks of social media use

Discussion of the risks associated with social media and AI-powered social media use specifically in planning processes remain very limited. Empirical studies of social media use in planning practice argue that social media platforms are vulnerable to the distortion or miscommunication of planning issues (Afzalan & Evans-Cowley, 2015; Evans-Cowley & Griffin, 2011; Williamson & Parolin, 2013). In a study of social media use to facilitate green infrastructure planning in Eugene, Oregon, Afzalan and Evans-Cowley (2015, p. 80) found that despite the participation of a planner in an online community forum, the social media generated 'an environment in which distortions were propagated'. In this study, distortions were found to be the result of poor articulation of an individual's ideas (Afzalan & Evans-Cowley, 2015), rather than an intentional or mischievous distortion of information warned by Williamson and Parolin (2013). The level of potential anonymity on social media however, can enable and

encourage intentional distortions of information by individuals. Evans-Cowley (2010) suggests that anonymity and the use of fake identities on social media systems could limit the capacity of planners to know who exactly they are interacting with online.

The digital communications literature contains a broader and comprehensive discussion of the risks associated with social media use. Scholars argue that social media platforms and their users are highly vulnerable to exploitation due to the combination of their low cost, high accessibility, immediacy of content dispersal, and limited moderation of content type or quality (Paquet-Clouston et al., 2017; Wald et al., 2013; Woolley & Howard, 2018). This vulnerability lends itself to risks of misrepresentation, exploitation and the potential for intentional swaying or misleading of public opinion on major political or social issues. Social media manipulation has been observed in the 2016 Brexit debate (Bastos & Mercea, 2018), 2016 US presidential debate (Bessi & Ferrara, 2016), and the 2015 conflict between Ukraine and Russia (Hegelich & Janetzko, 2016).

Manipulation on social media is not always linked to individual users – in some circumstances it may be social bots. But without realizing that those social bots are not real existing individuals, the content released by social bots might develop into to group ideas and influence other real human users' cognitive reactions along with their subjective well-being. Social bots are AI-powered computer programs that can mimic human behaviour and perform basic activities on social media, such as sharing or posting content, and sending friend requests (Zhang, et al 2018; Ferrara, et al. 2016). They have been used to promote political positions to influence elections and to tamper with the stock market by introducing false information on business performance (Ferrara, et al. 2016). Social bots have become increasingly common on social media. Social bots have AI - as they can mimic human intelligence and appear to have independent thoughts. These bots enable third parties to "reach and potentially influence a large and diverse population of web users"(Boshmaf et al., 2011, p. 93) beyond the capabilities of

an individual user. While some bots are transparent regarding their non-human nature (e.g. Emoji Weather USA - a weather sharing bot on Twitter), others are deliberately misleading and seek to represent themselves as human users (Edwards et al., 2014).

In May 2018, the U.S. Senate Intelligence Committee released a report concluding that the Russian government had engaged in a variety of cyberattacks intended to disrupt the 2016 presidential election. The Russian government's use of phony social media attacks to change political discourse in the U.S. has been well documented by journalists and raised the broader specter that online communities are at risk of being manipulated by actors with nefarious intentions (U.S. Senate Select Committee on Intelligence, 2017). While some political science scholars referred to above are beginning to explore the extent and severity of this manipulation at the national political level, few studies have examined the potential harm that such cyberattacks could cause at the local municipal level.

Social bots programmed with malicious intent use a variety of strategies to mislead social media users (See Table 1). These strategies are often combined to further enhance the reach and influence of a social bot with a specific agenda, and are often successful in spreading rumours, false information, and reinforcing specific perspectives (Wald et al., 2013). Social bots have become increasingly sophisticated and difficult to distinguish from human users, making it difficult for human users to identify credible and trustworthy sources of information on social media (Alarifi et al., 2016).

Table 1: Strategies used by social bots

Strategy	Description	Sources
Astroturfing	Creation of multiple accounts for sharing or resharing opinions to suggest greater consensus on an issue than actually exists.	(Badawy et al., 2018; Ratkiewicz et al., 2011)
Twitter bombs / Smoke screening	Flooding a hashtag used by opposing arguments/positions with counter content, deliberately obscuring one	(Abokhodair et al., 2015; Stieglitz et al., 2017)

	party's arguments with the opposition's counter arguments.	
Tagging influential users.	Mentioning high profile or influential users in posts containing low quality content to exploit the credibility of the follower and gain the attention of their large follower base.	(Shao et al., 2018; Subrahmanian et al., 2016)
Spamming	Publishing a large number of similar posts in a short period of time.	(Ferrara, 2018; Stieglitz et al., 2017)

A variety of studies have measured Twitter bots' influence on elections across the world (Howard et al., 2017; Neudert et al., 2017; Buccoliero et al., 2020). A similar methodological approach was used across the different research studies. First, researchers collected a dataset of tweets/retweets across the short period of days through hashtags and keywords that were relevant to their study topics. Second, they classified the dataset by ideology based on the number of times that certain keywords were mentioned in the hashtags or the tweet. While analyzing the data, different open source tools such as BotOrNot (Badawy et al., 2018) were used to calculate bot scores. Researchers used a variety of data analysis approaches, including comparing the portion of links of reliable URLs to unreliable URLs, comparing the twitter traffic on those certain days, and looking at the geospatial spread of users that have interacted with bots. Such studies found commonalities to determine a list of reliable news sources and fake news sources. In general fake news sources were found to exaggerate news and label themselves as "satirical" while reliable news sources were supported by research and evidence.

Discussion

This paper sought to understand the risks of AI-powered social media accounts on online planning processes and community well-being, and identify potential mitigation strategies to address these risks. The following sections discuss each of the research questions

and findings of the literature in greater depth, as well as identifying opportunities for future research to better understand the nexus of social media, community well-being and online participatory planning processes.

<u>The risks of AI-powered automated social media accounts</u>

Online communities intersect closely with the geographic places where people live, work, and play. The forums, hashtags, and other community markers that appear to be spatial online actually connect with real places during community planning processes. These virtual communities are susceptible to corruption, potentially suffering from the undue influence of AI-powered social bots. While these virtual communities are not the same as the real-world communities they correspond to, they are useful proxies for such. The outcome of such corruption is unjust to the virtual and underlying real-world communities. The spread of misleading information online can deceive people, alter their perceptions, and impact both their virtual and real-world communities.

If and when those same defective communities are utilized to inform physical planning priorities and decisions in the real world, the degree of concern increases substantially and we may be instead facing a crisis between public and planners. The public might misread the purpose of a planning decision because individuals' perceptions of their physical surrounding will be distorted and intensified by AI-powered social bots. At the same time, if public perception has been already intensified or distorted by AI-powered social bots (wreaking havoc on both virtual and real-world communities), planners are also hobbled in their ability to take reasoned and purposeful action in enacting further plans. These social bots can be multiplied by the thousands at the stroke of a key and can directly impact well-being in physical communities.

<u>Mitigation strategies</u>

Automated social media accounts or bots are incredibly difficult to identify, let alone curb nefarious activities due to the anonymity of social media, speed at which new accounts can be created, and the use of machine learning and AI to train such accounts to convincingly mimic human behavior on social media (Yang et al., 2019). Individuals are poorly placed to judge the authenticity of social media accounts, and the accuracy of information they post, leaving much of the onus for mitigation on governments, and social media companies. Social media companies are increasingly aware of the negative implications of automated social media accounts on their users, and organisational reputation. Early policies developed by social media platforms such as Twitter have focused on verifying the identity of high profile users and limiting the number of automated posts users can share, specifically targeting bots that post spam and Twitter-bombs (See table 1)(Abokhodair et al., 2015; Stieglitz et al., 2017). At the time of writing this article, there was little evidence of government policies specifically focused on addressing manipulation of online communities by nefarious or AI automated social media accounts. Rather, some governments are increasingly seeking to use social media to actively develop specific narratives and shape the behaviors of the general population (Bradshaw & Howard, 2017).

Despite the above, there remain a number of possible strategies to mitigate potential risks of AI-powered automated social media accounts or bots to community well-being, and online participatory planning processes. First, it is critical that we are better able to identify automated social media accounts. Strategies to achieve this may include increased verification of users (not just for high profile users) when creating an account and the accuracy of content posted, continued development and awareness building of user-friendly bot-detection tools such as "BotOrNot", and embed AI and machine learning processes into social media to automatically detect AI-powered automated social media accounts and clearly label them as such for other users (Yang et al., 2019). Second, planning authorities must actively engage in

producing clear and regular posts containing accurate information on key planning issues. Regular posting and moderation of content enables reinforcement of correct information, and heightened opportunities for participation and dialogue with decision-makers. It also encourages trust-building in the planning system and subsequently supports ongoing development of individual and community well-being. Finally, given the rapid growth in AI-powered automated social media accounts, individual users need to be increasingly aware that other users may not be genuine, and therefore be more discerning and critical in their reading of others' content.

Future research

While this paper sought to draw on key theoretical and empirical sources to explore the aforementioned research questions, additional research is needed to provide more complete answers. Our own review of the literature is limited by our restriction on sources written in English and the scope of topics constrained by our conceptual understanding of AI in community well-being. Future research should seek to better understand the scope, scale, and intensity of this social bot use in planning processes through additional, broader literature reviews and through attempt to empirically measure the threat to online community well-being. Research should also assess the presence and discoursal impact of bots in numerous large-scale real estate development projects, across a wide range of geographies, uses, size, and controversy levels. Such investigations could track the conversations online, monitor them over time, and develop an analytical framework to assess the likelihood that a user is a social bot or not, and their degree of influence over discourse around planning issues. Ultimately, the hope would be that scholars could construct social network maps to assess how influential each follower is, so that we may project the possible influence (and harm to community well-being) each bot could potentially generate.

In this paper, we have shown that scholars have begun to examine how tech-savvy social media users and their AI-powered social bots are manipulating political discourse through the medium of Facebook and Twitter. The paper identifies a number of risks associated with AI-powered automated social media accounts, particularly relating to misinformation and distortion of unrepresentative and inaccurate perspectives in participatory planning processes. While this paper brings together the literatures surrounding social media bots, urban planning and online-participatory planning processes, what is currently absent from the literature is a thorough and comprehensive examination of the potential harm that such manipulation could cause to public participation processes linked to land development and urban planning.

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Conflicts of interest/Competing interests: The authors declare that they have no conflict of interest.

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Code availability: Not applicable

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