What counts as contribution? Micro-practices of enrolment and exclusion in a financial problems support group
by Anna Wilson, Stefano De Paoli, and Daniel Rough

Abstract

This paper explores the micro-practices of participants in an online community and the relationship between these practices and different metrics of contribution to the community. It compares contribution metrics derived from two different measurement technologies, one based on a conventional, individualistic algorithm and one on whole-part relationships. We combine an actor-network theoretical perspective with empirical research that employs both social network analysis techniques and detailed, qualitative analysis of discussion forum activities and exchanges between participants. Together, these approaches allow for a detailed tracing of the discussion forum network. We find that the two different technologies of measurement enact different versions of contribution (and hence reputation). Because of this, they identify different actors as influential in the discussion forum actor-network (although there is some overlap). However, neither effectively distinguishes between actors that tend to enrol others into or exclude them from the actor-network; and thus neither reliably identifies those whose actions align with the actor-network's aims.

Contents

Introduction

Online platforms are now a common means of bringing participants together for economic, social and knowledge exchange activities. As these platforms have become widespread, many have incorporated measurement technologies (Mol, 1999) that attempt to quantify and make visible the contribution of individuals to the community or network the platform is intended to support. Most commonly, these measurement technologies are based on the notion of online "reputation" (Dellarocas, 2003; Farmer and

Glass, 2010), often using algorithms that attempt to aggregate and quantify the judgements that users make about each other and/or the history of a user's transactions with others with the aim of facilitating judgements about new interactions. However, as we have argued elsewhere, conventional reputation systems are rooted in an inherently individualist paradigm (Rough, *et al.*, 2023; Wilson and De Paoli, 2019) and thus may not be well-aligned with the purposes of communities that seek to develop mutualism and cooperation. Recently, motivated by an interest in such platforms, we have proposed that alternative technologies of measurement could be constructed that derive their metrics from whole-part relations rather than individual, accumulative measures (Rough, *et al.*, 2023). In this paper, we compare the contribution metrics generated by technologies grounded in each of these two contrasting paradigms, using a discussion forum-based online support group as a case study.

We start by describing our conceptualisation of communities that interact through digital social media, which draws on ideas from actor-network theory (ANT) (Callon, 1984; Latour, 1987; Law, 2009; Mol, 2010, 1999). We describe how digital platform-based communities such as the support group we study can be described as actor-networks comprised of actants and micro-practices that assemble to both generate and facilitate flows of knowledge and affective resources in the form of practical and emotional advice and support.

We then provide a brief description of conventional technologies that attempt to measure reputation, and contrast these with our proposed alternative. Following this, we compare metrics of contribution or standing within the community obtained through technologies grounded in each of these two different approaches for users of a Financial Problems online support group. We chose this platform because it employs a form of conventional/individualistic reputation system, in which participants accumulate points on the basis of their activities and judgements relating to their activities registered by other participants through the platform's interface. We show that the two technologies construct different versions of contribution (or reputation). We then select particular actors identified as "important" by each technology and examine the micro-practices they enact within the discussion forums.

Placing a deliberate focus on the details of individual interactions, we then go on to analyse the micro-practices (more or less stable networks of repeated, habitual practice) of these apparently key actants. We observe a range of different habitual or patterned interactions, some of which act to enrol new actors, but others that appear counter-productive, shutting down or cutting off the potential contribution of others to the actor-network. That is, if the content of interactions is recognised as an enactment that translates the interaction, then we can recognise that some enactments cause some actants to become more durable than others. Given that the purpose of this actor-network is to provide supportive connections and facilitate the flow of knowledge and advice, such counter-productive enactments are not practices that should be counted in any metric designed to provide an indicator of standing or contribution within the community. Thus, although automated network density metrics may be more effective than the existing points system in identifying influential actants, effective indicators of contributions that act towards sustainability and the circulation of valuable knowledge and affect may need to consider the content and consequences (or action) of interactions.

Understanding a support group's activities as information and affect circulating in an actor-network

Online communities dedicated to facilitating knowledge diffusion and the creation of supportive connections are now widespread, addressing health issues, social exclusion, minority rights and/or particular life experiences as well as professional or technical communities and leisure interest groups (see, for example, Barak, *et al.*, 2008; Chung, 2013; Eysenbach, *et al.*, 2004; Griffiths, *et al.*, 2009; Mehra, *et al.*, 2004; Pedersen and Smithson, 2013; Wright and Bell, 2003).

In this paper, we focus on a discussion forum-based support group for people experiencing financial

problems. We consider this digital platform as an assemblage of users, digital objects and the micro-practices they engage in. Within this assemblage, there are flows of information, knowledge, practical support and affect (often in the form of emotional support). The effectiveness of these flows depends on the strength and density of the network. To conceptualise these flows, we draw on ideas first developed in the field of science and technology studies, particularly actor-network Theory (ANT) (Callon, 1984; Latour, 2005, 1987; Law, 2009).

ANT has been proposed as providing an alternative critical approach in information system research (Doolin and Lowe, 2002) that can yield an 'alternative reading of social interactions' [1] (Doolin and Lowe, 2002, p. 72) by allowing researchers to 'explore how distinctions are produced, status is constructed and social relations are stabilized' [2]. ANT perspectives have been used fruitfully in several prior studies of sociotechnical IT systems; however, these have tended to focus on design and implementation phases (see, *e.g.*, Diaz Andrade and Urquhart, 2010; Mähring, *et al.*, 2004; Marres, 2004; Rodon, *et al.*, 2008; Storni, 2015), or the evolution of a technology (see, *e.g.*, Faraj, Kwon and Watts, 2004). In the present work, we adopt a similar perspective, but here apply it to describe and understand the interactions that take place in an established sociotechnical system, at a time when the network designers are no longer present and the technology is more or less fixed. We examine the processes of enrolment and translation that continue to operate when the networked community is left to evolve on its own.

The notion of an actor-network extends that of a network in several important ways. First, an actor-network perspective acknowledges that we are never dealing with static networks, but rather ones that are continuously produced and re-produced; and each element of a network is itself continuously being enacted and translated as a nexus of time-varying relations. That is, actor-networks 'expand, contract and shift configuration over time, and even the most stable and predictable of them are constantly being reappropriated and redefined by the nature of the flows that animate them' [3].

An ANT perspective also foregrounds the possibility of emergent behaviours, particularly in relation to the "need" of the assemblage as a whole to act in ways that help it survive and grow. That is, the idea of an actor-network assemblage recognizes that the whole network has properties and behaviours that develop as it seeks to sustain itself and expand through the recruitment of new participants (Fenwick and Edwards, 2010).

Within this perspective, rather than inhering to particular nodes in these network assemblages, knowledge and affect, including reputation and trust, are effects generated in and circulating through the transient interactions and stable connections that hold an assemblage together. It is partly this shift away from individualistic perspectives that draws us to ANT as a framework for understanding digital platforms that promote cooperation and pro-social behaviours. However, this does not mean that we do not recognise power and influence to be concentrated in some actants or parts of a network. Indeed, ANT offers an approach to 'analysing the exercise of power' [4] in assemblages. Of particular relevance to online communities, ANT provides a way to think about those components of an assemblage that are particularly effective at engaging or recruiting new actants. Key notions (Callon, 1984) include *enrolment* — the moment or phase when actors are enrolled as actants in the emerging actor-network, so that their actions become both shaped by and essential to the sustainability and growth of the actor-network; and *mobilization* — when some actants emerge as spokespersons who both represent other, more passive network actors and seek to mobilize them (enrol them as actants), thus creating a stronger and more stable actor-network. Such spokesperson-actants are inevitably associated with the emergence of influence and the exercise of power.

An ANT perspective may thus be helpful in thinking about the role of particular actants in the support group discussion forum network and the micro-practices they are associated with. It is important to note that 'the question ANT asks [is] not where the activities of actors come from, but rather where they go: effects are crucial' [5]. That is, by examining the more stable networks of micro-practices that are engaged in by apparently influential actants, we may better understand what kinds of contribution serve to stabilise and strengthen the network as a whole.

Going beyond these "classic" ANT concepts, we also turn to Mol's (1999) work on ontological politics to reconsider the role and design of systems that count contribution in order to provide an indication of "reputation" or trustworthiness. Mol's concept of multiple realities, illustrated using the medical "condition" of anaemia (Mol, 1999), emphasises how the technologies and practices used to make measurements or evaluations are themselves actors that create the reality they measure. Just as the different clinical, laboratory and pathophysiological approaches to diagnosing anaemia that Mol describes perform different versions of the condition, so different approaches to measuring contribution to the life and activities of an online community may result in the performing of different versions of "reputation."

ANT, taken in the broad sense of ANT-informed thinking, thus provides a set of terms and sensitivities: a 'kaleidoscope' [6] that may allow us to 'shift our understanding and to attune to reality differently' [7]. By understanding 'what is going on, what deserves concern or care, anger or love, or simply attention' [8], we may be better able to understand the different versions of reality being performed — the choices, values and actions being hidden and revealed, and the decisions about what deserves attention and valuing — when reputation or contribution measurement is enacted through different technologies.

■ ────────────────────────────

Metrics to reflect and encourage behaviours that strengthen the actor-network: Reputation or contribution?

In this section, we consider different approaches to the measurement of how well users' behaviours align with the aims of a particular digital platform-based actor-network. There are many reasons for the designers and facilitators of digital social platforms to generate and make visible indicators of the contribution of individuals to the community or network the platform is intended to support — that is, the contribution of different actors to the strength and growth of the actor-network. For example, such indicators might be included in the system to allow the rewarding of "good" behaviours, to assist with identifying collusion or other "bad" behaviours that weaken or disrupt the network, and/or to provide evidence on which others can make judgements in relation to possible interactions.

The identification and measurement of positive contributions — actions and interactions that promote the sustainability and growth of a platform-based actor-network and align with the network's aims — is not, however, always straightforward. The conventional approach to such measurements has generally been through so-called reputation systems (Farmer and Glass, 2010) which according to some commentators (Dellarocas, 2003) equate to the digitization of word-of-mouth reputation that would normally exist in "off-line" communities. The intention is that the processes for assessing an individual's past behaviours, often to make judgements about likely future behaviours, reliability and trustworthiness, can be represented computationally.

Following Mol's (1999) work on multiple realities, it is important to recognise that there are co-existing options for counting contribution or establishing online reputation, and that each option performs a different version of reality in which reputation is based on different values. In other words, different models of contribution or reputation may come to shape different realities within which online community actor-networks exist and operate. Farmer and Glass' (2010) notion of a 'competitive spectrum' [9] of reputation systems goes some way to acknowledging this. Their widely-used model asks reputation system designers to consider the purpose of the community, and identify the kinds of action that align with that purpose and should therefore be rewarded by the system. They suggest that in communities where there is high competition (*e.g.*, competitive games), reputation systems may take the form of performance rankings. In contrast, in communities whose goal is cooperation and support, members of good standing may have badges indicating their "helpfulness" to others. Examples of such "collaborative" reputation systems include eBay's well-known feedback and reputation system, in which a track record of positive commercial exchanges generates an indication that a person's behaviour generally aligns with the aims of the network.

The competitive spectrum described by Farmer and Glass acknowledges variation in goals and thus the need for different reputation systems. However, underlying each approach is the assumption that online communities can be conceptualised as, in the words of Dellarocas, 'nothing but a sum of individuals' [10]. One of the consequences of such an individualistic perspective has been that reputation models have come to be conceptualized around individual contribution and self-satisfaction. Thus, Farmer and Glass argue for an atomistic approach where 'reputation statements' (the building blocks of reputation models) are generated when 'a source makes a claim about a target' [11] — for example, a customer rates a seller on an e-commerce platform, a user "likes" an online video, or a gaming platform awards points to a player. Then, several reputation statements are aggregated to form an overall indicator (*e.g.*, a metric, a badge) — the reputation or contribution "measurement." Regardless of where they are placed on the competitive spectrum, these statement-based technologies are thus likely to perform a reality in which reputation is a commodity or form of (social) capital. They therefore inherently encourage individualism (Wilson and De Paoli, 2019) on the caring or collaborative side of the spectrum.

Such technologies are at odds with our conceptualization of an online community as an actor-network, which is more than a collection of individuals, and instead a networked assemblage with dynamic and emergent properties. They may also be inadequate as technologies to measure the contribution of interactions to the strength and growth of the actor-network itself, rather than to its component actors as individuals. If the community is understood as an assemblage of practices and interactions, then we need to reframe measurements of contribution to, and standing within, that community as representative of whole-part relations rather than of individuals and the sum of their actions and statements about their actions. We have therefore proposed (Rough, *et al.*, 2023) the use of network density measures drawn from social network analysis (SNA) techniques (Scott, 2017) to establish indicators of importance or contribution to the strength and viability of a network. One advantage of such metrics is that they provide measures calculated directly from the network's properties, rather than from subjective, disputable statements by individuals. Metrics such as degree and betweenness centrality are well-established indicators of the importance a particular node in a network has to, for example, the flow of information through the network, or the connection or separation of different subnets. We believe that this alternative reputation measurement technology will enact a version of reputation that places value on the creation and maintenance of relationships (conceived of as links in the network) that facilitate such flows and connections.

We acknowledge that there may be some tensions between the use of SNA techniques and an actor-network perspective (Venturini, *et al.*, 2019), but suggest that they can be used together to generate a kind of productive dialogue (Bosco, 2006; Mützel, 2009; Vicsek, Kiraly and Konya, 2016). Although SNA analyses tend to flatten networks and can have an overly strong focus on relationships between human actors, they do succeed in shifting the focus from actors alone to their relationships and interactions. They also provide ways of visualizing networked assemblages and drawing attention to actors and interactions that draw in, or exclude, actors from certain relationships. That is, they provide one way of 'tracing the network and the action of its constituents', an activity which 'combined with a refusal to make a priori distinctions or grant status, enables a critical light to be shone on the assumed, the mundane and the status quo' [12]. In the following, we combine an SNA-based tracing of an actor-network with a study of the micro-practices that the analysis might hide, in order to shine such a light.

The Financial Problems Support Group discussion forum

We focus on a discussion forum dedicated to financial problems, hosted on a site that provides discussion forums and an Internet presence for support groups addressing a range of issues including specific health problems, unemployment, financial problems, relationships and sexual orientation/identity. Once a participant has registered with the site, they may join up to 10 support group discussion forums. Within these, participants can initiate threads, comment on initial posts, reply to comments, "sympathise" with a post by clicking on a heart icon, comment or reply, or "support" other forum participants (within the

platform, supporting someone is a uni-directional relationship that allows the supported person to send private messages to the supporter, rather like the follower/followee relationships on Twitter). When joining the site, participants create profiles which are by default publicly visible but that a participant may choose to make private. Profiles include a short statement, a profile image and three metrics provided by the platform, presumably with the intention of recognizing contributions to the community and providing a basis for participants to decide with whom they might want to have a discussion or form a supportive relationship. The metrics are: the number of other forum participants whom this particular participant has identified as someone they support; the number of other participants that support them; and the number of points they have accumulated.

The points system, in particular the way points are accrued, has much in common with the kind of reputation system employed in sites such as StackOverflow (Bosu, *et al.*, 2013; Hart and Sarma, 2014; Movshovitz-Attias, *et al.*, 2013), where technical or other expert advice is exchanged. Unlike StackOverflow, points in the support group system are referred to as "sympathy points" rather than "reputation." It is perhaps intentional that this designation leaves it ambiguous as to whether someone with a high number of points is highly sympathetic, or deserves or attracts a lot of sympathy.

Support group members accumulate points by:

- Adding profile information for the first time including: picture, gender and Zip code (25 points each) and "About me" (5 points);
- Joining a group (maximum 10 groups, 25 points per group);
- Logging in (maximum once per day, 25 points);
- Answering a poll (5 points);
- Completing a self-test (5 points);
- "Supporting" someone (10 points);
- Creating, commenting on, or replying to a comment on a post (10, 25 and 10 points, respectively);
- "Sympathising with" (liking) a post, comment or reply (5 points).

Thus, new participants start with some points based on the information they make available via their profiles and their decision to join specific groups. Over time, the majority of points are likely to be gained by logging on and engaging with discussions. The points system, therefore, can be seen as both a reward for constructive participation and a metric for others to make decisions about with whom they want to interact, or whose advice they should trust. That is, it enacts a particular measure of contribution to, and standing within, the community. Interestingly, comments on posts (direct responses to initial posts) attract more points than initial posts, perhaps reflecting the "support group" nature of these discussions — participants who respond to those posting in search of help are rewarded more than those who seek help, or those that add follow-up replies to comments. The version of reputation or contribution performed into being by the sympathy point system is thus one which values: frequent participation; the accumulation of supportees; and being the first person to respond to a thread started by another participant. It is thus a measurement technology grounded in the individualistic paradigm underpinning the reputation systems described, for example, by Farmer and Glass (2010).

In the following section, we compare the representations of contribution or standing within the community arrived at through this point system and a network-density based approach. We use these to identify actants that may be particularly important within the actor-network and then, following ANT's focus on the minutiae of concrete interactions, we explore the micro-practices of some of these actants and their impact on other support group participants/potential actants.

■ ──────────────

A comparison of two realities: Using different contribution-measurement technologies in the support group actor-network

Historical data were obtained directly from the discussion forum pages. Information about interactions was collected for the nine-month period December 2015 to August 2016. The details recorded included the participant responsible for initiating a thread, participants commenting on the initial post, participants replying to comments, participants' reputation points, and the number of times posts, comments and replies were "sympathised" with. Over 400 individual participants contributed to the discussions.

In a Social Network Analysis approach, the discussions can be represented as a directed graph where participants are represented as nodes and interactions or relationships between them are represented as lines. Figure 1 shows such a representation, where the lines represent the act of commenting on or replying to a post.
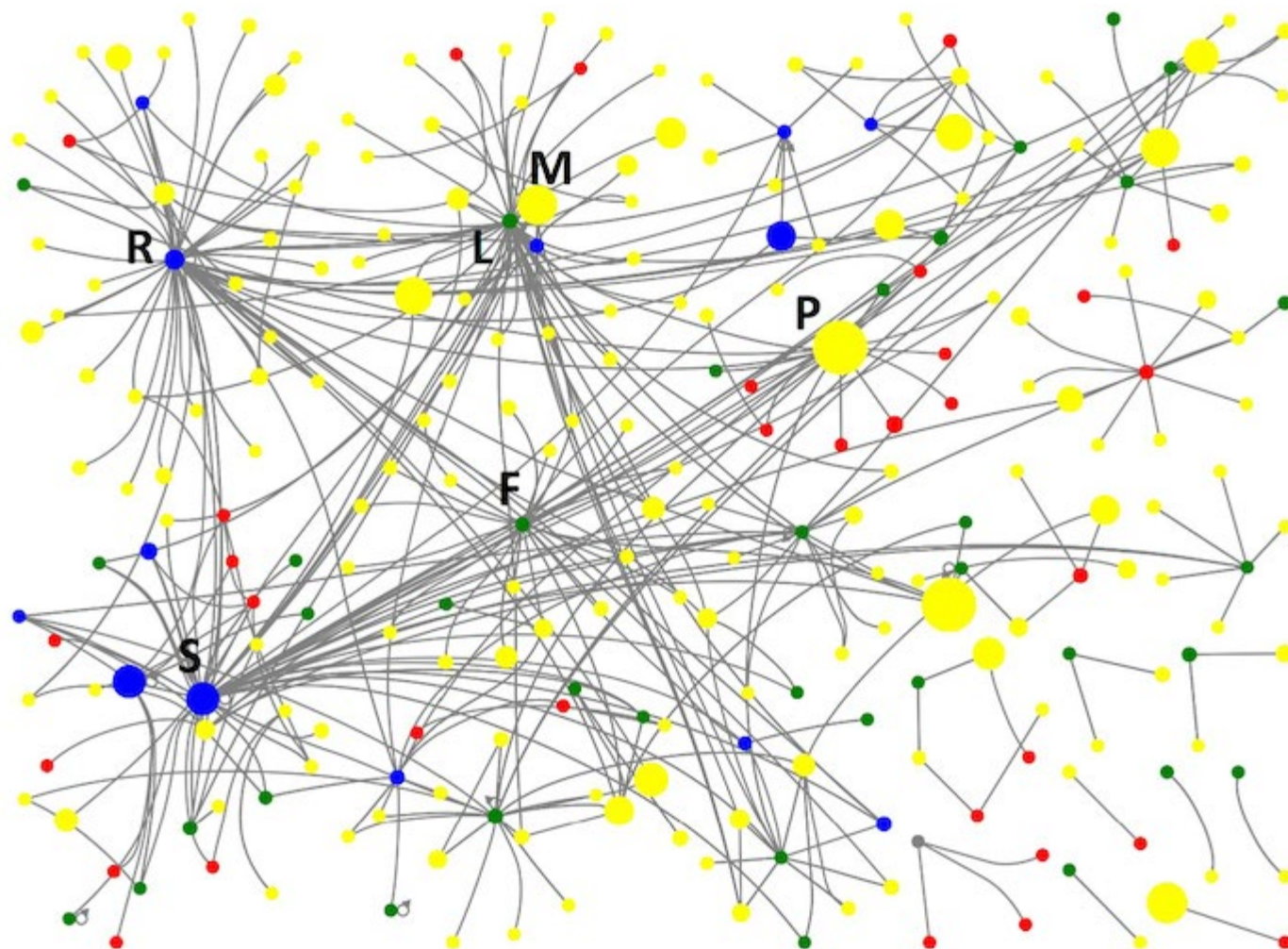

Figure 1: Network graph showing commenting and replying interactions between participants in the financial problems support group discussion forum. The size of a node indicates the number of sympathy points the represented participant has accumulated. The colours of the nodes indicate the types of interaction the participants engage in during the period observed in this work (see text for details).

Note: Larger version of Figure 1 available here.

The text labels indicate nodes examined in more detail in following sections.

In this representation, the size of a node reflects the number of sympathy points accumulated in the platform's system. Sympathy points were distributed very unevenly, ranging from 10 to 400K, with an average of 17,802 but a median of 1,515 and a mode of 10. A minimum size has therefore been applied to nodes representing participants with less than 20K points.

Node colour indicates the kinds of discussion forum activity that its represented participant engaged in. Red nodes indicate participants who only initiated threads, and did not post a response or comment to any other participant, in the period observed. Yellow nodes indicate participants who responded or commented, but initiated no threads. Green nodes indicate participants who initiated threads and responded to others within them, but did not participate in threads they did not initiate. Blue nodes indicate participants who initiated threads and commented or responded in threads initiated by others. The predominance of yellow nodes shows that participants are far more likely to comment on or reply to a post than to initiate a thread. Only one third of participants initiated threads — of those, two fifths did not reply to comments on their initial posts (these are the participants represented by red nodes).

Given that the purpose of the discussion forum is to enable the flow of knowledge, advice and emotional support, we suggest that a strong actor-network of this type is one that has a high density, indicating that many participants in the community are connected with each other. Another indicator of the strength of the actor-network might be the distribution of colours, with more blue nodes desirable since these indicate participants who both initiate threads (and therefore elicit responses from others) and contribute to threads by others (and therefore potentially provide some kind of support or advice). That is, blue nodes represent actants that facilitate flows of information and support in more than one direction.

This kind of visualization helps to identify participants who are either more or less important in binding the network together. For example, participants at the centre of complex networks of relations contribute a sizeable amount to the density of the graph. Others, such as the disconnected nodes in the bottom-right corner, appear to be only peripheral actors in the discussion forum assemblage. Although some of the more hub-like nodes have high sympathy point ratings, it is evident from Figure 1 that some do not. This suggests that the sympathy point system may not be adequate in identifying actants that are critical to the circulation of knowledge and affect within the assemblage.

The alternative contribution/reputation measurement technology that we have proposed (Rough, *et al.*, 2023) draws on techniques from social network analysis (Scott, 2017) to provide indications of the viability of the actor-network as a space through which information and emotional support can flow. Metrics such as degree and betweenness centrality reflect local densities, connections and separations, and thus indicate nodes in the network (and thus perhaps actants in the actor-network) that are particularly influential in relation to facilitating or hindering network flows (Borgatti, 2005). Such metrics have been widely used to identify so-called "influencers" in other digital social networks (see, for example, Kempe, Kleinberg and Tardos, 2005). In ecological contexts, such measures are used in the analysis of food webs to identify topological keystone species — that is, species that are essential to the continuing health of the environment or equally species that may be central to the spread of a disease or infection to epidemic scale (Estrada, 2007). Thus, a similar approach to the discussion forum actor-network may give insights into those actants that are particularly powerful in terms of affecting its health and viability.

Following this logic, we note that there is a high degree of reciprocity in the network, but the graph has a fairly low density, as most participants connect with only a very small number of others. Thus, betweenness centrality distribution is highly skewed, with less than 15 percent of nodes having above average betweenness centrality. As betweenness centrality measures how much a node acts as a bridge between other network nodes, those with a high value of this metric are located at the hubs of clusters.

Figure 2 illustrates the network density metric-based approach by presenting an alternative version of Figure 1, but now using the metric of betweenness centrality, rather than sympathy points, to determine the size of the nodes.
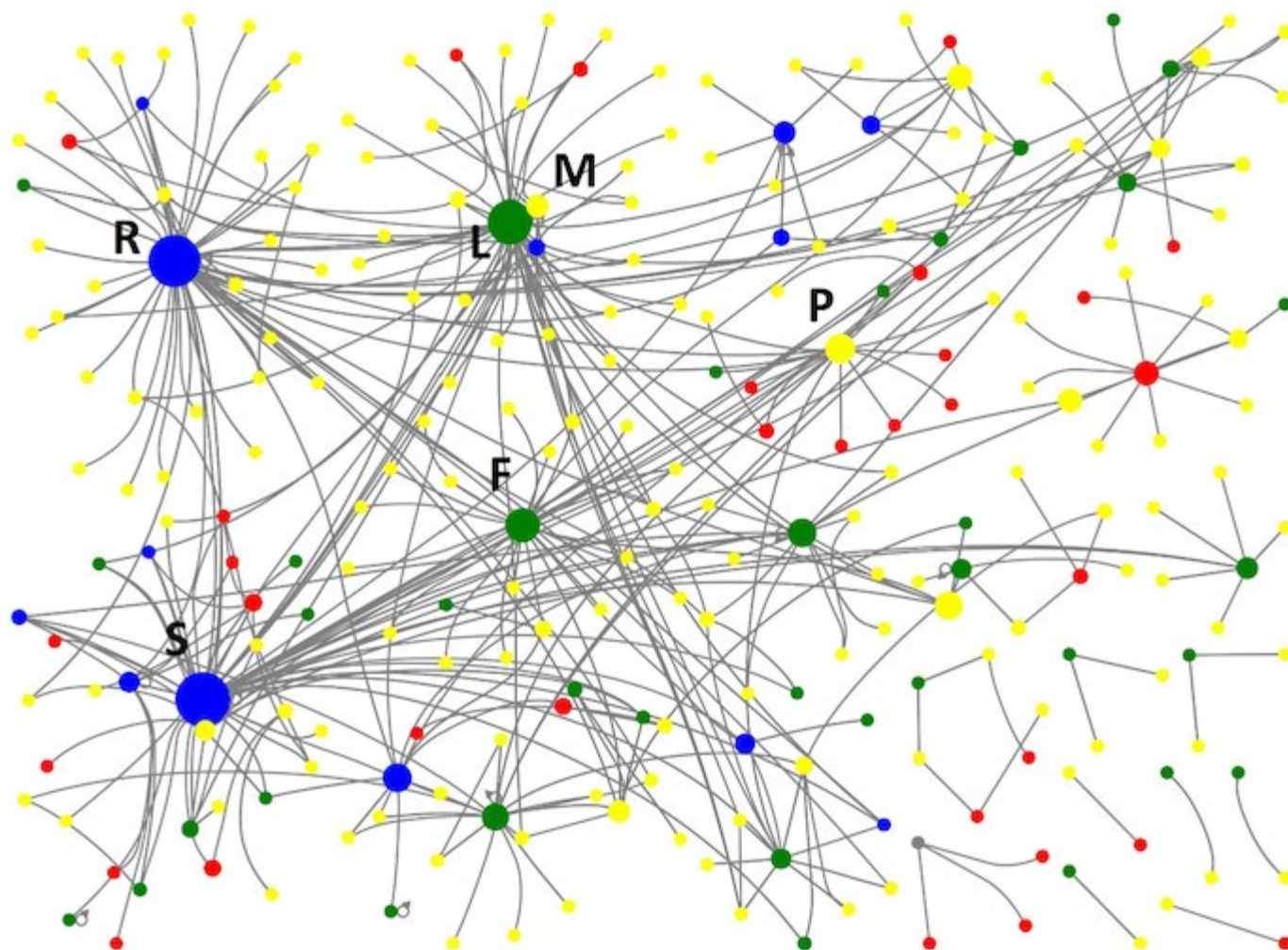
Figure 2: As Figure 1, but with the size of the nodes reflecting betweenness centrality rather than sympathy points.

Note: Larger version of Figure 2 available here.

Our calculations show that, in this particular network, nodes with high betweenness centrality are also identified as important or influential by alternative measures such as degree centrality and PageRank (Page, *et al.*, 1999), suggesting that they are rather stable in terms of their position as "important." We have chosen to illustrate this with betweenness centrality because this is a good indicator of information passage points — that is, of nodes that have the potential to disconnect the graph if removed.

In both graphs, a clustering algorithm has been applied to highlight the (dis)connectedness of groups or clusters of participants. The broadly hub-and-spoke pattern of these clusters highlights the skewed distribution of betweenness centrality noted above — it is evident that some participants interact with large numbers of the support group membership, but others interact with only one or two other people.

Interestingly, not all of the "hub" participants participate in the discussion forum threads in the same ways. While no participants who only initiated threads occupy hub-like positions, participants who engaged in all other combinations of ways — only responding, only responding within threads initiated by themselves,

and both initiating and responding to threads initiated by others — do. Not all of these participants have high numbers of sympathy points and so are not all represented by the larger nodes in Figure 1.

Figures 1 and 2 also suggest that reputation as performed by the sympathy points system does not strongly correlate with level of activity. This may be partly because those who are more recent members of the groups may be currently highly active but have not yet built up their reputation scores to the levels of those who are long term members but no longer particularly active contributors.

■ ────────────────────────

Examining micro-practices in the actor-network — enrolment and exclusion

While both the reputation points system and the network metrics may go some way to identifying actants in the discussion forum assemblage that are loci of power in relation to the flow of knowledge and affect, they do not tell the whole story. Indeed, ANT highlights the need to attend to specific details of micro-practices if we are to understand the network as a whole, both in terms of how it 'hangs together' (Mol, 2010) and in terms of its evolution. We therefore turn to examine some of the micro-practices within the discussion forum, and in particular those associated with actants that might be identified as important to the network through either their points score or network density measures.

Reading the content of the exchanges in the discussion forum — that is, getting a sense of the character of the information and affect that are flowing in the network — reveals (unsurprisingly) that people may be seeking practical advice and support around a variety of issues such as applying for jobs, dealing with debt and finding accommodation. They may also be participating in the site because they are feeling excluded from their "real world" community and are looking for mutual support. Typical exchanges included:

> *P1*: Hi all. How do you make ends meet? I have five little ones. I work. I provide for them, but I totally neglect myself. :(
>
> *P2*: Please take extra good care of yourself!
>
> *P1*: How do I do that without feeling guilty for spending on myself?
>
> *P2*: By remembering the proverbial instructions given on airplanes to "put the oxygen mask on yourself before putting on others." Without you, what would happen to your "five little ones"?
>
> *P1*: :) Thank you!

One of the features of the first of *P1's* posts that was common to many thread-initiating posts was the lack of specificity regarding the help or advice that was being sought. Many participants initiated threads with posts that combined expressions of depression or distress with questions such as 'Any money saving tips?' or 'Is anyone else on social security?' It was in the responses to these initial posts that patterns of contribution among participants with high points/network metric scores began to emerge. Some forum participants always responded with a message of emotional support ('Hang in there' or 'Hugs'); amongst these, some also provided emotional advice, such as how to battle depression and anxiety, or cope with friends and family's unsupportive attitudes to unemployment or debt. Others frequently responded by expressing camaraderie and then going on to discuss their own (usually dire) situation. Only a small fraction of the discussion forum participants responded to posts with concrete, practical advice about sources of income, charities that provide food/rent contributions, etc. However, those who did tended to do so consistently, often offering the same advice several times regardless of any details provided in the

request for help (for example, one participant repeatedly suggested finding a roommate; another repeatedly suggested making a budgeting spreadsheet).

Another rather stable micro-practice we observed within the threads was what might be termed situational one-upmanship, wherein responses went beyond empathy and into a kind of competitive claiming of distress. Threads that were initiated with statements about the poster's current financial, emotional and/or personal status were frequently responded to with statements from other participants about how their own situation was worse, as in the following:

> *P3*: I'm behind with the rent and have no money. How can I
> have let this happen?

> *P4*: I understand what you're going through, I am struggling
> through a period of being homeless, not having a place to eat
> and not knowing where I am going to sleep.

In addition, it became clear that the emotional status of some of the support group members meant that those trying to provide positive and upbeat advice sometimes faced a hopeless task. For example, one of the longest threads, consisting of 38 posts made by seven different people, saw the thread initiator respond to eight pieces of concrete advice with rationalizations for why that advice couldn't work for her.

We examined in detail the posts (including comments and replies) made by a selection of participants who appeared as hubs in Figures 1 and 2. First, we concentrate on participants with high sympathy point scores, who are also relatively active during the observation period and thus also have relatively high metrics derived from local density measures (pseudonymised as Peony, SportsMan and Moonshadow). Following this, we describe the micro-practices of three other participants who had high betweenness and degree centrality but lower accumulated points (pseudonymised as Longhair, Fioca and Ripple).

This more detailed examination of a focused number of interactions reinforces the impression that there were different patterns of contribution to the forum — that is, that a range of micro-practices had stabilized to shape the flows of knowledge and affect within the actor-network assemblage. As the following accounts show, these were not always associated with effective enrolment of new actants (the expansion of the actor-network) but instead sometimes represented the imposition of barriers to participation.

Peony

Peony is a moderator for the Financial Problems support group. She has just under 400K reputation points, supports 212 people and is supported by 826. Her profile page states she has been a support group member since 2009.

Peony's participation in the discussions is represented by the yellow node labelled *P* in Figures 1 and 2. The yellow colour indicates that she only ever responds to threads initiated by other people; however, she connects with many people during the discussions, and is often the only person to respond to threads initiated by others.

Peony's responses tend to be emotionally supportive and offer advice in the form of a question about whether the poster has already tried certain courses of action, as in the following:

> *D*: My son is about to wake up and I've no food for him
> #sadsinglemom

> *Peony*: Hun, I am so sorry to hear about your situation, have
> you contacted the food bank in your area? Contacted your local
> church, synagogue, mosque? There is help out there!

If the person to whom she is offering advice replies to her, she almost never responds. Indeed, there are only three people with whom she interacts more than once. All other participants to whom she responds never post again. Thus, despite her high sympathy point-based reputation, her actions appear to result in barriers to flows of new knowledge and affect deeper into the assemblage and repelling rather than enrolling potential actants.

SportsMan

SportsMan is moderator of another discussion forum on the platform on the related topic of unemployment. He has just over 130K reputation points. His profile is private, so it is not possible to know how many people he supports or is supported by.

SportsMan initiates threads, and contributes to threads initiated by others. His engagement in the discussions is represented by the blue node labelled *S* in Figures 1 and 2. He connects to many different participants in the discussions and links several otherwise mostly separate clusters of participants. He thus has high degree and betweenness centralities.

SportsMan is, like Peony, often the first person to respond to a new thread, mostly where the thread initiator is a newcomer to the support group. Typically, he responds with a welcome and a request for more information, but without expressing emotional support, as in the following:

> *B*: Hi. New here. Husband and I are unemployed for the first time in our married lives. It's amazing how fast the bills piled up and have eaten away at our savings. I am thinking about returning to college to renew my [nursing] licence. I have been having panic attacks at night, am not getting my sleep ... I want to sell or rent out our house and move into an apartment + take other measures to reduce our debt. My husband won't hear of it. Anyone else have an uncooperative spouse isn't helping the situation?

> *SportsMan*: Welcome. How long is it since you last worked as a nurse? Have you and your husband discussed meeting with a financial advisor?

SportsMan's responses rarely result in further participation. Indeed, during the nine-month observation period, no new contributor posted again after being responded to by SportsMan. When SportsMan initiates threads, it is usually with a link to a Web site or a suggestion he picked up elsewhere. These tend to attract responses from other high-sympathy-point members of the community, but rarely elicit responses from those asking for advice or help. Thus, like Peony, SportsMan does not appear to have taken on the role of enrolling new actants into the assemblage, despite his high scores in both sympathy points and centrality. Peony and SportsMan have settled into rather stable micro-practices that repeatedly bring together the same kinds of response and references to the same Web sites, but both act as unintentional gatekeepers who effectively repel those tentatively seeking to enter the assemblage and benefit from the flows of support within.

Moonshadow

Moonshadow is moderator of another discussion group (for a health problem) and regularly contributes to the Financial Problems forum. She has just under 200K reputation points, supports 235 people and is supported by 256. Her activity is represented by the yellow node labelled *M* in Figures 1 and 2. She responds to many different participants, and so has relatively high degree and betweenness centrality in the network, but she never initiates threads. She never asks for advice herself, or posts unsolicited advice or comments.

Moonshadow is often the first to respond to requests for help, advice or support. Occasionally, she responds with quite detailed advice on money matters, or psychologically informed approaches to keeping a positive mindset and changing habitual, damaging behaviours. However, her responses are more often brief and non-specific, offering a message of emotional support or thanks for sharing.

She refers to her own experiences very rarely, but when she does it is to express empathy and encouragement:

> *P*: Tired of this. Tired of being sober and broke and lonely.
> Tired of feeling everything all the time. Tired of feeling like no
> one cares.
>
> *Moonshadow*: Sometimes that is how it happens no one calls
> me really don't have much support so I figure I can take care of
> myself and getting sober is hard but can be done I have done it.

Moonshadow rarely leaves a response to her own comments un-responded to — that is, she shows continual engagement with a thread once she has entered into it. Her final contributions to a thread are often expressions of support ('Hugs,' 'We're here for you,' and occasionally 'Prayers'). During the observation period, first-time posters and others with low sympathy points/low levels of connection in the network to whom Moonshadow responded were much more likely to participate in other threads than those who had been responded to by Peony or SportsMan. It appears that she was successfully enrolling new participants into the actor-network, thus contributing to its sustainability. Moonshadow thus seems to be important for the flow of emotional support and affect, and to a lesser extent, knowledge, with the network.

Longhair

Longhair has just under 10K reputation points, but he has high betweenness and degree centrality. He supports 20 people and is supported by 32. His posts reveal that he is recently divorced, has no stable employment and has been close to homelessness. He is able to keep his head above water through odd jobs. He is also an aspiring musician.

Longhair is represented by the green node labelled *L* in Figures 1 and 2. He responds to others but only in threads he started (which account for 10 percent of the threads in the observation period). Despite this, he connects with many different participants, rather than a small clique.

Longhair sometimes posts images along with text — these tend to be of a (sometimes darkly) humorous nature. Many of these posts attract a large number of "sympathies", suggesting that on these occasions "sympathising" may well have been an indication of agreement rather than sympathy, or an appreciation of his efforts to inject a touch of lightness and humour into the forum.

Most often, however, Longhair initiates threads with posts that are effectively status updates. Sometimes these are positive, other times negative, as in the following:

> *Longhair*: It's hard not to feel like an idiot when the evidence
> says so. I'm having to borrow to pay my rent this month, which
> is already late. I let this whole month completely get away from
> me and probably the month before. I'm not making enough
> already and I've been careless with my choices. I don't expect
> much of a response to this I'm just venting. Sick of myself and
> knowing it's time to get things in order.

This initiated a long thread involving several participants who were feeling similarly frustrated and close to the edge. This discussion seemed to provide an important outlet and a feeling of solidarity.

Longhair interacts with many discussion forum participants, including both established contributors with high scores and those who are new or contribute infrequently. His actions have stabilized into a micro-practice that brings together self-narration and sympathy. He seems to be developing into an effective actant that contributes to the flow of knowledge and affect within the assemblage.

Fioca

Like Longhair, Fioca has only a low sympathy point score (under 5,000) but very high betweenness and degree centrality. She is represented by the green node labelled *F* in Figures 1 and 2. This node is much larger in Figure 2 than Figure 1, indicating that her contribution to the density of the network is recognised by the network metrics but not by the sympathy point system. The node's green colour indicates that she initiates threads and continues to contribute to them, but in the period observed she did not contribute to threads initiated by anyone else.

Fioca's posts reveal her to be experiencing homelessness and depression. She also frequently refers to herself as introverted and affected by 'toxic' people. She initiates threads with an indication of distress and a request for support. Most often, these threads quickly extract themselves from the public sphere through the use of private messaging available to those with supporter/supportee relationships. Fioca seems reluctant to share more than generalised distress in public. Her desire for private support is evident in several threads, such as:

> *Fioca*: I've been crying on and off ...on right now....it's so hard to stay hopeful. I just want a better life already. I deserve a better life. I'm a good person

> *SB*: I understand the tears, depression. Sending you 'virtual' hugs. It's difficult not only to talk about it but to find anyone from around us to understand. So, if you wish to chat

> *Fioca*: @SB I do ... can we [private message]?

This initial exchange is followed by a short exchange setting up their support relationships so that the conversation can be transferred to the private messaging medium.

Fioca's posts attract messages of sympathy and support from otherwise relatively quiet members of the support group — indeed none of the high-sympathy point scoring participants mentioned above respond to her cries for help. She often thanks her respondents for their support, as in the following exchange:

> *Fioca*: I don't want to die unhappy

> *DK*: That in itself is a huge step in the right direction. You want to feel better and that is the first leap onto the track of recovery and happiness

> *Fioca*: @DK thank you ... that was really encouraging

Towards the end of the observation period, Fioca's posts change in both degree of openness and the nature of her requests for support. After a period of not contributing to the discussion forum, Fioca returns with a much more detailed, public account of her situation and a request for practical as well as emotional advice. She faces a looming crisis as she only has a few days left before she will be homeless and sleeping rough again. This post attracts outpourings of sympathy from six participants who do not otherwise contribute to the discussion forum, and as Fioca replies with additional information, the responses start to include more practical and detailed advice, such as turning to classified advertisement sites, becoming a delivery-driver, or taking in laundry. By the end of the thread, one participant sends her links to part-time work listed as

available in her local area.

Although she does sometimes respond to say why a suggestion won't work, Fioca continues to express gratitude and her rejections of suggestions appear to be on sensible grounds — for example, she cannot drive. It may be her active gratitude that attracts so many to engage: her participation acts as a magnet, pulling flows of affective resources into the network. Thus, although she does not provide any advice or support for others, she creates what seem to be important opportunities for others to enter into the actor-network and act as sources of empathy and support, and also sometimes practical advice.

Ripple

Ripple has high degree and betweenness centralities, but relatively low sympathy points at just over 3,000. She supports 33 people and is supported by 202. Her patterns of activity are represented by the blue node labelled *R* in Figures 1 and 2. Her profile page describes her as searching for growth, comfort and inspiration. Her posts reveal that she is a single mother who is experiencing financial hardship and precarious employment conditions.

Although she occasionally responds to other people's threads, Ripple is primarily a thread initiator, initiating more than 20 percent of the Financial Problems threads during the observation period. Ripple usually initiates threads with messages intended to be uplifting or inspiring. She frequently includes images that have a religious or spiritual tone. However, sometimes Ripple's posts have a more negative tone, as she is struggling with depression:

> I'm almost to the point of not wanting to call her Mommy
> anymore, I'm feeling A LOT of resentment. I am not sure if
> that qualifies as the same as hatred.

Ripple's posts often attract "sympathies". They are clearly valued by some participants; when she announces her decision to stay away from the site, many participants post to say how much they appreciate her contributions. However, her patterns of interaction seem to have stabilized into micro-practices that repel potential actants from the assemblage rather than enrol them. She either ignores or actively disagrees with those that respond to her. More than two-thirds of the participants who responded to her initial posts did not participate in the forum again during the period we studied; those who did, did not interact with Ripple again, with the exception of Moonshadow. Indeed, the 38-post thread referred to above was primarily between Ripple and Moonshadow.

Discussion and conclusions

In the preceding sections, we compared two different technologies for measuring contribution to an online support group discussion forum. We used this analysis to attempt to identify important or influential participants, *i.e.*, actants that facilitate or impede flows of knowledge and affect; that enrol or exclude new actants into the assemblage; and whose micro-practices align with and re-align the interests of the actor-network. We found that contribution (and so reputation) is enacted differently depending on which technology is used for its measurement. Going on to examine the micro-practices of actants that are identified as important by one or both technologies, we found a range of varied behaviours that work to construct and re-construct the actor-network in different ways.

Our analysis allows us to understand power and influence within the support group discussion forum, not as a set of causes, but rather through 'empirical stories about processes of translation' [13] and 'minute negotiations that go on at the points of connection' [14]. Two actants enacted as powerful by the sympathy point system, Peony and SportsMan, turn out to act as gatekeepers. Thus, the fact that their network density

metrics rank them as less important than the sympathy point system might suggest that this alternative approach has some advantages. Indeed, the network-based metrics identify other actants as influential who were not identified as such by the sympathy point system, including Longhair, Fioca and Ripple. However, examining the impact of these participants on the enrolment of other potential actants reveals this influence to be of varied character, suggesting that we have not yet found a technology of measurement that distinguishes between different types of influence. The fact that Moonshadow, who seems to enrol new actors, is not among those actants enacted as most influential by the network-based metric, also suggests possible inadequacies.

We may consider the different quasi-stable micro-practices that each of these actants perform in terms of Callon's (1984) notion of *interessement*, which 'identifies the practices through which barriers are built between those who are part of the network and those who are not ... the actions through which other interests are excluded' [15]. These barriers can be 'discursive ... constituted through differences of taste, style and language' [16]. In enacting their habitual practices, these actants appear to be constructing discursive modes of enrolment and exclusion, through the exchange of (for example) virtual hugs and signs of empathy (Moonshadow, Longhair and Fioca) or, in contrast, situational one-upmanship (Ripple) or lack of apparent genuine interest (SportsMan and Peony).

Latour suggests that, '[a]s the name '*inter-esse*' indicates, 'interests' are what lie in between actors and their goals, thus creating a tension that will make actors select only what, in their own eyes, helps them reach these goals amongst many possibilities.' [17]. Moonshadow places great emphasis on providing emotional support and encouraging a positive outlook; Longhair encourages story-telling and openness. Fioca enables the circulation of emotional support and reciprocal gratitude. SportsMan (and to a lesser extent Peony) performs a kind of sympathy without empathy, sometimes taking on the role of expert advisors to those seeking help (*cf.*, Mol's description of care provisions as a 'product of the patient-seeking-help model' [18]) rather than presenting themselves as "co-experiencers". Finally, Ripple's actions suggest that she wants the network to align itself with her subjectivity and interests.

However, ANT also reminds us that actants are acted upon as well as act. From this perspective, we can see how the assemblage itself interferes (Mol, 1999) with the practices of the actants, creating multiple possibilities for the participants to become something else besides what they are in other assemblages. They may tell stories which perform a reality where they are sages, stoics or sufferers; and they may act to reproduce, expand or re-align the network with their own interests.

Returning to technologies that claim to measure, and so in reality enact, contribution and reputation, we may make the following observations. The existing sympathy point system may favour being the first to respond, and so under or even de-value extended, long term interactions. This version of reputation-creation may thus interfere with the practices of some actants, leading to the rapid but rather generic and superficial engagement exhibited by Peony and SportsMan. Of course, there are likely to be other factors leading to this — but we cannot rule out the power exercised by the sympathy point technology as an actant. In contrast, the network metric-based technology may recognize those actants that form critical nexuses in the assemblage, influencing the flow of knowledge and affect and the enrolment of new actors. However, as we have seen, at least in the version of this technology applied in this work, it does not distinguish between the varied micro-practices that align with the intended interests of the actor-network (such as those of Longhair and Fioca) and those that attempt to re-align those interests (such as those of Ripple). In addition, it perhaps somewhat underestimates the contributions of actants like Moonshadow. It seems that, if our measurement of contribution is to be truly representative, we must understand that we create a new reality of contribution in this process of measurement, and so perhaps we cannot ignore the character or content of interactions. **FM**

About the authors

Anna Wilson is a reader in interdisciplinary research in the School of Education at the University of

Glasgow.
E-mail: anna [dot] wilson [dot] 2 [at] glasgow [dot] ac [dot] uk

Stefano De Paoli is a professor in the Division of Sociology at Abertay University.
E-mail: s [dot] depaoli [at] abertay [dot] ac [dot] uk

Daniel Rough is a lecturer in computer science in the Faculty of Science and Engineering at the University of Dundee.
E-mail: drough001 [at] Dundee [dot] ac [dot] uk

Acknowledgements

Notes

1. Doolin and Lowe, 2002, p. 72.

2. Doolin and Lowe, 2002, p. 74.

3. Nespor, 1994, p. 12.

4. Edwards, 2002, p. 355.

5. Mol, 2010, p. 255.

6. Mol, 2010, p. 261.

7. Mol, 2010, p. 255.

8. Mol, 2010, p. 262.

9. Farmer and Glass, 2010, p. 122.

10. Farmer and Glass, 2010, p. 33.

11. Farmer and Glass, 2010, p. 6.

12. Doolin and Lowe, 2002, p. 74.

13. Law, 1992, p. 384.

14. Fenwick, *et al.*, 2011, p. 97.

15. Edwards, 2002, p. 355.

16. Nespor, 1994, p. 14.

17. Latour, 1987, pp. 108–109.

18. Mol, 1999, p. 80.

References

A. Barak, M. Boniel-Nissim and J. Suler, 2008. "Fostering empowerment in online support groups," *Computers in Human Behavior*, volume 24, number 5, pp. 1,867–1,883.
doi: https://doi.org/10.1016/j.chb.2008.02.004, accessed 14 January 2023.

S.P. Borgatti, 2005. "Centrality and network flow," *Social Networks*, volume 27, number 1, pp. 55–71.
doi: https://doi.org/10.1016/j.socnet.2004.11.008, accessed 14 January 2023.

F.J. Bosco, 2006. "Actor-network theory, networks, and relational approaches in human geography," In: S. Aitken and G. Valentine (editors). *Approaches to human geography*. London: Sage, pp. 136–146.
doi: https://dx.doi.org/10.4135/9781446215432, accessed 14 January 2023.

A. Bosu, C.S. Corley, D. Heaton, D. Chatterji, C.J. Carver and N.A. Kraft, 2013. "Building reputation in Stackoverflow: An empirical investigation," *2013 10th Working Conference on Mining Software Repositories (MSR)*, pp. 89–92.
doi: https://dx.doi.org/10.1109/MSR.2013.6624013, accessed 14 January 2023.

M. Callon, 1984. "Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St Brieuc Bay," *Sociological Review*, volume 32, supplement number 1, pp. 196–233.
doi: https://doi.org/10.1111/j.1467-954X.1984.tb00113.x, accessed 14 January 2023.

J. E. Chung, 2013. "Social interaction in online support groups: Preference for online social interaction over offline social interaction," *Computers in Human Behavior*, volume 29, number 4, pp. 1,408–1,414.
doi: https://doi.org/10.1016/j.chb.2013.01.019, accessed 14 January 2023.

C. Dellarocas, 2003. "The digitization of word of mouth: Promise and challenges of online feedback mechanisms," *Management Science*, volume 49, number 10, pp. 1,407–1,424.
doi: https://doi.org/10.1287/mnsc.49.10.1407.17308, accessed 14 January 2023.

A. Diaz Andrade and C. Urquhart, 2010. "The affordances of actor network theory in ICT for development research," *Information Technology & People*, volume 23, number 4, pp. 352–374.
doi: https://doi.org/10.1108/09593841011087806, accessed 14 January 2023.

B. Doolin and A. Lowe, 2002. "To reveal is to critique: Actor–network theory and critical information systems research," *Journal of Information Technology*, volume 17, number 2, pp. 69–78.
doi: https://doi.org/10.1080/02683960210145986, accessed 14 January 2023.

R. Edwards, 2002. "Mobilizing lifelong learning: Governmentality in educational practices," *Journal of Education Policy*, volume 17, number 3, pp. 353–365.
doi: https://doi.org/10.1080/02680930210127603, accessed 14 January 2023.

E. Estrada, 2007. "Characterization of topological keystone species: Local, global and 'meso-scale' centralities in food webs," *Ecological Complexity*, volume 4, numbers 1–2, pp. 48–57.
doi: https://doi.org/10.1016/j.ecocom.2007.02.018, accessed 14 January 2023.

G. Eysenbach, J. Powell, M. Englesakis, C. Rizo and A. Stern, 2004. "Health related virtual communities and electronic support groups: Systematic review of the effects of online peer to peer interactions," *British Medical Journal*, volume 328, number 7449, 1166.
doi: https://doi.org/10.1136/bmj.328.7449.1166, accessed 14 January 2023.

S. Faraj, D. Kwon and S. Watts, 2004. "Contested artifact: Technology sensemaking, actor networks, and the shaping of the Web browser," *Information Technology & People*, volume 17, number 2, pp. 186–209. doi: https://doi.org/10.1108/09593840410542501, accessed 14 January 2023.

F.R. Farmer and B. Glass, 2010. *Building Web reputation systems*. Sebastopol, Calif.: O'Reilly.

T. Fenwick and R. Edwards, 2010. *Actor-network theory in education*. London: Routledge. doi: https://doi.org/10.4324/9780203849088, accessed 14 January 2023.

T. Fenwick, R. Edwards and P. Sawchuk, 2011. *Emerging approaches to educational research: Tracing the sociomaterial*. London: Routledge. doi: https://doi.org/10.4324/9780203817582, accessed 14 January 2023.

K.M. Griffiths, A.L. Calear, M.A. Banfield and A. Tam, 2009. "Systematic review on Internet Support Groups (ISGs) and depression (2): What is known about depression ISGs?" *Journal of Medical Internet Research*, volume 11, number 3, e41. doi: https://doi.org/10.2196/jmir.1303, accessed 14 January 2023.

K. Hart and A. Sarma, 2014. "Perceptions of answer quality in an online technical question and answer forum," *CHASE 2014: Proceedings of the 7th International Workshop on Cooperative and Human Aspects of Software Engineering*, pp. 103–106. doi: https://doi.org/10.1145/2593702.2593703, accessed 14 January 2023.

D. Kempe, J. Kleinberg and É. Tardos, 2003. "Maximizing the spread of influence through a social network," *KDD '03: Proceedings of the Ninth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, pp. 137–146. doi: https://doi.org/10.1145/956750.956769, accessed 14 January 2023.

B. Latour, 2005. *Reassembling the social: An introduction to actor-network-theory*. Oxford: Oxford University Press.

B. Latour, 1987. *Science in action: How to follow scientists and engineers through society*. Milton Keynes: Open University Press.

J. Law, 2009. "Actor network theory and material semiotics," In: B.S. Turner (editor). *New Blackwell companion to social theory*. Chichester West Sussex: Blackwell, pp. 141–158. doi: https://doi.org/10.1002/9781444304992.ch7, accessed 14 January 2023.

J. Law, 1992. "Notes on the theory of the actor-network: Ordering, strategy, and heterogeneity," *Systems Practice*, volume 5, pp. 379–393. doi: https://doi.org/10.1007/BF01059830, accessed 14 January 2023.

M. Mähring, J. Holmström, M. Keil and R. Montealegre, 2004. "Trojan actor–networks and swift translation: Bringing actor–network theory to IT project escalation studies," *Information Technology & People*, volume 17, number 2, pp. 210–238. doi: https://doi.org/10.1108/09593840410542510, accessed 14 January 2023.

N. Marres, 2004. "Tracing the trajectories of issues, and their democratic deficits, on the Web: The case of the Development Gateway and its doubles," *Information Technology & People*, volume 17, number 2, pp. 124–149. doi: https://doi.org/10.1108/09593840410542475, accessed 14 January 2023.

B. Mehra, C. Merkel and A.P. Bishop, 2004. "The Internet for empowerment of minority and marginalized participants," *New Media & Society*, volume 6, number 6, pp. 781–802. doi: https://doi.org/10.1177/146144804047513, accessed 14 January 2023.

A. Mol, 2010. "Actor-network theory: Sensitive terms and enduring tensions," *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, special issue, volume 50, pp. 253–269, and at https://hdl.handle.net/11245/1.330874, accessed 14 January 2023.

A. Mol, 1999. "Ontological politics: A word and some questions," *Sociological Review*, volume 47, supplement number 1, pp. 74–89.
doi: https://doi.org/10.1111/j.1467-954X.1999.tb03483.x, accessed 14 January 2023.

D. Movshovitz-Attias, Y. Movshovitz-Attias, P. Steenkiste and C. Faloutsos, 2013. "Analysis of the reputation system and user contributions on a question answering website: Stackoverflow," *ASONAM '13: Proceedings of the 2013 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining*, pp. 886–893.
doi: https://doi.org/10.1145/2492517.2500242, accessed 14 January 2023.

S. Mützel, 2009. "Networks as culturally constituted processes: A comparison of relational sociology and actor-network theory," *Current Sociology*, volume 57, number 6, pp. 871–887.
doi: https://doi.org/10.1177/0011392109342223, accessed 14 January 2023.

J. Nespor, 1994. *Knowledge in motion: Space, time and curriculum in undergraduate physics and management*. London: Routledge.

L. Page, S. Brin, R. Motwani and T. Winograd, 1999. "The PageRank citation ranking: Bringing order to the Web," *Stanford InfoLab*, at http://ilpubs.stanford.edu:8090/422/, accessed 14 January 2023.

S. Pedersen and J. Smithson, 2013. "Mothers with attitude — How the Mumsnet parenting forum offers space for new forms of femininity to emerge online," *Women's Studies International Forum*, volume 38, pp. 97–106.
doi: https://doi.org/10.1016/j.wsif.2013.03.004, accessed 14 January 2023.

J. Rodon, J. Antoni Pastor, F. Sesé and E. Christiaanse, 2008. "Unravelling the dynamics of IOIS implementation: An actor-network study of an IOIS in the seaport of Barcelona," *Journal of Information Technology*, volume 23, number 2, pp. 97–108.
doi: https://doi.org/10.1057/palgrave.jit.2000131, accessed 14 January 2023.

D. Rough, S. De Paoli and A. Wilson, 2023. "Commonshare: A new approach to social reputation for online collaborative communities," *Social Science Computer Review*, volume 41, number 1, pp. 4–26.
doi: https://doi.org/10.1177/08944393211028191, accessed 14 January 2023.

J. Scott, 2017. *Social network analysis*. London: Sage.
doi: https://dx.doi.org/10.4135/9781529716597, accessed 14 January 2023.

C. Storni, 2015. "Notes on ANT for designers: Ontological, methodological and epistemological turn in collaborative design," *CoDesign*, volume 11, numbers 3–4, pp. 166–178.
doi: https://doi.org/10.1080/15710882.2015.1081242, accessed 14 January 2023.

T. Venturini, A.K. Munk and M. Jacomy, 2019. "Actor-network versus network analysis versus digital networks: Are we talking about the same networks?" In: J. Vertesi and D. Ribes (editors). *DigitalSTS: A field guide for science & technology studies*. Princeton, N.J.: Princeton University Press, pp. 510–523.
doi: https://doi.org/10.1515/9780691190600-034, accessed 14 January 2023.

L.M. Vicsek, G. Király and H. Kónya, 2016. "Networks in the social sciences: Comparing actor-network theory and social network analysis," *Corvinus Journal of Sociology and Social Policy*, volume 7, number 2, pp. 77–102.
doi: https://doi.org/10.14267/CJSSP.2016.02.04, accessed 14 January 2023.

A. Wilson and S. De Paoli, 2019. "On the ethical and political agency of online reputation systems," *First Monday*, volume 24, number 2, at https://firstmonday.org/article/view/9393/7730, accessed 14 January 2023.
doi: https://doi.org/10.5210/fm.v24i2.9393, accessed 14 January 2023.

K.B. Wright and S.B. Bell, 2003. "Health-related support groups on the Internet: Linking empirical findings to social support and computer-mediated communication theory," *Journal of Health Psychology*, volume 8, number 1, pp. 39–54.
doi: https://doi.org/10.1177/1359105303008001429, accessed 14 January 2023.

Editorial history