On the ethical and political agency of online reputation systems

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Abstract

Social and socioeconomic interactions and transactions often require trust. In digital spaces, the main approach to facilitating trust has effectively been to try to reduce or even remove the need for it through the implementation of *reputation systems*. These generate metrics based on digital data such as ratings and reviews submitted by users, interaction histories, and so on, that are intended to label individuals as more or less reliable or trustworthy in a particular interaction context. We undertake a disclosive archaeology (Introna, 2014) of typical reputation systems, identifying relevant figuration agencies including affordances and prohibitions, (cyborg) identities, (cyborg) practices and discourses, in order to examine their ethico-political agency. We suggest that conventional approaches to the design of such systems are rooted in a capitalist, competitive paradigm, relying on methodological individualism, and that the reputation technologies themselves thus embody and enact this paradigm within whatever space they operate. We question whether the politics, ethics and philosophy that contribute to this paradigm align with those of some of the contexts in which reputation systems are now being used, and suggest that alternative approaches to the establishment of trust and reputation in digital spaces need to be considered for alternative contexts.

Contents:

Introduction

Sociomaterial accounts of human-technology interactions raise important questions about the degree to which technological systems and artefacts are imbued with agency (and hence morality) (Introna 2014). Whether one subscribes to inter-actional (Johnson, 2006) or post-human intra-actional (Barad, 2003; Introna, 2014; Latour, 2002; 2003) accounts, the degree to which the design and features of technological systems alter and even co-create new social practices and identities, and how we can sensitize ourselves to such shapings, are important questions. In

this paper, we address the question of how reputation systems, as conventionally designed, co-constitute new versions of trust and identity in digital spaces.

Trust is a fundamental component of social relations. It helps actors make decisions in situations where direct knowledge that can guide action and cooperation is not always immediately available. Trust helps reduce complexity in social interactions, allowing actors to take decisions in situations which entail some risk (Luhman, 1979). Interactions in a digital environment are likely to require trust (Hsu et al., 2007; Usoro et al., 2007) even more than those in a physical environment, as these interactions take place between people and organizations that may be geographically and culturally distant. While trust is often seen as a tri-partite relation between one individual (trustor) and another (trustee) in relation to an object or outcome, it can also take a collective form in what is known as reputation, or how a community or group of people view the trustworthiness of another person or entity.

Increases in the availability of digital data are having a significant impact on our opportunities to engage in social interactions and the ways in which they are enacted. Increased digitization leads to increased remote and mediated interactions. If we view humanity as a network: before the internet, interactions tended to be between nodes that were previously only separated by a small distance; now the chances of creating a new connection/entering into a transaction or relationship with a previously very distant node are much higher, and the chances of the different parties to a social or economic transaction being physically co-located are much reduced (Shu and Chuang, 2011).

This has led to questions about how to establish trust in mediated interactions involving distant and/or unfamiliar actors, when:

- We do not know whether the person with whom we are interacting/transacting is who they say they are.
- We do not know whether they have the goods, skills or knowledge they claim to have.
- We do not know whether their digital presence will persist, and so whether we will have any continued relationship (and therefore a chance to reciprocate or for comeback.
- We cannot rely on local knowledge and word-of-mouth from people we know and already trust (reputation).

Such concerns may be increasingly important in a period of concern about "fake news" and the manipulation of (social) media by various state and corporate actors.

One of the main ways in which online platforms have responded to this situation is through *reputation systems* (Dellarocas, 2003; Jensen, Davis and Farnham, 2002; Resnick et al., 2000). These are systems that collate data in the form of feedback, ratings, and digital interaction/transaction histories, process them through algorithms, and produce a synthetic and very often quantitative measure intended to give a guide to an individual's trustworthiness (Farmer and Glass, 2010).

In a context/mission creep mirroring that of other business-intelligence inspired data analytics (Wilson et al., 2017), such systems are becoming increasingly ubiquitous,

no longer confined to the trading and expert knowledge-sharing sites they were originally developed for. Described by Masum and Zhang as a 'distributed court of opinion' (2004, n.p.) that will alleviate the strain on our overburdened 'individual processing capacity' (ibid.) in the face of vastly increased accessible data and so 'help the same number of hours in the day go further' (ibid.), great things are expected of them. It has been suggested they could play pivotal roles in the creation and maintenance of good governance, transparency and accountability in public office and commerce, through either the creation of trust or even – paradoxically – the removal of the need for it (Litos and Zindros, 2017; Masum, Tovey and Newmark, 2012; Masum and Zhang, 2004; Picci, 2007). But as they, or components such as ratings systems, permeate into perhaps unexpected digital spaces – such as learning environments[1], community support groups (see, e.g., http://supportgroups.com) or even online communities of criminals needing to trust each other in the exchange of services and goods such as hacking and botnets (Décary-Hétu and Dupont, 2013; Dupont et al., 2016) – and as China moves to introduce a mandatory social credit system that incorporates elements of online reputation systems (Botsman, 2017) and that attempts to reduce individuals to single measures of quality – we need to ask questions about whether their design is commensurate with the intentions of the systems they are being brought into.

One important question concerns the values that reputation systems embody and carry into the digital spaces in which they are used. It is now fairly widely accepted in certain areas of research that technology and technical artefacts (including information and communication technologies) are not politically or morally neutral.

[1] Virtual learning environments and learning management systems are increasingly making use of both the conceptual models and user-interfaces of business-intelligence applications, with examples such as the popular CANVAS system providing a 3-star scale to indicate student performance.

Winner (1980) argued that artefacts, very much like people, have their own politics which cause them to enact or contribute to particular types of ordered social system. He described the now well-known example of the low bridges on roads to Long Island from New York. Winner noticed that the low height of these bridges would exclude categories of people (those travelling on buses, generally working class people or African Americans) from certain actions, such as accessing a middle-class residential area. These low bridges thus embodied political decisions and enacted particular discriminations and exclusions.

Going beyond politics that may be intentionally designed into technological artefacts, other authors have suggested that the neutrality thesis concerning the morality of technology and technical artefacts, including information and communication technologies, is untenable. For example, Van de Poel and Kroes (2014) argue persuasively that technical artefacts may embody what they refer to as moral extrinsic final values. By this they mean that the moral value or disvalue is associated with the artefact's function and is therefore relational or extrinsic (since the function must relate to other objects, people or states of affairs) but is inherent to that function. The features and functionalities designed into digital technologies shape the affordances, opportunities and limitations for action that users experience, and thus pattern their potential behaviors, according to the values that the technologies embody. The Value Sensitive Design movement (Friedman et al., 2013; Johnson, 2006) has advocated designing artefacts and tools, including digital technologies, with an explicit awareness of the values they embody or promote. According to this community, 'it is important that the values at stake are identified and analyzed carefully' (Friedman et al., 2013; Kahn and Borning, 2013, 6) during

the design process. However, Introna (2014) suggests that technical artefacts not only embody values, but also have a kind of agency (through which morality can be ascribed to them) that goes beyond values that are (or may be) consciously designed into them. Introna's position is grounded in a sociomaterial perspective (Barad, 2003; Latour, 2005) that recognizes technical artefacts as nexuses in complex networks of human and non-human, physical and digital actors that shape and are shaped by political and social currents flowing within and through them.

In relation to reputation systems, an important question arises concerning the political and moral decisions that these systems embody and carry into the digital spaces they operate in. In the following, we draw on Introna's (2014) call for a more disclosive approach to exploring the agency and ethics of sociomaterial systems. By conducting a 'disclosive archaeology' (Introna, 2014, p. 31) of typical reputation systems, we suggest that conventional reputation systems are loaded with not just the values they are designed for (trust, honest behavior, reliability), but also a more extended and subtle value-system: the political and ethical paradigm of the competitive, capitalist free market based on self-interested individuals. Such systems are underpinned by a view of reputation that implicitly (and sometimes even explicitly – see, for example, Gandini (2016)) commoditizes it, positioning it as a capital that is inherent to individuals, who can accumulate it, lose it and occasionally even speculate on it. This might be appropriate for a digital system that is intended to serve as a competitive market, for example an e-commerce website, or to function within a platform capitalist model. However, this may not be the case in other contexts, where a different political, ethical or philosophical paradigm underpins the construction or enactment of the digital space.

In the following, we start by describing the main features of conventional reputation systems. We identify some of the key 'figuration agencies' (Introna, 2014, p. 41) that invest these systems with the capacity to shape interactions and behavior patterns along certain ethico-political lines. We then examine various contexts in which such systems, or parts of them, operate, including trading sites and expert question-and-answer (Q&A), and show why we believe they embody and enact a fundamentally market-based, capitalist paradigm. Finally, we examine other contexts in which they are used, including mutual cooperation platforms and supportive discussion forums, and ask whether the properties and features of these systems are likely to encourage the kinds of behaviors that participants and designers (and society at large) may wish for.

Trust and reputation systems in digital spaces

Common features of online reputation systems

Online reputation systems are systems that draw on data about a user's activities to generate an indication of that user's standing within one or more online communities (Dellarocas, 2003; Jensen, Davis and Farnham, 2002; Resnick et al., 2000). In some ways similar to the points systems and leader-boards common to online games, in which points are sought competitively and assigned by the game; the "capital" nature of such points is made clear in those games that allow players to "spend" their points within the game-world.

Reputation systems outside of games have a stronger focus on providing users with a metric on which to base judgments about whether to trust other users or select them as partners for a transaction. They are now default parts of the design of e-commerce sites, where items are bought and sold in conventional financial transactions. They are also integral to the increasing number of sites based on a "gig" (Friedman, 2014) or "sharing" (Hamari, Sjöklint and Ukkonen, 2015) economic model. In the former, members offer their skills and services for money but in a freelance capacity; in the latter, they provide or/and seek resources such as tools, transport or accommodation without the exchange of money. In addition, many expert Q&A sites (usually based on discussion forum rather than trading structures) employ reputation systems so that users asking questions can judge whether or not to trust an answer, or community members can build up their own reputation as experts (see, e.g., Movshovitz-Attias et al., 2013). For participants in these latter sites, high reputation scores may also be seen as badges of achievement or honour – measures of kudos, as indicated by the name of the reputation scores in the online expert coder community StackOverflow (Movshovitz-Attias et al., 2013; Bosu et al., 2013). The inclusion of reputation systems in a digital space may thus also be seen as a form of gamification, providing motivation to contribute more and higher quality postings or items in a knowledge-sharing community.

Reputation systems can base reputation measures on data from a range of sources, processed in a range of ways (Costagliola, Fuccella and Pascuccio, 2014; Hendrikx, Bubendorfer and Chard, 2015; Vavilis, Petković and Zannone, 2014). They may employ data generated directly from a user's activities, such as how many times they visit a site, how long they spend on a site, how many transactions they complete, the

ratio of completed to started transactions, how many contributions they make to a discussion, how many network ties they have, and so on. They may also draw on ratings of that user's contributions/behavior provided by other users: for example, through "likes," up- and down-votes, ratings against particular reputation-items such as helpfulness, reliability, promptness etc., or qualitative feedback in the form of text-based reviews. When reputation systems are intended to support transactions of a trading nature (whether as part of the conventional, gig or sharing economy), an entity's reputation score might be based on customer feedback about reliability, product quality, speed of response, etc. When they are intended to support expert discussion forums or interest groups, reputation scores may be based on other users' judgments of the quality of an individual's contributions to the site, number of contributions, and so on. In either case, reputation metrics are intended to serve as proxies (Floridi, 2015) for prior experience and personal knowledge, on the basis of which predictions of future interactions can be made.

Whichever factors are included in a reputation system, they are often used to generate a numerical measure of the user's overall behavior/reputation/ranking within the relevant community (despite Masum and Zhang's caution that 'No person can be reduced to a single measure of "quality"' (2004, np)). Reputation "scores" may be aggregates or averages; the data used to calculate these scores may be unweighted or weighted according to a range of factors, including the reputation of the user submitting the ratings and the age of the rating. Scores may be made public to other community members, so that they can make decisions about how and with whom they interact; or they may be known only to the site administrators (or an automated process) and used to make decisions about allowing or removing

privileges within, and even access to, services and users within the space. In the former case, they are visualized on the interface of the service (e.g., using star-ratings or badges).

Reputation systems as agentic components of sociotechnical/sociomaterial assemblages

We believe that reputation systems cannot be considered as merely mechanical or technical artefacts that can be separated from the social environments in which they operate. Instead, we take a perspective that draws on the work of sociomaterial theorists such as Callon (1984), Latour (1987; 2003), Law (2009) and Delanda (2016). That is, we conceptualize platforms or sites that facilitate digital interactions as sociotechnical assemblages consisting of users, digital and physical infrastructure and resources, information and practices. Such a conceptualization includes two key elements: an emphasis on the possibility of emergent behaviors and effects such as 'ideas, identities, rules, routines …' (Fenwick and Edwards 2010, 3); and a recognition that social or political agency is distributed within the assemblage, including artifacts, rather than inherent to individual human actors (Latour, 2005).

A reputation system, in such a perspective, is an agentic component of the assemblage. It is, by design, intended to induce or discourage particular behaviors amongst the users of the systems and platforms they are part of. It explicitly acts to incentivize certain practices, from simply participating in the system to behaving in ways that are deemed "good," and limit or exclude others. As such, a reputation

system is imbued with some kind of agency (even if it is viewed as derived). Indeed, a reputation system may be included in a platform precisely because of a recognition that 'it takes *effort* to sustain stable networks of relations' (Law and Singleton, 2005, 337, emphasis in original) and reputation systems can be relied upon to constantly contribute to this effort.

Introna suggests that, since they allow and prohibit particular practices in support of particular sets of values, technologies are 'morally significant from that start' (2014, p. 32). However, it is also likely that such agentic components of sociotechnical assemblages produce *unintended* consequences, for example emerging patterns of behavior or social or emotional experiences among users, which are instead *effects* of the assemblage as a whole. This, then, raises questions about where to locate moral agency within an assemblage. While the sociomaterial, intra-actional view sees agency as distributed, it may also be somewhat localised in particular components or clusters of components within an assemblage, in the form of what Latour refers to as mediators; that is, actors that 'make others do unexpected things' (Latour, 2005, p. 106). Thus, we might particularly associate certain agentic effects with reputation systems, since perhaps without their inclusion in the assemblage these effects would not emerge or be brought into being. However, this complex co-constitution of the politics and ethics of technology may mean sociotechnical assemblages are 'not open to simple intervention and correction' (Introna, 2014, p. 32) through regulation of use or minor change to design, but instead need to be constructed anew.

A disclosive archaeology of reputation systems

Introna (2014) suggests that a disclosive archaeology aimed at exploring the ethico-political agency of sociotechnical systems can usefully start with the delineation of the system's 'figuration agencies' (Introna, 2014, p. 41). He proposes four categories:

1. Affordances and prohibitions.
2. (Cyborg) Identities.
3. (Cyborg) Practices.
4. Discourses.

Here we adopt Introna's use of the parenthetical adjective (cyborg) to indicate that, in the assemblage, identities and practices are 'hybrid[s] of machine and organism (Haraway, 2006, p. 117), rather than inherently human.

The outline of common reputation system features described above brings to light many of their affordances and prohibitions. Users can buy, sell, award stars, write feedback, favorite, up- and down-vote and so on – that is, they can pass public judgments of others. However, frequently, they cannot defend themselves – they cannot explain why they had to, or chose to, do things the way they did. They can also both accumulate and lose reputation, often spend it and sometimes even speculate on it.

To better understand affordances and prohibitions, and to uncover how reputation systems act within platform assemblages to co-constitute both (cyborg) identities and practices, we examine the operation of reputation systems in two contexts: trading/transactional states and expert Q&A forums. In doing so, we start to understand what kind of ethical and political paradigms reputation systems are likely to embody and enact.

Reputation systems in trading/transactional sites

There is a substantial existing body of research into the features and impact of reputation systems in platforms intended to support online commerce. For example, there have been several studies of the auction/market platform eBay's reputation system and the impact it has on participation in the system (see, for example, Cabral and Hortaçsu, 2010; Dellarocas, Fan and Wood, 2004; Houser and Wooders, 2006; Hui et al., 2014; Resnick et al., 2000; Resnick and Zeckhauser, 2002; Resnick, Zeckhauser and Swanson, 2006). The main findings of this research suggest that feedback contributions on eBay are not strongly driven by altruism (Dellarocas, Fan and Wood, 2004), and instead are more strongly driven by an expectation of reciprocity, in what is clearly an example of a (cyborg) practice that has emerged through the facilitation of the reputation system. In further examples of (cyborg) practices, Resnick et al. (2000) suggest that users not only reciprocate but also retaliate. They also suggest that users of the site become less likely to participate in the feedback process once they have accumulated experience (and "respectable" reputation scores). This observation is consistent with the suggestion that users'

participation in the feedback process is not strongly driven by altruism, as it may imply that once users have built up a secure reputation, they no longer feel the need to elicit ratings from others by providing ratings themselves. Resnick, Zeckhauser and Swanson (2006) showed that reputation is, however, important, and that the same items, sold by the same seller under two different identities, attracted an 8% lower price when sold through a newly-established identity with low reputation, as compared to the seller's "real" (well-established, high reputation) identity. These findings show that reputation systems have an important role in the construction of the (cyborg) identities of successful and unsuccessful, and hence "good" and "bad," sellers.

Cabral and Hortaçsu (2010) studied the impact of negative feedback, finding that the first time a seller receives negative ratings/feedback has a more significant impact on his/her sales than subsequent negative ratings, but also that once a seller receives a negative rating, they are much more likely to receive more. They also found that sellers with low reputations are more likely to exit the system. Thus the association of users with particular (cyborg) identities – in this case, the 'bad' seller – can result in a kind of emergent amplification or downward spiral.

Reputation systems have also become fundamental components of platforms facilitating the gig economy, in which gig-workers offer services in a freelance capacity. AirTasker (http://airtasker.com), for example, has a reputation system that may be particularly important when users are seeking workers (called Taskers) who may carry out tasks in their homes, such as repairs, cleaning, or babysitting. AirTasker's reputation system is, from the user's point of view, almost identical to the

ones they will be familiar with on eBay etc. (we don't know if the algorithm is exactly the same). Reputation scores are displayed using a five-star scale, calculated based on sub-scales provided through an exit survey and accompanied by free text comments. These efforts to establish trustworthiness are supplemented by steps taken to verify identity (steps which are as likely to give the platform itself more trustworthiness as individual Taskers).

The effect of the sociotechnical assemblage is to clearly position human labor as a marketable commodity: as Taskers have to bid for jobs, having a high reputation score will increase their market access capacity and potential economic value. However, the reputation system seems to co-create a (cyborg) practice of almost universally positive feedback: every AirTasker is reviewed as wonderful (or not reviewed at all). This may reflect constraint on the part of those giving feedback, whether out of politeness or for some other motive, or the possible removal from the assemblage of Taskers who do not maintain a five-star average (as happens on many other gig-type platforms such as the transport-arranging site Lyft.com).

AirTasker is a relatively demure gig-worker platform, positioning itself as a place where you can find a reliable cleaner or baby-sitter. Taking the example of Fiverr (http://fiverr.com), we see again a reputation system that is based on the same features as those operating in platforms on which goods are traded. However, Fiverr's reputation system is made more complicated by the use of a "perks" system. This means that reputation buys not only higher levels of potential trust among users, but also actual increases in services provided by the platform. One possible result of this is that users with low reputations – likely to be those who have only

recently joined the site, or those who do not use it very often – are penalized, while those who have stayed "loyal" to the site and sell many of their services through it get preferential treatment. This is reminiscent of the use of points in online games, which incentivize continued play by linking points to the ability to unlock additional game features. Thus Fiverr's reputation system not only contributes to the positioning of human labor as a commodity, but also simultaneously positions workers as game-players.

The tone of text from both sellers and customers on Fiverr also points to some important consequences of treating human time, labor and reputation entirely as commodities. Fiverr gig-workers offer to do almost anything (recent offers include "I will sing Happy Birthday dressed as Tin Foil Man in a thong") and Fiverr customers leave rather unconstrained reviews compared to those on AirTasker. Thus it seems that in the sociotechnical assemblage of Fiverr, which positions itself as rather youthful and hip, the reputation system co-constitutes a (cyborg) practice of judgmentality, and encourages customers to treat service providers as commodities or goods that can not only be bought and sold, but also categorized in relation to quality. At the same time, providers' (cyborg) identities emerge as available, flexible, there to be commanded, and cheap – to the point where dignity is a potential barrier to success.

Reputation systems also afford practices that may subvert the original intentions or inscriptions of the designers, in order to allow different constructions of (cyborg) identities. Reputation systems, especially in e-commerce platforms, seek to discourage cheating and manipulation. However the very design of these systems

offers affordances for malicious users to tamper with their own reputation or those of others in order to obtain illegal or prohibited advantages. As reputation, in these services, is an asset that may facilitates custom and drives people to purchases, unscrupulous participants may find ways to artificially increase their reputation scores to increase custom, or to lure customers into potentially fraudulent transactions. Equally, participants may try to damage the reputation of others, leading to the loss of custom for the targeted user and possibly increase in custom for a rival. Reputation manipulation, afforded by the reputation system as part of a sociotechnical assemblage, can thus undermine the capacity of these systems to generate and sustain healthy trust relations. These manipulations and their effects may also be seen as resulting from the computer-mediated nature of these trust building systems, which operate by proxy for far away actors and organizations. Clearly, a manipulated reputation is also a process of (cyborg) identity-building.

Reputation systems in expert Q&A sites

We turn now to briefly explore reputation systems in expert Q&A sites, using the example of StackOverflow. StackOverflow is a Q&A site where programmers can ask and answer questions relating to technical issues; it has probably the best-known and most elaborately-developed reputation system in a Q&A site (Bosu et al., 2013; Hart and Sarma, 2014; Movshovitz-Attias et al., 2013). In StackOverflow's reputation system, users can up-vote and down-vote questions and answers provided by others, actions that not only contribute to reputation-building but also move questions up and down in terms of the order of display, and so make them

more or less visible. Users gain and lose reputation in a variety of ways, including through the up- and down-voting of questions; there are many more ways to gain reputation than to lose it. The most significant way to lose reputation points involuntarily is if a post is flagged as offensive or spam; points can also be "spent" (transferred to another user) in a bounty system for those seeking quick and accurate answers to complex or esoteric questions.

In StackOverflow, points are converted into privileges: for example once a user has 15 points, they can vote up a question or answer; once they have, 20, they can talk in a chat; once they have 125, they can vote down questions or answers; and so on. At 1500 points users are allowed to add new tags to the site (questions are tagged as corresponding to particular topic areas, such as SQL or Java); at 2000, users can edit other users' questions and answers. At 10000 points users gain moderation rights; at 25000, they have access to the site's analytics. Thus there are incentives to build one's reputation that go beyond the acquisition of reputation for its own sake, or in order to gain the trust of other users.

However, this reputation system is still grounded in an individualistic, accumulative and competitive paradigm, which may have negative consequences for the diffusion of professional knowledge. For example, Movshovitz-Attias et al. (2013) found that while the majority of questions on the site were posted by novice users with low reputations, on average higher reputation users ask more questions than lower reputation users, simply because they contribute more often to the site. StackOverflow has also been found to (unintentionally) exclude or discourage female participants (Vasilescu et al., 2012), which has been partially attributed to the reward

system. Thus StackOverflow's reputation system contributes to the emergence of (cyborg) practices around how quickly and how often users both ask questions and provide answers, in ways that may to some extent undermine its aims and ethos.

Discourses

Turning to the last of Introna's four figuration agencies, we examine some of the current discourses around online reputation.

The notion of online reputation has received substantial attention in recent years, with some authors suggesting that the increasing digitization of transactions and interactions is leading to a "reputation society" (Masum, Tovey and Zhang, 2012) and others proposing that reputation is in fact social capital in a "reputation economy" (Gandini, 2016).

As evident from the descriptions above, online reputation systems have been developed for two general purposes: as tools to help users of web-based platforms make decisions about whom to trust; and as motivators for more and higher quality participation in certain web-based activities or communities (and correspondingly as disincentives for unwanted behaviors). Such systems are based on the premise that 'reputation becomes visible, tangible and, under certain conditions, even measurable … through algorithms and metrics that elaborate online reputation scores' (Gandini, 2016, p. 28).

Some authors suggest that this kind of measurement and sharing of reputation information could radically shift the balance of power in society, as 'peer networks will confer legitimacy on people emerging from the grassroots' (Newmark, 2012, p. ix). However, one might ask whether reputation systems as currently developed are more likely to reinforce self-interested individualism, since they are grounded in methodological individualism which sees social groups as aggregations of individuals, each aiming at self-satisficing egoistic behavior, under the often not explicit idea that this is done for the benefit of the whole group. As Adam Smith famously stated, 'It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own self-interest' (Smith, 1838, p. 7).

Some aspects of these discourses around the power of digital reputation appear to have been taken to extremes in the (nominally socialist) Chinese government's recent experiments with and planned national roll-out of a combined social and personal-financial credit system (Botsman, 2017; Hvistendahl, 2017). In these, conventional measures of financial credit-worthiness are being combined with behavioral metrics including shopping habits, friendship networks and the sharing of 'positive energy' (Botsman, 2017, n.p.) online to produce a single trustworthiness or social credit score.

Representing an alternative, more critical discourse, one episode of the TV series Black Mirror, *Nosedive*[2], takes the idea of ubiquitous reputation systems to the extreme; in so doing, it powerfully illustrates some of the political implications of

[2]https://www.theatlantic.com/entertainment/archive/2016/10/black-mirror-nosedive-review-season-three-netflix/504668/

reputation systems and their capacity to be the driver of social exclusion and inclusion. In it, people use an app on their mobile phone to rate each other during or after any real interaction. In a plot move that has echoes of the developing Chinese social credit system (Botsman, 2017; Hvistendahl, 2017), those with high scores have access to better apartments and other perks. On the other hand, those with low scores become social outcasts. This reputation system, then, constitutes an instrument for both upward and downward social mobility. Similarly to the low bridges described by Winner, the reputation system in *Nosedive* embodies a politics with rules of exclusion and inclusion which are enacted through and by the artefact.

Disclosing the ethico-political agency of reputation systems: trust and reputation as forms of capital

The characteristics of conventional reputation systems made apparent above are summarized in Table 1.

Figuration agencies	*Some examples*
Affordances/prohibitions	● Acquisition/loss of reputation - reputation 'wealth' and 'poverty' ● Rating people, as well as goods and services, for 'quality' - awarding stars, writing feedback, passing judgment ● Encourages behaviors for which points are

	awarded, such as promptness, low price, reliability; discourages behaviors that deviate from the norm. ● Often removes the possibility of explanation for poor reputation (scores) ● Removes need for criticality and complex judgments ● Self-fulfilling/self-reinforcing (upward and downward spirals)
(Cyborg) Identities	Constructs identities of "good" platform users, e.g. ● seller - popular, many interactions ● gig-economy worker - flexible available, cheap ● buyer - gives feedback on every interaction ● expert - quickest to answer, frequent contributor ● Novice - should keep quiet and not venture opinions until reputation has grown.
(Cyborg) Practices	● Immediate feedback ● Constrained feedback - in response to pre-determined categories, and a reluctance to write negative reviews (every transaction is marvellous)

	• Unconstrained feedback - under the cover of anonymity, fake ids and distance • Reciprocation, retaliation, collusion • Competition and attacks • Dominance and lurking (peripheral participation) • Creation of notion that it is normal and indeed expected to rate people, as well as goods and services or the perceived quality of their knowledge • Creation of reliance on the opinions of others rather than the exercise of judgment or the explicit taking of risks
Discourses	• Commoditization of reputation • Reputation as (social) capital • Interaction partners as vendors and customers

Table 1: Figuration agencies of reputation systems

By disclosing these figuration agencies, we begin to understand what sort of politics may be embodied in conventional reputation system designs, and to see how this is re-inscribed back into online communities. These systems appear to be based on individualism, the free market as the ideal (political) economy and liberalism as the essence of social relations. For example, Dellarocas, one of the most influential

theorists of these type of systems, states that '[t]he new platforms may be all about harnessing crowds and communities, but in the end, those crowds and communities are nothing but a sum of individuals' (2010, p. 33), a position that neglects the sometimes strong and complex social, political and cultural mechanisms that couple individuals and result in emergent, collective behavior. Similarly, Picci explicitly positions his arguments as rooted in rational choice theory, positing that 'individual social actors act to advance their self-interest' (2007, n.p.) and claiming that reputation systems 'allow selection forces to weed out the least fit' (ibid.). Gandini's claim that reputation is social capital rests on the belief that it is 'an eminently economic concept' (2016, p. 30) that 'functions as a form of currency enabling trust among strangers' (ibid., p. 32) and that is 'a resource that may be mobilized and that remains with the individual … as a capital that is invested, traded or managed … as an investment in social relations with expected economic return' (ibid., p. 36), a view that combines individualism with a clear commoditization of reputation.

However, if reputation is viewed as a currency or marketable commodity, resulting from action of self-interested individuals, then it may be exposed to the same risks and problems that arise in financial markets, including questions related to ownership, fairness and control. Indeed, the global financial crisis has led to renewed questions as to the validity of competitive, free-market models and suggestions that approaches that recognize the strong coupling of different components in the system should be developed (Helbing and Kirman, 2013). Within the economics of reputation and trust that reputation systems are helping to create, there is already evidence for the kind of problems that arise when financial gain can be made by adopting certain behaviors, including the use of multiple or fake personas to acquire

undeserved reputational credit/value, exaggerated reciprocity, individualized reciprocity resulting in clique formation, retaliation and clique-based attacks. As early as 2007, an ENISA report (Carrara and Hogben, 2007), listed fifteen potential threats to the generation of trust through reputation systems, including among others the Sybil attack, whitewashing, ballot stuffing and collusion. For example in the collusion threat/attack, several malicious users collude together to boost the potential reputation associated with one (or more) account. As this reputation then is inflated by fabricated positive ratings given by colluders, it could be used to lure customers attracted by the high reputation of a seller, only to defraud them subsequently.

Collusion is per se a process which is afforded by the design of rating systems, where multiple unknown people's ratings contribute to build a reputation score. We often hear in the news about another potential threat, namely extortion and/or bad-mouthing. This is the case when there are single individuals, or more organized campaigns (which would amount again to collusion), which operate for the purpose of blackmailing or producing unfairly negative ratings for a user which could easily lead to a loss of reputation or loss of custom. Moreover, this could also lead to difficulties for the target user for regaining the original reputation. This is known to be an issue in websites such as Tripadvisor[3] or other leisure review websites, where the service has a procedure in place for e.g. hotel owner to report that. It is also known that there are crowdsourcing services which offer unscrupulous sellers ways to boost their reputation (Xu et al., 2015) or damage the reputation of others. Bots have also been linked with manipulation of reputation and to an automated production of scores, which are not reflective of actual behavior and thus (cyborg) identity of

[3] See https://www.tripadvisor.com/TripAdvisorInsights/w592

participants (De Paoli, 2013). Reputation systems, then, may not only enact a market-based, accumulative and acquisitive capitalist paradigm in whatever digital spaces they are employed – but also risk introducing behaviors that are detrimental to the health and sustainability of those spaces.

Implications for platforms intended to foster non-competitive, non-individualistic interactions and behaviors

While a market-based view of reputation may be acceptable and even desirable in a business-focused trading site, it may undermine the intentions and purported values of other types of site. For example, although expert Q&A sites could be viewed as markets for knowledge, with competition among providers to supply the best quality knowledge, they are not real markets in the sense that there is no obvious cost to those seeking (and presumably consuming) the knowledge on offer and knowledge-providers retain the knowledge that they give out. Instead, a closer comparison might be with school or university learning environments, or sites of professional learning, where knowledge, once created, can be distributed and shared at no loss to any party to the sharing transaction. Rather than the power dynamics of a market, governed by competition and differentiation in wealth, expert Q&A sites are more likely to be characterized by dynamics of pride and commitment to the advancement and promotion of particular forms of knowledge and skill. In this kind of context, reputation might still take the form of something to be accumulated, but not so much at the expense of other actors competing for the same resources and capital.

Some of the implications for the inclusion of reputation systems in sociotechnical assemblages not intended to facilitate commercial transactions or operate on a platform capitalist basis can already be seen in existing platforms. As stated above, reputation systems are increasingly being included in platforms that have quite different intended functions. Systems based on the same principles are also increasingly being incorporated into digital spaces that indeed set out to bypass commercial transactions and achieve cooperative or mutualistic transactions. For example, the accommodation-arranging platform Couchsurfing.com positions itself as setting out to achieve a social good: 'We envision a world made better by travel and travel made richer by connection. Couchsurfers share their lives with the people they encounter, fostering cultural exchange and mutual respect' (Couchsurfing, 2016). Couchsurfing.com relies on substantial levels of trust between strangers, as users share their homes with each other without any monetary exchange.

Lauterbach (2009) showed that there are significant levels of both direct and generalized reciprocity within the overall couchsurfing community. Couchsurfing's reputation system is based on systems used in conventional economic trading sites but has two unusual features. The first is in its use of friendship ties. Users can identify the type of relationship they have with other users, choosing from: Haven't met yet, Acquaintance, CouchSurfing friend, Friend, Good friend, Close friend, and Best friend. Thus the reputation system contributes to the construction of distinct (cyborg) identities in which friendship is categorised and graded. Couchsurfers who have hosted or stayed with other members are permitted to submit private feedback (to Couchsurfing) and public references for 14 days after a stay. Members must have a couch request with the "Yes" "Maybe" or "Confirmed" status in order to leave a

Surf/Host reference. Other members may create references under the "Other" or "Friend" reference designations (as opposed to "Surf" or "Host"). Users' publicly visible reputation information is simply the number of references they have been given, and the number of those that are positive and have been confirmed (i.e., the user has confirmed the host/guest exchange). Other users can see free text references left by former guests/hosts. All of these affordances and prohibitions contribute to the creation of possible (cyborg) practices.

It seems that this qualification of feedback based on the nature of relationships may be an attempt to mitigate the pure free-market nature of a conventional ratings-based system, in which every opinion counts the same, no matter how well-informed. However, this reputation system remains at heart accumulative and judgmental, and constructs the (cyborg) identity of 'good host' in ways very similar to the construction of 'good seller' on trading sites. Couchsurfing has a second unusual feature, which offers another example of how a reputation system can undermine the stated ethos of a platform. After some years of operating with the system described above, Couchsurfing.com introduced an additional "vouching" system, to allow some users to increase their reputation levels. This very restrictive system allows users to vouch for other users only if they have received three or more "vouches" themselves, effectively restricting vouching to an elite core: in, 2009, only 6.8% of members were able to vouch (Lauterbach et al., 2009). The affordances and prohibitions associated with vouching seem to have created both new (cyborg) practices (vouching and exaggerated reciprocation) and new (cyborg) identities (an elite). Thus the use of a conventional reputation system – albeit with some modifications – may in fact represent a misalignment with Couchsurfing's stated values of opening up

sociocultural spaces and recognizing the contribution to this endeavor made by anyone who is willing to open up their home to a stranger.

Another sociotechnical context in which conventional reputation systems may not align with designers and users intentions and values is the supportive discussion forum. On the surface, such forums may seem to be similar to the expert Q&A forums considered in the previous section – discussion boards to which users can post questions that they are seeking answers to from community members with similar interests, pre-occupations and lived experiences. However, there are some fundamental differences to the aims and use of such sites which may have profound implications for any kind of trust facilitation system.

First, expert Q&A sites such as StackOverflow are professional/technical interest community sites. Their users tend to be people who already have some degree of technical expertise (and therefore knowledge and cultural capital) and are seeking more. Several things follow from this:

- Questions on sites such as StackOverflow are technical in nature, seeking specific solutions to specific coding, implementation or operating system problems.
- They are likely to have answers which can be clearly judged as right, wrong or useful, depending on whether these answers lead to solutions that the questioner (and other members of the community) can implement. Where there may be more than one correct answer/workable solution, some will be

more efficient or simpler to implement than others, and can be judged better on those grounds.

- Because users have some existing level of expertise, their judgment as to the value of answers might be expected to be reasonably reliable.
- Users are often enthusiasts for their work, and so are discussing something they enjoy doing. They are also proud of their expertise and are keen to provide answers if they have them.
- Questions (and answers) on sites such as StackOverflow are almost never personal or emotional; they are rarely likely to be of dramatic importance to the questioner's life or living conditions.

In contrast, the stories that may be told, and the advice and guidance sought and given on community support discussion forums, for example relating to health issues or financial problems, may relate to issues which are of substantial personal significance to users. There are many such communities, some facilitated by charities, health systems, or other authoritative figures or structures, but others having a more grass roots or community-driven character (see, for example, Barak, Boniel-Nissim and Suler, 2008; Chung, 2013). Many are associated with particular illnesses, whether physical or mental (see, for example, Eysenbach et al., 2004; Griffiths et al., 2009; Wright and Bell, 2003). Some discussion forums and mailing lists have developed to provide a safe space for minority groups such as the LGBTQI community (Mehra, Merkel and Bishop, 2004). Others provide discussion forums for larger groups, a good example being the parenting forum Mumsnet (Pedersen and Smithson, 2013).

While reputation scores are not yet widespread among such sites, they have found their way into some of them. For example, the set of discussion forums hosted by the platform supportgroups.com, which includes forums dedicated to financial problems, homelessness, anxiety, and other mental and physical health issues, has a linked reputation system so that users can acquire points for contributing across the forums they are enrolled in. The use of reputation systems in digital spaces that might attract vulnerable, socially-isolated or excluded people may be of particular concern. There is a well-established correlation between ill-health or social exclusion and depression/anxiety (see, for example, Belle Doucet, 2003; Galea et al., 2007; Murali and Oyebode, 2004; Murphy and Athanasou, 1999; Paul and Moser, 2009; Vinokur, Price and Kaplan, 1996), which is not surprising given the potential for experiences of precariousness, social exclusion and social isolation, and feelings of inadequacy and decreasing hope. While people may well have positive stories and strategies to share, they may often be describing how they overcame a difficulty that was quite an unpleasant experience. Similarly, those visiting the site in order to find help and advice may well be seeking the emotional, as well as practical, support that can be provided by a community of people experiencing similar difficulties. We might speculate on the potential impact of inscribing a capitalist-oriented reputation system into such an environment. While on the one hand users might value trust creation processes as they decide who to interact with and seek support from, it is easy to imagine situations in which reputation scores might have negative impacts, for example on users' self-esteem. Given the value-system inherent in the design of conventional reputation systems, reputation may represent another form of capital in which users can find themselves to be poor, and so another benchmark of failure, inadequacy and inequity.

In all the above examples of existing systems, reputation is effectively reduced to a commodity – something that can be accumulated and lost, for which there exists a competitive market, and which is highly individualized. Given that the desired purposes of sociotechnical assemblages in which reputation systems act are extremely varied and may be intended to create and maintain a healthy knowledge ecosystem or provide a supportive community of peers, introducing such a capitalism of reputation may be counterproductive. Trust is likely to be important in facilitating and encouraging interactions on such community-focused, supportive platforms, and some kind of trust facilitation or reputation system may well be needed; however our disclosive archaeology of the ethico-political agency of conventional reputation systems suggest the need for a novel approach, which is not based on individualistic principles. From the evidence available from studies of mutual cooperation sites such as couchsurfing.com, it seems that, as Introna (2014) warns, attempts to regulate the impact of conventionally-designed reputation systems by making small alterations are insufficient. Rather, what is needed is an approach that reinforces relationality and community cooperation. We therefore suggest there is a real need to rethink online trust and reputation, starting from a rejection of individualism and the notion of reputation as a form of capital, and turning to systems that valorize cooperation and mutualistic acts that increase the quality and strength of the assemblage as a whole.

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