Relational Trust, Transactional Assurance: Socioeconomic Bricolage on the Blockchain

Michael Castelle
Centre for Interdisciplinary Methodologies
University of Warwick
Coventry, UK

Abstract
Recent research at the intersection of HCI and blockchain technologies has shown an interest in distinguishing and classifying the use of distributed ledgers of records (e.g. in their manifestation as protocol, application, currency, register, or governance mechanism). However, just as contemporary centralized software applications make extensive practical use of multiple data stores and messaging infrastructures, future blockchain applications are likely to deploy traditional systems software in interaction with multiple distributed-ledger protocols — the latter both in their potential roles as stock (e.g. store of information) and as flow (e.g. currency) — in increasingly complex combinations. In this brief position paper, I consider the design and nascent use of an experimental social news reader—one which combines reputational attestments with prediction markets in an attempt to increase the subjective relevance of users' feeds—to explore the developing interactions of formalized relational and financial protocols in blockchain-based applications.

Author Keywords
Blockchain; trust; social media.

ACM Classification Keywords
H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous.

Introduction

The adoption of publishing business models on the part of large Internet companies like Google and Facebook — whose respective Search and News Feed products are, like traditional newspaper enterprises, *multi-sided markets* [11] with their core process of simultaneously matching users, authors of content, and advertisers — is increasingly considered a problematic architecture which invariably causes 'incentives to bias' [29] and which is responsible, by virtue of providing complex vectors for malicious interference, for a trend of polarization [22], social bots [12], and unreliable news content [34].

Through an exploratory case study of a U.S.-based startup organization currently developing *Relevant*, a blockchain-centered distributed social media application developed in explicit response to more centralized platforms (see Fig. 1), I will discuss how contemporary actors are constructing and negotiating the formalization of social phenomena like reputation and relevance of media content via creative blockchain-based combinations of behavioral user input and prediction market mechanisms.[1] The developers have described their goal as the formulation of "new economic incentives that reward the creation and dissemination of quality content" [1], and my goal is to articulate the ways that purely transactional and so-called "trustless" technologies are increasingly deployed in (and logically segregated from) interaction with more subjective human judgment (of, e.g., subject-matter expertise) in the attempt to realize new distributed sociotechnical substrates.

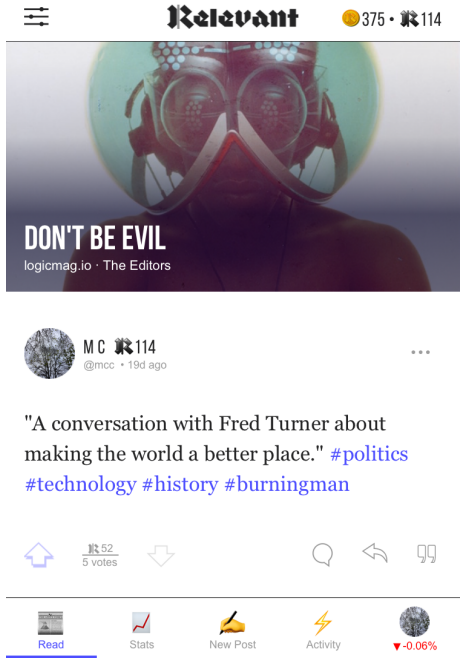

Figure 1: Screenshot of an article on Relevant's mobile news feed rated positively by five other users.

[1] In the Fall and Winter of 2017-2018, the author acted as an intermittent participant-observer on the organization's public-facing Slack instance, as well as that of a larger social good-oriented blockchain community. The author had occasional unstructured discussions with application developers and/or community members but was not privy to any closed-source code bases or discussions internal to private organizations.

I argue that this particular genre of product—which also includes social platform applications like SteemIt and Rize, built on the Steem [2] and PROPS [37] tokens, respectively—can be of interest to HCI researchers, not just because of the sometimes critical and ethical underpinnings (in the case of Relevant, derived not from libertarian fantasies [17], but of a stated interest in repairing the decline of trust in shared journalistic content), but because it attempts to leverage blockchain techniques' facilitation of self-interested transactions for more diverse sociotechnical purposes than that originally envisioned by cryptocurrency pioneers.

My perspective—that future applications are likely to be designed with the intention to experimentally balance self-interested economic transactions with relational interactions and speech acts—provides a way to imagine systems which cannot be placed directly under the recent survey/typology of blockchain applications of Elsden et. al. [10]. Instead, a multiplicity of underlying infrastructural protocols—of which only one is proposed to act as fungible currency in the Bitcoin tradition—may be implemented as part of a more interrelated sociotechnical system, including (in this case) the maintenance of records of quantified relational expertise in a variety of topics, whose value (in providing a news feed whose content is valuable to users without relying on a publishing business model) is more overtly social than economic. In addition, because a centralized, experimental version of this app is currently (as of Winter 2018) live on iOS and Android, we can observe not just the 'entrepreneurial actions' of the founders/ developers [16] but also the ways that nascent users have come to participate and play with the system and its potential parameters, in a form of "imaginative" participation in a hypothetically decentralized social media.

The resultant application design, though still in development, is of particular interest in that its overt detachment (but mutual interdependence) of the infrastructuring of economic rationality (described by the developers as the "incentive protocol") from the infrastructuring of relational approval (the "reputation protocol") parallels the long-running debate between social theories of self-interested rationality (of e.g. microeconomics) vs. theories from political economy and sociology which problematize instrumental rationality in various ways, such as emphasizing the 'embeddedness' of economic practices in social life [4]. Moreover, this materialized disjunction also has an intriguing correspondence with the social psychologist Toshio Yamagishi's theories of trust [36], which argue that other existing conceptions of trust conflate (1) an actor's judgments of the other's character and/or feeling towards the actor with (2) the assurance of security given the expectation that the other is acting in their own self-interest.[2] This latter theory, I will suggest, is an appealing way to understand the governance problems unwittingly built into Bitcoin's original "trustless" design, as well as the potential common patterns we can expect for blockchain applications which attempt to materially implement socioeconomic systems.

Relational Trust vs. Transactional Assurance

Historical and Informatic Theories of Trust

With the rise of electronic commerce and the popularity of digital marketplaces like eBay in the late 1990s, information scientists began to take the concept of *trust* more seriously. Their early attempts at clarifying the nature of trust, however, relied on either insufficient dictionary definitions [18] or

[2] This dichotomous perspective is sometimes reinvented in other fields: see, for example, the division between 'economic uncertainty' and 'lack of trust' in Mizruchi and Stearns' sociological study of bankers' transactions [25].

ad hoc classifications [14] wholly independent with the tradition of psychological and/or social-scientific literature on the subject of trust, the latter in part centered on the work of Niklas Luhmann [23]. While Luhmann argued that trust and risk are related, in trust's role as a "reduction of complexity", Adam Seligman has convincingly argued that the component of trust relating to risk is a specifically *modern* phenomenon [32]; some supporting evidence for this has been given by Lorraine Daston, in her work on the relationship between the mathematical formalization of risk and the classical development of contract law [7].

More recent research on trust in HCI, however, has largely continued the adoption of this modernized conception, regarding certain less-impersonal types of trust as merely 'cognitive' or even 'emotional' [6]. Work on HCI and blockchain technologies specifically has proposed a tripartite distinction between technological, social, and institutional trust [30], but in what follows, I take a more ontologically sociotechnical view and propose a conceptual cleavage along a different axis proposed by the social psychologist Toshio Yamagishi, between that of *trust* and *assurance*.

Yamagishi's Ontology of Trust

Yamagishi, in his 2011 treatise [36], focuses on the aspect of trust as 'expectation of intentions', as distinguished from 'expectation of competence' and further distinguished from 'expectations of natural order' (such as that of the sun rising every day). He argues that two distinct qualities of expectation of intentions have been conflated, which he distinguishes as 'trust' and 'assurance': 1) *trust* is "expectations of others' (particular individuals or others in general) intentions based on one's judgment of their character traits or their feelings toward the trusting person"; while 2) *assurance* "comes from the judgment that there is no incentive for a partner to take advantage of you" [36, pp. 31-32].

We can place this concept of assurance aside for a moment, while reflecting that what specifically distinguishes it is its belief in the *self-interestedness* of said partner. Yamagishi takes his complementary notion of *trust* and further separates it into *character-based trust* — "the expectation that one will act in a trustworthy manner because he is honest and trustworthy as a person" and *relational trust* — "the expectation that a person is disposed to act in a trustworthy manner toward [the trustor]".

Given Yamagishi's categories, we can see that if the problem Relevant's developers intend to solve is the disconnect between the social and economic interests of the social media user, the platform, content providers, and advertisers, this is happening along multiple trust valences:

- 1) The user is *not* necessarily *assured* that the platform has no incentive to take advantage of them.
- 2) The user does *not* necessarily *trust* various content providers' honesty/character.

The first situation, in Yamagishi's nomenclature a matter of *assurance*, can only be resolved if the user believes the platform's has no self-interested reason to deceive them. However, with Google or Facebook's business model, there is a strong economic incentive to display content as dictated by the maximization of advertising income. As previously mentioned, the notion of "trust" in 3rd-party intermediaries on which Bitcoin was originally founded to absolve [26] is specifically of this 'assurance' kind.

The second situation, in Yamagishi's nomenclature a matter of *trust*, specifically *character-based trust* (that e.g. a news site is not promulgating propaganda), is one that can be potentially resolved indirectly, through one or more intermediaries whose character the user *does* trust (such as a

good friend). If I have confidence that these friends would not recommend known propaganda to me, I am more likely to trust the content that they recommend or share, and this trust can potentially extend transitively (i.e. I am more likely to trust the character of friends of my trusted friend.) It should be noted that *this* notion of trust, by contrast, was the one studied by early scholars of the role of reputation in marketplace platforms such as eBay (and later, Uber and Airbnb) [19, 28].

Incentivizing Relevance

The Interdependence of Economic Rationality and Relational Reputation

The approach taken by the Relevant project, interestingly, appears to observe Yamagishi's distinction between assurance and trust, and attempts to resolve 1) the matter of assurance through a token-based *prediction market* in which all actors—human or bot—act in self-interest to place bets on the relevance of new content for a given topic, with potential (economic) rewards to be reaped later; while attempting to resolve 2) the matter of character-based trust through a reputation mechanism derived from research in the early 2000s on P2P sharing (which had similar issues with regards to obtaining reliable information from strangers). These two quantifications—one of which works as a currency protocol, and the other not (see Fig. 2)—are in the current prototype encoded as the user's "coins" and their reputation score, respectively; while the latter (reputational) value changes immediately with every user's upvoting of a given post, the (former) coin reward occurs at a later time based on 'earnings' based on the post's performance with other users.

This means that the 'social' ranking of reputation (which is designed as a multiplicity, with differing reputation rankings per topic and/or hashtag) directly affects economic

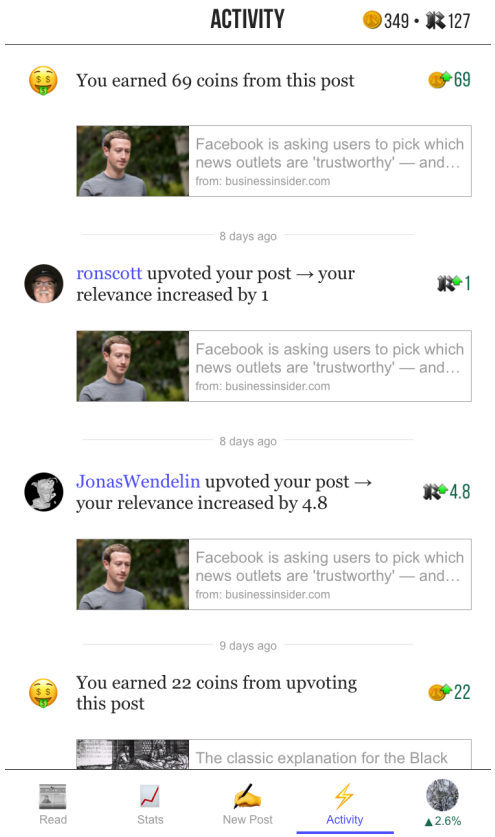

Figure 2: Screenshot of Relevant's activity screen, illustrating the segregation of the (economic) incentive protocol and the (social) reputation protocol.

outcomes, but the inverse relationship is deliberately not directly built into the system. (See Fig. 2, in which reputation scores improve before coin rewards are added.) This design of the application's reputation and incentive protocols is, I argue, an unconscious attempt to invert the historical transformation of market society described by Karl Polanyi, where "instead of [the] economy being embedded in social relations, social relations are embedded in the economic system" [27, p. 40].

On Protocol Bricolage

As mentioned in the introduction, I believe the design of the Relevant application represents a kind of *protocol bricolage* which arguably differs from a unidimensional typology of blockchain applications [10]. As originally deployed by Claude Lévi-Strauss [24], the term *bricoleur* referred to a category of actor considered in opposition to a hypothetical rational, Western *engineer*;[3] in this case, I would argue that contemporary distributed ledger systems, while often 'engineered', are in their nascency the result of more of an experimental cobbling-together of technologies and techniques. (This is reflected in the comparatively improvised genre of descriptive blockchain systems literature known as the "white paper", often distributed in a dynamically-changing draft state unsuitable for scientific publication.) My argument, however, is that a typology which segregates, for example, 'infrastructure' from 'currency' or even 'governance' may not be sufficient to characterize this genre of developing applications whose features derive from a complex interaction of multiple protocols. In this, the study of blockchain-based applications should certainly include and learn from existing literature on virtual economies [21, 15], with the significant difference that the application design of the former encourages or presumes the existence of secondary markets for exchange of tokens with fiat money, as opposed to attempting to ban or control those markets (as often occurred in the latter).

On ICOs and Institutional Isomorphism

The past year has been characterized by a regulatory ambivalence over the nature of the application-specific scarce tokens (or 'appcoins' [33]) which blockchain techniques make possible. Much as the development of the electronic matching of buyers and sellers problematized the legal definition of the *exchange* (formerly, a centralized 'floor' of buyers, sellers, and the specialists physically maintaining the order books) [3], these limited tokens are currently problematizing the notion of a *security* (a financial asset with expectation of profits, such as stocks or bonds); the overlap in concepts is laid bare in the practice of "Initial Coin Offerings" (ICOs), named in analogy to the initial public offerings (IPOs) in which investment banks, auditors, and lawyers organize pricing and distribution of ownership shares on the public market.[4] The enthusiasm for developing and selling application tokens, however, is due to its overt success as an unregulated fundraising activity in a competitive environment where public offerings of high-tech firms on regulated exchanges are less common. Blockchain startups have thus been mimicking each other in a form of *institutional isomorphism* [9] both to raise (fiat) money for development and to pragmatically draw attention to new products.

While one critique of social media platforms like Facebook and Twitter is that they are strongly dependent on advertis-

[3] As noted by [8], this category of the engineer who would somehow be "the absolute origin of his own discourse" is itself a myth, deployed rhetorically by Lévi-Strauss.

[4] The ICO phenomenon, partially predicted as a possibility in the late 1990s [35], has been charitably characterized as 'regulatory arbitrage' [31], but it seems less empirically clear that the majority of the actors involved are particularly familiar with existing securities law. As of this writing, the Securites and Exchange Commission (SEC) appears to be tentatively moving towards treating such tokens as securities; see [5].

ing revenue, a corollary critique involves their role as public companies which are highly incentivized to perform well in quarterly reports and generate revenue for their shareholders. However, this 'shareholder value' conception of corporate control [13] is arguably replicated in ICO schemes; that is, there may be unforeseen consequences as actors (both developers, users, and prediction-market agents) attempt to maximize the exchange value of the coins representing Relevant's curation awards. Avoiding issues like these is an important aspect of *market design* [20], and it will be of increasing importance for researchers to document such design processes of decentralized socioeconomic applications as they (literally) take on further currency.

REFERENCES

1. Slava Balasanov. 2017. Relevant: An Introduction. (Oct. 2017). https://hackernoon.com/relevant-an-introduction-5b79ef7afa9
2. Chelsea Barabas, Neha Narula, and Ethan Zuckerman. 2017. Defending Internet Freedom through Decentralization: Back to the Future? (Aug. 2017). http://dci.mit.edu/assets/papers/decentralized_web.pdf
3. Michael Castelle, Yuval Millo, Daniel Beunza, and David C. Lubin. 2016. Where do electronic markets come from? Regulation and the transformation of financial exchanges. *Economy and Society* 45, 2 (April 2016), 166–200. DOI: http://dx.doi.org/10.1080/03085147.2016.1213985
4. Koray Çalışkan and Michel Callon. 2009. Economization, part 1: shifting attention from the economy towards processes of economization. *Economy and Society* 38, 3 (Aug. 2009), 369–398.
5. Securities and Exchange Commission. 2017. Statement on Cryptocurrencies and Initial Coin Offerings. (Dec. 2017). https://www.sec.gov/news/public-statement/statement-clayton-2017-12-11
6. Cynthia L. Corritore, Beverly Kracher, and Susan Wiedenbeck. 2003. On-line trust: concepts, evolving themes, a model. *International Journal of Human-Computer Studies* 58, 6 (June 2003), 737–758. DOI: http://dx.doi.org/10.1016/S1071-5819(03)00041-7
7. Lorraine Daston. 1995. *Classical Probability in the Enlightenment* (new ed edition ed.). Princeton University Press, Princeton, N.J.

8. Jacques Derrida. 1972. Structure, Sign and Play in the Discourse of the Human Sciences. In *The Structuralist Controversy*, Richard Macksey and Eugenio Donato (Eds.). Johns Hopkins, Baltimore, 247–265.

9. Paul J. DiMaggio and Walter W. Powell. 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review* 48, 2 (1983), 147–160. DOI:http://dx.doi.org/10.2307/2095101

10. Chris Elsden, Arthi Manohar, Jo Briggs, Mike Harding, Chris Speed, and John Vines. 2018. Making Sense of Blockchain Applications: A Typology for HCI. In *Proc. CHI*. ACM.

11. David S. Evans and Richard Schmalensee. 2016. *Matchmakers: The New Economics of Multisided Platforms*. Harvard Business Review Press, Boston, Massachusetts.

12. Emilio Ferrara, Onur Varol, Clayton Davis, Filippo Menczer, and Alessandro Flammini. 2016. The Rise of Social Bots. *Commun. ACM* 59, 7 (June 2016), 96–104. DOI:http://dx.doi.org/10.1145/2818717

13. Neil Fligstein and Taekjin Shin. 2007. Shareholder Value and the Transformation of the U.S. Economy, 1984-2000. *Sociological Forum* 22, 4 (Dec. 2007), 399–424. DOI:http://dx.doi.org/10.1111/j.1573-7861.2007.00044.x

14. Tyrone Grandison and Morris Sloman. 2000. A Survey of Trust in Internet Applications. *Commun. Surveys Tuts.* 3, 4 (Oct. 2000), 2–16. DOI:http://dx.doi.org/10.1109/COMST.2000.5340804

15. J. Hamari and V. Lehdonvirta. 2010. Game design as marketing: How game mechanics create demand for virtual goods. *Int. Journal of Business Science and Applied Management* 5, 1 (2010).

16. Karim Jabbar and Pernille Bjørn. 2017. Growing the Blockchain Information Infrastructure. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*. ACM, New York, NY, USA, 6487–6498. DOI:http://dx.doi.org/10.1145/3025453.3025959

17. Henrik Karlstrøm. 2014. Do libertarians dream of electric coins? The material embeddedness of Bitcoin. *Distinktion: Scandinavian Journal of Social Theory* 15, 1 (2014), 23–36.

18. A. Kini and J. Choobineh. 1998. Trust in electronic commerce: definition and theoretical considerations. In *Proceedings of the Thirty-First Hawaii International Conference on System Sciences*, Vol. 4. 51–61 vol.4.

19. Peter Kollock. 1999. The production of trust in online markets. In *Advances in group processes*, Edward J Lawler, Michael W. Macy, Shane R. Thye, and H A. Walker (Eds.), Vol. 16. JAI, Greenwich, CT, 99–123.

20. Airi Lampinen and Barry Brown. 2017. Market Design for HCI: Successes and Failures of Peer-to-Peer Exchange Platforms. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*. ACM, New York, NY, USA, 4331–4343. DOI:http://dx.doi.org/10.1145/3025453.3025515

21. Vili Lehdonvirta. 2008. *Real-Money Trade of Virtual Assets: New Strategies for Virtual World Operators*. SSRN Scholarly Paper ID 1351782. Social Science Research Network, Rochester, NY. https://papers.ssrn.com/abstract=1351782

22. Q. Vera Liao, Wai-Tat Fu, and Markus Strohmaier. 2016. #Snowden: Understanding Biases Introduced by Behavioral Differences of Opinion Groups on Social Media. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16)*. ACM, New York, NY, USA, 3352–3363. DOI: http://dx.doi.org/10.1145/2858036.2858422

23. Niklas Luhmann. 1979. *Trust and Power*. John Wiley & Sons, Ann Arbor, Mich.

24. Claude Lévi-Strauss. 1966. *The Savage Mind*. The University Of Chicago Press, Chicago.

25. Mark S. Mizruchi and Linda Brewster Stearns. 2001. Getting Deals Done: The Use of Social Networks in Bank Decision-Making. *American Sociological Review* 66, 5 (2001), 647–671. DOI: http://dx.doi.org/10.2307/3088952

26. Satoshi Nakamoto. 2008. Bitcoin: A peer-to-peer electronic cash system. (2008).

27. Karl Polanyi. 1944. *The Great Transformation: The Political and Economic Origins of Our Time*. Farrar & Rinehart.

28. Paul Resnick and Richard Zeckhauser. 2002. Trust among strangers in internet transactions: Empirical analysis of eBay' s reputation system. In *The Economics of the Internet and E-commerce*. Advances in Applied Microeconomics, Vol. 11. Emerald Group Publishing Limited, 127–157. DOI: 10.1016/S0278-0984(02)11030-3.

29. Bernhard Rieder and Guillaume Sire. 2014. Conflicts of interest and incentives to bias: A microeconomic critique of Google's tangled position on the Web. *New Media & Society* 16, 2 (March 2014), 195–211. DOI: http://dx.doi.org/10.1177/1461444813481195

30. Corina Sas and Irni Eliana Khairuddin. 2015. Exploring Trust in Bitcoin Technology: A Framework for HCI Research. In *Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction (OzCHI '15)*. ACM, New York, NY, USA, 338–342. DOI: http://dx.doi.org/10.1145/2838739.2838821

31. Avtar Sehra, Philip Smith, and Phil Gomes. 2017. Economics of Initial Coin Offerings. (Aug. 2017). http://www.allenovery.com/SiteCollectionDocuments/ICO-Article-Nivaura-20170822-0951%20%20-%20Final%20Draft.pdf

32. Adam B. Seligman. 2000. *The Problem of Trust* (new ed edition ed.). Princeton University Press, Princeton, NJ.

33. Peter Van Valkenburgh. 2016. Framework for Securities Regulation of Cryptocurrencies, Volume 1. (Jan. 2016). https://coincenter.org/2016/01/securities-framework/

34. Michela Del Vicario, Alessandro Bessi, Fabiana Zollo, Fabio Petroni, Antonio Scala, Guido Caldarelli, H. Eugene Stanley, and Walter Quattrociocchi. 2016. The spreading of misinformation online. *Proceedings of the National Academy of Sciences* 113, 3 (Jan. 2016), 554–559. DOI: http://dx.doi.org/10.1073/pnas.1517441113

35. William J. Wilhelm. 1999. Internet Investment Banking: The Impact of Information Technology on Relationship Banking. *Journal of Applied Corporate Finance* 12, 1 (March 1999), 21–27. DOI:http://dx.doi.org/10.1111/j.1745-6622.1999.tb00656.x

36. Toshio Yamagishi. 2011. *Trust: The Evolutionary Game of Mind and Society* (2011 edition ed.). Springer, Tokyo; New York.

37. Inc. YouNow. 2017. PROPS: A Decentralized Ecosystem of Video Applications. (Nov. 2017). https://www.propsproject.com/static/PROPS%20Whitepaper.pdf