Towards a participatory digital ethnography of blockchain governance

Ellie Rennie (PhD), RMIT University. ARC Future Fellow and researcher at RMIT's Blockchain Innovation Hub, the Digital Ethnography Research Centre, and the ARC Centre of Excellence for Automated Decision-Making and Society. ORCID: 0000-0001-6792-9744

Michael Zargham (PhD), BlockScience and Visiting Researcher at the Vienna University of Economics and Business.

Joshua Tan, Practitioner Fellow at Stanford University's Digital Civil Society Lab and a PhD candidate at the University of Oxford.

Luke Miller, computer science intern at Metagov.

Jonathan Abbott, computer science intern at Metagov.

Kelsie Nabben, PhD candidate at RMIT University.

Primavera De Filippi (PhD), National Centre of Scientific Research in Paris, and Faculty Associate at the Berkman-Klein Centre for Internet & Society at Harvard.

Abstract

Blockchain governance occurs through a combination of social and technical activities, involving smart contracts, deliberation within a group, and voting. These processes are significant as they demonstrate how governance of distributed infrastructures is evolving. While typologies of blockchain governance can be constructed by gathering on-chain interactions and formal rules, other aspects are more difficult to observe, including governance interactions occurring inside discussion forums. In this paper we discuss a participatory digital ethnography technique, whereby participants and researchers use a bespoke bot to identify governance interactions occurring within project forums (on Discord). The technique is designed to be used in conjunction with analysis of software for the purpose of mapping and understanding the 'governance surface' of different protocols. We describe our tools and methods for understanding automated futures through a case study of the SourceCred community, an organization using, developing and maintaining open source software called SourceCred. The SourceCred codebase is also used by other decentralised communities for various organisational functions, including reputation and compensation.

Introduction

In decentralised blockchain systems, the ongoing operations, maintenance and improvement of platforms and applications require that people who are unknown to each other arrive at a collective decision. Depending on the platform or application, participants may signal their preference by updating software or sending a transaction to a smart contract. Actions that seem

like routine technical or administrative processes can have far-reaching consequences for how digital infrastructures develop and whose interests they serve.

Preceding these actions are conversations that take place on social platforms, also ordered through technical architectures. Such "off-chain" deliberations on social platforms, together with "on-chain" software-based rules and actions, make up what has become known as blockchain governance (Werbach, 2018), Dgov (Semenchuck, 2018), or "DeGov" (Buterin, 2021). Identifying effective governance of decentralised blockchain infrastructures is an urgent concern for those involved with implications for the economies that blockchain technologies operate in (Schneider, 2021).

Where platform governance of centralised infrastructures calls for greater explainability of automated decision-making to limit harmful outcomes, decentralised communities choose automation to make governance processes manageable and transparent in conditions of low trust. Software may be used to define pre-agreement of processes or actions, reducing scope for error or attack, or improving responsiveness to exogenous influences.

In this article our chief concern is to outline and demonstrate a method for understanding "governance interactions" within such systems, defined by Kooiman as "solving societal problems or creating societal opportunities; attending to the institutions as contexts for these governing interactions; and establishing a normative foundation for all those activities" (Kooiman, 2003, p. 2).

Focusing on governance interactions makes governance interpretable and analysable (Kooiman, 2003), yet in this case requires understanding the roles of, and relationships between, human and non-human actors. Here we discuss a digital ethnography research experiment in which we brought some of the tools of decentralised governance into our own research approach. Aside from ameliorating the challenges of data collection on and across platforms, these tools enabled the co-creation of datasets, illuminated issues and moments that we might otherwise have missed, and helped to turn observation into dialogue. For the practice of ethnography, automation can assist in the construction of a field site by enabling a group of people to actively observe a conversation, handle consent processes, and deal with the logistical challenge of collecting data into one place. Ethnographic processes such as assembling and interpreting the (expanded) field site are still necessary but can be supported and augmented through use of bots such as ours. The insight we derive from this experiment is that embedding humanities and social science research inside human-machine entities is not just a means to understand decentralised futures but may help meet their requirement for attentiveness to their own boundaries and dynamics.

Automating work

"I've been calling our technology oppressive since I got here and asking why we don't change it", SourceCred contributor Aloysious wrote in the "tokenomics" channel of the Discord server. The SourceCred algorithm was tracking contributions of the team members who maintain it and determining how much each of them would be paid for their work. The message was directed at others who were experiencing the direct material and emotional consequences of working for an algorithm of their own making, knowing it was also being taken up by other groups. Aloysious

asked, “What if we design [SourceCred] to ~~reward~~ support people for learning to coordinate, share, getting well (remove the leaderboard) and influencing web3 / teaching others.”

At the time this comment was posted we had been “in” the SourceCred Discord for over six months as an active bot that could be summoned by using the telescope emoji, and as a channel called “Metaeth”. Anyone within the server could add the Telescope emoji to a post, which would trigger a consent and data collection process, resulting in approved comments appearing in the channel and our dataset. An ethnographer (co-author Rennie) was keeping an eye on the bot’s activities and the server conversations to understand how it worked and going where it pointed her – to conversations that community members signalled she should read either inside the Discord server or places linked from it such as posts and videos on other platforms.

The research endeavour emerged from Metagov, an open research collective attempting to build datasets on blockchain governance. We created the bot to work in multiple blockchain communities as a tool for ethnographers. Our intention was that for each field site, the bot would be shepherded by a single ethnographer who would take on the task of participating in conversations with the community, follow events and decide what to foreground for analysis. We approached SourceCred first, knowing that this community’s own experimentations with automation for collaborative endeavour were aligned with our own.

SourceCred was in the process of redesigning their algorithm and the comment by Aloysious was just one of many on the nature of organisations, work and the opportunity to do things differently that was retrieved by the bot at the command of a human, thereby making its way into our

dataset. Back in our research meetings, we discussed our own methods and whether automating aspects of data collection in collaboration with the community could get us closer to knowing how decentralised infrastructures were governed and maintained. There was the real possibility that our partly automated method of data collection would itself be oppressive, removing the understanding that comes from the manual, participative and personal dimensions of ethnography. Like SourceCred, we dealt with mundane technical developments while trying to understand more fundamental questions related to ethnography and collaboration. We discuss both of these dimensions in this paper.

SourceCred itself shows how novel forms of measurement (made possible by automation) can change the nature of online coordination towards new ways of working and belonging for online communities. Ethnography was our means of understanding what "attending to" such an algorithm looks like, and the experiences of working for and with a system. In the case of SourceCred, governance interactions were inseparable from the values, care and attention of the community's members towards the protocol and each other.

By automating aspects of our own research practice, we were able to view areas of the field site that might otherwise have gone unnoticed in a digital ethnography due to the volume of information and activity. The participatory features that the bot enabled also provided an additional layer of information, in that they expressed the priorities of the participants and their ideas of what researchers should know. Before delving into the ways automation changed our ethnographic practice, we first describe the motivation for our work in relation to automated futures.

From platform governance to governance surface

To govern, in broad terms, is to constrain the field of action that is available to others (Foucault, 1982). Governance occurs in both political and non-political spheres and is shaped by systems and tools, evolving "in relation to what is technically possible for it to see at whatever historical moment" (Bratton, 2016). Blockchain infrastructures are governmental in that they are systems for coordination, permitting some actions and limiting others, through what is prescribed in software code. They are also governed in the organizational governance sense - "a sort of constitutional law of the firm" (Colebatch, 2014, p. 309) – entailing rules, standards and policies.

Existing approaches to understanding governance of and by technology provide only limited tools for blockchain governance research due to their focus on centralised infrastructures. The term "platform governance" typically refers either to attempts to curb the power of platforms through regulation (governance of platforms), or to the actions and powers of corporations in setting terms for use (governance by platforms). Scholarship in this area recognises that corporations, even when working within the limits of law, have significant discretion to develop their own rules, which may conflict with other rights and responsibilities (Suzor, 2019). Platform corporations derive power through their use of data, including capabilities of pre-emption and surveillance that enact social and political processes through machines of their own creation (Gorwa, 2019). At the epistemological level, technology affects how we access knowledge and modifies what we can know and be expected to know (Hong, 2020). Andrejevic (2020) observes that automated systems program context, resulting in a "mode of governance that dispenses with processes of subjectification by operating directly on the environment of the individual actors, shaping their conduct by intervening in their surrounding milieux" (18). While the temptation is

to see this purely as a problem of transparency, others look instead to the material and ideological influences that may be at play in the use of algorithms (Ananny & Crawford, 2018). Researchers from the fields of humanities and social sciences have argued in favour of explainability, which can mean descriptive accounts as well as critical simulation (Burgess et al., 2021). Our focus in this article is on "explainability to whom?" recognising that decentralised communities seek validation of socio-technical resilience rather than explanations of the mathematical dimensions of systems.

Ethnographic research has focused on the power and practices of users of platforms. Platform governance is complicated and extended by users; tactics applied or overlayed to automated systems may subvert platform logics and create different outcomes. For instance, ethnography has revealed how "boundary work" (Nippert-Eng, 2008) is performed by users to delineate and manage social connections, privacy and information sharing within or despite the rules set by platforms (Marwick and boyd, 2014). Others have examined how users can shape platforms through the creation of roles with specific governance functions (Gillespie, 2018) or by deploying bespoke, externally created bots to enforce rules, manage spam, or monitor conversations on some platforms (Latzko-Toth, 2014). Bots have been associated with problematic governance outcomes when added by external parties as they can alter the terms set by the platform unbeknownst to the user (Jhaver et al., 2019).

Like centralised computing infrastructures, blockchain protocols disrupt political geography, present new challenges for jurisdictions, and have immense amounts of capital associated with them (two trillion USD across blockchains at the time of writing). Automation is also a feature of

blockchain platforms, from smart contracts that execute predefined agreements to actions performed by bots beyond the purview and control of most users (such as Miner Extractible Value (Daian et al., 2019)).

However, users of decentralised blockchain systems experience different configurations of power to what is available on centralised platforms; they can maintain custody of assets, control their personal information, and perform peer-to-peer transactions. Some applications on decentralised platforms are 'unstoppable'– meaning immutable code – where no-one controls the keys to make direct changes and all actions are automated (such as Tornado Cash). At the other end of the spectrum are systems where the power to enact change lies with the community, sometimes with elaborate structures and processes (for instance, MakerDAO). On-chain decision-making in such cases is typically performed using a decentralised autonomous organisation (DAO), which Hassan and De Filippi (2021) define as a "blockchain-based system that enables people to coordinate and govern themselves mediated by a set of self-executing rules deployed on a public blockchain, and whose governance is decentralised—i.e., independent from central control" (p. 1).

There is a growing awareness within blockchain communities that decentralized governance, particularly when tokens are involved, can leave these systems and their constituents vulnerable. Some key issues that confront blockchain projects include: The level of engagement in voting processes (including who votes); the influence of those holding a disproportionate amount of tokens in plutocratic systems; conflict of interest in voting; problems related to identity and reputation (including bots influencing outcomes); collusion; and transparency (Lee and Kladges-

Mundt, 2021; Zietz, 2018). Blockchain governance may also bring new networked forms of accountability. The possibility that members may leave (including copying software to "fork" the protocol) creates pressure on those most invested to be responsive and attune to group needs, although this can be constrained by the costs of exit.

Existing conceptions of platform governance are therefore insufficient for understanding these systems. The question of *how* they are governed requires paying particular attention to the capabilities and actions of users in relation to the boundaries that are set for and by them. Zargham et al. (2021) have helpfully named this the 'governance surface', which narrowly construed is the set parameters that are subjected to human oversight. Broadly construed, the governance surface is the set of actions made available by a software system that can affect changes to the policies enacted by that software which can include adjusting who has access to set or change parts of the system in the future.

The word 'surface' in governance surface reflects the mathematical definition, meaning the bounded limits of the object. It differs from the concept of 'interface' as used by Galloway (2012) to describe the obfuscation of rules that occurs in making software as intuitive as possible to the user – the mediation of an executable and functional language into a discursive and aesthetically readable form. Where an interface hides, the governance surface is knowable – a critical distinction in situations where users have rights within a system and where the system relies on the exercise of such rights.

Human inputs are also assumed in the concept of platform governance in centralised systems, including design decisions and corporate strategy. However, in centralised systems, these inputs are limited to the entity that controls the protocol. In a decentralised system the governance surface describes an institution-like arrangement whereby the power to enact decisions is held by constituents of that protocol (such as token holders or their delegates). Although not all users will have the skills to audit the code, public communication relating to a system's design (through 'whitepapers', blog posts, social channels and podcasts) is common and expected, acting as the means by which a protocol's human constituents understand their rights and responsibilities. By clearly identifying the governance surface, it is possible to analyse the relative stability of a sociotechnical system's properties to governance interactions as well as the system's capacity to adapt to changes in circumstances.

Ethnography for decentralised systems

Some blockchain governance interactions are readily observable through code repositories such as Github or through on-chain transactions. Others occur on sites where people propose, debate and, in some cases, vote on improvements, including Discourse for polls and Gnosis Snapshot for votes. Typologies of governance can be developed by looking at how these various tools are implemented. However, some aspects of blockchain governance are more difficult to trace. New methods, such as those discussed in this article, are needed to be able to produce new knowledge about them.

To govern, people must develop a sense of what they hope or expect to see, which they arrive at through learning, mimetic desire (Girard and Freccero, 1976), and agonism (Mouffe, 2013). If

these aspects of governance are visible anywhere it is on the social channels established by blockchain developers for users. These channels provide for the everyday consumption of information and announcements, and are where people go for assistance, to learn, complain and question. Blockchain communities develop norms, behaviours, and languages to describe themselves within these spaces. Participants may take on moderation roles as they accumulate expertise and status, shaping not only the conduct of people but also the non-human administrators and enforcers of rules.

For decentralised communities grappling with the forces of decentralisation, participation, and automation, ethnography may be the only means by which to surface and analyse unstructured processes, including some vulnerabilities in governance design (either as an input into a mixed methods approach or a standalone exploration of a decentralised community). For instance, while the rules may be visible in Github, activities such as reorganizing the permissions in Github or Discord (creating private spaces, or defining roles for read/write access, etc.) may alter the governance surface, yet be difficult to see, requiring close attention to a project and its community. Research with decentralised communities may also uncover power dynamics within the group, including behaviours and influence on decision outcomes that may have serious consequences for the protocol.

Blockchain projects grappling with decentralised governance are aware that what occurs in informal spaces is part of decision-making processes and their outcomes, evident in efforts to conscript people with experience from other domains to patch gaps in governance and community management. Some projects have commissioned research to better understand what

is occurring within Discord communities. For instance, research for the decentralised exchange Uniswap by Shorin et al. (2021) found the forum to be disconnected to governance discussions happening elsewhere and recommended means to address this.

However, ethnographers face particular challenges inside these servers. Ethnography typically involves linking up information that is discovered with information that is presented by others. Participants knowingly or unknowingly offer ideas, experiences, and information to the researcher either in passing or through formal interviews. In the process, a dataset is collated, which typically stays with the researcher until the written ethnography is produced. When communication takes place on Discord, logistical and ethical issues can inhibit these workflows. Researchers must deal with high volumes of conversation; when an event is happening, the text chat will move fast, retrievable only through scrolling. Ensuring that participants are aware of the research becomes difficult when people come and go from servers regularly. In creating software that automates consent and data management functions, we also found that ethnography became a more participative process.

Our work is not the first to grapple with these issues in researching digital communities; ethnographers in the fields of STS and communication studies have written of the ambiguity that comes from only being able to see a portion of the action occurring within a system, including what can seem like fleeting interactions (Kozinets, 2020; Pink et al., 2016). As with other studies of online communities, observing governance within blockchain communities entails a shift from "intimate knowledge of face-to-face communities and groups" to looking at communities who may be networked, emergent and changing (Burrell, 2009; Marcus, 1995). In online contexts,

even longstanding members of these communities - including those who play key roles - may only ever have a partial view into what is taking place. Hine (2020) writes that when undertaking ethnography for the internet, the researcher must accept a "perpetual feeling of uncertainty, of wondering what has been missed, and attempting to build interpretations of events based on sketchy evidence" (p. 4). To deal with the vast amount of information online, ethnographers have deployed compatible techniques from social science and data science. The tools we created command that researchers interact with a community during the process of data collection and provide the community with visibility over data and data collection processes.

Encountering SourceCred

We approached SourceCred to be our first partner in this endeavour partly because the SourceCred product is used in a number of other blockchain communities to make work traceable – in some cases linked to a payment system. Their CredRank algorithm was adapted from Google's PageRank algorithm (first developed by Larry Page and Sergey Brin at Stanford (Brin and Page, 1998)) which "computes "importance" of nodes in a graph based on the "importance" of nodes connected to it" (Miyazono, 2020; see also Zargham, 2019, who was an early contributor to the project). During the timeframe in which our research took place, SourceCred was in the process of redesigning their algorithm to make it more transparent and flexible. SourceCred's plugins, which are used to gather information, currently work across GitHub, Discourse and Discord.

A token called Cred is minted for each individual contributor according to the calculations of the algorithm. The algorithm's explorer (the controversial "leaderboard") told us that over 2000 individuals had earnt Cred since its commencement. We could also see that of the currently active contributors (approximately 20 people), most had begun working on it after the midway point in the project's timeline. While Cred is non-transferrable, a second token, Grain, is distributed to those with Cred (over 2.5m tokens at the time of writing). Within the SourceCred community, Grain is redeemable for USDC (a cryptocurrency pegged to the US dollar) at a rate determined by the community. Those who use instances of SourceCred choose whether or not to issue their own token analogous to Grain (not all do). SourceCred is also interesting from a governance perspective as it has potential to address identity provability problems which are a common challenge in DAOs by providing visibility over individual contributions across multiple modes of interaction (eg Discord, Discourse, Github, etc). SourceCred developer Seth Benton writes that SourceCred can act as a Sybil-resistant identity tool as "meaningful contributions over time are difficult for bots to fake" (Benton, 2019).

SourceCred's Discord plugin has been a topic of contention within the SourceCred community at times as it weights contributions that occur in an informal space – exactly the interactions we set out to observe. Measuring Discord contributions and assigning Cred to them was first proposed by founder Dandelion Mane in 2019: "We could have a plugin that reads the history of our Discord server and finds every message with at least one [SourceCred emoji] reaction. Then, it can create a node for that message, with edges connecting the reactors to the message that generated the reaction" (decentralion, 2019). A SourceCred emoji was soon created for this purpose and a debate around whether to restrict Cred to GitHub and Discourse ensued. Some

argued that Discourse - the platform used for formal proposals - was for more considered contributions and therefore sufficient, while others thought this biased people who were willing to "jump through hoops and self promote" (decentralion, 2019). When our research commenced, community sentiment was falling on the side of recognising diverse contributions and supportive of the Discord plugin as a means to achieve this, as encapsulated in the comment by Aloysious above. However, Dandelion said in an interview (conducted after their departure) that they regretted the Discord plugin as it rewarded social interactions about work rather than the doing of work (Mane, 2022).

SourceCred was also interesting to us because it was in the process of transitioning its own governance model, moving from a "Temporary Benevolent Dictator" (TBD) to a non-hierarchical structure still to be determined. Various models had been proposed and discussed already, including sociocracy and Indigenous governance systems. The community was also confronting the prospect of a fork, wherein a small group of former SourceCred members had decided that they would copy the codebase of SourceCred and set up a new entity (and forming a new SourceCred DAO). According to the proposer, SourceCred seemed disjointed from the "ecosystem", experimentation with governance and social activities had become the primary focus, and weightings were favouring Discord contributions. While the community was not opposed to forks in principle (the code is open source), the way this particular fork was proposed was viewed to be hostile by some who were working on SourceCred at the time and there was a significant risk that existing financial partners would see the forked version as the legitimate one given the proposer's mention of the Web3 ecosystem[1]. These governance-focused events

[1] After listening to these concerns, the proposer opted to set up as different entity and the incumbent SourceCred community remain the only SourceCred.

produced a series of important conversations within the SourceCred community, carried across the various communication platforms used by the group. Our aim was to locate governance interactions of significance. Before discussing this, we first describe Discord and SourceCred's use of it.

Discord and the SourceCred server

The Discord platform launched in 2015 and was designed with the sociability of online communities in mind (Baguley, 2019). Discord has become the community centre of many blockchain communities. Once a Discord server is created, access is granted via invitation, although this can be a link on a public website. Some channels in a server may be restricted to a core team or only accessible once the user has agreed to abide by certain conditions. Individuals may have multiple Discord accounts in one or more servers, and many use pseudonyms. Those providing technical support and answering questions may be volunteers unknown to the project's core team except through their presence inside the server and related platforms.

One of the attractions of Discord for blockchain communities is its flexible design, allowing admins to configure their server to include channels for specific conversations and bots that automate some tasks. In Discord, bots can serve as upholders of good behaviour and social standards, such as making sure the user understands expectations relating to conduct before being allowed to read or respond to discussions. While the architecture of Discord servers may vary widely, it is the place where people are encouraged to wander in to find information and potentially friends and collaborators.

Although topics are delineated into channels – such as “governance”, “support” and “general” – conversations can easily spill across these boundaries. Some blockchain communities are linked, appearing as ‘bridges’ between servers, reflecting the nested nature of these protocols and projects. The openness of many forums and the open API can also make Discord susceptible to scammers, who can crawl servers for lists of members, sending direct messages to people on those lists. Messaging individuals with questions or to seek their consent for data collection and analysis can be unproductive, time-consuming and easily ignored.

SourceCred uses Discord as its primary place for discussion, announcements and meetings. Social gatherings also take place; a channel where people chat and dance and another for quiet working. Posts that appear on other platforms are often linked to inside Discord, including meeting minutes. More formal deliberation centres on the Discourse site, a platform where people post proposals for others to comment on but will often be carried over into Discord. Bots are used extensively within the SourceCred Discord server (including bespoke bots), alongside particular non-software systems that have been introduced to make online governance interactions more effective, including the use of American Sign Language in video calls to signal when one wishes to say something, express sentiment on a discussion point, or to ask for clarification. Use of emojis within the platform are more than responses as the SourceCred algorithm calculates Cred based on emojis. The elaborate system of tools and protocols – human and software – are extraordinary to encounter; beyond an online community, the server is a decentralized workplace and a lab for the development of DAO tools.

The Telescope bot and "meta" ethnography

We created a bot and bridge initially to automate the administrative aspects of data collection. Our research with SourceCred officially commenced when an administrator within the SourceCred server ran software to establish a bridge with our own Discord server and to add a bot that we had created, named "Telescope". The outcome of these actions meant communication would stretch between Discord servers (SourceCred's and our own), introduce a new space (channel) for SourceCred members, and the collection of information and metadata would commence. The data could be exported into a spreadsheet or carried into a publicly accessible database called Govbase where we record the formal properties of governance (Tan, 2020)[2]. Within the SourceCred server our channel was known as MetaEth (short for ethnography, not Ethereum).

What was initially intended by our team as a simple set of tools to collect key conversations and events from inside a Discord server evolved into a system for networked ideas and inputs sourced across the various applications that SourceCred communicated through. The Telescope bot was set up so that anyone within the Discord server could activate it using the telescope emoji (making them a research informant, or 'curator' in Figure 1). Once applied to a comment, the bot would then send a message to the project's channel within the researchers' server and ask whether to request permission to add the comment to the dataset (a measure designed to prevent someone spamming the dataset). If a researcher responded yes, the bot would then send a direct message to the author of the comment asking them if they were happy for it to be included, and

[2] The authors are all contributors to Govbase, which was created by Joshua Tan and Michael Zargham.

whether they would like it used anonymously or with attribution to their Discord handle (see Figure 1). If the author agreed to the comment being included in the dataset, the comment would appear in the approved messages feed, either in an anonymized form or with the associated username, depending on the author's preference. If the author disapproved, the comment would not be added to the dataset (this happened with approximately 20% of requests). Following a suggestion by a community member, we changed the consent process to an 'opt in once' design. In this rendition, an author approves the first comment to be tagged as well as future comments. They continue to be alerted when a new comment of theirs is tagged by the Telescope and may withdraw individual comments even after they have given initial consent.

We found that using a bot to manage the consent process is useful in online communities where members may have arrived after the researchers have introduced themselves to the group. The Telescope bot relays information about the research and tells the participant who they should contact if they have concerns.

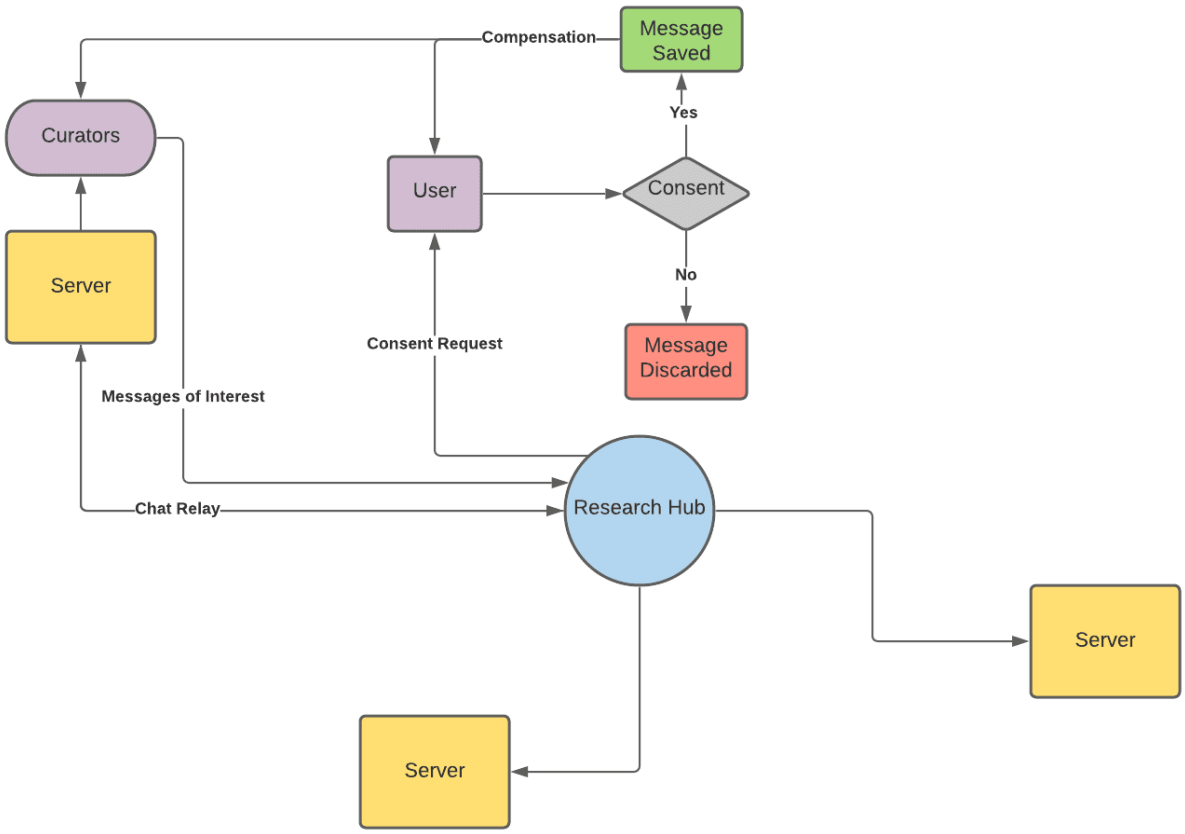

Figure 1: Control flow for the Discord Telescope bot, first iteration.

Our presence as a channel within the SourceCred server was not outside community norms; many blockchain communities create a bridge into other projects' Discord servers, providing a feed of announcements or conversation with that external server. The interconnected or nested nature of blockchain infrastructures is visible through these channels. For us, having approved messages appear in a channel inside the community's Discord server was a means to give the community visibility over what data we were collecting.

Comments identified through use of the Telescope can be carried over into Govbase with metadata attached to them, including a timestamp, author (if provided), community name, and context provided by the researcher. The comments can then be used in the development of cases, such as descriptions of events. Handling the comments alongside other data within Govbase makes it possible to gain a clearer picture of the relation between on-chain boundaries and rules and what occurs in the informal governance spaces.

The Telescope bot in action

People quickly began to grasp how the bot could be used: to go back through significant posts to direct the researcher to historical events or discussions; to highlight when a meeting was happening that might be useful to the researcher; and to direct the researcher to a conversation that had occurred on another platform, including meeting minutes or audio recordings. As expected, some community members used the Telescope bot more than others (taking on the role of "informants") and were more present in our channel discussions. From these engagements we ended up with a dataset that contained important decisions and linked us directly to where a discussion had taken place on a key governance matter. We also achieved clarity over which comments we might quote directly in our research.

The bot also enabled a form of participatory ethnography, with similarities to Tacchi's (2015) Ethnographic Action Research (EAR) method, in which local researchers (working in development settings) collect and share information. As comments began to be approved by their authors and appeared in our channel in the SourceCred server, members of the community began discussing the curated list of comments inside the channel. For instance, a member had missed a

post when it was first authored and began responding to it, reopening discussion of a particular proposal. In another case, a member of the research team asked a question about a proposed change to the algorithm that had appeared in GitHub, asking whether it had been put to a governance decision (overhauling the "scoring rules" amounted to a significant change in policy with implications for all stakeholders). Members of the development team responded that it was still an experimental design, undertaken at the request of a partner organization who suggested that the PageRank-based algorithm was difficult for their non-technical community members to interpret. A discussion ensued, revealing the change was of 'existential' importance, and the developer leading the change had chosen to tread carefully. While this suggests that there is a role for processes that induce transparency, the contextual detail that emerged from discussion (typical of ethnographic methods) provided insight into the ways that values and concern for others influenced code upgrades at SourceCred. Processes that were not visible from knowing the formal boundaries of governance - including exploration, concern and deliberation that had not yet become visible in formal governance processes - were illuminated in the channel. As one person described it, we had seen a new protocol emerge when it was still being 'turned over by the mycelium'. Similarly, their requests to us, such as the change to the consent process as well as suggestions that we ask more questions, are shifting our research practice.

We also experienced first-hand how automation can obscure some governance processes. If the telescope emoji was applied to a comment in the server that had been generated by another bot, the post would not show up as bots cannot give consent (a fixable problem by assuming default consent). Automation also initially reduced our ability to add context. After some anxiety at how people might respond to requests that appeared from a bot without any indication as to how it

might be used, we altered the system so that the researcher or research informant ("curators" in the technical control flow) could add commentary to a requested message using the reply function in the requested messages feed. Curators were then able to add reflections on the context of the comment or why they would like to include it in the dataset. These comments could be exported to assist with coding the data.

Even with these tweaks, the bot was a tool to augment ethnographic research practices rather than a complete data collection system. For instance, we met with the community prior to commencement to talk through our research intentions and to hear their priorities and concerns. We also held a focus group early in our engagement with the community, during which aspects of the 'fork' were revealed that we were not able to see in our dataset. During the analysis phase, co-author Rennie went back through each comment to read the context in which it appeared and coded the dataset to identify themes. She attended some meetings and watched others asynchronously, took field notes throughout, and read articles, meeting notes and presentations that were shared in the Discord server. Rennie and Tan interviewed former members of the SourceCred community face-to-face during and Ethereum conference. Co-author Zargham also continued to engage with the community and provided additional insight into the technical aspects of SourceCred and its historical foundations. Through these interactions we were able to learn more about the current SourceCred contributors. They pointed out to us during our introductory meeting that the SourceCred community consists of people of diverse nationalities, heritage, and genders. A significant proportion of the group had experience in offline cooperatives (including housing collectives) and declared themselves anti-capitalist, attracted to SourceCred as an experiment in non-hierarchical organisation. Some were based in Seattle with

pre-existing social connections (the word “family” was used often). While the geographically bound, face-to-face dynamics of SourceCred were inaccessible to us, the Discord server provided a vibrant and active field site.

Through these automated and non-automated processes we were able to better understand SourceCred, including how individuals alter their ways of working and interacting with each other to accommodate the algorithm they work on and for. The SourceCred algorithm needs to know when a contribution has occurred, which is achieved by people recording their own and others’ work. This can manifest as expressions of gratitude and support for work in channels called “props” and “didathing”. With this comes a heightened awareness of the conditions of their own and each other’s labour, how different types of work are weighted, and the legacy of past contributors which never disappears from the tally. Not everything is attributable to the algorithm; the qualities, ethics and concerns of SourceCred arose from the life experiences of individuals involved. The same systems would likely generate different outcomes when transposed into a different group and governance system. The extent to which the algorithm exacerbated or alleviated conflict through the calculation of social processes, and how it altered alignment over work priorities, are topics that require deeper explanation than can be dealt with here. Suffice it to say that the people and automated systems of SourceCred challenge standard conceptions of workplace hierarchies and how infrastructures are built and maintained. It is precisely these differences that suggest to us that research on decentralized futures needs to look beyond the transparency and explainability of algorithms and towards degrees of attentiveness – towards or because of – automated systems. For instance, to achieve the desired outcome of fair

scores, instead of tweaking the tech to feel fairer, SourceCred have at times tweaked their behavioral norms.

While our work on blockchain governance is ongoing, our work with SourceCred has led us to pay close attention to the social "closure" of (technical) automated systems. SourceCred the codebase is automated but SourceCred the community is autonomous. And yet the capacity for that autonomous community to self-steer (productively or otherwise) is in part attributable to SourceCred code which is a kind of cybernetic sensory perception. The possibilities of blockchain governance and decentralised automated futures lie within this relationship.

Conclusion

In a conference presentation (which we discovered via a video linked to within the Discord server), the founder of SourceCred, Dandelion, says that SourceCred's version of the PageRank algorithm works in conditions where there is strong community moderation, relying on the attention of the community to prevent it being gamed (Mane, 2020). While platforms such as Google use obscurity to achieve system security, Dandelion theorised that security in decentralised systems is achieved by people observing each other's actions. Dandelion was referring to the close-up attention of participants working towards a collective outcome within a known governance surface. The boundaries for action as defined by the code are knowable by participants whose governance powers include monitoring and decision-making. SourceCred's efforts over the course of our engagement with them included attempts to make the inputs and outputs of the product even more explicit to the communities who choose to use it.

Once our research tools had been added to the SourceCred server, it became apparent to us that research can play a part in generating and focusing attention on issues and questions, possibly enabling the same kind of 'security' in governance processes. While it is too early for us to say whether our approach might impact on governance design, participatory and partly automated ethnographic methods can help us understand how decentralized futures are unfolding.

The Telescope bot and its associated channels are, at one level, just a tool – a means for dealing with large amounts of data, managing consent, and communicating with research participants. However, it can also change the research in meaningful ways by surfacing the priorities of a community of users, including their perceptions of key events or issues. It also creates an explicit set of boundaries around approved records, providing those in the forum to know what is on the official record. Falzon (2009) writes that ethnographers "think of their data as a gift from their informants, with all the implications of reciprocity that gift exchange implies" (1). If anything, the Telescope bot makes the reciprocity implications stronger, establishing expectations for interaction that are more immediate than ethnographers may be used to.

The onus remains with the researchers to understand the context of what is in the dataset, and to question and analyse the data in relation to the broader system. For others who may use our bot, we caution that it does not speed up the difficult work of ethnography as the researcher will still need to inhabit, pay attention to, and analyse the field site (although it does simplify consent processes considerably). It does, however, allow the community to be an interlocutor in the process, actively identifying points of interest and seeking responses from the researchers. By

using these tools, we also made ourselves a participant in the systems that we seek to study, a product of decentralised human curation and automated administration.

References

Ananny, M. & Crawford, K. (2018). Seeing without Knowing: Limitations of the Transparency Ideal and Its Application to Algorithmic Accountability. *New Media and Society 20*(3), 973–89.

Andrejevic, M. (2020). *Automated Media*. New York, USA: Routledge.

Benton, S. (2019). DAOs and the Missing Link: Reputation Protocols. *SourceCred*. Retrieved from https://medium.com/sourcecred/the-dao-missing-link-reputation-protocols-8e141355cef2

Bratton, B. (2016). *The Stack: On Software and Sovereignty*. Cambridge, USA: MIT press.

Brin, S. & Page, L. (1998). The Anatomy of a Large-Scale Hypertextual Web Search Engine, Seventh International World-Wide Web Conference, Brisbane, Australia.

Burgess, J., Angus, D., Carah, N., Andrejevic, M., Hawker, K., Lewis, K., Obeid, A. K., Smith, A., Tan, J., Fordyce, R., Trott, V., & Li, L. (2021). Critical simulation as hybrid digital

method for exploring the data operations and vernacular cultures of visual social media platforms. *SocArXiv*. https://doi.org/10.31235/osf.io/2cwsu

Burrell, J. (2009). The Field Site as a Network: A Strategy for Locating Ethnographic Research, *Field Methods 21*(2), 181–99.

Buterin, Vitalik. 2021. Moving beyond Coin Voting Governance. Retrieved from https://vitalik.ca/general/2021/08/16/voting3.html

Colebatch, H. K. (2014). Making Sense of Governance, *Policy and Society, 33*(4), 307–16.

Daian, P., Goldfeder, S., Kell, T., Li, Y., Zhao, X., Bentov, I., Breidenbach, L. & Juels, A., (2019). Flash Boys 2.0: Frontrunning, Transaction Reordering, and Consensus Instability in Decentralized Exchanges, *ArXiv Preprint ArXiv:1904.05234*.

Decentralion (2019). SourceCred Discord Plugin. Retrieved from https://discourse.sourcecred.io/t/sourcecred-discord-plugin/283.

Falzon, M-A. (2009). Introduction. In Falzon M-A (Ed.) *Multi-sited Ethnography Theory, Praxis and Locality in Contemporary Research* (pp. 1–25). Abingdon, UK: Routledge.

Foucault, M. (1982). The Subject and Power, *Critical Inquiry, 8*(4), 777–95.

Galloway, A. R. (2012). *The Interface Effect*. Cambridge, USA: Polity Press.

Gillespie, T. (2018). *Custodians of the Internet*. Yale, USA: Yale University Press.

Girard, R. & Freccero, Y. (1976). *Deceit, Desire, and the Novel*. Baltimore, USA: John Hopkins University Press.

Gorwa, R. (2019). What Is Platform Governance? *Information, Communication & Society*, *22*(6), 854–71.

Hassan, S., & De Filippi, P. (2021). Decentralized Autonomous Organization, *Internet Policy Review, 10*(2), np.

Hine, C. (2020). *Ethnography for the Internet: Embedded, Embodied, and Everyday*. 2nd ed. Abingdon, UK: Routledge.

Hong, S. (2020). *Technologies of Speculation: The Limits of Knowledge in a Data-Driven Society*. New York, USA: NYU Press.

Jhaver, S., Birman, I., Gilbert, E. & Bruckman, A. (2019). Human-Machine Collaboration for Content Regulation: The Case of Reddit Automoderator, *ACM Transactions on Computer-Human Interaction*, *26*(5), 31:1-31:25. doi: 10.1145/3338243.

Kooiman, J. (2003). *Governing as Governance*. Los Angeles, USA: Sage.

Kozinets, R. (2020). *Netnography The Essential Guide to Qualitative Social Media Research*. 3rd ed. Los Angeles, USA: Sage.

Latzko-Toth, G. (2014). Users as Co-Designers of Software-Based Media: The Co-Construction of Internet Relay Chat, *Canadian Journal of Communication*, *39*(4), 577–95.

Lee, L. & Kladges-Mundt, A. (2021). Governance Extractible Value. Retrieved from https://ournetwork.substack.com/p/our-network-deep-dive-2

Mane, D. (2020). SourceCred: A Social Algorithm. Sustain Web3 conference. Retrieved from https://www.youtube.com/watch?v=yVTqRLekRl4&t=1s

Mande, D. (2022). Interviewed by Ellie Rennie and Joshua Tan. Denver, USA.

Marcus, G. E. (1995). Ethnography in/of the World System: The Emergence of Multi-Sited Ethnography, *Annual Review of Anthropology*, *24*(1), 95–117.

Marwick, A. E. & boyd, d (2014). Networked Privacy: How Teenagers Negotiate Context in Social Media, *New Media and Society 16*(7), 1051–67.

Miyazono, E. (2020). SourceCred: An Introduction to Calculating Cred and Grain. Retrieved November from https://research.protocol.ai/blog/2020/sourcecred-an-introduction-to-calculating-cred-and-grain/

Mouffe, C. (2013). For an Agonistic Model of Democracy. In J. Martin (Ed.) *Chantal Mouffe : Hegemony, Radical Democracy, and the Political* (pp. 191-206). Abingdon, UK: Taylor & Francis.

Nippert-Eng, C. E. (2008). *Home and Work: Negotiating Boundaries through Everyday Life*. Chicago, USA: University of Chicago Press.

Pink, S., Horst, H., Hjorth, L., Lewis, T. & Tacchi, J. (2016). *Digital Ethnography: Principles and Practice*. London, UK: Sage.

Schneider, N. (2021). Cryptoeconomics as a Limitation on Governance. Retrieved from https://www.smartcontractresearch.org/t/cryptoeconomics-as-a-limitation-on-governance/716

Semenchuck, M. (2018). Newsletter #1. *DGov Network*. Retrieved from https://wiki.dgov.foundation/newsletter/2018/newsletter-1-september.

Shorin, T., Joanna P., Lotti, L., Lewis, A.Z. & Gomez, M. (2021). Uniswap Research Report: Discord, Governance, Community. Retrieved from https://otherinternet.notion.site/Uniswap-Research-Report-Discord-Governance-Community-eb545f60b0ba4c30af066ca1a855e0fe

Suzor, N. P. (2019). *Lawless: The Secret Rules That Govern Our Digital Lives*. Cambridge, UK: Cambridge University Press.

Tacchi, J. (2015). Ethnographic Action Research: Media, Information and Communicative Ecologies for Development Initiatives. In H. Bradbury (Ed.), *The Sage Handbook of Action Research*. London, UK: Sage.

Tan, J. (2020). Introducing Govbase. Retrieved from https://medium.com/metagov/introducing-govbase-97884b0ddaef

Werbach, K. (2018). Trust, but Verify: Why Blockchains Need the Law. *Berkeley Technology Law Journal*, 33, 487–550. doi: 10.15779/Z38H41JM9N.

Zargham, M. (2019). Exploring Subjectivity in Algorithms. Retrieved from https://medium.com/sourcecred/exploring-subjectivity-in-algorithms-5d8bf1c91714.

Zargham, M., Bernadineli, D.L., Clark, A., Shorish, J. & Emmett, J. (2021). Summoning the Money God: Applying Control Theory to Cryptocurrency Monetary Policy. Retrieved from https://medium.com/reflexer-labs/summoning-the-money-god-2a3f3564a5f2

Zietz, P. (2018). Blockchain Governance. Retrieved from https://blog.0xproject.com/blockchain-governance-7ff89e6ec383?gi=dc591988d098.

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