

The Ethnography of a ‘Decentralized Autonomous Organization’ (DAO)

De-mystifying Algorithmic Systems

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This paper details ethnographic methods, experiences, and insights from an ethnographer and an industry engaged complex systems engineer in how to study resilience in blockchain-based DAOs as a novel field site. Amidst digitization of numerous elements of government, work, and everyday life, ‘Decentralized Autonomous Organizations’ (DAOs) provide a field site for the generation of ethnographic insights into opportunities and limitations in organizational resilience in human-machine assemblages. As a broad organizational form, DAOs aim to enable people to coordinate and govern themselves through automated rules deployed on a public blockchain (Hassan & Di Filippi, 2021). DAOs are an experiment in ‘computer aided governance’. These adaptive, socio-technical infrastructures are envisioned as capable of restructuring the foundations of governance in human societies (Merkle, 2016; Kolestsi, 2019; Garrod, 2016). Ethnography provides a qualitative tool to elicit the social dynamics of governance, adaptability, and resilience in a context of algorithmic governance and automation. By foregrounding the social dynamics of organizational adaptability and resilience, our resilience framework and vulnerabilities mapping tools help us to operationalize complex domains to de-mystify and re-humanize algorithmic systems.

INTRODUCTION

‘Decentralized Autonomous Organizations’ (DAOs) are an un-ignorable phenomenon in digitally enabled self-governance. But how can we study DAOs, what and where is the field site, and how can it be accessed and understood? This paper de-mystifies and re-humanizes blockchain-based algorithmic systems by utilizing ethnographic methods to study resilience in DAOs. We develop a novel qualitative research methodology on resilience and vulnerability mapping that can only be generated through ethnographic practices to focus on the human outcomes of technological systems. Here, resilience refers to the EPIC conference theme of 2022 as the ‘ability to learn, adapt and evolve in adversity and changing conditions’ (EPIC, 2022). The application of this method of ‘resilience ethnography’ in digital domains helps to foreground the social dynamics of how people utilize technology for adaptability.

The role of ethnographers and ethnography itself is changing in a world of increasingly digitized interactions. Past EPIC attendees have questioned the changing nature of ethnography amidst trends towards digitization. Our work becomes less experiential as we are required to ‘study people who study screens’ (Haines, 2018). Former models of ethnography break down in new environments and the way that ethnography provides insights in portraying culture and the human experience is evolving (Anderson, et. al., 2014). The study of ‘the digital’ invites new modes of ingenuity, experimentation, participation, data collection, analysis, and formulation. This includes the ability of ethnographers to ‘become’, participate, and form part of computational systems (Rennie, 2021). In doing so, ethnographic entanglements with digital systems iteratively shapes and forms the social implications of these systems.

As algorithmic systems become more pervasive in digital infrastructures, governance, and the mediation of everyday life, ethnography remains a highly relevant practice to disambiguate the co-constitutive relations between humans and computation by accounting for where and how people are involved in algorithmic processes. The study of DAOs is a relevant field site to broader inquiries into where, why, and how people use automation in social institutions, how this may be navigated effectively, and the social benefits and drawbacks that automation affords. Ethnography offers the ability to generate a richer understanding of technical work and its social dynamics and sociocultural implications, including data, its provenance, the context and motives of design decisions, and outcomes in practice (Rattenbury & Nafus, 2018). Computational systems are available in the wild for ethnographers to investigate. Ethnography can provide an “in-depth understanding of the socio-technological realities surrounding everyday software development practice” to uncover how practitioners organize themselves, make decisions, and apply certain methods, tools, and techniques (Sharp, et. al., 2016). The development of interactive systems of work and organization must recognize and systematically incorporate exploration of the intended social purposes, applications, and actual outcomes of new technologies.

In this piece, a computer engineer and an ethnographer engage in ethnographic participation and analysis of resilience in a DAO as a complex, socio-technical, algorithmic system. We present a novel DAO resilience mapping methodology and guiding research questions for the ethnography of a DAO, before demonstrating what ethnography in this niche field teaches us about the role of ethnography in analyzing resilience in socio-technical domains. First, we explore the literature on ethnographic practices in frontier digital domains and DAOs as a concept. We then outline our methodology to evaluate DAO resilience through vulnerability mapping, and detail the field site and our practices to undertake an ethnography of a specific DAO called “GitcoinDAO”. Analyzing resilience in GitcoinDAO requires us to explore the key components of the purpose, structure, social, and technical dynamics of a DAO to ask what is being decentralized, made autonomous, automated, and organized? Through this analysis, we identify insights and limitations of governance and automation in socio-technical organizing. Finally, we discuss how ethnography in this digital domain provides qualitative feedback to the community on both the system itself and the environment it’s operating in to make the social and organizational dynamics of distributed, digital organizations more legible to themselves and others. Our methods foreground ethnographic practices in machine-oriented worlds to uncover the social implications of socio-technical infrastructure where it operates.

BEING “IN” A DAO

“GM.” “GM!” “GM!”. The DAO was waking up in the PST time zone as members said Good Morning to greet one-another in the “Discord” chat application channel. Especially during Covid times, the ‘GM’ ritual became a way to present for work, to delineate between sleep and the next activity, and to find some human connection amidst isolation in the hopes of staying sane (Nabben & Maddox, 2021). Soon, it would be a different time zone checking in to the online channel. The message that was ‘pinned’ to the top of the Discord channel titled “getting started” laid out the Code of Conduct that governed participation in the DAO. After verifying one’s humanity through a recapture bot, I was encouraged to 1. Read the Mission, 2. Update my server nickname to include my time zone, 3. Say hello in the “#intros” channel, and 4. Submit a pitch of why I should be admitted, which allows me to acquire tokens to become a member (usually through purchase (known as power through

money, or ‘plutocracy’) or labor (rule through merit, or ‘meritocracy’)). The rules of engagement, perhaps comparable to other online communities in the Free and Open Source Software (FOSS) space to which public blockchains and DAOs adhere, specified that insults and harassment would not be tolerated, nor advertising or speculation on token price, don’t share your passwords, and “we encourage productive conversation about how to govern and further decentralize this DAO project”. There were tens of other channels dedicated to all kinds of activities, including operational working groups, a grants program, “inspiration”, and “vibes”.

Being “in” a DAO is about sharing attention over time. As digital denizens, DAO members are geographically dispersed but co-located through shared attention in online chat applications, forums, votes, and pursuit of collective goals. The experience of ‘togetherness’ manifests through co-location over time by repeatedly contributing to the attention space alongside your distributed others and caring about interests that relate to the DAO. This a-physical locale generates a social fabric through which each individual has a relationship with each other, and the DAO itself. Token ownership in DAOs is facilitated by the blockchain-based infrastructure, enabling a ‘peer-to-peer’ interface for direct interactions between constituents. Like other communities, relationships are developed through shared interests, experiences, and events, establishing a sense of purpose, belonging, and incentive alignment. People’s daily routines of work and play, as well as their identity, can encircle the rituals and practices of involvement in the attention-consuming activities of a DAO.

Attention over time generates a history of shared cultural customs in the life of the organization as it transforms, from co-signing manifestos and releasing software code to recovering from hacks or software bugs (Nabben & Maddox. 2021). For example, everyone in DAOs that are built on the Ethereum blockchain remembers where they were and what they were doing when the first DAO experiment (aptly named “The DAO”) was hacked and a substantial dollar value of funds were drained from the treasury (DuPont, 2017). The collective trauma of how rapidly it failed, the freezing of funds, and the infamous “fork” of the community which split to form “Ethereum” and “Ethereum Classic”. It took a few years before the community could bring itself to again believe in decentralized, blockchain-based coordination and attempt to build the infrastructure to make decentralized organizations a reality. The sense of community that can be summoned in DAOs is powerful. In a DAO, people are distributed, oftentimes pseudonymous, and rely on “trustless” infrastructure that allows them to transact with others without traditional trusted intermediaries. In practice, what this means is that trust is generated on different terms, where it’s socially acceptable not to know the real identity of the person you are interacting with and peers in the network rely on reputation, behavior, and the rules of the platform. These rules form the ‘consensus’ of the governance by the infrastructure itself through economic incentives and penalties. The physical footprint of meetups and conferences is a shadow representation of the distributed online presence which manifests in constant face-to-face events that occur all around the world in a moving parade of travellers in crypto t-shirts, ready for the next ‘hackathon’.

THE ETHNOGRAPHY OF SOCIO-TECHNICAL INFRASTRUCTURE

The theoretical frame employed in this research is one of an ethnography of sociotechnical systems. The phrase ‘sociotechnical’ refers to the interrelatedness of social and technical aspects of an organization or society. As such, sociotechnical system theory describes the complex interplay between people and technology in which neither the social (such as people, relationships, and structures), nor the technology (such as hardware, software, and processes), can be considered in isolation from one another (Golden, 2013).

‘Complexity’ in this context refers to the emergent nature of socio-technical systems through complex networks of actors, artifacts, and institutions (Smith, et. al., 2005). The notion of sociotechnical systems emerged out of management and behavioral research during World War II as an approach to optimizing organizational performance through self-management (known as “responsible autonomy”) and adaptivity for organizational change (Trist, et. al., 1951). A core value of this approach in Science and Technology Studies towards organizational design is that social and technical systems could be harmonized and balanced to optimize performance, satisfaction, and safety (Cherns, 1976). The theory has since been applied in other disciplines to refer to coherent systems of human relations, technical objects, and cybernetic processes that form large, complex infrastructures (Singh, 2014). In this context, governance is understood as the administration of such a system by the stakeholders themselves in a peer-to-peer fashion, rather than hierarchical management approaches which do not scale up to large sociotechnical systems (Singh, 2014).

By employing the use of the term ‘socio-technical infrastructure’ to describe DAOs, we evoke the need not just to conceptualize these as technical constructs but to pay attention to the prescient social dynamics that comprise the organization and its processes for organizing in the context of automation, how the social and technical components interact, and what is produced. Sociotechnical systems are often long-term enterprises, spanning the globe and serving vast communities, in which ethnography can help locate events in time and space (Ribes, 2014). Ethnography has been employed in sociotechnical organizations and infrastructures as part of a toolkit to analyze complex systems (Star & Ruhleder, 1996). Ethnography also allows us to see algorithms as heterogeneous and diffuse sociotechnical systems. Qualitative practitioners view algorithms as formulating part of broader cultural patterns of meaning and practice, rather than as objective procedural formulas or “black boxes” like computer scientists and critical theorists (Seaver, 2017). This makes ethnography a relevant and attractive methodology for the study of DAOs.

WHAT IS A DAO?

“Decentralized Autonomous Organizations” (DAOs) are a unique field site, that is an exemplar of a sociotechnical infrastructure for ethnographic engagement. At the core, “Decentralized Autonomous Organizations” (DAOs) are a group of people, coordinating toward a shared purpose, and using a blockchain to manage and mobilize a shared resource (most often a treasury of digital tokens, but this common resource can also be signaling of collective preference, knowledge, labor, or something else). What is automated is smart contracts, which are a piece of code residing on a blockchain network that automatically executes, controls, or documents an action according to pre-programmed terms of agreement. DAOs are relevant to broader societal structures as they seek to provide governance infrastructure as an institutional approach to solving coordination problems. In this way, DAOs are demonstrative of the messy, social, governance question of ‘how to order society’ that humans have grappled with for thousands of years but re-presented in digital domains. DAOs are scalable human-machine assemblages, meaning technologies that are inseparable from humans, or technological beings (Savat, 2013). One practitioner interviewee describes DAOs as “internet native communities with a cybernetic aesthetic”. They are geographically distributed local communities, self-selected by interest, versus more traditional ways of organizing by geography, ethnicity, gender, or nationality. DAOs are an evolution of, and reaction to, previous forms of digital communities like Reddit forums or Facebook social media groups. They provide an institutional infrastructure to enact “a

governance model sanctioned by software” (Bisq, 2021) and aim to be ‘decentralized’ from any single point of control or ownership. They also aim to be ‘autonomous’ in operation, referring to the idea that software code can make a group of people independent from external political or operational direction or coercion.

The concept of a Decentralized Autonomous Organization relates conceptually to the field of cybernetics, that is interested in self-organizing computer-aided systems. The actual phrase “Decentralized Autonomous Organization” was first mentioned by a computer scientist, referencing a “self-defining and self-maintaining system” capable of “evolutionary” processes (Dilger, 1997). This idea was merely in the ether of blockchain communities who, without acknowledgment of prior mention, engaged in a discourse on “Decentralized Autonomous Corporations” (DACs) and Decentralized Organizations (DOs). What was described was a machine organized society, in which DACs provided goods and services and blockchains issues equity shares to distributed owners to operate as transparent, trustworthy, fiduciaries (Larimer, 2013). Co-founder of the Ethereum blockchain Vitalik Buterin then wrote a post exploring how to bootstrap a DAC, and the term “DAO” later appeared in the founding whitepaper of the Ethereum blockchain (Buterin, 2014). From there, the vibrant community of blockchain software developers engaged in experimentation, adoption, and evolution of the concept. DAOs have since expanded to such generality that the term can refer to an investment vehicle, a social club, a service provider, or a combination of all (Brummer & Seira, 2022). In the blockchain literature, DAOs have been defined 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 distributed among participants (Hassan & De Filippi, 2021). Blockchain technology offers novel infrastructure to coordinate and make agreements, distinct from both traditional contractual and relational governance, as well as governance models present in other digital infrastructures (Lumineau, et. al., 2021). ‘Blockchain communities’ refers to the distinct values, culture, and infrastructural practices of different blockchain protocols, such as Bitcoin, Ethereum, and PolkaDot.

A central premise of a DAO is that participants in the distributed infrastructure get to govern it. This often occurs through governance “rights”, granted via ownership of digital assets in one’s digital wallet. In blockchain communities today, a focus on this desire for ‘self-governance’ stems from the libertarian origins of Bitcoin, as the first fully functional public, decentralized, peer-to-peer cryptocurrency protocol (Nabben, 2022a). Cyberlibertarianism, broadly speaking, is an ideology that advocates that technology, market, and policies should constitute spaces of individual liberty, meaning self-governance (Dahlberg, 2017). A countercultural online sub-group known as “The Cypherpunk’s Mailing List” imagined developments in general computing and broad access to public key cryptography fundamentally altering the “nature of government regulation, the ability to tax and control economic interactions, the ability to keep information secret, and will even alter the nature of trust and reputation” (May, 1988). Bitcoin has been labeled by social scientists as a techno-economic imaginary of “infrastructural mutualism”, referring to a cooperativist vision of money and society, achieved through “writing [software] code” (Swartz, 2018). The reason why the infrastructural decentralization and self-ownership ideology is gaining momentum now is perhaps related to a zeitgeist of mistrust in the incumbent institutions.

DAOs offer a narrative of democracy done right. DAOs are projected as a digital domain beyond traditional institutional or platform structures that we can ‘own’, in terms of co-create and cohabit, instead of it owning us. What this creates is an online agora, whereby the wisdom of the masses mobilizes real-world resources towards their goal. From these intentions emerges domains of complexity around how people can put these ideas into

practice to operationalize the ideal of collective autonomy and govern across both online and offline domains. Governance occurs among blended interactions of “on-chain” and “off-chain” activities that shape the boundaries of the organization and allow people to act within it. One example of “on-chain” activity is voting, where only people with the right tokens in the right quantity for that community can vote and responses are recorded on the blockchain. An example of an “off-chain” governance is the person-to-person interactions that occur in direct messages and real-world “meatspace” as an essential part of governance activity, or in some cases, the political backchannelling necessary to get public-facing votes to pass. Due to these combinations of code and people-based interactions, DAOs are a field site for the investigation of the design and social outcomes of automation and governance. Resilience in this setting refers to the human aspects of how and why individuals adopt these organizational structures, against what threats, and if they can use it to adapt, learn, and evolve in adversity (EPIC, 2022).

DAOS & DISTRIBUTED, ORGANIZATIONAL RESILIENCE

Decentralized technologies are an experiment in designing, building, and enacting alternative, participatory forms of organizational infrastructure. The governance challenges facing DAOs are numerous. Like their blockchain-based foundations, DAOs are complex, adaptive, socio-technical systems. To achieve their purpose, DAOs “aim to be governed by democratic or highly participatory processes or algorithms” (Law, 2021). Here, governance is broadly conceived as the “field of action”, including the rules and processes for membership, participation, expression of preference, accountability, and recourse (Rennie, et al., 2022). Yet, designing for flexibility in this complex web of social and technical elements and in line with a clear purpose is not an easy task.

The composition and hierarchy of relations between social and technical actors in and between DAOs remain nascent, contested, and evolving. Self-governance is a necessary and often inconvenient by-product of the desire for self-determination. A common discourse in DAO settings is that of “governance automation” and “governance minimization”, referring to the reduction of power and reliance on governance wherever possible, by deferring governance to algorithmic processes through automation at the technical layer (BlockScience, 2022). Blockchain proponents have been said to prefer algorithmic authority over traditional forms of institutional authority, meaning the power of algorithms to direct human behaviors (Lustig & Nardi, 2015). Some argue that DAOs should facilitate “automation at the center, humans at the edges”, with the “holy grail” being artificially intelligent actors coordinating resources (i.e. internal capital) (Buterin, 2014). Meanwhile, others warn of techno-utopianism in centering the role of algorithmic agents in place of human values and rights (Schneider, 2021; Zook & Blankenship, 2018). The blockchain narrative of the superiority of algorithmic governance and the rhetorical power it holds to attract and retain faithful followers may prove more important than the technological practices of blockchain itself. Claims that blockchain (or any) technology is apolitical, or even can be, are false (Larkin, 2013). Ethnography is of prime importance in this setting due to a cultural bias towards algorithmic governance via automation. This projects the notion that design decisions are objective and code is autonomous once deployed, when in practice, people and social processes are involved in numerous levels of distributed coordination.

As a nascent organizational form, DAOs themselves are interested in developing methodology and practices to enhance resilience in the face of various threats and vulnerabilities. In this setting, ethnographers operate as a qualitative source of feedback for

people to understand DAOs, and for DAOs to understand themselves. Anthropological methods have long been utilized as a form of ‘observational cognition’ in the design of complex computer systems to enhance how a system perceives itself and its circumstances, and thus its ability to adapt and absorb changes to persist (Beer, 1981; Glanville, 2004). This has led us to utilize our ethnographic practices within DAOs to pursue broader studies of organizational resilience and develop a bespoke methodology to do so. Resilience in a DAO ultimately relates to the social purposes or goals of the people choosing to participate in that system (Nabben, 2021a). DAOs are as varied as the heterogeneous groups of people that compose them. Depending on the values of a group of people, the motivation for a DAO can be to make money (known as “DeFi degenerates”, which stands for “Decentralized Finance”), to further “regenerative finance” (ReFi) efforts to counteract resource consumption and climate change, or for creative expression such as “Non-Fungible Token” (NFT) artist communities. For a DAO to be considered resilient, its governance must align with the shared purpose of participants of that system (Zargham & Nabben, 2022).

An approach that has developed in our ethnography to analyze DAO resilience is the identification of resilience through identifying vulnerabilities. Vulnerability is a relational notion to resilience, referring to substrates where social or technical components in a complex system may undermine the adaptability and persistence of the system as a whole over time, and in response to threats or changes in context (Healy & Mesman, 2014). By identifying vulnerabilities, they can be addressed through governance, which is acting to steer the system in accordance with agreed purposes and parameters of change in the system. Vulnerabilities in DAOs include social, technical, economic, and legal dynamics challenging DAOs. Vulnerabilities can emerge from outside (exogenous) threats, such as obtaining legal personality from external authorities, or organically from within (endogenous), such as collusion, attack, or lack of engagement by internal members. They can also manifest at or across multiple scales, including the individual (micro), group level dynamics (meso), or broader ecosystem (macro) level (Nabben, 2021b).

Examples of some vulnerabilities emerging in and to DAOs include:

- Social: The challenge of ‘doing’ governance. DAOs can also be a threat to themselves, for example, establishing and reinforcing power imbalances through protocol design and algorithmic governance. In many cases, software developer ontologies are shaping governance infrastructures, with ideals of “digital democracy” manifesting as paradigms of plutocratic token voting, rather than “inclusion”, as well as managing member onboarding, participation, and alignment of purpose as DAOs expand in size of operation or membership.
- Legal: Legal ambiguity surrounding DAOs and the potentially unlimited liability of DAO members, including fears that the U.S. Securities and Exchange Commission (SEC) will classify a token as a security, possibly leading to individual and/or group level liability for penalties associated with contraventions of securities laws (e.g. Uniswap class action (United States District Court, 2022)).
- Technical: Deliberate hacks to attack the system, or people exploiting software bugs that exist nascently without others being aware of it (for example, “The DAO” hack where a line in the software code was exploited and an anonymous party trained millions of dollars in value at the time from the shared treasury, leading to a split (known as a ‘fork’) in the community and the software code of the underlying infrastructure (DuPont, 2017)).

- Economic: Such as flash crashes, which are short, deliberately coordinated drops in token price. (For example, the MakerDAO flash crashes and attempts to change their pricing oracles in response to maintain a mean price and filter out crashes (Ossthoek, 2021)).
- Environmental: The existential threat of blockchain as a class of technology that produces negative externalities by utilizing computer processing power (along with Machine Learning and Artificial Intelligence).

These prescient social, technical, legal, and environmental dynamics offer a rich field site for ethnographic investigation to identify DAO vulnerabilities.

The following resilience framework was developed as part of our research, which offers a canvassed process to identify and observe vulnerabilities, by which they can then be addressed toward more resilient socio-technical infrastructure (Nabben, 2021a).

Table 1: A model for observing resilience in socio-technical systems.

ANALYSIS:				
	Purpose / Objective	Stakeholders	Threats	Vulnerabilities of each stakeholder/s
DAO 1				
DAO 2				
DAO 3				

Analysis

Ethnography is necessary for the application of this tool, as it allows for qualitative insights into designer and user aims, ideologies, and politics in their threat perception, that would not otherwise be observable. Threats or crises help reveal infrastructural dynamics, which “become visible upon breakdown” (Star & Ruhleder, 1996). The analysis involves choosing a blockchain project (in this case, a DAO), identifying the objectives and goals of the project, key stakeholders, understanding their threat models or identifying crisis events they have been exposed to, and documenting the vulnerabilities of each sub-set of stakeholders.

ACTION SPACE:								
Micro-level responses to threat			Meso-level responses			Macro-level responses		
(Technical	Social	Economic)	(Technical	Social	Economic)	(Technical	Social	Economic)

Action Space

The action space introduces the processes and practices of “governing” vulnerabilities. Here, multiple scales are identified at which governance actions by stakeholders can be observed. The action space can also be used as a design tool (whereby the ethnographer becomes a participatory stakeholder) to identify where governance, technical, economic, or legal interventions are or could be taking place, by which to reduce or mitigate the vulnerabilities of certain stakeholders against certain threats. Stakeholders then act (or don’t, with inaction considered part of the action space), which is observed and documented in outcomes.

ACTIONS & OUTCOMES:		FEEDBACK LOOPS:	
Observations of what Actions occurred and why	Observations of what outcomes occurred and analysis in-line with research question	Communication of findings	Iterations: adaptations in response to communication of findings

Actions & Outcomes

Outcomes refer to describing the plans and intents of various actions taken, which are then compared against an analysis of the actual outcomes that occurred. It requires observation of what actions occurred, why, and what the consequences were. This step lends itself to further analysis as to whether the outcomes produced were those expected, or whether unintended or undesired consequences were produced, in relation to the research question or purpose of the system.

This approach aims to produce a methodology for analyzing resilience in decentralized socio-technical infrastructure. These steps of analyzing, synthesizing, and communicating findings provide feedback to the field site, as well as shaping it. They are dynamic in nature, in that they require ongoing analysis, governance, and iterations in socio-technical systems that are constantly adapting and changing. By identifying and observing vulnerabilities it becomes possible to hypothesize and test how they can be “governed” to afford adaptive capacity, toward more resilient digital infrastructure. This resilience methodology is intended for use and design at numerous layers of decentralized systems: from local subsets or components of a DAO (such as a ‘sub-DAO’) to organizational level dynamics, to the systemic dependencies of DAO ecologies.

ETHNOGRAPHY OF A DAO

Good ethnography “informs, illuminates, and unveils” culture from a member’s point of view (Patel, 2015). Emerging technologies often manifest in utopian narratives about technologically driven societal change that will benefit people, markets, and governance (Lanzeni & Pink, 2021). It is less often that they are understood in the experiences of

everyday life. Yet, the practice of organizing through emerging technologies like DAOs is configured through everyday activities, routines, processes, environments, and experiences which can be observed through digital ethnographic practices of observation, interview, and participation.

The ethnography of a DAO requires the study of both individual actors, especially software engineers but also product managers, ‘meme-mancers’, and ‘lore masters’ who build DAOs culture through shared narratives. (In our study of GitcoinDAO, research data included self-published comic books about “Moloch, the god of coordination failures versus Anon” (Gitcoin Community, n.d.)). Similar to blockchain governance, DAO governance across the multiple categories of DAOs occurs through a combination of social and technical activities, involving ‘smart contracts’ that automate decisions upon certain conditions, community deliberation, voting, or other methods to signal preference, and accountability mechanisms, including “decentralized courts”. While some of these behaviors and interactions occur transparently “on-chain” or on the public blockchain ledger and in formal manifestos, constitutions, terms and conditions, or process ‘docs’ on GitHub, other dynamics are difficult to observe without insight and participation in online discussion forums (Rennie, et. al., 2022). This requires the ethnographer to become a member of the culture they are researching, demanding full participation and deep entanglement. In a DAO, this means participating in the entire lifecycle of membership, token acquisition, forum discussions, proposals, voting, labor, language, and culture. DAOs are required to capture and maintain this attention of designers, governors, and participants to function.

Due to the decentralized nature of distributed organizations, we found that a constructive starting point in the ethnographic process is to undertake a cartographic mapping exercise to traverse the territory of a distributed, peer-to-peer network. This allowed us to garner understanding about the nature of the broader entity participants are constituting, to make a nascent and dynamic digital organization legible. A map offers a foundation to generate the capacity to understand the what, why, and how of the human experience of DAOs, and also to identify vulnerabilities across various substrates of the DAOs functional and collective purposes. From here, the ethnographer becomes a source of information or feedback to the DAO to surface potential vulnerabilities, as well as uncover the ingenuity of how DAOs create organizational adaptivity and resilience.

Some prescient questions when analyzing a DAO, which will be detailed as follows, include:

- 1. What is being decentralized?
- 2. Who or what is being made autonomous (both functionally and politically), and from whom or what?
- 3. What is being automated?
- 4. What is being organized? (Nabben, 2022b).

What is being decentralized?

Decentralization in crypto communities refers to the physical distribution of the people that operate the computing architecture that runs the network as well as the distribution of political influence over the network from any single point of control (Buterin, 2017). Genuine decentralization also requires that participants in the network are meaningfully empowered in steering the collective (although this is not always the case). Thus, decentralization of blockchain-based protocols is composed of protocol, nodes, ecosystem, and digital tokens (Muzzy & Anderson. n.d.), requiring both technical and social consensus

to function. Governance and ownership rights are usually distributed based on capital (plutocracy) or merit (meritocracy), both of which hold pre-eminent value and respect in the space. Interactions between ‘nodes’ manifest across both digital and physical domains. It is for this reason that the ethnographic field of blockchain communities is described as “multi-sited” and “radically networked” (Rella, 2021). Personal connections contribute to the flow of governance processes across chat applications, forums, Web application voting mechanisms like ‘Snapshot’, on-chain data from “multi-signature” wallets, and end-user addresses.

Who or what is being made autonomous?

By definition, DAOs include some notion of autonomy, but “what is required for a smart contract to rise to the level of a DAO is not exactly clear” (Wright, S.A. 2021). In practice, autonomy is relative. Ethnographers ask relevant questions here, including how do people think about their own autonomy, both individually and as a group, relative to the autonomy of others and other groups, what does it mean to engage in an autonomous system, and is the system autonomous from its own members? (Cefkin & Stayton, 2017).

Autonomy refers to the emergence of meaning from within a system, comprised of individuals participating in a greater whole (Varela, et. al. 1974). In blockchain communities, DAOs are conceived of as “blockchain-powered organizations that can run on their own without any central authority or management hierarchy” (Wang, et. al., 2019). Autonomy in DAOs refers to political autonomy, meaning individual freedom through self-governance enabled by digital infrastructure and automation that removes the need for trusted third parties in economic and social interactions, as well as functional autonomy, meaning the degree of flexibility an individual or group within an organization to respond to complexity or challenges as they see fit (Swann, 2020). Autonomous parts must make trade-offs to operate in conjunction with other autonomous parts as a collective to function effectively in-line with the intentions of the organization as a whole.

What is being automated?

Participation in a DAO requires engagement in an evolving entity that is comprised of people and automated components. Automated decision-making systems are defined as involving “procedures in which decisions are initially—partially or completely—delegated to another person or corporate entity, who then in turn use automatically executed decision-making models to perform an action” (Algorithm Watch, 2019). Automation in DAOs is concerned with everyday societal structures of resource coordination and organizing, including the automatic execution of transactions according to the rules of the system. On programmable blockchains (such as Ethereum), automation occurs via “smart contracts”. Smart contracts are “computer programs stored on the blockchain that allows us to convert traditional contracts into digital parallels” (Szabo, 1994), and fundamental building blocks of blockchain-based applications. Smart contracts are programmed to define rules in advance like a regular contract but are automatically executed via software code when the contract conditions are realized. Claims are made that “there is no need to wait for a human to execute the result” and “smart contracts remove the need for trust” (Ethereum Foundation, 2022). Yet, this is not entirely accurate as humans are needed to set goals, design and write the code, and conduct behaviors that trigger execution of the result.

All algorithms are designed and programmed by directors and software engineers to follow the processes and procedures in pursuit of certain goals (Burrell, 2016). Similarly, smart contracts follow predictable, procedural processes, and are not substitutive for human

judgment. In practice, DAOs display varying degrees of decentralization and automation (Tse, 2020). Ethnography is crucial in garnering a clearer sense of the design decisions, implementation, and social implications of these systems. The methodological training in awareness to acknowledge the subjectivity of goals and design decisions as a form of organizational policymaking is referred to in digital domains as “algorithmic policy-making” (Zargham & Nabben, 2020). DAO analysis requires delineating not only what is being automated but how automation processes are determined, by whom, and for what, as part of a broader, structural agenda in directing an infrastructure and its constituents.

What is being organized?

The goal of a DAO and the resources being coordinated by participants can be diverse. The purpose of a system, including a DAO, is not so much in what it claims or aspires to do but in what it does (Beer, 2002). Rather than being a static organization, DAOs are defined by a shared, functional purpose, and can be understood as an ongoing, iterative social process of ‘organizing’ (Star & Bowker, 2010). The parameters of DAO organizing are often institutionalized in some form of shared statement, whether that be a signed constitution, manifesto, or terms and conditions of engagement (Zargham & Nabben, 2022).

To generate insights into organizational resilience in human-machine systems, we draw on the case study of a blockchain-based Decentralized Autonomous Organization called “GitcoinDAO”.

AN ETHNOGRAPHY OF GITCOINDAO

The Discourse forum, Discord, and Twitter channels were heaving. The nervous system of GitcoinDAO, just one particular ‘Decentralized Autonomous Organization’, stretched throughout the online information flows where community members contributed their attention to participate in forum proposals, governance debates, voting, implementation, and infrastructural maintenance.

GitcoinDAO is a crowdfunding platform with the functional objective of facilitating funding for opensource software projects. What is being decentralized in GitcoinDAO is governance. This guided the operations of the organization to become more decentralized also. What is being organized, or the goals of GitcoinDAO and governance within it, is to fund open-source software. Having followed the project for over 12 months throughout its transition to becoming a DAO, we have witnessed it adapt, evolve, and persist.

The crowdfunding platform project had transitioned to become a DAO by distributing tokens that represented governance rights to their community based on prior use of the platform (in what is known as a ‘retroactive airdrop’). When governance was rapidly granted to the community en masse, we needed to acquire governance tokens as researchers to be able to participate beyond the ‘token gated’ web page of GitcoinDAOs governance platform. One of the affordances of Gitcoin’s governance token system allows holders of governance tokens to ‘delegate’ their voting power to ‘stewards’ (while retaining control of the token assets themselves). Zargham received tokens due to his previous participation in posting grants for open-source software projects and donating to others on the platform. Mine was much more precarious, reaching out to friends that were involved in the project for research interviews, until eventually, someone responded in a Telegram chat, “Oh, I gotchu girl. Tokens coming your way. What’s your address?”. I responded, “I was legitimately not expecting that”.

A core principle of blockchain communities since Bitcoin as the first public, decentralized blockchain was invented, is encapsulated in the saying “not your keys, not your coins”. This refers to the ethos that each person has individual responsibility for owning and operating their own digital infrastructure and assets and they cannot trust anyone else. Yet, my counterparty on an online messaging application had just evolved these rules of interaction, demonstrating their value for collective autonomy – meaning that everyone can be out for themselves, but we are better together if we are going to collectively provision and govern our own infrastructure (which is more typical of the Ethereum blockchain community ethos of “public goods”). Without obstructing my ethics requirements and without having custody of my own tokens, I was in. This is not to say that there were no politics involved in distributing governance tokens, including the core team and Venture Capital investors receiving substantial token allocations relative to initial volunteers in the organization (Nabben & Zargham, 2021). Once governance rights were granted to the community, one of the initial co-founders of the crowdfunding platform posted into the Twittersphere: “hello thank you for your inquiry but i no longer know anything about that. please ask the DAO in discord [a Web2 chat app] thx” (Owocki, 2022). By ‘exiting to DAO’ (Nabben, 2021c), the founders were relinquishing both control and responsibility and ultimately, the fate of the project was down to the community.

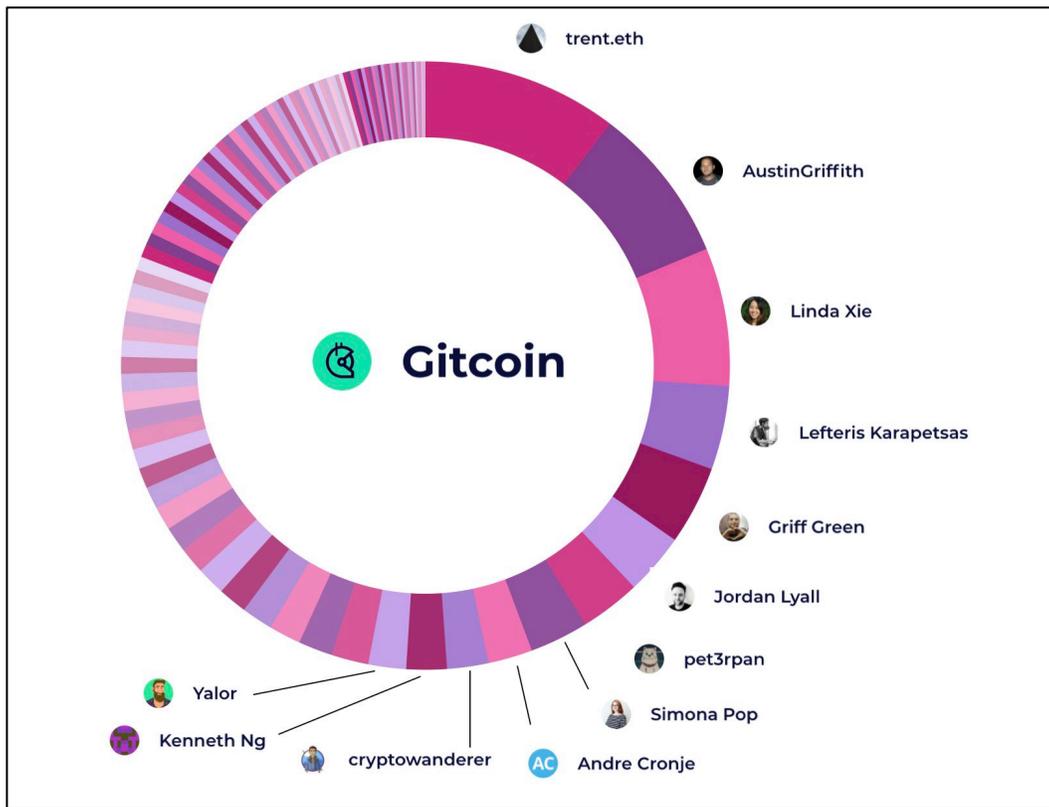


Figure 1. “The first open source congress of Gitcoin” by Alex van de Sande, referred to by Co-founder and former CEO of Gitcoin as “my new bosses” (Owocki, 2021).

Ethnographic research in a DAO commanded entanglement in a number of ways. This includes participating in the design of the system, acquiring governance tokens to see behind the token-gated voting web interface, and posting initial research findings on the forum for other community members to engage with. Access was straightforward in an environment that espouses free and open access to “permissionless” infrastructure (Nabben & Zargham, 2022b). In terms of positionality in relation to the DAO, Zargham’s systems engineering firm had been working with the Bitcoin founding team for months to develop processes to protect the platform from “sybil attacks” (when people create multiple, fake identities online or use bots to game the system). I became involved in this process through regular team calls with people participating in DAOs, which are a core DAO ritual where the disparate community shares attention space. In part, our presence as ethnographers doing research on the DAO helped to facilitate ethnographic practices within the DAO, such as encouraging their own reflexivity. For example, one original co-founder of the project found ethnographic insights, such as that ‘all infrastructure is political, including this one’, illuminating of their frustration that decentralized democracy hadn’t just ‘worked’ (Nabben & Zargham, 2021).

The first vote on the platform for one of the first, big DAO experiments was “Is pineapple a legitimate pizza topping?”. 1,134 votes and the verdict were 54.53% in favor of “pineapple for the win”. Decentralized governance was going great. In this historical moment of distributed governance rights and prefigurative politics, the light-hearted meme-loving, playful nature of DAO communities shone through. This echoes the cultural expressions of online communities that precede them, including hacker sociality, and Free and Opensource Software (Coleman and Golub, 2008). It was also terrifying. Did they know what they were doing? Can this new community of governors steward the \$64 million treasury for a sustainable funding source?

The shared attention of DAO participants is accrued across a range of cultural artifacts. Memes in the form of annotated images that spread virally on Twitter and narrative folklore-style blog posts about how and why the DAO emerged perpetuate tales of “Quadratic lands” and “slaying Moloch” the “god of coordination failure” (Owocki, 2021). Identifying these “master narratives” aids in uncovering the identity, self-perception, and aspirational imaginaries of a DAO (Star & Ruhleder, 1996).

Once of the first steps in employing the resilience framework fields of ‘analysis’, ‘action space’, and ‘actions and outcomes’ was to conduct a mapping exercise of goals, stakeholders, and actions. Digital ethnographic methods, including observation, participation in governance and voting, and interviews with key stakeholders provided us with multiple insights into organizational structure, vulnerabilities, and resilience. By mapping the ecosystem as it emerged, we were able to delineate between the promises and practices of the DAO, to uncover vulnerabilities. The ecosystem mapping exercise was a practice in creating a ‘big picture’ of what we were observing to establish a shared truth of institutional knowledge and current ‘state’ of the organization. The map included the technical components, stakeholders, social structures, and political systems. As a map of the social system, rather than the technology, we included the purpose of the system, stakeholders and affordances to various stakeholders and groups, power relations, organizational functions and their relationship to governance functions, and identification and analysis of potential operational and maintenance challenges. It identifies and segregates functional autonomy (as the things that need to get done) and political autonomy (as how internal power structures

work to get them done) in relation to the overarching purpose of the organization. What we created was one of the first representations of the multi-million dollar organization.

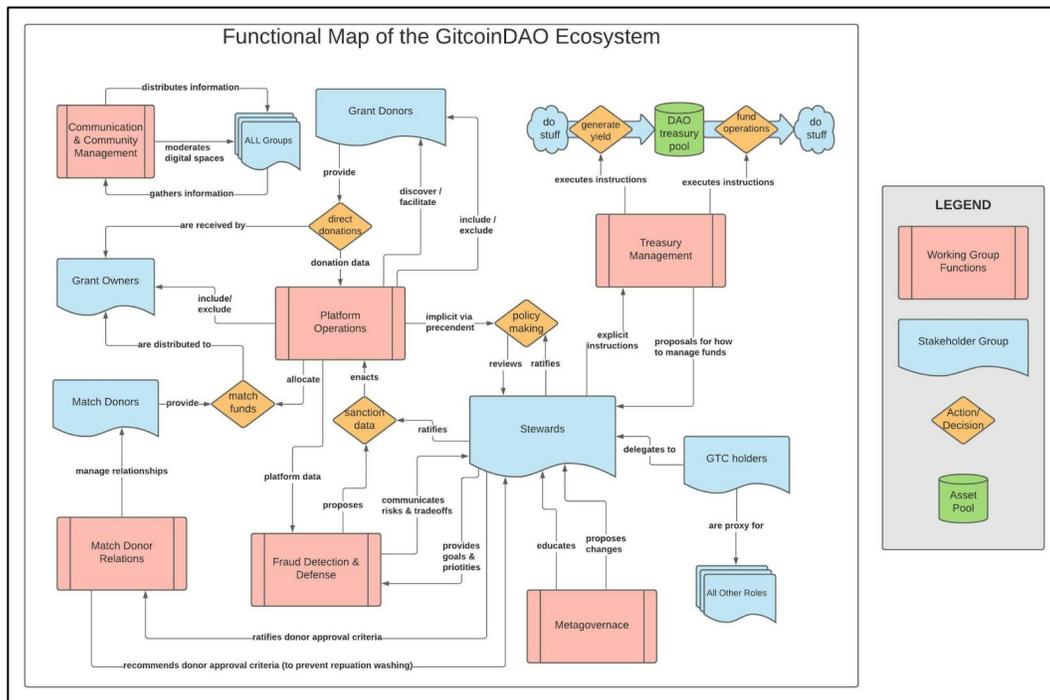


Figure 2: Functional Mapping of BitcoinDAO Ecosystem (Zargham, 2021).

From the basis of the DAO map, we were able to observe the action space, and outcomes of how the DAO adapted to the massive transformation in governance structure. By visualizing the DAO, the map helps to position the ephemerality of a DAO in time and space. As it is updated over time, the map demonstrates how DAOs adapt and evolve their governance processes, labor and accountability structures, technical mechanisms, and culture to manage risk and mitigate threats in novel ways that enhance organizational resilience. The adaptations that we identified could only be garnered through ethnographic observation and participation in the DAO. Our findings became feedback loops to the DAO, as we wrote and communicated them back to the community.

DISCUSSION & FINDINGS

Organizational adaptations in the DAO occurred structurally, socially, and technically to govern vulnerabilities. Typically, socio-technical systems are difficult to analyze as most administrative interactions occur not through computational processes but via out-of-band interactions (Singh, 2014). Through ethnographic techniques, we were able to observe the human-machine dynamics as well as “off-chain” interactions and social dynamics of a decentralized organizational infrastructure as it adapted.

The vulnerability and resilience mapping exercise also enabled us to identify a number of areas of BitcoinDAO that weren’t adapting to the organizational transformation from project to DAO. What we found is significant threats arise from internal vulnerabilities in

BitcoinDAO, rather than from external threats. Figuring out how to structure and operate a decentralized organization created significant challenges to the overall stability and functionality of the community. For example, governance did not occur in a strictly non-hierarchical, peer-to-peer manner. The separation of governance and labor classes in the governance token distribution mechanism was grounds for a rocky beginning. Governors held incredible power and prowess in their new-found roles, whilst no policies or systems were in place to track and reward labor contributions in the day-to-day functioning of the DAO. This is against the democratic principles of organizing espoused by cooperative organizations, where laborers are owners in the organization that they are contributing, which aligns incentives and maintains engagement. Policies to address this issue evolved in real-time, including through community forum posts to ‘open-source’ our research for community feedback and input (Nabben, 2021).

Identifying vulnerabilities produced opportunities to adapt and address them towards greater resilience. Through the communication of our insights, we were able to contribute to real-time community forums on these matters. BitcoinDAO employed a number of novel techniques to address this threat, for example, iterating on the structure of the organization. This included rapidly self-organizing into “sub-DAOs” that reported to the governors of the overall DAO. Drawing on the principle of subsidiarity (that decision-making rights each be assigned to the lowest level of a governance arrangement at which they can be exercised competently) to replicate bottom-up governance strategies evident in commons research nested ecosystems (Ostrom, 2015; Marshall, 2007), each sub-DAO had its own distinct, functional purpose, whether this be “fraud detection and defense”, “memes, merch, and marketing”, or “DAO operations”. This designated political autonomy and strategic autonomy to the DAO governors but functional and operational autonomy to the laborers in each sub-DAO for greater organizational adaptivity and scalability. It also introduced administrative overhauls regarding budget requests and accountability on spending.

In practice, governance occurred in disparate attention cycles across janky compilations of Web2.0 and Web3.0 tools and applications. The patchwork of decentralized governance spans Discord, to Discourse forums, to Snapshot (a “decentralized application” for voting), to smart contract addresses that hold the treasury, to “multi-signature” wallets, which require a small handful of parties to manually sign off transactions to move cryptocurrency to its democratically allocated destination, and back to Discord. Administration of the system by stakeholders proved far less automated in practice than the visions projected by this DAO and others of collective autonomy via automation (in this particular DAO, although they are currently creating proposals to “automate Bitcoin grants”).

Instead, automation was leveraged in subtle ways in specific areas to augment human capacities and enhance organizational resilience. An algorithmic machine learning (ML) process was rapidly developed and deployed ‘in flight’ during a granting round to flag sybil attacks (multiple, fake online identities that game the funding system) (Emmett, et. al., 2021). Sybils are a major threat to the DAO because false identities unfairly giving or winning matched donation funds undermines the legitimacy of the entire granting process and purpose of the system. Initially, the ML pipeline was overseen by the engineering team of (co-author) Michael Zargham, before gradually being handed over to the “Fraud Detection and Defence” working group to iterate and maintain the process. Algorithmic processes were meticulously contextualized into an “algorithmic policy”, which dictated the role of people and the role of algorithms to operate the procedures in line with the terms and conditions of the platform (Zargham & Nabben, 2020). What resulted is computer-*aided*

governance – where algorithmic processes augmented human goals, and people and machines worked in synchronization with one-another to defend against sybil attackers.

In general, the mapping exercise served in the generation and establishment of institutional knowledge for the community. While there are terms and conditions from the initial Gitcoin platform that govern some behavioral norms in the community, there is no shared, established constitution or manifesto (as in many other DAOs) to provide a fundamental axiom of the world that the community agrees on. This negatively impacts attention cost, as high-quality contributors don't have clear avenues to access or navigate the community to contribute in a decentralized manner. Institutional knowledge also creates the grounds for effectiveness, such as clear boundaries around how shared resources can be allocated, rather than political infighting over core operational matters.

Although we were able to map organizational vulnerabilities and techniques for resilience, it proved difficult to capture and hold the attention of the DAO to communicate our findings in meaningful and effective ways. Posting the map on the 'Discourse' forum elicited positive and enthusiastic responses from some community members, including 11 love heart emojis, and comments such as, "This is really helpful", "Thanks!", and "See the ecology is strong, it is a continuous development" (Zargham, 2021). Yet, there was relatively little engagement in the ideas presented amidst the swatch of other information on forum proposals, votes, and grants. The impact of our ability to provide feedback to the DAO was varied, with some design suggestions becoming seminal to the resilience of the organization itself, and some failing to attract and hold the attention of the dispersed monolith. In part, the lack of engagement in the initial take of qualitative research on the DAO makes sense, given the cultural bias for actions (or "BUIDL"ing – meaning to build software), rather than reflexivity and deep cognition about the strategic implications for the organization.

CONCLUSION

DAOs are a cutting-edge digital domain and unique field site for ethnographic practices to learn about resilience in socio-technical settings. The ethnography of a DAO commands the development and application of foundational ethnographic tools as well as novel methodologies to elucidate insights in complex, socio-technical domains. 'Resilience ethnography' in DAOs includes the resilience framework to identify what to look for and the mapping exercise to identify vulnerabilities. Mapping the technical and social components of a decentralized organization enabled us to identify innovative approaches emerging within a DAO to adapt to changing circumstances, as well as emergent vulnerabilities. What surprised us was the identification of meaningful strategies already being taken by a DAO to generate organizational resilience, that may translate to other domains. Our practice demonstrates how ethnographic practices remain relevant more broadly for the design and maintenance of resilient technological futures by injecting qualitative insights into digital domains.

Ethnography in the domain of socio-technical systems helps to "re-humanize automation" by accounting for how humans are involved at every stage of the design, development, implementation, and maintenance of digital infrastructure (Pink, et. al., 2022). In practice, ethnography de-mystifies algorithmic systems, to make something like a DAO an observable unit of study and participation. In blockchain-based organizational infrastructure, ethnography reveals where governance is occurring and where automation is not occurring in critical, organizational processes that generate adaptivity and change. The study of DAOs provides a reference point to broader inquiries into where, why, and how people use automation in social institutions, how this may be navigated effectively, and the social context, benefits, and drawbacks that these processes and techniques afford. Although

helpful, algorithms can only tell us what they are programmed to tell us and do not substitute for direct human involvement or feedback in decentralized organizing.

The ethnography of DAOs foregrounds not just technical but social, human dynamics of these assemblages. Ethnographic contributions to DAOs illuminate the adaptive components of these organizations by tracing the materialities of not just code and hardware but people, motivations, processes, relations, and politics. Automated Decision-Making systems, technologies, and devices do not and cannot exist independently from human thought, embodiment, and action. They are inextricably linked to humans and entangled within social relationships, cultural contexts, and human-made organizations and infrastructures (Lupton, 2019).

This piece demonstrates the value of ethnographic techniques in the anthropology of information systems as emerging domains of decentralized social institutions, algorithmic governance, and automation. This contribution shows how ethnographers can approach and gain access to decentralized organizations as a field site, and what value they can contribute to these communities. These techniques and practices are also applicable to the study of social dynamics in other sociotechnical infrastructures to learn how they adapt, or where and why they fail to.

This essay also highlights a possible direction for further research into how system designers and participants can be more reflective of decentralization, autonomy, and automation in their own organizations. The remaining hard questions include how to explain or transfer ethnographic practices and insights into a decentralized organization (such as reflexivity in relation to one's field, research, decisions, and ethical obligations to the people affected by one's work), how to better incorporate ethnographic insights into DAO design and practice given the time and attention it takes to communicate emerging results of ethnographic practice to design engineers, and how to measure the impact of ethnography on a DAO.

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NOTES

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