The Human Factor in Blockchain Governance

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Abstract. This paper examines the human factor in blockchain governance, inspired by the views of blockchain insiders and experts. This paper was motivated by the author's drive to examine the role humans have in blockchain technology. Through a Delphi study, these experts were asked about the human factor in general and specifically in decision making and the role of the founder. After the interviews were completed, the responses were reviewed, coded, and analyzed, leading to a unique insight that would otherwise have been unavailable.
This paper will show that there is a human factor in blockchain governance, which often manifests itself in a significant way, and off-chain. More importantly, the human factor is also necessary for the blockchain and its community to function. The human factor in decisions can also become problematic and needs to find a balance between presenting the right issues and having a fair representation. However, there is no standardized and uniform process for that. Becoming dependent on a specific group or person, such as a founder, can easily become problematic, trigger centralization, and should be avoided. However, respondents feel that if the blockchain is truly decentralized, then the human factor does not pose any problems.

Keywords: Blockchain · Governance · Human Factor · Decentralization · Fairness · Participatory research · Delphi Study · Visionary paper.

1 Introduction

This paper reports on a part of a larger empirical study on decentralized blockchain governance through empirical input from blockchain experts. These results generated input for several papers, of which this is the third. This paper will address the human factor in blockchain governance. The reason why this is important is twofold. To begin with the observation that blockchain could have a deep social and economic impact, potentially with the ability to transform the financial system, bureaucracies, or governance models [18]. This follows from a paper that claims that blockchain not only potentially transforms financial technologies but can also severely impact society and human culture as a whole, for example in democracy and organizational processes [25]. They see blockchain as the first medium for value and as a potential disruption to many industries such as the music industry and its royalty process [26].

Furthermore, the human factor is an interesting phenomenon, as one of the main purposes of blockchains is to create a "trustless" system. Reducing or possibly eliminating the role of humans is the key to preventing double spending and fraudulent activity [15]. Werbach coined this as "trust, but verify", like a virtual blockchain mantra [28]. Both trust and verification, as a notion, can arguably be interpreted as having human involvement at some level or at some phase. Additionally, the blockchain is made by humans, run by humans who mine, validate, and transact, and if needed, humans make updates and changes or have the option to fork. So, there is still a significant role for humans in the blockchain despite the effort to eliminate it. That almost creates a juxtaposition between the technology on one side and the human factor on the other. Distinguishing between their different perspectives is important, as the ethics of the organization (the blockchain) differs from the virtues of its community [29]. This needs to be acknowledged in governance, according to Wieland, who sees governance as a contextual precondition for beneficial co-habitation. Thus, the relationship between technology and humans, the human factor, is an interesting topic and more than worthy of further examination.

This paper has the following structure. It begins with a quick examination of the relation between the human factor and technology in sec. 2. In sec. 3 the research design for this study is explained, where sec. 3.2 details the respondents who participated in this study, while sec. 3.3 lists the questions submitted to the respondents. The responses to the three questions are given in sec. 4. Finally, sec. 5 outlines the view of the author', while sec. 6 summarizes the findings of this study.

2 The Relationship between Humans and Technology

Various acclaimed and influential books and films are dedicated to the relationship between humans and technology, such as Orwell's 1984, Stephenson's Snowcrash, and Collins' The Hunger Games. These books tend to paint a dystopian picture of a 'brave new world'. In blockchain, this dystopia is often reflected by cyberpunk and cypherpunk communities, who fear a dark and grim side in the impact of technology [10]. They often use the phrase "don't trust, but verify." However, the author has a more solarpunk view, a point of view that envisions an interconnected and sustainable future [19].

One of the starting points of this paper is a reference to Sellars, who claimed that technology should not be ignored by philosophy [20]. It was not until the late 1960s that the relationship between science and technology became a topic of research, probably best phrased by Simon, who argued that scientists are concerned with how things are, while engineers focus on how things ought to be [21]. A more dystopian assessment came from Ellul who claims that humans lost control over technological development [5]. All of these notions led to a better appreciation of the relationship between technology and humans. Franssen et al. noticed that ethical questions about technology became more pronounced in the second half of the previous century [6]. This is not exclusively focused on the

consequences of a technology, but also on the actions of engineers and the process of technological development. The latter could be seen as the human factor and accountability. This is reflected in fields such as Science and Technology Studies (STS) and Technology Assessment (TA).

Surry noticed that new technologies can generate new business, or create or rejuvenate sections of the economy [22]. The other side of the equation being that technology actively reduces reliance on certain sectors in the workforce. This makes Surry speak of the codependency between humans and technology, and research should be done with an open mind, as reflected by the "tool metaphor" [23]. Technology is seen as value neutral, much like blockchain, which can be used for good and bad purposes. Consequently, the ultimate use and application of technology depend on the society's motives that created it. However, Borgman strongly criticized this approach as being too simplistic [2].

Today, technological development is seen more as a goal-oriented. Franssen et al. see a connection between technological artifacts, functions, and goals, making it difficult to maintain the notion that technology is value neutral [6]. This led to the notion of moral agency of technology and is a current debate, for example, in AI [14]. Although this is an ongoing debate, Franssen et al. warn that when acknowledging the fact that technologies can have moral agency, this may be interpreted as seeing technology as morally relevant. In addition to neutrality, Franssen et al. see responsibility as a central theme. Engineers, for instance, were seen by Ellul as "the high priests of technology," often unable to steer it [5]. The individual responsibility of an engineer is often hard to isolate from the environment in which they work due to hierarchical constraints or market forces, and they cannot always be held accountable [24].

The perspective of Co-Construction of Technology (CCOT) emerged to emphasize the relationship between people and societies (users) and the development of technology [17]. This places equal value on human and technical forces and ensures that they interact to create new technologies. This perspective is sometimes criticized for failing to name either humans or technology as leading and simply seeks the safe middle ground.

Lastly, there are sociotechnical perspectives, as in Science and Technology Studies (STS) [11]. STS sees a complex interaction between social groups and technologies, where that interaction is often unscripted and subtle. This should be seen as a constant state of flux between social groups and technology. The driving force for new technologies is a social drive that reflects the technology's needs and preferences. Human activities and technical developments constantly affect and influence each other.

3 The research design

3.1 The Delphi Method

This paper is part of a larger empirical study focused on blockchain governance. The main purpose was to identify what defines blockchain governance and to

look at factors that impact or contribute to it, like the human factor. The Delphi method was chosen as the research method, as this allowed for a deeper understanding of blockchain governance and its contributing factors. The opinions of well-known and internationally recognized blockchain experts were sought. This so-called nominal group technique aims to converge experts' opinions on a particular topic [4]. As a consensus methodology, it can produce very relevant results, for example, in determining the relevant factors at play [9]. For the question on the human factor, the author was not seeking a consensus on what the human factor is and does, but was looking for a wide inventory of opinions in order to get a better understanding. Although empirical research such as the Delphi method can be prone to bias, mitigation measures such as multiple people in the research team were taken to prevent this [8]. Once the respondents had answered the questions, the results were coded, so the relationships between the responses could be analyzed [7]. The approval for the empirical study was granted through the Ethics Committee. Before then, the questions and selection process were discussed and agreed with the research team and supported by the Department's empirical and methodological unit.

3.2 The respondents

Ten to twenty-five respondents are suggested for a Delphi group, although there is no empirical research to justify this [13]. The quality of the respondents is the most crucial component in Delphi; therefore, selecting or getting access to the right respondents is an essential step. For the selection of the respondents, the following criteria were applied. Respondents should (a) represent a decentralized blockchain, (b) have extensive practical, hands-on experience, and expertise in a decentralized blockchain project, and (c) have a good reputation in the ecosystem. Based on these three criteria, ten potential respondents were recruited from the author's own network, as he has been active in decentralized community for more than ten years. Due to time constraints, one of the respondents opted out, resulting in nine respondents for the Delphi group. Each of the nine respondents represented a different project. The seven projects that can be named are: (1) Litecoin, (2) Algorand, (3) MakerDAO, (4) Digibyte, (5) MetaBrands, (6) PIVX, and (7) Syscoin. These projects and respondents represent a good cross section of the decentralized blockchain.

3.3 The questions asked

The Delphi study consisted of seven main questions, often with subquestions. In total, sixteen questions were asked to the respondents, divided into seven intervals. This paper reviews the *three* questions focused on the human factor. As mentioned earlier, although the blockchain is made by humans and needs humans to run it, the blockchain itself aims to reduce, if not eliminate, its role. That juxtaposition warrants further study.

The first question (A) asked is "Do you see a human factor in the governance of the decentralized blockchain and how does that manifest itself? The

respondents are given a definition of the human factor as "the understanding of interactions among humans and other elements of a system" [1]. In a blockchain context, this translates as the fit between people (and their behavior, stake, role, incentives, etc.) and blockchain technology and how it operates in its ecosystem.

The second question (B) is "Is or does the human factor need to be reflected in decision-making or dispute resolution, for instance in voting?". An additional context was given through an example. A popular representation is 1 coin = 1 vote. Is it important to distinguish between stakeholders and / or the type of decision needed?

The third question (C) centered on whether the founder of a blockchain has or should have a key role and voice, and was phrased as follows: "The founder of a project has often (in)formal influence or sway or is asked for approval before tabling a proposal. How do you (ideally) see the role of the founder/founding team in a project?"

4 Research findings

The nine respondents were asked three questions (A, B and C, see above), potentially generating 27 responses. In total, 24 responses were collected.

4.1 Is there a human factor in blockchain governance (A)

In general, all respondents have widely recognized that many decentralized blockchain projects aim to minimize the human factor. This is simply done to maximize trustlessness and promote reliance on automation. This was often followed by a "however comment", by which respondents indicated that the human factor is still present and manifests itself in various ways. For instance, in the roles of developers and miners, often resulting in significant influence. Although respondents made a clear choice, most of them added an additional narrative in which their choice was nuanced or provided with context. These comments can be divided into four categories.

The first category is described as *the need for humans*. This can be simply for practical reasons because human interaction is required, for instance, to assess the code that executes the procedures. Humans are also needed to decide how a system is defined, as well as to do an overall sanity check. In a more philosophical sense, it was pointed out that humans are a fundamental ingredient of governance. Humans are the layer on which all is created, as one respondent put it, the human factor is layer 0. It was also mentioned that if you take the human factor out, the blockchain is reduced to system integration.

The second category refers to the human factor in *voting*. When the algorithm does not or cannot decide, the human factor comes into effect. A vote can be influenced, and if the result is ambiguous, the interpretation can be influenced by the human factor. This also applies to the process where community members submit proposals or launch discussions, where core members' miners or validators have an impact.

The third category acknowledges the existence of the human factor, but in *a limited role*. The human factor is only present in limited issues. This was felt because of the nature of the blockchain, as most issues do not need human intervention but rely on automation or self-execution. In this category, the human factor manifests itself only when there are divergent opinions and disputes, friction arises that needs addressing, and human intervention is the only option available to address the problem.

The fourth category contains some *miscellaneous* responses. One respondent stated that there is no human factor and said that humans are not needed in the blockchain. This is best reflected in acknowledging the aim of the blockchain, which is to reduce the human factor. Slightly less eliminating the human factor was a response that felt that humans are soloists and find it difficult to cooperate and support other ideas or people. On the other hand, this respondent nuanced his own comment by saying that real-life collaboration around the world shows that cooperation exists and, by that, the human factor works.

It can be concluded that respondents acknowledge the existence of the human factor. When analyzing their responses, they all see this as governance of the blockchain, or managing the code, or off-chain governance. Additionally, it was noted that if an open source code-base with thousands of developers around the world, where people can voice their opinions, discuss, and ultimately suggest code, can work together and improve a decentralized protocol, this surely is proof of how decentralized governance with the human factor works.

4.2 Reflecting the human factor in decision making (B)

Five respondents indicated that the human factor should be reflected in decision-making. One respondent said, "yes, absolutely, as blockchain is a human invention; so how can it function without it?" It also needs to be pointed out that the human factor can act as the interpretation of correctness, as a sanity check. In that light, one response needs to be mentioned, namely that the human factor decides what governance system makes sense. Different blockchains have different requirements, making 1 coin 1 vote often not the best form of representation.

The one respondent who felt that the human factor does not need to be reflected in decision making said 'absolutely not.' The human factor needs to be excluded for one simple reason, namely that humans cannot be trusted. A viewpoint that resonates with cyberpunks and cyberpunks and "don't trust, but verify." [10].

Two respondents did not make a clear choice and outlined a less absolute and more cautious tone. For instance, the popular and often used decision-making model of 1 coin, 1 vote is prone to a concentration of voting power. However, the 1 coin 1 vote model is widely implemented and is in some sense a one-size-fits-all-type decision-making model. Perhaps it is so popular, as it is easily implemented and resembles an open election-style decision-making. In addition, the human factor is often ambitiously seen as a tool or a means to diminish the voices of bad actors. That is often very problematic, undoable, and can even be questionable as censorship resistance is seen as important to the decentralized blockchain.

As general comments, some respondents also commented on the concept of voting itself. Although most would agree to the concept of voting, voting itself can be marred with issues as already addressed in the 1 coin 1 vote model. This can also be seen in something as simple as setting a quorum. Who decides on what quorum and more importantly why, as there might be an underlying bias in setting those quorum rules. An additional point of concern is that due to its often complicated technical nature, the average voter on any blockchain might not necessarily have the specialist expertise to cast an informed vote. One respondent suggested that the scope of voting needs to be reduced, and only specific issues that require special support need to be put to a vote.

Most of the respondents provided suggestions or alternatives to help position the human factor in decision making, for example, in stimulating representation to reduce concentrated voting power. Lastly, two comments were made on representation. The first comment was regarding delegated authority, as that is a more efficient way of decision making by those who understand the subject matter better. The second comment suggested that quadratic voting is a better form of representation, as it is a more even distribution of the voting power.

4.3 The role of the founder (C)

Six respondents preferred a minimized role of the founder, and their responses can be divided into three categories.

The first category acknowledges the role of the founder and sees *the founder as part of the blockchain ecosystem.* This was particularly so because it was felt that the founder has complex knowledge. But they also ideally see the role of the founder as limited. Specified founder knowledge was felt to give an entitlement to a certain level of influence or sway. It was also seen that ignoring their relevance is not good and has a potential negative effect: either the founder becomes disgruntled or specific key knowledge is missed out. That led to some respondents ideally seeing the founder as active and co-working closely with the other stakeholders. That is by far the preferred route, rather than letting the founder become disgruntled, losing invaluable knowledge, or having him, her, and them estranged with other stakeholders. If there is founder involvement, respondents felt that it is best to document and acknowledge their role and not ignore it. A founder can be a huge asset to any project, but the role is (ultimately) ideally minimized. It was also noted that it is important to avoid pitting the founder against the other stakeholders, as that can easily result in a rift.

The second category focuses on *preventing or reducing the dependency of the founder.* To begin with the cautionary tale that the influence of a founder can easily become a steppingstone for centralization. The respondents did see a fine line between making use of an unbelievably valuable resource and falling into a reliance trap. It was suggested that each blockchain have more thought leaders in its community or relegate to a wider community, so the blockchain actively mitigates that dependency from happening. This was also reflected in one comment, stating that the importance of, or reliance on the founder needs to be limited to where it is absolutely necessary, and relegate to reliance to a

wider community. A final comment was that an ideal setup, often initiated by the founder, makes the founder irrelevant. Reliance on a founder is a single point of failure that should be avoided.

The third category consists of comments that can best be described as *miscellaneous*. Although from a rational perspective the reliance on the founder is seen as something that needs to be avoided, utilizing the founder can also be in line with the wishes or expectations of both a specific community and the founder. It was also pointed out that the role of the founder itself is not the problem, but the (wrong) founder holding too much power is the problem. That means that if the blockchain is decentralized, a founder issue is becoming irrelevant or is even non-existent.

Two respondents said that the founder should ideally not have any role. The founder and founding team should setup blockchain governance and development in such a way that it becomes independent of single decision makers. So, the governance should be based on the majority of votes of the blockchain node software, and not on a majority of coins as founders sometimes have. Based on open-source software that is also open for contributions. Another respondent claimed that the question was irrelevant or else the system is simply not decentralized.

5 Author's opinion

The respondents overwhelmingly indicated that they do see a human factor (question A) in the blockchain and see this as part of blockchain governance. It was noted that if an open source codebase with thousands of developers around the world, where people can voice their opinions, discuss, and ultimately suggest code, can work together and improve a decentralized protocol, this surely is proof of how decentralized governance with the human factor works. Involvement of humans in governance is also recognized in various studies and is referred to as governance of the blockchain by Olnes, off-chain governance by Liu, governance of the infrastructure by Fillippi et al. [16] [12] [3].

Regarding question B, if the human factor needs to be reflected in decision making, it can be concluded that the human factor can potentially be a double-edged sword. Without it, the blockchain remains vulnerable to, for example, ignoring flaws or meeting community expectations. Too much will inevitably lead to centralization and censorship. A fine and delicate balance. It is recognized that it is better if not essential to have someone – being the human factor - inside, to avoid unduly influence of bad actors. Furthermore, the issues that can be voted on often vary too much to have a standardized and uniform process. It is therefore important to factor in the specific needs of that blockchain. Mitigating this generally requires greater reflection of the human factor in decision making.

As to question C, the role of the founder, this can be best summarized as "yes, but". Although the founder is seen as part of the blockchain's ecosystem due to specific knowledge, it is best to document it and define roles and responsibilities. Furthermore, it is best to reduce or prevent dependency on the founder, as this

potentially can lead to centralization. This can create a dilemma between using a valuable resource and becoming too reliant on a specific person. It was noted that expectations can also dictate the role of the founder. The role of the founder might be placed in a political comparison and consequently in need of checks and balances, where the role and importance is acknowledged, but safeguards are put in place to prevent centralization or over-reliance. As mentioned above, reliance on a specific person or group becomes a single point of failure, something that needs to be avoided.

6 Conclusions

Analyzing all input, it can be concluded that there is a human factor in the blockchain and, oftentimes, a significant one despite its drive to remove humans from the equation. Blockchain in that sense is no different than the perspective as found in co-dependency, the equal value perspective in CCOT, and the complex interaction in STS.

The human factor is necessary for the blockchain and its community to function. However, reliance on a specific person or group becomes a single point of failure that needs to be avoided. This can be mitigated by simple measures. First, it is important to have more thought leaders in a specific blockchain to balance the relevance of any particular person. Furthermore, by limiting the number of issues that can be addressed by individual community members, negative interference can be avoided. Lastly, in addition to adding thought leaders, it is important to boost community engagement and utilize blockchain's transparency, as it relegates scrutiny and decision making to a wider community.

It is often not the human factor in general that is the issue, but a specific human that is. If the blockchain is truly decentralized, then that does not pose any problems. The blockchain paradigm "trust but verify", also and perhaps especially, applies to the human factor [27].

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