True Democracy Blockchain Government

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Modern representative democracies have been shown to have many problems throughout the last few decades. From corruption and misrepresentation, to the influence of mass media, the modern information age has proven that there are many problems with modern representative governments. However, possibly for the first time in history, new technologies have given the opportunity for a true direct democracy where the citizens of a nation can have complete control over their own governance. Using blockchains, cryptocurrencies, and political cryptotokens, an architecture can be created with the promise to reduce corruption and misrepresentation as well as increasing the speed and overall efficiency of the government. This added blockchain could also allow for increased elasticity of the government in response to unforeseen problems and create a government which reacts much more efficiently to societal issues than a modern representative democracy. In the past there have been many practical problems with implementing a direct democracy, such as transportation of votes or cyber-security of voting machines that can be dealt with through the use of blockchain technology. In this paper, I propose a theory of direct democracy created using blockchain technology, which promises to greatly improve the operation of government by decreasing corruption, increasing representation of the citizens, and improving the elasticity and speed of the government.

1 Modern Representative Democracies and Their Problems

One main principle of a representative democracy is the idea that representatives are a more educated political elite than the everyday citizen, and are therefore more qualified to make decisions than the public. This could be true if these positions were filled by experts; however, because of the nature of politics, these positions are instead often filled by those with the strongest political ties and greatest campaign funding rather than those who have the most expertise. In cases such as this, the general public, because of their greater size, will contain some who are more educated on a given topic and therefore will be able to make better decisions than these politicians.

Also, in the modern day, politicians succeed by taking advantage of polarizing topics because this leads to extreme partisanship, which gives politicians a stronger base and leads to greater campaign donations and political support. Therefore it benefits politicians to stay polarized down party lines on these hot button topics rather than finding compromises and enacting measurements which all sides agree upon.

There are many issues in current representative democracies; however, for simplicity, I have chosen three of the largest categories; corruption, misrepresentation, and speed of the government.

Corruption stems from the incentives surrounding government representatives. Representatives are not directly incentivized to help the citizens who elected them, but are rather incentivized as all people are, to better themselves and their career. One such way to better their position is to assist the citizens who can get them reelected in order to maintain their own power and influence. However these representatives can also be incentivized through many other means such as bribery, campaign donations, or mutual political support from other political parties. In fact, non-monetary bribes are so common in politics within the United States today that many politicians

admit to accepting large vacations or gifts from corporations in order to motivate them to vote a certain way on bills, such as Virginia ex-governor Bob McDonnell who was shown to have recieved over $175,000 of gifts and vacations from a company called Star Scientific to have the state conduct FDA required drug testing of one of their products using tax payer money.[1] It is also commonplace to trade votes, give votes for one bill in exchange for receiving votes on another, between representatives.[2] It has been commonplace since the 1800s to partake in what is called "Pork Barrel Politics", which is when a politician uses their legislative or political power to gain the favor of political interest committees or even other politicians, and receive political support or campaign contributions in return. Corruption is the most serious problem that modern democracies face since there is no way for citizens to fight this except during elections, and this has historically proven to not be enough.

Misrepresentation occurs frequently throughout representative governments due to their structure. The votes of every citizen are compacted into the votes of a few select representatives, giving rise to the ability for the representatives to vote one way, while the majority of their constituents vote in opposition. The process of creating and electing representatives attempts to condense large numbers of people's opinions and views into one individual, which will lead to imperfections since no one representative can perfectly model an entire society's views. Therefore it can be argued that allowing for citizens to operate in place of representatives would lead to a much more accurate representation of a society's views. In addition, representatives often use other forms of manipulating representation such as gerrymandering to stay elected, further distorting the views of a population. However laws outlawing gerrymandering will rarely be passed since this would harm many of the politicians passing these laws. Therefore politicians prefer to ignore this form of misrepresentation so that their political support remains stable.

The final problem that blockchain government addresses is that a modern representative government is slow at passing bills and responding to problems. The average bill takes around 250 days to be passed in the United States, which is extremely inefficient since problems that arise can take over eight months to be addressed. Representative governments are slow and inefficient because oftentimes politicians add riders to popular bills, or less popular political objectives to a more popular bill. This causes extra debate and a loss of time while these riders are considered and weighed against the bill.

2 Overview of Blockchain Government Functioning

A blockchain government is a distributed ledger system, contains the bills, laws, and votes of a government. This blockchain also allows for individual users to propose, support, and vote on bills.

There are two main ways to run a blockchain government. One of which is augmenting an existing governmental structure and using the blockchain aspect to help citizens address problems found in these modern democracies. The other way is to create an entirely new form of government, specially tailored to interact with these blockchains. A new form of government would take much more research and could potentially be much more problematic than augmenting an existing form of government, but if done correctly, from the start it could avoid many of the problems that modern governments

[1] Weiner, Daniel, The McDonnell Case: Corruption as 'Ordinary Politics', 7/24/19, https://www.huffpost.com/entry/bob-mcdonnell-goes-to-the_ b_ 9779140

[2] Casella, Alessandra, et. all, Trading Votes for Votes. A Dynamic Theory, https://econ.columbia.edu/wp-content/uploads/sites/41/2017/10/votetrading_ oct_ 8_ 2018.pdf

face. Regardless, these next points hold true to both.

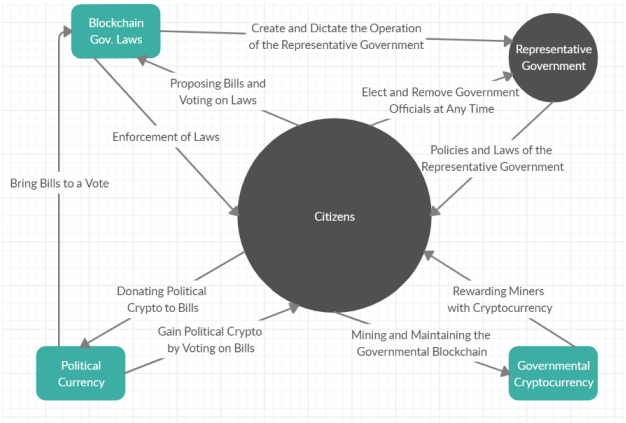

Figure 1: Blockchain Government Structure

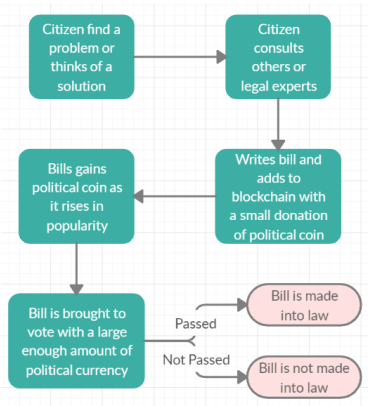

Figure 2: Bill to Law Process

- There are two sections of this governmental. A blockchain government, and classical government.
  - The classical government, such as the United States representative government, still exists, but can be altered by the blockchain government.
  - The blockchain is controlled by the citizens and contains a set of laws and bills managed by citizens.
  - The laws set in the blockchain government overrule any laws set by the classical government.
  - The blockchain government can have laws managing the classical government which can alter the structure or the laws themselves of the classical government.
  - The blockchain government acts as an augmentation to the classical government, and any type of conceivable government can exist as this classical government.
- The blockchain government can be set up either as large legislative power to form laws, or as a measure to maintain and fix the representative government. In this way a blockchain government can have a varying degree of influence on its society.
- The addition of a blockchain government adds elasticity to a society, allowing adaption to unforeseen problems through an alternative path to address issues.
- All citizens can draft their own bills.
- All citizens can vote on any bill brought to a vote.
- A political cryptotoken (with no monetary value) is used to determine which bills address the issues that are considered by the public to be the most concerning.
- When voting, a way to get more informed about a given bill and both sides of its issue should be easily available on the voting page of the given bill.
- The presence of a blockchain government can serve to solve many problems in a modern democracy.
  - Corruption is lowered as representatives are not needed to pass laws. Corruption itself can even be directly addressed by the citizens.

  - Misrepresentation is lowered as voting representation is equal in the blockchain government. Citizens can even address misrepresentation, such as gerrymandering, that representatives would not address themselves.
  - Since citizens can pass laws themselves there is a lowered importance on any political parties, allowing for compromises on many issues which are usually stretched over political lines.

- The blockchain government is founded with a set of founding laws. These are the laws which the government begins with, and laws regarding how the blockchain itself will operate.
  - There are two types of founding laws, permanent and temporary.
  - Permanent founding laws are laws that are necessary to have a properly functioning government, ex. bribery is illegal.
  - Laws overturning permanent laws require a higher percentage of votes to pass and therefore these laws are more difficult to overturn
  - Temporary founding laws are less necessary to the operation of the government and are therefore able to be changed more easily by requiring a lower percentage of votes for opposing laws to pass.
  - Temporary founding laws encompass many less important laws determining the functioning of the classical government as well as other non-vital laws, ex. Motor vehicle laws for the DMV.
  - Temporary laws are easier to change as these laws are less important to the operation of the government, and new laws must adapt to new technologies or unforeseen events.
  - Many problems with a blockchain government can be fixed through the addition of founding laws; ex., A politician finds a way to restrict the access to the blockchain from a certain group of people through reducing internet connectivity in certain neighborhoods, adding a general founding law that all people must have equal access to voting can address this.
  - Extensive research and testing should be done regarding the founding laws and what laws are necessary to make a government such as this function correctly.

- There will be a branch of law enforcement that is able to enforce the founding laws on the blockchain. This branch may be borrowed from the existing form of government, or it may be defined in the founding laws.

- Citizens are given private public keys or another form of government regulated verifiable encryption upon citizenship.

- A government regulated monetary cryptocurrency (separate cryptocurrency than the political token) is also hosted on this blockchain.

- The government regulated currency can only be mined by citizens as the miner must have a government verified public key, meaning any attack on the blockchain must come from or use a citizen's private key.

- The blockchain is stored on every individual user's computer and it is backed up at random intervals, allowing for a public record of the government and the

ability to revert to a previous version of the blockchain if any tampering is detected.

2.1 Hypothetical Government Structure

The purpose of a direct democracy blockchain government is to create a secure way to allow all citizens to create and vote on laws, reducing misrepresentation and corruption. This is accomplished by hosting the laws and proposed bills on a blockchain such that all members of the blockchain have access to the entire set of laws and bills being considered by the nation. It could also be beneficial to create blockchains for local governments as well, allowing for a separation of power between local and federal governments.

The blockchain is operated by every citizen, and every citizen is able to both vote on and draft their own bills. This process of voting and drafting bills will use a political cryptotoken, which is used to draft and support bills and will be rewarded back to citizens when they vote on these bills. This incentivizes political activity of citizens as they will obtain more political tokens when they are more politically active. This is intended to give more political power to those who are more active on political issues and matters facing the society. However, the amount of political power gained by any individual is minuscule in comparison to the political power held by the entire society. This political token reward is used as an incentive and reward for voters, not as a way to power for any individual or small group.

There will also be a way to be informed on any given bill which has been brought to a vote. One such way is to have a comments section on the voting page of the bill. This section is seperated into two parts, those who voted for the bill, and against the bill. Each citizen can comment and upvote comments on their respective side of the comments page. This would allow for those ideas judged more pertinent to get more exposure and it would allow for citizens to see what each side of a controversy considers to be their strongest points. It also prevents tampering or sabotage from those who voted on the other side of the controversy. Those who upvote could even be rewarded with greater political token than those who do not participate in informing the public, since general education is important in a blockchain government. Also, as a countermeasure every person could have a limited amount of upvotes to prevent abuse of the system.

2.2 Political and Government Regulated Currencies

The mechanics of this political token are very important to the operation of the government. To start, a small amount of token is necessary to propose any bill, preventing any individual from overloading the blockchain with bills. However, this amount must be small enough to allow an average citizen to propose a bill and therefore will be dependent on the amount of political token circulating in the blockchain. After the bill is drafted into the blockchain, other citizens can donate their political tokens to the bill to help bring it to a vote. This allows for individuals to support the bills which address topics most important to them, and overall the topics most important to the society. However, individuals may not gift this political token to others and the political accounts of every person must remain anonymous, because gifting can easily lead to bribery and corruption. As each individual citizen's contributions are added, the problems which are most important to society are brought to vote before those that are less important to the society. Tokens invested in a bill will be slowly appreciate, such that semi-important topics are not constantly outweighed by the most polarizing topics in the society. In this way, these polarizing topics will gain many tokens, but these tokens will be redistributed when the law is voted upon, allowing for less polarizing topics to slowly be brought to a vote through their appreciating value.

Laws are voted upon in the following manner:

a number of laws will be brought to a vote everyday; this number could be fixed or could be dependent on the amount of political token activity as a measure of societal stress, since people will generally invest more political tokens when more important issues arise. It could also be dependent upon other variables but should be limited since every citizen should have enough time to make an informed decision on each law. If there are too many laws presented then some citizens will not look at each bill and the views of the citizens could be misrepresented, but if there are too few bills being voted on then the government will move slowly and inefficiently. Only the laws with the highest amount of political token will be brought to vote each day. The political token in these bills will then be given to those who voted on the bill and some will be given to tokens invested in other bills, split evenly between all voters regardless of their vote. Therefore these political tokens are essentially taken from certain groups of advocates and given to the general public once the views of these groups are brought to a vote. Because of this, no one group can continuously bring a bill to vote as other groups with opposing views will eventually be able to bring their bills to a vote regardless of the amount of political token they currently hold. However, regardless of the amount of tokens this party owns, their bill cannot pass unless they get at least a majority vote. In this way, all important issues are brought to a vote, but only bills which the public agrees with will pass into law. In a similar fashion, this also allows for less important bills to eventually be brought to a vote. As a bill stays on the blockchain without being voted on, it accumulates political tokens and slowly grows until it is eventually brought to a vote. Thus important bills are passed quickly, and less important bills are passed slowly, creating an efficient system of bringing bills to a vote.

This blockchain that the government is built on has to be maintained through hashing, and for this a government regulated cryptocurrency will be used. The political section of the blockchain will be maintained by piggybacking off of a conventional cryptocurrency. Through the normal maintainence of the cryptocurrency, the political section of this blockchain will also be maintained. In this way, miners of this cryptocurrency will be rewarded by gaining a certain amount of this government regulated cryptocurrency, as is done in a conventional cryptocurrency. To avoid the ability of an external 51% attack, all citizens will be given a private and public key signed by the government to prove that the miner is indeed a citizen of the government for which it is mining. In this way, hostile external entities will not be able to perform a 51% attack on the government blockchain. A %51 attack is where a miner gets over %51 of the computing power in a blockchain, and is able to double spend cryptotokens or cryptocurrency. There are other ways around this %51 attack, such as a proof of stake algorithm, which are being used in some blockchains currently, and it is possible that one of these new algorithms may find a solution to a %51 attack. In addition to this, the government will also have to provide voting devices for citizens who cannot afford devices to participate in the voting procedure themselves. The founding laws of the government will have to address this. This additional computing power will also help to prevent a 51% attack as well benefiting the government for supplying the computers. It may help the security of the blockchain to force devices running the government blockchain to help maintain it through mining. A law like this could be put into the founding laws of this type of government, but that decision can be made by the founders of the government.

Governmental servers will back up the blockchain daily in case of an attack or malfunction of the blockchain. Additionally, individuals devices will back up the blockchain at random intervals to allow for the blockchain to be restored to its last working order. Since both

governmental servers and individuals will have copies of the previous copies of the blockchain, a potential hacker would have to infect many copies of the blockchain in order to be successful, making the blockchain relatively safe.

2.3 Founding Laws

The founding laws of blockchain government are the laws necessary for the starting government to operate. These laws are hosted on the first few chains on the blockchain and are seperated into "permanent" and "temporary", based on how necessary they are for proper government functioning. The permanent laws require a high percentage of votes to overturn, and the temporary laws require fewer percent, making them more and less difficult to change respectively.

The success of an early government depends mainly on the starting laws in which the government is created. Because of this, the first few blocks of the blockchain will create a list of "founding laws", some of which will be temporary to help with the starting operations of the government, while others will be more permanent and will be the laws necessary for the government to function properly. For example, a similar system to the United States representative government could be setup in mostly temporary laws, as this form of government has proven to be relatively stable. However, many of the laws outlining this form of government may be overwritten as the society and government evolves and new technologies and ways of life emerge. More permanent founding laws would include the laws necessary for the government to function properly at any time, such as a law stating that political token cannot be gifted to any other individual, only donated in support of bills. Permanent founding laws can either be completely permanent, or take a very high percentage of votes to change (80%-95%). Since the future can never be predicted and new technologies and new times can always change society, some laws that may be extremely beneficial now may need to be changed in the future. In this way, allowing some of the more permanent founding laws of the government to be changed may be necessary for the functioning of society. Although, the percentage of votes that a bill must need to change a founding law must be sufficiently high so that these laws cannot be changed unless it hinders the functioning of parts of society, and is determined to be absolutely necessary.

In addition, the blockchain government of any society must have control over any branches of a classical government created by this blockchain government. In this way the blockchain government, and therefore the citizens of the nation, will always have power over any representatives, including the ability for citizens to draft their own bills or remove representatives from office. This incentivizes the representatives to follow the will of the people and maintain proper representation or they will be removed from office, thus lowering corruption and misrepresentation. It is possible that it may be better for an expert to have control over certain areas which are counter intuitive, such as some economic policies like tariffs, which could otherwise lead the citizens to vote incorrectly to keep jobs, while a global trade increases the overall economy. Although, this element would add a potential layer of corruption, and very specific laws would have to be created and tested to control these expert representatives.

3 Problems Addressed by Direct Democracy

This proposed direct democracy blockchain government addresses many problems found in a modern representative democracy through giving legislative power to the citizens, which will also undoubtedly lead to greater representation of the citizens in any classical governmental structures created by this blockchain government as well. This also addresses the problem of corruption as representatives are more

incentivized to follow the will of the majority to remain in office and any corruption could result in their immediate removal from office.

A blockchain government addresses the problem of the speed and response time of the government in two ways. First, problems in the representative government can be addressed directly by the citizens. Oftentimes, politicians overlook certain problems to keep good relations with sponsors and other politicians. This forces some politicians to address pertinent issues which they founded their campaign on, while other politicians overlook these issues because of third party supporters. With citizens directly able to fix problems, many problems which otherwise would go overlooked, can finally be addressed. This would also help to stop issues from being debated along party lines. Bills are often labeled as "Democratic" or "Republican", and therefore are automatically opposed by the other party regardless of the contents of the bill itself. With a citizen controlled government, bills would not have to deal with party lines, and could be made into laws faster, which would greatly increase governmental efficiency.

Before the invention of mass communication, direct democracy was seen as impossible, as it would have been extremely difficult to get a physical vote from every citizen in a timely manner, but as technology improves so does our way of life. With the rise in popularity of blockchain technology and the innovation and development of new types of blockchains it is becoming possible to create a secure voting system using this technology. Current governments were built in the past, founded in times before computers and mass communications would make a direct democracy feasible. In general, as technology progresses, it gives new tools and possibilities to improve upon what has already been built, and in this way governments are no different.

Regardless of how politics progresses, technology is advancing and eventually new technologies will be used to create digital governments of one type or another, as new technologies can increase the speed of the government and expand the representation of the people. New technologies have the power to make politics, government, and society run more efficiently, and operate based on the ideals of the citizens who are most effected by these decisions.

4 Problems of a Blockchain Government and Potential Solutions

One of the main concerns of any digital form of government, even voting machines, is their potential to be hacked. However blockchains are quite secure and have been tested since the creation and popularization of Bitcoin in 2009. If hackers were able to find a way to break this system, then they would be rewarded with a significant amount of money. The most reliable way which has been found so far is a 51% attack, which would require incredible amounts of computing power. That being said, the stakes of failure are increased when a government is placed onto a blockchain, and many new points of entry are added. Therefore, very significant penetration testing of a potential blockchain government would be absolutely necessary before it was released. Also, a way to update the security systems of the blockchain after its release should be instated. However, secure copies of the blockchain will be kept on both personal devices and in government servers to allow reversion of the blockchain even if an attack is successful.

Security flaws may be found as well, as time goes on. The government should implement a secure way to update the blockchain code, while protecting the information stored on the chain itself during the updates. As well as security updates, as time goes on, the size of the blockchain will increase to the point that many standard devices may not be able to contain

it. When this happens, it may be useful to design a way to compress the blockchain, either individually or through a government regulated blockchain update system such as truncating the blockchain after it reaches a reasonably large size and repeating that processes every few years, or by separating the blockchain out across neighboring nodes as has been experimented with in some recent cryptocurrencies.

Mass bribery may also be a problem for a potential blockchain government. However, mass bribery is much more difficult to complete as it takes much more money, and there is no way to tell which laws a given individual votes for. Therefore, as long as it remains impossible to track voting, mass bribery should not be a feasible strategy. It would also be unfeasible to accomplish mass bribery without at least one person reporting the bribe to the government, and as long as it remains illegal bribers will almost always have to deal with law enforcement.

Another potential problem is how this blockchain will address unforeseen problems, as they may arise and the ability for any government to address unforeseen problems is vital to its survival. One potential solution is to instate a secondary quick voting process to deal with imminently pending issues. Another solution is to instate a court which could oversee and help to manage the operations of the blockchain, adding an extra layer of human elasticity. Although this court could add a possibility of corruption, so the laws governing a potential court of this blockchain government would have to be tested in many experiment governments to ensure its success.

Another potential problem with this blockchain is improper law drafting. Many times in US legal cases the exact writing of the law is incredibly important. Therefore, laws drafted by citizens should be easy to understand and reasonably short. A section of the government dedicated to help citizens draft laws could be established. However, citizens will generally not vote for laws with unclear meanings or laws which do not make sense.

A problem prevalent in classical representative democracies which could be a large problem to a potential blockchain government is the creation of political parties. Political parties have large influence over the general population and can persuade or encourage citizens to vote certain ways rather than voting as they would without interference. Political parties have the ability to manipulate the masses of a society and therefore are a threat to a potential true democracy. There are a few possibilities to stop the formation of political parties or political groups. Their creation and abilities could be carefully regulated. The size and power of political groups could be limited, and voting systems other than first pass the post, which is shown to create two large political parties, could be instituted or required instead. News centers may also give a bias of their own which followers of a given news source may adopt. Because of this, some measurements should be put in place to prevent "Echo Chambers", where one type of idea is enforced and no opposing ideas are put forward. One such measure could be to force news companies to give equal time to those on both sides of any controversy.

Another potential problem is the selective adding of certain votes or bills by miners. Miners could decide to not add any votes for or against a certain bill or decide not to add certain bills pertaining to certain topics. However, the control of votes or bills through mining is extremely unlikely, as it would take just one miner to add a block with all of the skipped votes to counteract many blocks of another group of miners selectively excluding these votes. Therefore as long as the mining rate is sufficiently high then this will not occur. This practice could also be made illegal in the founding laws, and those miners who have added significantly different votes to the blockchain from those available could be investigated by law enforcement.

Since a government such as this has never been attempted before, there may be other ways to cheat this system, but to address these it would be best to run an experimental government and study the ways in which individuals or groups can find to break this system. The exact operation of this type of government and the interaction of its many pieces should be studied closely if it is going to be implemented, and potential problems with the workings of a blockchain government should be dealt with before any serious attempt. The founding laws and exact workings of the system would have to be tuned and this general idea of a blockchain government may have to be adjusted before it functions optimally, but the only way to find out which parts of the government need modification is through testing and close examination.

5 Conclusion

Although this sort of government has never been tested before, a blockchain government holds many possibilities for increased efficiency over traditional representative democracies, among which are increased reaction speed, greater representation, and lowered corruption. One of the more important aspects of this type of government is that citizens themselves have the ability to draft bills, addressing the problems that society believes are the most important and allowing for compromises by excluding political parties. With a government similar to this, large problems like climate change could be easily addressed without large companies intervening and pressuring representatives to prevent laws such as a carbon tax or other solutions from being passed. Overall, a blockchain government is a more secure way to bring representation to the citizens of a nation while potentially greatly increasing efficiency and reducing corruption. There may be even more applications which the citizens of the government themselves may find over time, which makes it only more versatile. This form of government has great potential and should be explored to see exactly how much it could improve our modern society.