

Blockchain Voting and its effects on Election Transparency and Voter Confidence

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ABSTRACT

Public elections are one of the basis upon which representative democracy is built. Thus, it is of the utmost importance that governments and organizations are able to successfully hold non-fraudulent representative elections. Several methods are employed in order to allow citizens to cast their votes, such as Ballot-based voting, purely electronic methods, and Electronic Voting Machines, among others. However, we argue that current methods, specially those based on electronic platforms, provide unsatisfactory levels of transparency to voters, thus harming the trust voters have that the vote they cast was the same one counted by election officials, a problem known as voter confidence. Instead of stepping back to traditional and inefficient offline strategies, we suggest the modernization of State structures by the use of emerging technologies. In this research, we explore the possibility of using Blockchain technology to help in solving those transparency and confidence problems. First, we give an overview of Blockchain itself and other uses focused on societal problems and their respective analysis. We then analyze how the adoption of Blockchain into a digital government repertoire can contribute to common e-voting issues and also promote elections transparency, increase auditability, enhance voter confidence and strengthen democracy. By attending to this poster presentation, visitors will have a clear understanding of what is Blockchain and its basic concepts, why are market and researchers so excited about it, how it can help to solve common voting systems issues, who is already using it and the benefits and potential risks of its adoption.

CCS CONCEPTS

•Applied computing → Voting / election technologies;

KEYWORDS

Voter Confidence, Electronic Voting Systems; Blockchain

ACM Reference format:

Teogenes Moura and Alexandre Gomes. 2017. Blockchain Voting and its effects on Election Transparency and Voter Confidence. In *Proceedings of dg.o '17, Staten Island, NY, USA, June 07-09, 2017*, 2 pages. DOI: <http://dx.doi.org/10.1145/3085228.3085263>

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dg.o '17, Staten Island, NY, USA

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DOI: <http://dx.doi.org/10.1145/3085228.3085263>

1 INTRODUCTION

Voter confidence, as defined by [3], is the confidence a voter has that his ballot was counted correctly in an election. The "Winner or Loser" effect claims that someone who has voted for the party or candidate that won the election tends to trust the result more than one who has cast a vote for the losing side [9]. Due to this effect, voter confidence can vary wildly, thus mining one of the fundamental principles of representative democracy, which is to be able to properly choose members of government. [3]

We consider that current methods of voting, regardless of being electronic or not, provide unsatisfactory levels of transparency, in the sense that it can be very hard or impossible for a voter to assure that the vote he/she cast during the election is the same one being counted by election officials. Electronic voting in Direct Recording Electronic (DRE) Systems such as the Brazilian one[7] are receiptless and no records of the election except for vote counts are made public, which means that only government officials are able to recount the votes if needed, without providing the population with any assurance that there was no external interference in the election process.

Furthermore, electronic systems have been shown to be prone to hacking. One example is that of Virginia's WIN voting machine[2]. It showed various levels of security related flaws that led the Virginia Information Technologies Agency to recommend its discontinuation of use for officials' elections. Also, Brazilian researchers have been able to backtrace information from a DRE System that could lead an attacker to correlate a vote with a voter, thus breaking the secrecy of vote, one of the fundamental requirements of a democratic election[4].

We introduce and analyze the concept of voting over a Blockchain network on several implementations, which make auditing easier for interested citizens.

The advantages of such a system over the current state of the art are many. Most importantly, it offers greater transparency by maintaining an open registry of votes, while protecting voters' privacy. Because it requires consensus from all nodes in order for a transaction to go through, it is a more secure system. In order to modify the result of an election, an attacker needs to be able to access all nodes in that network. For a large enough amount of nodes, that attack might become very difficult to perform, if not impossible at all.

2 BLOCKCHAIN AND SOCIETY

Despite being a fairly recent technology - its first large scaled implementation was deployed with the advent of Bitcoin, the first alternative coin to become highly popular - the Blockchain has

already been the focus of several electronic government research papers and open source projects. In common, they all take advantage of Blockchain's core strengths: a decentralized, trustless, redundant network, which carries non-reversible transactions and computer programs (in the form of smart contracts¹). Some of them propose completely re-engineering democratic processes such as elections, while others approach alternative voting schemes so that its records are made permanent and available at all times to the population. There are also discussions that cover the social impact of Blockchain based software, such as [6].

3 BLOCKCHAIN FOR VOTING

Proposals of voting over Blockchain networks have been gaining more and more traction, with the media paying greater attention to the matter after the 2016 US elections, in which there were rumors of electronic voting machines being tempered with by overseas hackers[5]. President Obama's decision to expel 35 Russian diplomats over concerns of Russia's interference with the 2016 election, among other sanctions, have highlighted even more the tension behind the security of voting procedures [8].

Security incidents with voting procedures are not new to the public, however. There have been several occasions when the validity of an election was put in doubt due to issues with the voting system. One major example of that happened in Florida in 2000's election between Republican nominee George W. Bush and Democrats nominee Al Gore. Both had close vote counts and the results of voting in Florida, Oregon and New Mexico were decisive to the overall result of the election. After more than half a month, Bush was declared president-elect in a process that required recounting votes in Florida.

The incident heated the debate of using electronic voting for the upcoming elections.

3.1 Cases

Because of aforementioned problems with current voting systems, the opportunity has arrived for those who believe that Blockchain-based voting systems are able to deliver society a trustworthy voting mechanism capable of increasing transparency in the election's process, and in consequence enhancing voter confidence. *Follow My Vote* [11], *VoteWatcher* [12], *Australia's Postal service* [1] and *BitCongress* [10] are some of the most prominent projects that already implement Blockchain as a core piece of their technology stack.

3.2 Pros & Cons

The use of Blockchain brings a lot of potential advantages for voting systems but also has issues about which adopters need to be aware.

Transparency, immutability, high availability, reliability, auditability and voter confidence are some of benefits brought by its trustless, distributed and decentralized architecture.

However, Blockchain technology is a double-edged sword. In order to communicate to other nodes on a peer-to-peer network, voting systems must be connected to that network. By doing so,

nodes are immediately susceptible to cyber security issues and threats.

4 FINAL REMARKS

E-Voting systems adoption tends to increase in coming years. Recent elections have shown us how much voting systems have to improve in order to provide truly secure, trustworthy and democratic elections. Foreign interference, recounting latency, and the lack of transparency are just a few issues claiming for improvements. Whether in developed countries or in emerging nations, the same issues prevails. In this poster summary, we outlined how voter confidence in the election process is of utmost importance for democracy to be truly representative and how multiple voting systems related to that concept, whether positively or negatively.

Then we presented Blockchain-based voting systems as an alternative to current electronic voting methods, including *on-site* and *remote* method, highlighting it's core characteristics that set it apart from other technologies, such as being a distributed trustless network of nodes that rely on state-of-art encryption to guarantee that transactions are properly done. In addition, we present initiatives already employing Blockchain-based voting systems for their voting procedures, and proceed to analyze upsides and downsides of the use of Blockchain technology to improve transparency in voting procedures in order to enhance voter confidence.

We are living in a time of great criticism of existing democratic structures and governments around the world are rushing to establish better connection to citizens. It is not enough anymore to be employ computers and believe that is all it takes to call oneself "modern". Governments and citizens are in need of actions and legislations that incorporate state-of-the-art technologies for greater public efficiency.

Finally, we believe that distributed ledgers technologies, such as Blockchain, have a lot to contribute to this brand new Digital Governance landscape. Whether in terms of decentralization of power or through the fostering of transparency, whether for E-voting systems or for personal information access control, Blockchain is something we should keep both eyes on.

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¹Smart Contracts are programs stored in a Blockchain that emulate contractual clauses without the need of a central authority for validation purposes