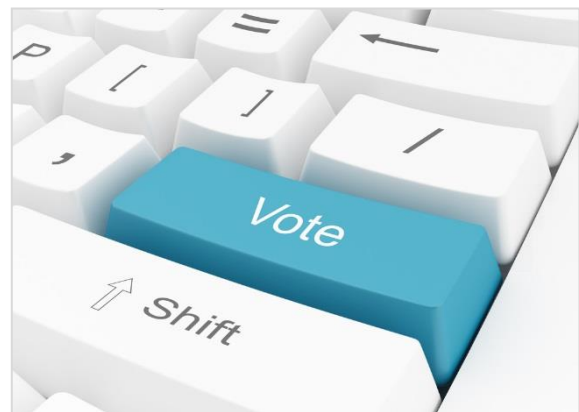


What if blockchain technology revolutionised voting?

Is blockchain the revolution in security and transparency that is needed to enable e-voting and, if so, what are the implications for the future of democracy?

Despite the digitalisation of several important aspects of modern life, elections are still largely conducted offline, on paper. Since the turn of the century, e-voting has been considered a promising and (eventually) inevitable development, which could speed up, simplify and reduce the cost of elections, and might even lead to higher voter turnouts and the development of stronger democracies. E-voting could take many forms: using the internet or a dedicated, isolated network; requiring voters to attend a polling station or allowing unsupervised voting; using existing devices, such as mobile phones and laptops, or requiring specialist equipment. Now we have a further choice; to continue trusting central authorities to manage elections or to use blockchain technology to distribute an open voting record among citizens. Many experts agree that e-voting would require revolutionary developments in security systems. The debate is whether blockchain will represent a transformative or merely incremental development, and what its implications could be for the future of democracy.



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How blockchain technology could be used for e-voting

The blockchain protocol is a means of logging and verifying records that is transparent and distributed among users. Usually, votes are recorded, managed, counted and checked by a central authority. Blockchain-enabled e-voting (BEV) would empower voters to do these tasks themselves, by allowing them to hold a copy of the voting record. The historic record could then not be changed because other voters would see that the record differs from theirs. Illegitimate votes could not be added, because other voters would be able to scrutinise whether votes were compatible with the rules (perhaps because they have already been counted, or are not associated with a valid voter record). BEV would shift power and trust away from central actors, such as electoral authorities, and foster the development of a tech-enabled community consensus.

One way of developing BEV systems for e-voting is to create a new, bespoke system, designed to reflect the specific characteristics of the election and electorate. A second approach that may be cheaper and easier is to 'piggyback', running the election on a more established blockchain, such as that used by the virtual currency, bitcoin. Given that the security of a blockchain ledger relies upon the breadth of its user base, this piggyback approach may also be more secure for elections with a small number of voters.

Blockchain experts are discussing a new generation of 'techno-democratic systems', and we can already see the emergence of virtual equivalents of national administrations, based upon blockchain technology. However, in the near term, BEV's strongest potential may be in organisational rather than national contexts. Indeed, they have been used for the internal elections of political parties, and shareholder votes

in Estonia. Taking the concept a step further, BEV could be combined with smart contracts, to automatically take action under certain agreed conditions. Here, for example, election results could trigger the automatic implementation of manifesto promises, investment choices or other organisational decisions.

Potential impacts and developments

The more optimistic promises of e-voting – e.g. that it would encourage the youth of Europe to return to democratic participation – should however be read with some scepticism. Similarly, many of the concerns about BEV – to do with anonymity, coercion and accessibility – also apply to traditional paper systems.

Coercion is a threat for any voting system that offers remote participation (e.g. postal votes). For both BEV and paper elections, the use of private polling booths is the only guarantee against fraud. **Accessibility** to all voters is a key concern in all elections. BEV could complicate matters by presenting citizens with too many options. For example, they might have the choice of whether to vote at a terminal in a traditional booth or use a personal device. There may be different interfaces for citizens who wish to go beyond casting votes and also exercise their right to access data and check that the correct procedures have been followed. **Anonymity** is often considered a crucial element of democratic participation, although most national elections are in fact ‘pseudonymous’. This means that it is not easy to discover how individuals voted, but it is possible because a code links each ballot paper with a personal entry on the electoral register. We are forced to trust the authorities to protect our anonymity. BEV is also pseudonymous, so it may sometimes be possible to discover how an individual voted. Can we trust the community and the technology to protect our anonymity? Work is in progress, in developing BEV, on a technical response to this issue that can offer full anonymity. Another potential response is to trust a central authority to distribute pseudonyms and keep them secret, just as they do now in pseudonymous paper voting systems. However, maintaining some centralised power and trust in this way could challenge the ideology of decentralisation associated with blockchain-based systems.

Another key question is how to ensure widespread trust in the security and legitimacy of the system. As with paper-based elections, it is not enough for the result to be fair and valid. The whole electorate, even if they are disappointed with the result, must accept that the process was legitimate and reliable. As such, beyond providing actual security and accuracy, BEV must also inspire broad public confidence and trust. Because the blockchain protocol is quite complicated, this may be a barrier to mainstream public acceptability of BEV.

Finally, in assessing the potential impact of BEV, we must consider the values and politics it reflects. BEV does not just digitise the traditional voting process, it proposes an alternative with a different set of values and political basis. Traditionally, the authorities manage elections and the process is black-boxed, centralised and top-down. BEV is the opposite. The process is managed by the people and it is transparent, decentralised and bottom-up. While participation in traditional elections reinforces the authority of the state, participation in BEV asserts the primacy of the people. In this light, it is not surprising that links are drawn between BEV and transitions towards a more direct, decentralised and bottom-up democracy. As such, the extent to which blockchain technology will flourish in the area of e-voting may depend upon the extent to which it can reflect the values and structure of society, politics and democracy.

Anticipatory policy-making

While European law does not specify protocols for elections in Member States, some convergence has occurred and efforts have been made to encourage use of e-voting while respecting the constitutional principles of electoral law (universal, equal, free, secret and direct suffrage). However, proposals to use blockchain in national elections would have to comply with several other areas of European law, including privacy and data protection for voters, and accessibility for all citizens.

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