

A theoretical framework for understanding trust and distrust in internet voting

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Abstract. Each and every case of success and failure in the implementation of internet voting is permeated by a common element: the concept of trust. Several researchers highlighted the relevance of creating trust for the successful implementation of technology [15] and, in particular, of internet voting [13]. But the concept itself is complex and challenging to define, for one fundamental reason: it is a concept of everyday social use that has been transposed to academia. When used in academic environments, the laxity of its definition [21] is problematic, because it leaves several relevant questions unanswered. Some of them are discussed briefly in this short paper, which aims to contribute to better understanding of the concept and its implications. ¹

Keywords: Trust and Distrust, Internet Voting Adoption, Societal-related Elements.

1 The definition of trust: is there something missing?

Trust is a concept labeled as a central element for fostering interpersonal relations, cooperative endeavors, or understanding social interaction [12], and is currently experiencing a revival of academic interest due to the impact of digital technologies in social life [2].

Trust is regarded as an immaterial bond, including subjective evaluations and social projections; *without trust, only very simple forms of human cooperation that can be transacted on the spot are possible* [10]. This scenario can be enriched by identifying the originators and receptors of trust, differentiating between interpersonal and institutional trust, and including the trustee's experience. Regarding the first distinction, individuals cannot build interpersonal trust with all people who contribute to providing well-being; institutions take on that role by mediating between unknown individuals. In addition, trust in technology has some properties that differentiate it from trusting in individual people i.e. human beings (institutions included). According to McKnight et al. [11], while in the interaction with humans trust relates to the willingness to perform harmful acts; when related to technology, trust is connected more with the capacity to

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provide the expected results due to the lack of an ability to infer intentionally from technology. This lack of moral agency allows focusing on elements relating to belief in the features of the technology itself and, in any case, transferring the moral concerns to those (the human beings or institutions) using the technology [16].

Regarding the trustee's experience, trust appears as a living and evolving concept that changes over time, due to the inputs the trustor receives. The experiential dimension allows dividing the approach to trust into 1) Calculus-based trust - a strategic calculation of the costs and benefits of starting a trust relation; and 2) Knowledge-based trust: a process of creating trust based on information acquired through interactions[8].

2 Trust and distrust, a necessary distinction.

Maybe because this picture is already quite complex, research into trust often left distrust out of view [16], or when considered, it is described as the opposite end of a single continuum, thus considering trust and distrust to be mutually exclusive and opposite conditions [7]. This occurs when we analyze trust in technology [9] and specifically for research into internet voting [5]. Some of the approaches used most frequently to analyze the adoption of technology – the Technology Acceptance Model (TAM) and the Unified Theory of Acceptation and Use of Technology (UTAUT) – do not include trust amongst the set of elements and parameters for consideration [1], assuming that trust appears as a logical outcome of fulfilling the factors included in the model. If this approach were correct, it would be possible to create generalized trust by providing certain elements: a simple formula could serve as a roadmap to fulfill the final goal of building trust in a specific e-government tool. This also applies to studies on I-Voting, in which trust is largely regarded as a goal to be achieved during development of the I-Voting system, instead of also being a precondition for adopting the technology or a dynamic element relating to non-technological factors. The concept of trust, then, appears as a dependent variable, i.e., because of improvements to the system in various regards: transparency [18], usability [3], security [37], or verifiability [6]. Although some studies assess the role of trust in acceptance and adoption of I-Voting, these are based on an essentialist concept of trust [13, 20].

As suggested, trust and distrust should be understood as related, but different theoretical constructs and which must therefore be assessed and evaluated independently. The opposite of "trust" is "to not trust," which differs from distrust and vice-versa.

Acknowledging such a difference is crucial to 1) overcome a traditional limitation of research into I-Voting, notably a preponderance of attention to trusting citizens and what makes them trust, to the detriment of conditions leading citizens to be distrustful [19]; 2) to leverage on the hermeneutical potential of distrust to better explain the adoption of technology and functioning of democracy. Hence, the proposed approach understands trust and distrust as different concepts occurring in parallel and gives citizens inputs to negotiate their position concerning using a specific technology based on them. Moreover, certain elements can help build trust or distrust at different

moments of the interaction or can even contribute simultaneously to creating trust and distrust for other individuals who would react differently to a given input.

In order to develop a framework to comprehend trust and distrust, we must identify potential sources of trust and distrust, in the form of stakeholders or events that might occur during its implementation and use. The list includes elements relating to the technology but also to the institutional framework, with remaining citizens and even with geopolitical relationships (The order is random, it does not involve any gradation):

- Legal aspects relating to legislating for internet voting in electoral law
- Moral or Ethical problems relating to comprehension of democracy
- Expert discourses for or against its implementation and/or use
- Technical trustworthiness of the system
- Management of electoral processes
- Political Interest in irregularly influencing the results (internal and external to the government and even to the country or nation)
- Transparency and presence of external observations
- Relational interaction with others
- Political culture: Acquired knowledge concerning institutions

3 Conclusions: the need for a holistic approach to the analysis of trust and distrust in internet voting

Research into the creation of trust in internet voting has been dominated by approaches biased to its technical dimensions and excluding the logic of distrust. In this short paper, we draft a theoretical framework, proposing different understanding of these elements, and with increased focus on the significance of societal factors.

One of the main conclusions extracted is the need to circumscribe technological trustworthiness-related elements, limiting them to specific processes for creating trust and distrust (i.e., post-use creation of trust and distrust for decision-makers), including other aspects that are relevant for citizens and might not relate to the system per se, but to how it is understood by non-expert users. Simply as an example, while verifiability of the internet voting system has been linked to high levels of trust [17], recounting votes (risk-limiting audits) are not efficient measures for increasing trust since people do not understand the logic behind them [4]. Both elements are logically contradictory but socially possible, if we assume that the construction of trust does not necessarily involve direct comprehension and understanding but can be transferred by others.

A second element that we should extract is the unsuitability of simplified approaches to the logic of creating trust. Creating trust or distrust is complex and includes many variables that will not reveal whether we are using an agonistic question such as "do you trust in...?". It will provide a simple response that hinders the inclusion of complex elements and different weightings in the logical process when constructing an answer. Trusting in internet voting might be motivated by other aspects and might change depending on the moment and the context. Hence, it appears we must determine an

inclusive context to evaluate those elements and a methodology to turn the theory into valid and applicable knowledge.

4 Bibliography

1. Alharbi, S.T.: Trust and acceptance of cloud computing: A revised UTAUT model. *Proceedings - 2014 International Conference on CSCI 2014*. 2, Mm, 131–134 (2014). <https://doi.org/10.1109/CSCI.2014.107>.
2. Bodó, B.: Mediated trust: A theoretical framework to address the trustworthiness of technological trust mediators. *New Media Soc.* 23, 9, 2668–2690 (2021). <https://doi.org/10.1177/1461444820939922>.
3. Carter, L., Campbell, R.L.: Internet voting usefulness: An empirical analysis of trust, convenience and accessibility. *Journal of Organizational and End User Computing*. 24, 3, 1–17 (2012). <https://doi.org/10.4018/joeuc.2012070101>.
4. Dalela, A. et al.: Voter Perceptions of Trust in Risk-Limiting Audits. In: Krimmer, R. et al. (eds.) *Sixth International Joint Conference on Electronic Voting E-Vote-ID 2021*. pp. 335–337 University of Tartu Press (2021).
5. Hopland, L., Hole, K.: Building and Maintaining Trust in Internet Voting. *Computer*. 74–80 (2012).
6. Kulyk, O., Volkamer, M.: Usability is not Enough: Lessons Learned from 'Human Factors in Security' Research for Verifiability. In: Krimmer, R. and Volkamer, M. (eds.) *Third International Joint Conference on Electronic Voting*. pp. 66–81 TUT Press, Bregenz (2018).
7. Lewicki, R.J. et al.: Trust and Distrust: New Relationships and Realities. *Academy of Management Review*. 23, 3, 438–458 (1998).
8. Lewicki, R.J., Bunker, B.B.: Developing and Maintaining Trust in Work Relationships. In: *Trust in Organizations: Frontiers of Theory and Research*. pp. 114–139 SAGE, California (1996). doi.org/10.4135/9781452243610.n7.
9. Li, H., Singhal, M.: Trust Management in Distributed Systems. *Computer*. 40, 2, 45–53 (2007). <https://doi.org/10.1109/MC.2007.76>.
10. Luhmann, N.: *Trust and Power*. Wiley-Blackwell, Chichester (1979).
11. Mcknight, D.H. et al.: Trust in a specific technology. *ACM Trans Manag Inf Syst*. 2, 2, 1–25 (2011). <https://doi.org/10.1145/1985347.1985353>.
12. McKnight, D.H., Chervany, N.: *The meanings of trust*. , Minnesota (1996).
13. Nemeslaki, A. et al.: Could on-line voting boost desire to vote? – Technology acceptance perceptions of young Hungarian citizens. *Gov Inf Q*. 33, 4, 705–714 (2016). <https://doi.org/10.1016/j.giq.2016.11.003>.
14. Oostveen, A.-M., van den Besselaar, P.: Security as belief User's perceptions on the security of electronic voting systems. *Electronic Voting in Europe: Technology, Law, Politics and Society*. 47, May 2014, 73–82 (2004).
15. Ou, C.X., Sia, C.L.: Consumer trust and distrust: An issue of website design. *International Journal of Human Computer Studies*. 68, 12, 913–934 (2010). <https://doi.org/10.1016/j.ijhcs.2010.08.003>.

16. Sharma, S.: Can' t change my political disaffection! The role of political disaffection, trust, and resistance to change in internet voting. *Digital Policy, Regulation and Governance*. February, (2020). <https://doi.org/10.1108/DPRG-07-2019-0049>.
17. Solvak, M., Krimmer, R.: The curse of knowledge? Does having more technology skills lead to less trust towards ivoting? In: *Fourth International Joint Conference on Electronic Voting E-Vote-ID 2019*. pp. 204–208 Taltech Press, Bregenz (2019).
18. Spycher, O. et al.: Transparency and Technical Measures to Establish Trust in Norwegian Internet Voting. In: Kiayias, A. and Lipmaa, H. (eds.) *International Conference on E-Voting and Identity; Vote-ID 2011*. pp. 19–35 Springer, Berlin, Heidelberg (2011).
19. van de Walle, S., Six, F.: Trust and Distrust as Distinct Concepts: Why Studying Distrust in Institutions is Important. *Journal of Comparative Policy Analysis: Research and Practice*. 16, 2, 158–174 (2014). doi.org/10.1080/13876988.2013.785146.
20. Warkentin, M. et al.: Social identity and trust in internet-based voting adoption. *Gov Inf Q*. 35, 2, 195–209 (2018). <https://doi.org/10.1016/j.giq.2018.03.007>.
21. Yamagishi, T., Yamagishi, M.: Trust and commitment in the United States and Japan. *Motiv Emot*. 18, 2, 129–166 (1994). doi.org/10.1007/BF02249397.