

Does e-voting pose a “wicked problem”?

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Assessing potential for wickedness based on policy debate of Internet voting in Estonia. A draft paper to be discussed at E-Vote-ID conference October 3-6, 2023 in Luxembourg.

Notion of “wicked problem” stems from discussions of urban planning in late 1960s and was first explicitly defined in Rittel and Webber (1973). The concept is almost exclusively used in relation to public policy issues and starting from 2000s it has gained popularity to the level that raises questions about misapplication and overuse (Lönngren and Poeck 2020).

Framing something as a wicked problem does not necessarily mean the issue discussed is wicked in strict ontological sense. Lönngren and Poeck observe that in most cases it is used in a constructivist sense and as creative, analytic or critical tool to make a point or gain a new perspective in discussing the issue. Although the use of the notion has moved on from original definition, this does not mean that people are getting the concept wrong or that there are no wicked problems, but rather that there can be certain kind of *very real* wickedness in various policy issues, but it is hard to give a final definition of these and rather work from family resemblance with exemplarily wicked problems and notorious definitions.

In following I will be inquiring if and in what respect electronic voting can be analysed as a wicked problem and what we can gain from such a framing. I will be using Estonian electronic voting as a sample case because of its continuous history and always accompanying controversy. I will not be using “wickedness” in a moral sense, but rather an indicator of what it would take to solve the problems involved, what type of solution it would be or if there is a need to solve anything at all.

In this sense the inquiry is successful also if I find out that despite in its initial temptativeness there is nothing inherently wicked in the history of electronic voting in Estonia.

Initial observations

The idea to analyse wickedness of e-voting based on Estonian experience is coming from quite neutral and objective assessments that there have been several suggestions to discontinue the project from local political players like Centre Party and Conservative People’s Party and international expert groups like OSCE/ODIHR missions in 2007 and Halderman’s group of researchers in 2014. Although Centre Party decided to not demand discontinuing the e-voting in 2016 when they gained position at national government, there are still party members who publicly demand and petition for discontinuing the project (Tschapoelgin, Kultaev 2023). Conservative People’s Party’s (CPP) predecessor People’s Union started the debate about constitutionality of e-voting in 2005 as president Arnold Rüütel unsuccessfully contested the “uniformity” of e-voting, the CPP proposed a draft bill to discontinue e-voting after 2023 elections (Vooglaid, Valge 2023), where they also unsuccessfully contested the results of electronic voting in Supreme Court (ERR News, March 30-31, 2023).

Trust in e-voting has always been an issue and according to opinion

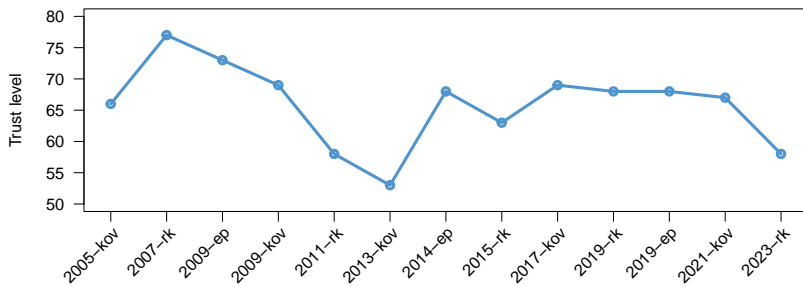


Figure 1: Fluctuation of trust in Internet voting 2005-2023.

polls public opinion on trustworthiness of electroning voting has remained very polarized throughout all its history. The trust level seems to fluctuate around 70 per cent (see Figure 1), but after discussion gets heated because some of the aspects of the process or the implementation gaining public attention goes down under 55 percent and into severe polarisation as observed in 2013 (Ehin, Solvak, Willemson, Vinkel 2022). Although the situation has somewhat improved in time, the trust in e-voting is the most polarized institution or service among eight which trust is polled after the elections by Tartu University researchers (see Figure 2).

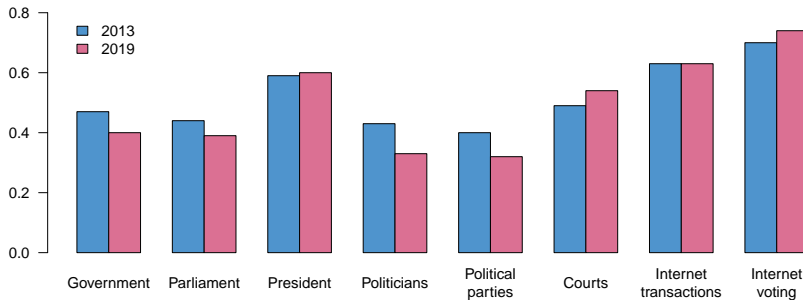


Figure 2: According to Sarle’s bimodality coefficient the trust in Internet voting is the most polarised among other trust issues measured by Johan Skytte institute.

There have been formal working groups or commissions gathered to solve problems with electronic voting in 2011 and 2019, yet the problems seem to have remained according to Supreme Court cases from 2019 and 2023 where the court demands fixing the legal issues with electronic voting. Although the amount of electronic votes surpassed 50 per cent of voters in 2023, only one political party of nine running in elections sent their observers to make sure all the processes are conducted correctly. The independent observers also raised their concerns by publishing joint statement demanding five specific improvements in order to render electronic voting “meaningfully observable” (Pöder, Švilponis, Kerbo, Kaldalu, Kruve, Seeder, Randma, Kubjas, Koplik, Kits, Vösandi 2023). Estonian Academy of Sciences has announced that it will start to discuss systems of electronic voting and voting security in general in its cyber security commission starting from August 2023.

According to such general observations it is justified to say that despite its more than 20 year history electronic voting has not secured itself solid base, but is very much contested and by very different social groups and institutions. Yet the government’s official take on electronic

voting is very approving and even praising, as observed by group of Estonian researchers that “the system has performed without major glitches and has become highly popular”, having enjoyed persisting political support to the level “it is difficult for any political actor to advocate discontinuation” and “political and reputational costs of abandoning i-voting would be very high, extending far beyond the realm of election administration” (Ehin et al 2022).

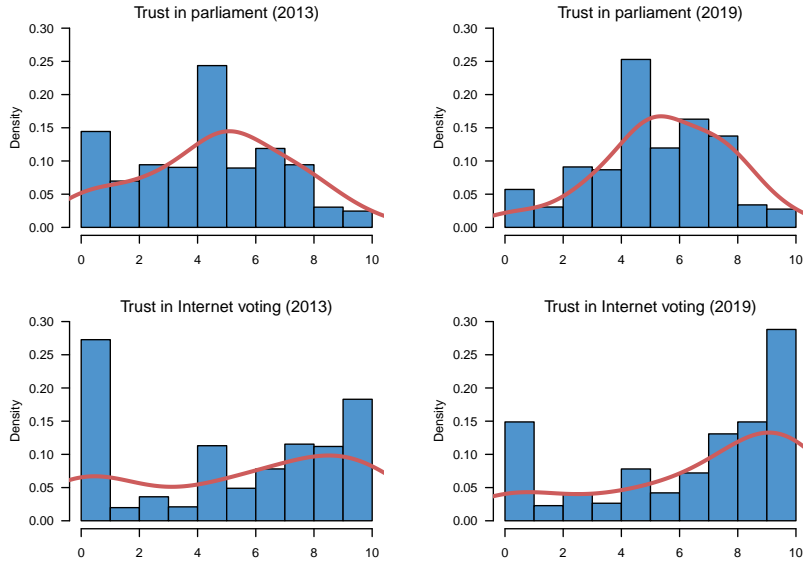


Figure 3: Compared to other trust issues the trust in Internet voting is polarised even in years when trust is relatively high.

Polarisation is indeed observable in political, social and even academical level and the trust curve of electronic voting has remained polarized and not approaching the shape of normal distribution even during years when trust in e-voting has been relatively high (see Figure 3). It seems that despite its more than 20 years of continuous development the discussions about electronic voting are not reaching common ground where solutions could be found. This rises the question of what is exactly wrong with electronic voting in Estonia, because the initial expectations of continuous technological acceptance have not lead to desired situation, although their echo still remains in public statements of the officials, researchers supportive of the idea and electronic voting team members.

Is the situation wicked?

In order to discuss the wickedness of electronic voting, I will refer to 10 initial characteristics of wicked problems as defined by Rittel and Webber in 1973. I use slightly modified phrasing (Peters 2017, Ritchey 2013) to broaden the initial scope of the discussion focusing on urban planning:

1. Wicked problems are difficult to define. There is no definite formulation.
2. Wicked problems have no stopping rule.
3. Solutions to wicked problems are not true-or-false, but better or worse.
4. There is no immediate and no ultimate test for solutions.
5. Every solution to a wicked problem is a “one-shot operation”;

because there is no opportunity to learn by trial and error, every attempt counts significantly.

6. These problems have no clear solution, and perhaps not even a set of possible solutions.
7. Every wicked problem is essentially unique.
8. Every wicked problem may be a symptom of another problem.
9. There are multiple explanations for the wicked problem. The choice of explanation determines the nature of the problem's resolution.
10. Policy maker has no right to be wrong.

First of all, electronic voting is dealing with the base functionality of democracy and government, the elections. This fact already contributes to many of those ten points, most notoriously 10 and 5, because failure to provide fair and trusted elections affects the whole society in very deep level. That's why policy maker can not afford to be mistaken and each try really counts significantly, which means that failing to deliver functional electronic voting may lead to discontinuation of the project altogether. This is echoed in Venice commission guidance for introducing new electoral schemes where it is suggested to build the systems step by step and basing on broad political consensus (Venice commission 2014).

Specifically in case of Estonian e-voting it also appears that government is very aware of the fact that policy maker *has no right to be wrong* in e-voting issues and therefore the system very much praised, up to the level of making it the matter of national pride and political goal with inherent value. The same might be observed in each run of the e-voting system where electoral committee jointly with Supreme Court tries to reduce the cost of *trial and error* by uniformly dismissing the complaints (ERR News, March 30, 2023).

Also the characteristic number 2 stating there is *no stopping rule* to wicked problems fits the pattern of always putting all the hopes in solving the problems in just the next phase and always considering them initially solved, only to find it was not exactly the case. The same expectation is also shared by Estonian researchers claiming "Internet voting has become normalized and even entrenched in Estonia" and that "electoral authorities no longer regard it as an experiment" (Ehin et al 2022), but it has been there from the first phases on 2005 and 2007 where scientific research tried to support the claim that the distrust in e-voting is below 1 per cent (Vassil 2007: 49-50).

Presuming the motivation of researchers is sincere, there seems to be hope to solve the problems, but the solution has still always been able to escape the authorities and the development team of the e-voting the system. This doesn't mean that there is no stopping rule in solving e-voting at all, but it implies that Estonian authorities and the researchers involved tend to be systematically wrong about the objective criteria of what is the sufficient solution.

Characteristic 1 related to definition and 3, 4 and 6 related to solutions are more ambiguous, because in a sense there are precise definitions about the democratic and constitutional requirements for elections. The main requirements are defined in a comparably up to date Estonian constitution from 1992, where in paragraph 60 principles of freedom of vote, generality, uniformity and directness of elections, proportional representation and secret ballot are specified. In addition the public nature of elections is implied in the first paragraph where people

are defined as upholders of the supreme power, which also means that people are in ultimate role of electing their representatives and overseeing the process (Constitution 1992).

In this sense there are precise definitions to be used and there is an ultimate test for the solution, which would be that it is submitted to constitutional review and it is recognised as following the constitutional requirements. However, contrary to many reports this has not been done despite repeated demands. The Supreme Court in the famous 2005 case 3-4-1-13-05 clearly states:

“The President of the Republic does not contest and the Chamber shall not, in the present case, examine the general conformity of electronic voting with the Constitution of the Republic of Estonia.” (Rask et al 2005)

There have been also repeated requests for chancellor of justice to conduct constitutional review, who also has declared that they don't consider this needed, latest in response to parliamentary query in 2023.

Therefore we could say there are definitions, but there is something wrong with them and maybe characteristic 4 stating *no ultimate test for solutions* is related to the issue. Although there are supposedly well established definitions, but there is no understanding how to apply them for the case of electronic voting. There are indeed remarks by former chancellor of justice and chair of Supreme Court about problems with electronic voting with the emphasis that these do not entail that there is either problem with constitutionality of e-voting (Teder 2011) or that the constitutionality could not be defended if such review is initiated (Kõve 2023).

At the same time constitutionality of electronic voting system is disputed mostly in relation to uniformity, observability and secrecy, preliminary decisions made in 2005 might be well outdated. The chair of Supreme Court in their statement in discussing case 5-23-20 addressed the issue, stating that because of lack of technical expertise they are not in a position to start constitutional review, because involving technical and other experts needed would delay the decision and would be an obstacle to declaring the election results (Kõve 2023).

This locates the problem of *test for solutions* to the dichotomy between legal and technical branches in the spirit of Lessig's famous “code is law” statement, which for present situation means that although we have definitions and criteria, there is no expertise to apply these criteria on specific situation because of technical barriers of understanding and inspecting the software, hardware and related procedures in theory and practical use.

The characteristic number 6 stating *no clear solution, and perhaps not even a set of possible solutions* describes the dilemma from another angle. There is indeed scientific debate on how constitutional principles of voting should be applied to electronic voting using computers and there are some quite prominent concepts developed, one of them being *end-to-end verifiability* (E2E-V) of election system. Using this concept to frame the issues with electronic voting was suggested first in one of the research paper preceding the official project (Lipmaa, Mürk 2001), but also 2011 by OSCE/ODIHR observers and in 2014 by Halderman's team (Springall et al 2014). Until 2015 representatives of electoral committee were against using the concept, yet in 2017 the new IVXV protocol was introduced which claims it implements E2E-V (Heiberg,

Martens, Vinkel, Willemson 2017).

Yet the question if E2E-V is properly implemented has been contested (Juvonen 2019) and although 2019 government working group for improving electronic voting did propose that ministry of justice clearly defines the concept of E2E-V for Estonian case taking account the Swiss experience of defining the concept in federal law and explanations from 2015 specifically meant for policymakers, conceived by the very researchers who themselves initiated the relevant research on 1980s (Benaloh, Rivest, Ryan, Start, Teague, Vora 2015), this has not happened. The authors of IVXV protocol refer to another E2E-V concept from 2010 (Popoveniuc, Kelsey, Regensheid and Vora 2010). As a matter of controversy chancellor of justice still claims that E2E-V could be threat to constitutionality (Madise 2019).

This illustrates quite clearly the situation with *possible solutions*, which are somewhat available, but it remains problematic how to choose from them and who should do it. Ultimately the problem seems to be rooted in the fact that science about underlying cryptography is not approachable for policy makers and even legal experts, leaving us with unspecified number of solutions which can't be properly assessed. This would not be a problem in an ideal situation, but has accompanied Estonian e-voting already before it even officially started in 2001 and in practise seems to be hardest to solve.

Characteristic number 3 stating wicked problems *do not have true or false solutions, but better and worse solutions* seems to be correct for e-voting too, but this differs from Estonian situation, because it is not even completely clear that any solution is better than the other. If this should be considered essential criteria for wicked problems, we should admit that situation with electronic voting in Estonia is not wicked in an authentic sense and we definitely have to consider this when we look back at the 10 criteria.

Type of wickedness involved

Characteristics number 7 about uniqueness, 8 about being a symptom and 9 about reflexivity are the most interesting ones because they provide guidance for analysing why we are in the situation of discussing wickedness of a problem in the first place.

Uniqueness of the Estonian e-voting can hardly be disputed, but it's not just a country size of a city state having used electronic voting almost past 20 years, while other countries with a notable exception of Switzerland discontinuing their e-voting systems. Estonia has been successful exporter of digital governance technologies, but electronic voting has been not a success in this sense. Even more, the computer scientists of Oxford University in 2016 claimed that developers of e-voting "have relied since the system's inception on building trust through interpersonal relations" and that "may work well for a close-knit society such as that of Estonia" (Nurse et al 2016).

We are talking about general problem of e-voting and its specific incarnation in Estonia, and character of uniqueness suggests that despite the problem as such might be wicked, but the case in Estonia has its unique properties. As Estonian scientists in their laterst review article claim (Ehin et al 2022), there is no direct need for e-voting in Estonia besides letting people abroad conveniently vote. They refer that about 6 per cent of e-votes were cast from abroad in 2019 elections,

which is the only situation where there are hardly other options for voting. Rest of the cases are more a matter of convenience and taking part of Estonian miracle of digitalisation of democracy.

But the situation is unique also in a sense that legal principles of different countries can't be applied on other countries directly and although Estonia has been given advice several times, in the end it is the decision of Estonian voters how they would like to vote, even up to the point of inventing completely new ways of democratic deliberation. This is strongly related to characteristic number 9 about explanation of the problem determining the nature of solutions. Estonia framing the situation clearly in a different way than rest of the world might be up to getting rid of old democratic rules altogether and inventing completely new models.

There have been numerous suggestions of introducing a novel protocols of deliberations at the same time getting rid of one or another constitutional principle, for example secrecy of ballot. This is even somewhat suggested by the legal experts and developers of e-voting during it's 20 years and some of it has come real – for example in 2019 OSCE/ODIHR observers suggested that Estonian system does not follow the principle of secrecy as defined in Estonian law but also international treaties. The problem has been dismissed without further discussion and there have been no signs of government or electoral committee planning to address it although there are updates planned to electoral laws (ERR News, July 3, 2023).

The situation of democracy and rules based order might be considered in a weak state worldwide and proposals to replace democracy with something more suitable are getting more mainstream also in policymaking debate (Farrell, Mercier, Schwartzberg 2023). In general Estonian democracy is very young and this might be part of uniqueness, but also the problem which the wickedness of the implementation of electronic voting is symptom of, as the characteristic number 8 suggests. The only European country currently seriously experimenting with electronic voting is supposedly Switzerland, which is on the contrary very old and well established democracy.

There have been attempts to analyse uniqueness of Estonian attempt to be a digital pioneer by Toots (2016) and Drechsler (2018), which point out that e-voting is peculiar also in the context of Estonian digital services. Toots claims that there are no digital democracy projects that could be considered as basis for e-voting. This means that e-voting in Estonia only imitates the surface of democracy, which could be described as Potemkin village.

Drechsler goes even further and claims that because “Estonia perpetually feels to be under an outright existential threat” from Russia, e-voting works as sort of insurance that state continues to operate even if conquered. Drechsler compares this to a situation of a terminally ill person, who is preparing to die and maybe even secretly hoping for it – claiming that Estonia does not dare to establish itself as a nation state with democratic institutions, because this is considered too dangerous and rather historically traditional tribal existence is sought.

Conclusions

Although solving problems with Estonian electronic voting is not the goal of this inquiry, suggested ways of solving wicked problems may also

elucidate the problem itself. One of the most fundamental solutions to wicked problems is stop trying to solve those problems altogether and instead choose to navigate around them on smaller scale, for example locally (Peters 2017).

We have observed that Estonian e-voting has some very essential characteristics of wicked problems, but misses some of them. For example the characteristic number 3 about only being better and worse and not right and wrong solutions seems to be one of these. As we already observed electronic voting in Estonia has many other objectives besides enabling people to vote, we could argue that the solutions don't appear really as better or worse since e-voting is not so urgently needed and we are not sure which problem it could solve in the first place.

As Lönngrén and Poeck (2021) suggest the concept of wicked problems might be overused, but they also observe that although it is not considered very productive concept in social sciences and humanities any more, it still gives new results in technical and engineering contexts. It seems the problem electronic voting is indeed wicked in Estonia, but it might not be that wicked at all, because it is not a true problem needing a solution.

This does not mean electronic voting as such is not in itself wicked and causing Estonia trouble exactly because of that. If it is true, that Estonia has introduced electronic voting not to improve democratic participation, but for some rather unique reasons related to local politics or existential threats from “erstwhile colonial overlords”, then we can admit that there is indeed sort of wickedness involved. However, this is not so much about exploring the ideas and practises of e-voting as such, but rather about Estonia being considered as an example to follow and introducing e-voting in other countries *based on same or similar reasons*.

Assessing if electronic voting could be interpreted as a contagious concept that can threaten our democracies if not handled carefully enough would be a topic of a different inquiry.

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