Universidad Europea VALENCIA

International Relations Global Bachelor's Degree

Bachelor's Thesis

One's-Self I Sing: A Citizen's Voice in I-Voting and Global Democracy

Presented by:

Vuk Radišić Višnjić

(they/any)

Directed by:

Dr. Esma Kučukalić

(she/her)

For my parents, who knew I could.

For Mark, who kept me going when I couldn't.

For Ebba, who suffered through the calls, the voice notes, and the panic.

For Esma, who was an incredible tutor throughout.

And for me.

Abstract and Keywords

Abstract

The World Wide Web has come a long way from its inception last century and has become a part of everyday life for most people around the world. Meanwhile, voter engagement and turnout rates have plummeted since the 20th century, elected politicians remain distrusted and unpopular, and undemocratic movements are on the rise. Internet voting has also developed and grown, but only in some parts of the world, and instances of this system remain often bogged down by either unpopularity, security concerns, or both. To understand if Internet voting could provide a chance for a more equal democracy to be born and thrive, the author examines elements such as: voter and youth disengagement, instances of electronic and Internet voting, and minority electoral rights.

Keywords

Estonia, Switzerland, Internet voting, Voter disengagement, Voting technology, E-governance, Digital democracy, Cybersecurity in voting, Voting rights

Resumen

La World Wide Web ha recorrido un largo camino desde su creación el siglo pasado y se ha convertido en parte de la vida cotidiana de la mayoría de las personas en todo el mundo. Mientras tanto, la participación y el compromiso electoral se han desplomado desde el siglo XX, los políticos electos siguen siendo objeto de desconfianza e impopularidad, y los movimientos antidemocráticos están en auge. El voto por internet también se ha desarrollado y desarrollado, pero solo en algunas partes del mundo, y algunos ejemplos de este sistema suelen verse obstaculizados por la impopularidad, las preocupaciones de seguridad o ambas. Para comprender si el voto por internet podría brindar la oportunidad de que una democracia más igualitaria nazca y prospere,

el autor examina elementos como la desvinculación de los votantes y los jóvenes, los casos de voto electrónico y por internet, y los derechos electorales de las minorías.

Palabras clave:

Estonia, Suiza, Voto por internet, Desvinculación del votante, Tecnología electoral, Gobernanza electrónica, Democracia digital, Ciberseguridad en la votación, Derecho al voto

Abbreviations

Abbreviation	Full term
AI	Artificial intelligence
DDoS	Distributed denial of service
DRE	Direct-recording electronic
E-voting	Electronic voting
EIF	Estonian Informatics Fund
EIK	Estonian Informatics Centre
EP	European Parliament
EU	European Union
EVMs	Electronic voting machines
I-voting	Internet voting
RIA	Information System Authority
RISO	Riigi Infosüsteemide Osakond
RVM	Re-voting malware
US	United States of America
USSR	Union of the Soviet Socialist Republics
VMM	Vote modification malware

Abbreviation	Full term
AI	Artificial intelligence
DDoS	Distributed denial of service
WWW	World Wide Web

Abbreviation	Full term

Index

One's-Self I Sing[1]: A Citizen's Voice in I-Voting and Global Democracy

Introduction

The advent of the World Wide Web (WWW or the Internet) has significantly simplified many aspects of daily life. News, books, movies, and other mediums have all become very much accessible from nearly anywhere in the world, with approximately 65 per cent of the world's population having some access to the WWW (World Bank, 2025). With dial-up, it was a matter of hours, today, it's a matter of seconds.

This investigation brings together several interconnected elements, from the political disengagement of youth voters to electronic voting (e-voting) and Internet voting (I-voting) system failures and successes. Though there have been many studies published in the field of international relations and politology on voter disengagement, including instances, trends, solutions, and causes, as well as on the topic of e- and I-voting, the following paper contributes to the professional literature from a rarely-explored combination of I-voting, youth and minority voter (dis)engagement, and global democracy.

Research Questions, Methodology, and Scope

The central point of this investigation has been the exploration of a rarer form of e-voting referred to as I-voting, and how such systems influence or could potentially influence democracy at international and supranational levels. To know the effects, potential and actual, of I-voting, one must look primarily towards *a) the instances and intricacies of such systems*, *b) the causes and effects of voter disengagement*, and, thus, also *c) the voter engagement and trends as seen under such systems*. It is the intent of the author to answer the following overarching question, which one believes can be answered in affirmative: *Can I-voting significantly influence global democracy?*

---

[1] The title here is a reference to Walt Whitman's 1867 poem "One's-Self I Sing". In the poem, Whitman speaks of democracy and equality, and individuality and humanity as a whole. The author has chosen to use this poem as the overarching title due to these themes and their invariable connection with one another.

The sub-questions here centre around engaging voters, old and young alike, removing both natural and intentional barriers that are so often encountered by the elderly and the many minorities, from ethnic and racial minorities to queer and sex- and gender-based minorities.

The research for this work has been conducted through a mixed methodology, employing both qualitative and quantitative methods alike.

For the prior, the author has chosen to make use of case studies. For the benefit of this work, this means that the author has studied and analysed specific instances of I-voting systems, with the specific foci of Estonia and Switzerland. With these countries, specifically, the author has attempted to understand and construct a narrative out of not only the data linked closely with (I-)voting but also with available historical, social, and colonialist information.

For the latter method, the author has chosen to investigate a number of statistics and data freely or publicly available, especially that quantitative information which relates in some capacity to voter turnout statistics, demographic data of chosen areas or countries, the demographic of active and participating voters, and similar data.

Additionally, the author has chosen to approach this area of study with two paradigms in mind: an interpretive or social constructionist paradigm and a critical paradigm.

The prior is focused heavily upon the existence of multiple perspectives and that one individual or even one group might have a different perceived reality from the next (DeCarlo, 2018). Taking this in tow, the author has made the purposeful decision to attempt to understand the complex social webs and attitudes which affect voter turnout and engagement, and the impact of technology on both.

The latter focuses largely upon "power, inequality, and social change", acknowledging "that systems are biased against others, such as women or marginali[s]ed ethnic groups", and it "posits that social science can never be truly objective or value-free" (Ibid). Additionally, the goal of one's research, the critical paradigm posits, should always be social change (Ibid).

The scope of the investigation has been limited to the generalities of e- and I-voting, and to the specific instances of I-voting systems (whether full-scale or pilot projects) as used in national elections, presidential elections, and referendums in Estonia and Switzerland, as well as their respective histories and processes. The paper also employs demographic and similar data on the populace of these two countries in an attempt to better understand I-voting. For the purposes of understanding voter disengagement and the obstacles which voters encounter in becoming or remaining politically aware and active, the investigation makes use of similar data of these and other countries.

This investigation does not deeply engage with instances of I-voting in other countries. It also does not deeply engage with the legal processes behind setting up the I-voting system; at most, it mentions them in order to establish a narrative for the purposes of explaining I-voting success or lack thereof.

The investigation aims to contribute to the literature by developing an understanding of a rarely-explored combination of I-voting, youth and minority voter (dis)engagement, and global democracy. While it synthesises existing research, its comparative analysis of Estonia and Switzerland, particularly concerning the evolution of I-voting's impact on different voter groups, adds further value.

Finally, the investigation will be relevant for the following Sustainable Development Goals: Gender Equality (no 5); Industry, Innovation, and Infrastructure (no 9); Reduced Inequalities (no 10); and Peace, Justice, and Strong Institutions (no 16) (United Nations, n.d.).

Chapter 1: (I-)Voting and How To Do It

1.1 What Is In a Name?

E- and I-voting systems are not widespread common occurrences and thus it is understandable that such concepts may be unfamiliar or even completely alien to some people. Additionally, terms such as e-voting are often "used inconsistently by different" individuals, organisations, and academics (International Foundation for Electoral Systems, 2013). To those points, the author defines and explains these terms below.

E-voting is simply voting by electronic means, whether it be via a closed voting system, such as the one used in Polish and other parliaments, or via an open system used in elections (Kaczmarczyk & Czajkowski, 2001, p. 50). E-voting might employ the WWW, phones, and other hardware and software for the purposes of enabling voters to cast their ballot (Musiał-Karg, 2017, pp. 76 - 77). The e-voting method that uses electronic voting machines (EVMs) (Debnath et al, 2017, p. 1) is known as direct-recording electronic (DRE) voting (Dandoy & Umpierrez, 2021, p. 30).

I-voting is a subtype of e-voting and is a system which transfers votes "via the Internet to a central server that counts the vote" whether through the use of voting kiosks or any private computer that has access to the WWW (Musiał-Karg, 2017, pp. 76).

I-voting, in particular, is split by "professional literature typically [. . .] in two categories" (Ibid). The first category consists of I-voting as it occurs at an official polling site, whilst the second can be anywhere from a specific voting location set up outside of the official polling stations to any computer that has access to the WWW (Ibid, pp. 76 - 77). Either way, the votes cast online through one's personal device or through a public kiosk are not stored in that machine but, rather, "on a central vote server that tallies votes at the end of polling" (International Foundation for Electoral Systems, 2013).

Voting via a machine is, in fact, not new. Though several machines had been proposed and patented before, the first voting machine was actually used in the late 1880s, with the use of the Acme Voting Machine, which was invented to detect voter fraud but left

the integrity "in the hands of the voter, who would often swear on the Bible" which "allowed many voters to cast their vote multiple times" (Thomas, 2023).

In 1892, thus, a new machine took the spotlight, one that was lever-styled, which further ensured privacy and anonymity of the voter and further prevented multiple voting attempts, yet remained issue-ridden, due to its inaccessibility to those with poor sight or other physical difficulties or disabilities, difficult maintenance work, and its inability to record independent votes (Ibid). In Ohio, almost a decade later, the Coyle was used, which was heavy and costly, but used "a plain card ballot with no perforated holes" (Ibid) with the names of the candidates written out on it, sort of like an electronic hole punch that ensured that a voter could verify their choice.

It lacked privacy curtains and was too expensive but the punch cards would be used again in 1965 in the Votomatic punch-card system which would be used in a presidential election the following year by 37.3 per cent of American voters. Cheaper, quick, and easy, it remained in use until "[t]he 2000 election fiasco" (Ibid) DRE "machines first came into widespread use in the 1970s" and now "are essentially portable computers that have been configured to display ballot choices and [...] record votes electronically" (MIT Election Lab, 2023).

Thus, electronic voting has been used since the late 19th and early 20th century and, for about four decades, that technology would not change much. It was after that "fiasco" (Thomas, 2023), that "[a]ntiquated voting technologies were rapidly replaced" with punch cards "sometimes still [being] used in state and local elections" (MIT Election Lab, 2023). Nowadays, optical scans are the most frequently used voting technology in the United States of America (US), followed by DRE machines at 20 per cent, with "mixed" technology making up the remaining three per cent (Ibid).

Some of the first instances of I-voting being used for public, electoral processes, took place in some states in the US in 2000 (International Foundation for Electoral Systems, 2013), with Switzerland following with I-voting trials soon in 2004 (Federal Chancellery FCh, 2020), and Estonia in 2005 with nation-wide I-voting availability (Sheeter, 2005). Whilst some countries had chosen to abandon their pilot projects (the US, Finland, and the UK) and some had adopted I-voting and then proceeded to discontinue such

programmes (Netherlands and Spain) (International Foundation for Electoral Systems, 2013), 14 countries were continuing to make use of it in their elections instead by 2023 (Chatten & Karlsson, 2023, p. 1).

Each system presents its challenges, as well as its benefits. Where one system might ensure the best security and government control, another might ensure the best accessibility (Musiał-Karg, 2017, pp. 76 - 77). Different countries, or even different cantons and counties, might seek a different balance and may seek each of those varieties of balances differently than other places might. Thus, no I-voting system is the same and each must be explored anew.

1.2 The Youths

One of the groups which is less likely to vote in many countries is the youth (Dressler, 2024; Gaudot, 2024, Derksen, 2018). In 2024, the UK saw the lowest voter turnout rate since 2001 (59.4 per cent), at 60 per cent (Clark, 2025). In 2022, France saw a voter turnout of 76 per cent of those under 25, as opposed to 92 per cent of voters in their fifties (Charlton, 2024).

I-voting is often touted for its convenience and for its alleged appeal to the younger generations (Hall, 2012, p. 156; Musiał-Karg, 2017, p. 81), on the account of their status as digital natives.[2] Whilst the comfort of voting from one's PC or phone might have some merit as a method of engaging the youths, a study of the first 10 years of the Estonian system found however that "[a]n action that took on average 30 minutes" now "takes on average less than three minutes and most surprisingly *less so the older the voter is* [emphasis added]" (Solvak & Vassil, 2016, p. 167). Aside from showing that I-voting is a faster method of casting one's vote, the study also shows that older voters are also using this system and that they might actually be using it better than young voters do. Additionally, Serdült et al (2015) found that it was often "the second youngest age group rather than the youngest that proves to be the most frequent user of i-voting"

---

[2] Digital natives is a disputed term which is used to describe younger generations—viz. Millennials, Generation Z, and Generation Alpha—which, due to being born around modern technology, have an "innate confidence in using [it] such as the internet, videogames, mobile telephony" (Selwyn, 2009).

(p. 38). Of course, due to the variety of i-voters and the countries which have implemented i-voting programmes or projects, there also remain disagreements amongst scholars on which age groups benefit more or show more interest in I-voting.

I-voting or not, the issues remain. Young voters cannot be made to vote simply by dangling an online apparatus in front of them and hoping that they forget the troubles they perceive with voting and with current political systems. The world is wracked with more crises by the year, with a worsening climate change issue, increasing number and severity of wars, more frequent and obvious situations where the risk of genocide is present, a global economic crisis waiting to happen, and inflation rising out of control just about everywhere. To understand why so many of them don't vote, one has to understand what the political candidates and parties are failing to address.

As Channel 4 (2025) determined in their report by polling thousands of 13-27-year-olds, 62 per cent of youth "believe that there is one law for the rich and one for the poor" (p. 9). Furthermore, they've found, the majority of this age group feels that being born into a wealthy family is more important to one's advancement than working hard or developing one's skills and talents (p. 9). Channel 4 also found that 47 per cent of youth believed that society must be changed radically, through a revolution, with a simultaneous dropping belief that democracy is fit for the UK, a rising belief that an authoritarian leader would be better, and a belief that the UK is a "highly democratic nation" dropping by more than half (p. 15).

Young people's values are also, on average, different from older generations' values. As Berkeley Initiative for Young Americans (2025) found in their study of US youth and their political engagement, "Millenials and Gen Z, on the whole, tend to be more egalitarian than older generations" and "they held a collective outlook that supported their desire for a more expansive role of government to intervene in society".

1.2.1 #Relatable[3]

There are media campaigns, there are official accounts for elected officials, and there are the videos and signaling meant to be relatable. There are, however, attempts which may fall flat. *Videre licet*, the President of France, Emmanuel Macron, stands in front of gold-leaf walls, promising people car park terminals which accept contactless phone payments (Macron, 2025) and dancing to viral songs; or as much time as United States Representative Nancy Pelosi spends making up TikTok and Tic-Tac-Toe wordplay in order to appear relatable and witty, she instead remains clearly out of touch the youths (Impelli, 2024).

Indeed, with a global decline in voter turnout, elected officials and politicians are trying almost anything to entertain and appease. Their thinking is not always entirely wrong though it is often flawed. A viral dance video is *not* going to solve the problem of voter turnout and unhappiness, but the Internet still *could*.

Take, for example, the German party, Die Linke ("The Left"), which in the 2025 federal election managed to outperform the paltry projections set for it until days before the election (Difford, 2025; Wahlkreisprognose, 2025; Wahlrecht, 2025) and instead doubled their seats in the Bundestag.

Expected to perform poorly and gain less than the 5 per cent required to enter the German national assembly, Die Linke surprised most by instead acquiring "nearly 9 percent of the vote and 64 seats in the Bundestag" being "one of only five parties to win multiple seats" (Firsova & Tankersley, 2025). How? Of course, strong rhetoric and ideas have helped, but so did "an aggressive social media outreach", including a travelling for a talk about "techno and TikTok" with "Ole Liebl, a queer influencer", which resulted in Die Linke gaining "more than 30,000 new members in the last month of the campaign" (Ibid).

Similarly, Obama used social media strategically in his re-election campaign, participating in the creation of a new standard (Mildebrath, 2024, p. 2). The 2016 US

---

[3] Hashtags (#) are a common way of showing the algorithm and the people a post on social media is related to a certain topic. Whilst the topic of how political figures relate to the people and vice versa has been talked about often, the reliability and humanity of said figures has truly come into focus in the age of the WWW.

presidential election and the referendum in that same year that is now known as the Brexit referendum were electoral processes during which discussions and advertisements were very much found online (Gorodnichenko et al, 2021). Social media allowed bots and artificial intelligence (AI) (Ibid; Bastos, n.d.; Mildebrath, 2024, p. 7) to influence humans, and companies and systems like Cambridge Analytica could target specific individuals based on their perceived or stated preferences, characteristics, and attitudes, as it had done in both of these electoral processes (Vasu et al, 2018, p. 11). Echo chambers, here meaning online spaces in which individuals gather to voice same or similar attitudes, result in users perceiving a reality in which the majority of society agrees with their opinions, which can shift actual public opinion, especially as people are more likely to interact with posts that contain attitudes they agree with, rather than those with which they do not (Gorodnichencko et al, 2021).

The trend of social media being a part of a political campaign has not diminished. On the contrary, an estimated 100 million Euro was used "on online political advertising in Europe in 2019" due to online spaces being a method of "reach[ing] potential voters and niche audiences easily, inexpensively and directly" (Mildebrath, 2024, p. 2).

Youth outreach, both off- and online, are definitely a correct path to take. As all things, however, it takes nuisance, understanding, and planning. In the same way, I-voting can be used to engage the youth, amongst other voter groups, but it needs to be done the right way. In order to understand what that way is, one must understand what this voting system actually is.

1.3 Security and Technology

Whilst I-voting has been present for over two decades, both as a concept, an amalgamation of pilot projects, and an actual system, questions of security remain, especially with new technologies and ideas gaining traction.

As one report finds, "I-voting systems rely on computer security measures, certification and, ultimately, on a degree of trust in the system programmers and operators" (Office for Democratic Institutions and Human Rights, 2024, p. 15). Transparency is often noted

as being a clear method of building trust with voters and thus I-voting documents and source codes, experts advise, ought to be publicly available and researchers should be involved in the creation and development of the systems (Maurer et al, 2024, p. 56).

1.3.1 Concerns and Solutions

The questions and concerns of security as they relate to instances of I-voting or even EVMs have been purported many times by authors, individuals (Scott, 2019), and specialists (Helger's Cryptoblog, 2011; Abram, 2024; Swissinfo, 2018; Swissinfo, 2019), political commentators and parties (Estonian Public Broadcasting, 2013; Swissinfo, 2019; Rigendinger & Ridard, 2023), and newspapers (Oja, 2011) and academics (Springall, 2014; Serdült, 2019). Many solutions have been proposed and some already implemented.

As I-voting instances "are usually paperless", "a manual recount of votes" is often impossible. Some instances, such as the Estonian system, "attempt to allow individual voters to verify [...] their votes [. . .] and can give third parties the opportunity to check by using mathematical proofs" (Office for Democratic Institutions and Human Rights, 2024, p. 15). Similarly to the Estonian application which is now in use, the Australian state of New South Wales, which has infrequently made use of i-voting in general elections and more frequently in the local elections, allows voters to verify their vote through an app or, unlike in Estonia, through a phone call (Maurer et al, 2024, p. 69). Some hybrid systems do exist, which do utilise the WWW for the sake of casting ballots, but only in a designated polling place with government-owned and operated computers (Office for Democratic Institutions and Human Rights, 2024, p. 14).

Confidentiality of a voter's ballot is one of the most often mentioned concerns when it comes to I-voting (Scott, 2019; Abram, 2024). Some applications used in I-voting utilise "asymmetric encryption" which "can be used to render the votes cast unintelligible" (Office for Democratic Institutions and Human Rights, 2024, p. 71). Before decryption, these instances might use a number of techniques to further ensure confidentiality and anonymity, including homomorphic encryption, which counts the votes whilst they're still

encrypted, or "mix-nets, which shuffle[s] the votes and break[s] the correlation" between the final server and the voter (Ibid).

The Estonian Academy of Sciences' Standing Committee on Cybersecurity compiled a report on the security of Estonia's e-services and has also found that it was important to continuously update and improve the security and reliability methods (Information System Authority, 2025a).

People are also often very concerned about "vote flipping", in which malware flips the vote of the person without their knowledge (Abram, 2024). Confirmation that one's vote has been recorded correctly is the large concern here (Ibid), perhaps more so than in electoral systems that use paper ballots. Some systems, such as Estonia and Norway,

Such malware is obviously concerning and vote-flipping malware is not the only kind out there. Vote modification malware (VMM) must infect "both the voters' computer and [their] mobile device" in order to successfully bypass verification and either block or alter the vote that is being cast (Torn, 2014, p. 43). The prior kind is cheaper to develop but is less effective in practice (Ibid) and whilst it can be developed in a matter of hours, even in 2011, it does not hold up when the voter is able to "verify [their] vote via alternative channels nor did it take measures to avoid getting detected" (Ibid, p. 45). Aside from the technical difficulties which present themselves and the solutions that are yet to be discussed, another issue arises with VMM malware. Not only is it necessary to alter a great percentage of votes to achieve any meaningful effect (Ibid, p. 43 - 44), but it is also difficult to infect and use the right devices (Ibid, p. 45 - 46). Ut dicitur, in the majority of I-voting systems, it is important to infect the voter's computer *and* their mobile device, which does not always happen, and even when one manages to infect both of the necessary devices of an eligible voter there is no guarantee that that voter will vote or even that they will vote online (Ibid). Following this logic, one estimation finds that, to alter 5,000 votes within five voting days, one would need to infect 53,000 computers (Ibid, p. 46).

On the other hand, re-voting malware (RVM) activates when the victim begins their voting process, does not flip the vote or block it immediately but, rather, records the PIN-codes of the voter's ID-card (Ibid, p. 48). This malware, instead, casts another vote

"later, when the voter re-inserts [their] ID-card into the computer" unless the voter leaves their ID card in the computer, in which case it waits a period of time before casting a new vote, in order to allow for the user to check their vote (Ibid). RVM need only infect the computer, and not the phone, thus being simpler to make, yet must rely on the user to leave or re-insert their ID into their computer, which complicates matters (Ibid). In Estonia, exempli gratia, "[i]n 2011, 1.9% of [Estonian] voters used Mobile-ID", meaning that they need not use their physical IDs and by 2014, that number had risen to 11 per cent (Ibid, p. 49) and in the 2024 European Parliament (EP) elections in Estonia, 31.4 per cent of all I-votes came via Mobile-ID or approximately 13.01 per cent of the whole active voting population (Valimised, n.d.c). All this to say, that by estimates, RVM would need to infect approximately 218,000 computers to make the same change of 5,000 votes, which would almost inevitably lead to its detection, if it could even manage to infect that many at all (Torn, 2014, p. 49). Aside from these specific applications, there are plenty of other voting-related malware out there, as well as other forms of digital attack.

As demonstrated in Ecuador in 2023, an e-lection might yet be "disrupted by large-scale [distributed denial of service (DDoS)] attacks", where online systems are overwhelmed by repeated attempts to access it or connect with it (Maurer et al, 2024, p. 55). It is important, however, to note that Ecuador had only allowed I-voting on a single day, which overlapped with the in-person voting day (Ibid) and thus such an attack can be avoided by simply allowing people to vote online for more than one day. A safety concern does remain for this and similar cases, such as when a larger than expected number of voters genuinely attempted to cast their ballot online in the 2021 local election in Australia, New South Wales—more than two times more than in the 2019 election—the system failed and some were unable to I-vote (Maurer et al, 2024, p. 68).

An additional safety concern often brought up in regards to I-voting is vote buying or the process of paying individuals to vote a certain way, by giving them "cash, food, alcohol, health care, poverty relief, and myriad other benefits in exchange for their votes" (Stokes et al, 2013). Before the 20th century, "vote buying was commonplace" (Stokes et al, 2013). There are again fears that vote buying could become a dangerous and commonplace practice once more with the use of I-voting systems (Abram, 2024;

Maurer et al, 2024). According to Maurer et al (2024), instances of I-voting in most countries lack a method of resisting vote buying, with the exception of Estonia (p. 81) which has allowed "multiple voting" (p. 56). Switzerland, meanwhile, has not noted vote buying and coercion in high enough levels to solve the issue yet (Ibid, p. 56) and a French instance makes it easy to sell or give away one's vote, as one need only have the contents of an e-mail or an SMS to vote (p. 74). Ukraine—where there is some discussion of introducing I-voting after the war, which continues at the time of writing, comes to an end—which currently has no I-voting instances at all, suffers from a huge vote buying problem (Ibid, p. 44). It is important to note that not all countries can handle such risks, including Ukraine, where the risks of introducing such a system would be considered "extremely high" (Ibid, p. 57).

1.3.2 Accessibility

There are also questions and concerns on how accessible voting is, whether on paper, on voting kiosks, or on one's personal computer. The accessibility of I-voting has been debated amongst scholars, with some arguing that computer literacy rates may pose an issue (Directorate-General for Internal Policies, 2016; Petitpas, Jaquet, & Sciarini, 2021, p. 3; Hall, 2012, p. 158-9; Chatten & Karlsson, 2023, p. 60). and other scholars (Lust, 2018, p. 73; Serdült et al, 2015, p. 28; Musiał-Karg, 2017, p. 81) arguing that, with the majority of the world being now connected to the WWW, rising levels of computer proficiency, and rising frequency of daily computer use, I-voting is a solution to a number of clear issues.

Aside from the computer literacy rates, another concern is the accessibility levels of e- and I-voting in general. The voting ability of illiterate and less-educated people, a study conducted in India found, rose significantly after the introduction of EVMs (Debnath et al, 2017, p. 3, 16).

I-voting's main potential, however, might be for those "people with reduced mobility such as the elderly or disabled citizens, citizens who work on Election Day, travellers or voters from abroad, as well as the voters living" too far from their nearest polling station (Directorate-General for Internal Policies, 2016, p. 9). In fact, at the beginning of the

Swiss I-voting adoption, the architects of the system were targeting, inter alia, disabled voters (Musiał-Karg, 2017, p. 81). With approximately "8 million economically active [European Union] citizens liv[ing] in an EU country other than their own" in 2016, the European Union (EU) regards voting accessibility as a subject of serious importance (Directorate-General for Internal Policies, 2016, p. 9).

Lack of literacy, distance between polls, and disabilities, however, are not the only obstacles people experience when it comes to voting. For many, it is the colour of one's skin, their sex and gender, the language which they speak, or even how they love that can pose a serious danger to their ability to be part of a democratic society.

Chapter 2: I-Voting & Minorities

It is pertinent that one investigates the causes of dropping or low voter turnout and not just the effects. There are many elements which affect voters' engagement levels, political leanings, and understanding of politics. These range from social constructs, such as race, sex, gender, sexuality, and ethnicity, to more palpable elements, such as one's quality of life and access to resources.

There's a number of reasons why eligible voters don't vote. Some of them are too physically ill to make it to the polls, even with government, familial, or other assistance, whilst others are too oppressed by their socio-economic stati, unable to afford the mental and financial space to seriously engage with politics. Others yet, "are less inclined to vote if they do not believe that their individual actions can make a difference to political outcomes," an oft repeated sentiment nowadays. They could also simply "lack the necessary information on how to vote or encounter barriers" (Ledgerwood & Lally, 2024).

Additionally, according to a Swiss study, social pressure can have an effect on the way people vote, with "social control" being "particularly strong in small and close-knit communities" (Funk, 2010, p. 1078; Hall, 2012, p. 153, 155). I-voting and mail-in voting, however, can make the process "unobservable", removing the social pressures, whilst also limiting the economic cost of voting (Funk, 2010, p. 1078; Germann & Serdült, 2017, p. 8; Acuña-Duarte & Salazar, 2024, pp. 13 - 14; Stakeholder Community Once-Only Principle for Citizens, n.d.).

2.1 Race and ethnicity

Race and ethnicity are social constructs which often exert much influence upon our day-to-day life. Different regions, countries, or even towns or districts can hold very different views from one another as to how and if one's assigned race or ethnicity should influence one's socio-economic or political standing.

Ashley Montagu (1962), famed British American anthropologist, exempli gratia, called the term race, when applied to human beings, "a prejudiced term which injects meanings which are not there" and such "pre-existing terms determine the manner in which [conditions or facts] shall be perceived and ordered" (p. 919 - 920). One's assigned 'race' continues to have much influence upon one's life. As Holt (1990) puts it, "the lives of all African-Americans" are marked by the construct, "because all experience racial alienation in some form social, economic, or political" (p. 305). W.E.B. Du Bois argued "that race was being used as a biological explanation for what he understood to be social and cultural differences" (Gannon, 2016). In the same spirit, over a century later, the majority of scientists believe "that race is a social construct without biological meaning" and that, according to one group of scientists, it is "a concept that has social meaning that interferes in the scientific understanding of human genetic diversity" (Ibid).

How groups of people are perceived is important to understanding voter engagement. Individuals existing in groups that are subjugated to terms which are meant to classify them as a collection of specific traits and behaviours, such as *Asian Americans* or *African Americans*, do not all behave the same way in the same places, whether as members of a society or as voters (Logan et al, 2012).

Understanding these constructs allows one to examine how I-voting, despite its potential for increased accessibility, might mitigate or exacerbate existing socio-political participation issues for minorities and marginalised groups which have historically been barred from electoral engagement and often continue to face those same or similar man-made, systemic issues. This is also particularly important for the topic of electoral engagement and voting as ethnic minorities engage often in a practice known as ethnic voting, which "impedes the development of [. . .] transitional democracies" and has "negative implications for democracy" (Cheung, 2023, p. 9). Such behaviour is frequent in "post-communist" countries (Ibid). The effects of either upon individuals or groups, in any means, cannot easily be boiled down to a couple of pages. We can, however, draw from examples and attempt to learn something through them.

Exempli gratia, in the beginning of the 1990s, ethnic Russians outside of the Russian Federation lost their privileged positions, especially in the former Union of the Soviet

Socialist Republics (USSR) colonies, and thus faced a variety of troubles, from legal to personal and practical (Martynova, 1999, p. 85). Their legal positions were "radically changed" after the Constitution was adopted in 1992, with the adoption of Estonian as the official language, inter alia, putting pressure on anti-independence Russians (Ibid, p. 90). Ethnic tensions stemmed, at least in part, from that colonial past and, notably, the wish for that quickly moving past to remain the present. As Martynova noted, "[i]n 1990, only about 26% of Russians in Estonia were in favour of a fully independent Estonia" and "preferred a partially independent Estonian Republic" (Ibid, p. 86). Lack of ethnic Russians' willingness to give up a former colony or even integrate into Estonian culture or identity was also visible even before the fall of the USSR, as only 15 per cent of those residing in Estonia spoke Estonian (Ibid).

Even at that time, however, their attitude was growing more favourable towards an independent republic. Attitudes amongst ethnic Estonians were also shifting, with some advocating for the inclusion of the Russians and some advocating for ethnic exclusion out of fear that they, as many other indigenous peoples, would be pushed out of their own territory and erased by their colonialists (Ibid). This fear, in part, stemmed from the rapid rate at which Russian and, in much smaller part, other non-Estonian populations had grown within Estonia's old and new borders.

In the 1920s, the Estonians numbered roughly 969,000, Russians 91,000, Germans 18,000, Swedes 7,000, and thousands or hundreds of other folk (Ibid, pp. 87-88). By 1934, however, that 12.4 per cent of the population which was non-Estonian began to grow and between 1945 and 1989, the ethnic Estonian population would grow by 22 per cent, as opposed to the non-Estonians, whose population would rise 26-fold. By that point, the non-Estonian population would be ethnically 91.4 per cent Russian, who went from a size of 20,000 people in 1945 to 474,800 people in 1989. By 1989, the "total number of Slavic-language peoples (consisting of Russians, Ukrainians and Belarusians) was 551,000, or 35% of the population" (Ibid, p. 88).

This large population, mixed with their "concentration in industrial areas" meant that ethnic minorities lived in "a Russian-speaking social and cultural environment" and that "[t]here were some offices [...] and even localities [...] where it was impossible to

communicate in Estonian" and, in turn, that "it was possible to communicate in Russian almost anywhere in Estonia" (Ibid, p. 89). Some towns and areas were almost entirely non-Estonian. In 1993, approximately 30,000 Russian specialists lost their positions due to their inability to speak Estonian (Ibid, p. 92).

In the 1990s, 80 per cent of ethnic Russians wanted Estonian citizenship, with two-thirds of those aged 18 to 29 preferring Estonian citizenship, and the majority of young Russians were in no "hurry to apply for Russian citizenship" instead remaining loyal to Estonia (Ibid, p. 94). Though tens of thousands left the country by June 1996, approximately 190,000 Russians had become Estonian citizens (Ibid, pp. 94-95). It is also important to point out that in 1997, approximately 20 to 25 per cent of the population was made up of stateless persons (Ibid, p. 133).

According to data released in January 1999, of the 1.6 million people residing in Estonia (Ibid, p. 107) ethnic Estonians consisted 65.1 per cent of the population and the Russians consisted 28.2 per cent of the population (Ibid). This means that the Russians were still the biggest minority of the non-Estonian population, which was now 34.9 per cent of the overall population (Ibid).

Despite or perhaps due to the attempts of ethnic Russians to politically and culturally unite amongst themselves, the "indigenous population [. . .] strongly supported the State policy of displacing ethnic Russians from the country", though such policies have shifted in the latter half of the 1990s (Ibid, 98-99, 103-104). First, Estonians felt that if they "behave[d] harshly with [the ethnic Russians], then they['d] go back home" though by the 21st century, this had changed, with the Estonian government trying to integrate the Russians into the country, by way of investments, exchange programmes, and Estonian language courses (Jack, 2022).

The damage, however, of the policies caused by the ethnic tensions and the fear of re-colonisation and re-exploitation was already done. "The economic situation of linguistic" and ethnic "minorities [. . .] appear[ed] to be worse than that of" Estonians (de Varennes, 1999, p. 139).

In the 21st century, however, the situation is quite different. As noted by "the 2021 census, there are people of 211 ethnic nationalities living in Estonia", an increase by 31

in ten years (Statistikaamet, n.d.). The years, however, have not necessarily improved the relations between ethnic Estonians and Russians. Whilst trade and cultural exchanges did exist between Estonia and Russia and ethnic Estonians and ethnic Russians residing within Estonia, the restart of the Russo-Ukrainian war has soured much, with the removal of Soviet-era monuments and collective punishment of Russians for the war (Jack, 2022).

In 2022, 65,000 people were grey citizens, holding an Estonian passport, but not an Estonian citizenship, for which they would need to pass an Estonian language exam (Ibid). This effectively meant that they could access public services but had limited voting rights (Ibid). Approximately half a year into the war, "Russian-speakers applying for Estonian citizenship more than doubled" and, soon enough, Russians had a harder time entering Estonia, one of the rare EU countries to which they can flee from a dictatorship (Ibid).

A study looking at ethnic voting in Estonia and Lithuania also found that individuals who are part of ethnic minorities who speak the language associated with that minority are "more frequently are more likely to vote along ethnic lines" (Cheung, 2023, p. 64) which can be detrimental to democracy (Ibid, p. 65).

Naturally, questions about why and how these people are lacking Estonian citizenships remain. It is more important, however, to note that even over three decades later, ethnicity in Estonia defines what and how people learn, how they are treated by others, and what rights they have.

2.2 LGBTQ+

Whilst there have been some studies on the behaviour of Lesbian, Gay, Bisexual, Trans, and Queer voters, hereinafter referred to as queer or LGBTQ+ voters, there has been no study of the behaviour of queer voters as influenced by instances of I-voting systems. Much as with race and ethnicity in the last section, queerness and the social conceptions which form around this and similar terms, can have a big effect on one's

voting behaviour, interactions with community, and upon the very democracies one lives in.

Significant statistics would be difficult to collect due to a number of social issues, inter alia. Future studies of these issues thus would likely gain greater understanding of the issues faced by, and behaviours of, queer voters under these and similar systems by focusing on qualitative research.

There are, however, a number of studies which have been conducted on the behaviours of queer voters in democratic or semi-democratic systems, especially behaviours which are exhibited by said voters during times of threatened or realised abnormal discrimination against LGBTQ+ individuals and groups.

Kamenou (2025) "identified two approaches to voting among participants: voting abstention as protest [. . .] and LGBTQ+ intersectional voting, which involves LGBTQ+ individuals prioritising LGBTQ+ identities and issues at the ballot box yet understanding these as intersecting with other dimensions of inequality" (p. 3). In times of discrimination, Kamenou argues, queer voters do not act only as members of the queer community "but also as political agents of intersectional social justice and radical political change" (Ibid).

Page (2017) found that queer individuals "lack the support of other minority-group members" in countries with higher levels of political homophobic discrimination and that when such support is present, it "encourages political participation" (p. 1). In Western Europe, queer voters "who report sexuality-based discrimination" (Ibid) also show a higher level of political participation. Before the 2004 EU enlargement, Page continues, individuals living in Eastern Europe and "who report discrimination exhibited lower levels of non-electoral participation" (pp. 3 - 4) than those who did not, which was not true in Western Europe, where higher discrimination reporting also meant higher levels of nonelectoral participation when compared to those who did not report discrimination. "[D]iscrimination", Page concludes, "may translate into higher levels of political participation in places where marginali[s]ed groups can organi[s]e and support each other [...] Without a political-opportunity structure, there may be lower levels of political participation" (Ibid, p. 18).

Although institutionalised discrimination was not found to sway queer voters from voting or not voting in any significant way, this "discrimination arguably affected one's engagement in civil society", Page (p. 18) notes. Whether in terms of queerness, gender, or race, the access individuals have to local communities and to resources results in an increase in the voter engagement of these individuals and thus all of the group (Logan et al, 2012).

Perrella et al. (2012, pp. 91, 99 - 100) found that, at least in the Canadian and US political system, queer voters lean towards the left-wing of the respective political spectrums. In 2006, voters in the US leaned modestly left (Ibid, p. 110). Amongst queer voters, however, liberals outnumbered conservatives "by a margin of almost ten to one, [and] were more likely to endorse an active role for government in society and to see abortion as an acceptable option" (Ibid, p. 110).

It must be reiterated that studies on the political behaviour of queer voters is limited and often difficult to execute due to social, legal, and other restrictions. Overall, to gain a greater understanding of the behaviours of different voters, as well as the causes and effects of I-voting and voter disengagement, this investigation turns now to case studies. These case studies, involving Estonia and Switzerland, will provide the figures and the realities of voters with which to build an argument with.

Chapter 3: Case Studies

3.1 Estonia: For You O Democracy[4]

Estonia, a small country bordered by Russia, Finland, and Latvia, has had strained relations with Russia since its decolonisation. Despite its often precarious situation, Estonia stands out as "one of the most digitally advanced societies" (Maurer et al, 2024, p. 54).

In fact, in early 2025, Estonia, along with Latvia, and Lithuania, disconnected "all remaining transmission lines between the Baltic countries and Russia, Belarus and the Russian exclave of Kaliningrad" and merged it, after 24 hours, with the EU network (Al Jazeera, 2025). Moreover, Estonia finds itself technologically ahead of most nations, including most European, North American, and South-East Asian ones (E-Estonia, 2024; Roonemaa, 2017).

In 2024, it ranked "at the top of the United Nations e-government ranking" (E-Estonia, 2014), alongside Denmark and Singapore. Estonia has also nurtured such a state that it has found itself with an unusually high number of *unicorns* (E-Estonia, 2024). Unicorns, in investment and business lingo, refer to privately-owned startups which are valued at over one billion United States Dollars. On the topic of companies, it was an Estonian team that developed Skype and made the platform successful (Rang, 2020; Roonemaa, 2017). Estonia, as both state and its private entity partners, is also often involved with the promotion of and research into arising technological and scientific innovations, such as novel food.[5]

Estonia also "offers 600 e-services to its citizens and 2,400 to businesses" or, in other words, it offers almost all of its services online. The only services that the Estonian state doesn't offer to its citizens online are a) marriage and b) divorce (Work in Estonia, n.d).

---

[4] The title here is a reference to Walt Whitman's 1860 poem "For You O Democracy".

[5] Novel food is defined by the EU as "food that had not been consumed to a significant degree by humans in the EU before 15 May 1997" such as "extracts from existing food" and "food derived from new production processes" (European Commission, n.d). Estonia works on plenty of new technological innovations, largely with Accelerate Estonia, a governmental innovation lab, an organisation aiming to make it easier for companies to provide solutions by sharing publically scientific research and assisting in various scientific efforts (Accelerate Estonia, 2024).

In fact, during an hour-long lunch break, you can sell your car, file an online tax declaration, and vote, and still have at least 37 minutes left (Solvak & Vassil, 2016, p. 1). According to the Stakeholder Community Once-Only Principle for Citizens (n.d.), median voting times in the past have been approximately one minute and a half. In the 2011 parliamentary elections, "the cumulative time savings" of that year "were 11,000 working days" or half a million Euros in salaries (Ibid).

Which makes one wonder, how exactly did a tiny Baltic state that was a colony for over four decades manage to become one of the EU's technological and democracy leaders?

3.1.1 David & Goliath

In the weeks, months, and years following Christmas of 1991, aid and business came flocking alike to the newly independent markets that were once the USSR, eager to engender and exploit cooperation, growth, and privatisation.

Amongst these nations, Estonia was the first to wrestle control of itself from Moscow, having declared itself independent November 16, 1988, (Remnick, 1988) followed by the Estonian Supreme Soviet, its parliament, declaring the beginning of their independence transition in 1990, along with their support for their fellow break-away colony, Lithuania (Nadler, 1990).

In 1991, Estonian telecom industry's line penetration went from "22.9 subscribers per 100 population to 32.0 subscribers per 100", (Bruce, Kessides, & Kneifel, 1999) still having relied on much of the Soviet infrastructure, though instillation had "slowed [. . .] in anticipation of Estonia's imminent political and infrastructural reorientation toward the West" (Budnitsky, 2022). The technology and infrastructure that had already been established during the Soviet occupation era, which had lasted for more than forty years, was subpar or unfinished. As one scholar puts it, "many projects remained unfinished" and "cooperation was not effective from a technological point of view as early as in the 1960s" (Kochetkova, 2021). "'[P]ractical results'", she continues, "were not often achieved" (Ibid).

The political cost of assisting the then-colonies and satellite states of the USSR alike was uncertain at best and careful ideation was a necessity to both assist those suppressed and to remain on friendly terms with the coloniser or, at the very least, to remain on terms that were better than direct warfare.

Exempli gratia, one of the key allies in Estonia's effort to become independent both politically and technologically was Finland. The two countries, here meaning both the governments and the individual citizens, would go on to set up business, institutions, and other physical forms of combined economic and political efforts, both before and after the fall of the USSR. Throughout this period, then-president of Finland, "Mauno Koivisto[,] sent financial support to Estonia in the guise of cultural cooperation funds to avoid drawing attention from Moscow" (YLE, 2017). Furthermore, by 1991, Finland sent "over 100 million Finnish marks" to Estonia, in an effort to assist their decolonisation efforts, (Ibid) which would be over 30,000,000 Euro in 2024 (Statistics Finland, n.d.).

However, all of this business was but the beginning of a bigger and better programme.

In December of 1990, "the Estonian Informatics Fund (**EIF**) was formed [...] as a working body of the Estonian Informatics Council" (Information System Authority, 2025b), a government organ founded only a year earlier. In March of 1993, the Estonian government followed up by establishing a *Department of State Information Systems* or the *Riigi Infosüsteemide Osakond*, hereinafter referred to as **RISO**. RISO worked most closely with EIF, until 1996, at which point the EIF would be made into the Estonian Informatics Centre (**EIK**) (Ibid). Now more than just a subsection of a different government office, EIK was an authority under the government, in charge of creating Estonia's state information systems, organising technological collaboration and IT training efforts, and publicly publishing relevant technology policies and documents (Riigi Teataja, 2003). In 2000, the Department of State Information Systems was established under the Ministry of Transport and Communications, the latter would acquire jurisdiction of the EIK the following year. In 2003, EIK would merge with the Public Procurement Centre, and would keep the EIK moniker until June of 2011, at which point it would become the modern-day Estonian Information System Authority or RIA (Information System Authority, 2025b).

During that same period, Estonia has not just been catching up with Europe. It has been excelling well past it. "In January 2000, a new law came into force [...] which made it obligatory for citizens to obtain an eID-card" (Musiał-Karg, 2017, p. 78). Since 2005, "five elections of local governments, five parliamentary and three European Parliament elections have occurred" (E-Estonia, 2023). In Estonia, and in each one of those elections, voters have been able to vote for their preferred candidate(s) via the WWW. I-voting gained traction in the early 2000s and would be first used in 2005, where "80% of those on the electoral roll" had "access to a new e-voting system" (Sheeter, 2005). Though "less than 1% of all voters" (Ibid) and almost 2% of participating voters (Valimised, n.d.c) cast their ballots in this way in that first local *e*-lection, "those running the Estonian e-voting project hope[d] that 20% of votes cast in future elections [would] be registered in this way" (Sheeter, 2005).

They need not wait all that long.

3.1.2 Voting Process

Before one truly begins to study the voting process and the electoral system as a whole in Estonia, one should first understand what the term *Estonian voters* means. In the vast majority of countries, only citizens get to vote in elections and, most often, all citizens of legal age are de jure given the right to vote, barring serious mental disabilities. Disenfranchisement is extremely rare when considering the approximately 200 countries in the world. As mentioned earlier, in Estonia, residents who are not Estonian citizens can vote in local elections.

In 2025, however, a law was brought third-country nationals (non-EU citizens) will be unable to vote in any future local-level elections, with the exception of stateless persons, who will be able to "vote in the autumn local elections, but not in future municipal elections" (Estonian Public Broadcasting, 2025). Remarkably, this law is a direct amendment to the Estonian Constitution and it was the first amendment ever made to the "Constitution since it was drafted in 1992" (Ibid). In fact, in a 1996 election, approximately "80,000 'foreigners' voted in the local elections" (Martynova, 1999, p. 94).

For future Estonian elections and from here on out, this means that the term *Estonian voters* means all three things for the sake of local elections: 1) residents who have lived in Estonia for long enough *and* are simultaneously EU citizens *but* are not Estonian citizens, 2) Estonian citizens of legal age, and 3) Estonian citizens of legal age living abroad. In case of presidential elections, the term refers only to the second and third type of Estonian voters. Importantly, in local elections, Estonian citizens aged 16 and 17 years old are also allowed to vote (E-Estonia, n.d.).

Estonians make use of their ID cards or their mobile ID for the purposes of voting online (Springall et al. 2014; E-Estonia, n.d.). The mobile IDs or e-IDs are mandatory (Maurer et al, 2024, p. 54). National ID cards are frequent in Europe, though no such relevant and secure ID card is in use in places like the US (Abram, 2024), which makes the idea of secure I-voting a distant dream there.

After choosing their preferred candidate(s), an Estonian voter's I-vote "is saved in a container file which is signed and encrypted" and is then sent to the State Electoral Office server (E-Estonia, n.d.). After the voter's right to vote has been confirmed, the voters' "signature is removed to maintain [their] confidentiality" (Ibid). Each stage has its own form of counting, approval, and subsequent certification, and is overseen and documented, with the human elements being filmed (Ibid).

To ensure privacy and to mitigate any effects of voter coercement, fraud, and buying, the Estonian government allows voters to change their vote as many times as they need to online and to vote at the polling station later, thus making all of their prior votes non-valid (Maurer et al, 2024, p. 54). There has also been discussion as of late of making smartphones the primary voting device in Estonia (Ibid).

3.1.3 Security Issues

Some of the security issues facing Estonia have already been discussed in 1.3.1. Concerns and Solutions, due to the limited amount of long-term projects or programmes from which academics and specialists may reference. In this section, the author has attempted to avoid any unnecessary repetitions of earlier stated concerns and ideas.

Concerns about the security of the Estonian i-voting system remain, despite a general positive consensus on it. Malware exists "that changes or blocks the i-voter's i-vote" (Valimised, n.d.d; Abram, 2024) and for such issues there already exist applied solutions.

One solution handles the problem by allowing a voter to check their vote after the matter, through a smart device, such as a mobile phone that has a camera and a WWW connection.The process is as follows:

"The voter makes their choice", which causes the software in use to generate a random number. They "are encrypted together with the public key of the voting system" (Valimised, n.d.a); the text produced is then known as a cryptogram and it is signed.

The appropriate elections server, having received the cryptogram, generates another code, which is sent along with the text back to the voter in the form of an IQ code (Ibid).

Having scanned it, the voter effectively sends the session code back to the server, which in turn sends the encrypted vote back to the voter's smart device, which then means they are able to see their vote and check whether all the entered information is correct (Ibid).

Should anything be incorrect, voters may use the aforementioned method of simply voting through their computer again in the days prior to the actual election Sunday or by physically voting on the election day, the latter of which cancels automatically prior, online votes (Valimised, n.d.d; Musiał-Karg, 2017, p. 78; Maurer et al, 2024, p. 54). After the elections are "over, [the Vote Storage Serves] sorts and cancels vote[s] based on double vote[s]" and afterwards "removes the digital signature", ensuring voter anonymity. This is then transferred to an offline system, which counts the votes and records it for the purposes of data analysis, which is performed afterwards, to ensure that all is in order (Chowdhury, 2013, p. 61).

Often, the questions and concerns surrounding identity confirmation and bad faith actors that may be voting in the name of a different person come up. For that and other reasons, Estonian officials have decided that, in order to vote, eligible citizens need an "eID-card with valid certificates", "PIN codes", a computer with eID reader software and

hardware, a WiFi connection, and either a Windows, MacOS or Linux operating system. (Musiał-Karg, 2017, p. 78).

"[T]he Standing Committee on Cybersecurity at the Estonian Academy of Sciences" found no high-level risks but did find "six potential medium-level risks" in their analysis of the Estonian I-voting system (Information System Authority, 2025a). These are, as follows, anti-democratic campaigns, continuous security and reliability advancement, further development of verification method and of the voting mobile app, I-voting protocol transparency betterment, further refinement needs, and electoral information reliability strengthening (Ibid).

Even those works which have heavily criticised the safety and security of the Estonian I-voting system do not fail to notice the measures to which the Estonian government, its agencies, academics and specialists, and workers have gone to to ensure a safer system. Having done so for so long and to such an extent, Estonia has also provided a wealth of information for academics in this field to study and reference, and have, additionally, exceeded expectations of what an I-voting system can do.

One example of such work is the Springall et al. (2014) investigation which, despite its authors' dislike and distrust of the system, has commended the work of Estonia's Internet Voting Committee and the use of ID cards (Ibid, p. 712).

3.2 Switzerland: To the States,[6]

Where Estonia triumphs, Switzerland stagnates.

I-voting is not a perfect system and it willl certainly not solve every issue facing democracy, now, before, or after. It, much like TikTok and pizza parties, is not the saving grace of politicians whose popularity has fallen steeply nor is it a surefire way of boosting voter turnout. These are all tools and, as any tools of the trade, they might be used to promote and protect democracy or to tear it all down.

---

[6] The title here is a reference to Walt Whitman's 1860 poem "To The States,". Within the poem, Whitman criticises the state of the United States during the Civil War, its president, leaders, representatives. It ends hopefully, imagining a political, democratic awakening in the peoples of the States.

As outlined earlier, I-voting is also often held in disregard due to both the imagined and the real insecurities that the system brings about. Authoritarian and adjacent leaders already have much sway when votes are submitted by way of paper, let alone when votes are handled in a digital format by a system behind whose curtain one cannot peek for sake of electoral security and safety.

Despite these fears, however, the Estonian public has decided that they trust their government and the I-voting system itself enough to use that system more often than any other currently known method. Does this standard apply to any other place? Does this apply to Switzerland?

3.2.1. Cantons Which Cannot

Swiss citizens find themselves in the voting booth several times a year, as they can challenge "any parliamentary vote" under their direct democratic system (Hall, 2012, p. 162). Postal voting has been in use since 1995 and, by 2003, nearly 95% of Genevan voters were using it (Ibid).

In Switzerland, I-voting [7] "has been in a trial phase since 2004" (Federal Chancellery FCh, 2020), one year before Estonia had its first instance of nation-wide I-voting, and had actually "set about the implementation of" I-voting "in 1998 (Musiał-Karg, 2017, p. 81). Between 2004 and late 2020, it has resulted in a total of 300 pilot tests across 15 of its 26 cantons, with only volunteer voters, with the number of such voters limited by federal and canton law (Federal Chancellery FCh, 2020). The idea for the implementation of I-voting actually arose in the year 2000, when Geneva, Neuchâtel, and Zurich volunteered to implement such programmes (Torn, 2014, p. 29). This I-voting project, named Vote électronique, began as "a joint project of the Confederation and individual cantons" (Musiał-Karg, 2017, p. 81).

In the 2004 instance, "21,8% of the eligible voters chose to cast their vote online" and the average turnout for those municipalities which offered I-voting as an option showed slightly higher turnout (Torn, 2014, p. 29). After these successful attempts, however, the

---

[7] It is important to note here that I-voting is often referred to as e-voting in Switzerland and that the two are used as synonyms (Milic et al, 2016, p. 4).

I-voting option was pulled back, with most of the electoral voting opportunities in Geneva "having involved referendums, rather than election of representatives or parties" and, in the four occasions where all voters were allowed the opportunity to vote online, an average of 18.3 per cent of voters chose to do so (Ibid).

The Swiss I-voting system also differs from the Estonian (and other) systems because it lacks a "post-channel verification protocol" that would allow the voter to understand how their vote was marked (Torn, 2014, p. 29 - 30) or, where it does have such a protocol, it is done via snail mail (Maurer et al, 2024, p. 45). Additionally, Switzerland even "has the most detailed i-voting regulation" as of time of writing, and the source code and documents, which were developed with the cooperation of international experts, are publicly available (Maurer et al, 2024, p. 54), with the latest the "Swiss Post's new e-voting system" having been publicly available since 2021 (Political Rights Section, 2023, p. 3). This very detailed level of regulations, however, might not be a sign of good management but the symptom of a complicated relationship between the federal and cantonal authorities. The Swiss I-voting incarnations have been riddled with security and public trust issues for years and far too often: in 2015, 2018, and 2019 (Serdült, 2019). In 2019, some citizens launched an "initiative [. . .] asking for a five-year moratorium as well as for a system even lay people can understand" (Serdült, 2019), showing that public trust has eroded, if it was ever truly there, and that the system is far too difficult to understand or use.

Despite being the first country to use I-voting at all, Switzerland has also taken steps to limit or effectively sabotage all of their I-voting trials, showing the existence of political will against the system, with disagreement and debate seemingly present most often amongst experts and politicians, not the voters (Serdült, 2019). "[F]or national-level trials", for example, "involving residents the share of voters eligible to vote online has been limited to" 30 per cent of canton residents since 2012 (Germann & Serdült, 2017, p. 11; Political Rights Section, 2023, p. 3) and only ten per cent for the electorate of the whole country (Political Rights Section, 2023, p. 3). There is no such upper limit for those with disabilities or non-residents (E-Voting Informationsplattform der Kantone, 2025).

By 2018, "the cantons of Geneva, Zürich, and Neuchatel allow[ed] voters to vote online in local, state, and federal referenda and elections" and only between 10 and 20 percent of voters did so, or about 5 percent of all Swiss citizens eligible to vote (Lust, 2018, p. 66). Meanwhile, in the 2015 Estonian national election "31 percent of Estonian voters cast their ballots on the internet" (Ibid). Additionally, "51 percent of the votes in" the 2023 Estonian election "were cast online—making Estonia the first country in the world where electronic votes outscore the traditional ballot box" (Jourdain, 2023).

As for how loyal voters remain to the Swiss I-voting instances, in "the Swiss canton of Geneva [. . .] almost one third of voters did remain loyal to the iVoting channel [whilst] the remaining two–thirds either abandoned iVoting or exhibited hybrid patterns in select[ion] among the available voting channels" (Mendez & Serdult, 2017, p. 23).

In 2019, the Federal Chancellery of Switzerland was commissioned "to work with the cantons to redesign the trial phase of e-voting", a task in which it promised to "[f]urther development", control and assess, ensure more transparency, and more closely cooperate with "the academic community" (Federal Chancellery FCh, n.d). This was a result of the immediate halt of I-voting trials in that same year, after a group of experts revealed major security flaws in the system, and it would not be until three years later, in July 2022, that the trials would be resumed (Wetherall-Grujić, 2023).

I-voting is also historically not very popular in Switzerland (Trechsel, 2002, p. 18; Germann & Serdült, 2017, pp. 12-13; Mendez & Serdult, 2017, p. 23; Swissinfo & Romy, 2018; Swissinfo, 2018; Swissinfo, 2019). In Geneva and Zurich, approximately 15 and 20 per cent cast their votes online, respectively, which is a significant drop from the first I-voting enabled election, in which around 30 per cent of voters used the Internet to vote (Germann & Serdült, 2017, p. 12). Some cantons experience even lower levels of I-voting due to "added burden[s] of registration" and expensive and timely bureaucratic processes (Ibid, p. 12).

In Geneva, also, by the end of 2014, less than half of the municipalities in Geneva had "participated in the federal trials, with some participating in more than 20 trials" (Ibid, p. 15). Postal voting, however, remains in use to cast about 80 per cent of the votes in Geneva, 70 per cent in Zurich, and 85 per cent in Neuchatel (Ibid). More unpopular, it

seems, is in-person voting, which accounts for only five to ten per cent (Ibid). The only group which has almost fully embraced I-voting are the expatriates, of whom 50 to 70 per cent of use this method (Ibid, pp. 12- 13).

The average voter turnout information and breakdown for Geneva and Zurich can be found below, in Table 1.

	Geneva	Zurich
Approximate average voter turnout	55%	49%
of which I-voting	15%	20%
of which postal	80%	70%
of which in-person	5%	10%

(Germann & Serdült, 2017, pp. 12, 15)

As illustrated above for the ease of comparison, postal voting remains by far the most used method of voting in these two cantons, as well as others.

There is, however, some light at the end of the tunnel, though whether it is a particularly strong bulb or the end of Swiss I-voting struggles remains yet to be seen. I-voting in Switzerland remains popular amongst those living abroad and, according to some polls, "the domestic Swiss population also support[s]" I-voting (Wetherall-Grujić, 2023). Some polls even show that 70 per cent of Swiss voters view I-voting favourably (Serdült, 2019). Milic et al (2016) also found that the majority of the Swiss electorate are actually in favour of I-voting systems being used as part of elections (p. 24), especially the younger voters (p. 22), although voters who aligned themselves with the Swiss People's Party, a right-wing political party, had, on average, less favourable views of online voting, along with the voters of the left-wing Green Party of Switzerland (p. 20).

It is this author's belief that Switzerland is an outlier when it comes to I-voting, due to a number of reasons, including but not limited to poor implementation and management of I-voting systems, average I-voter characteristics, and a lack of political will to make I-voting work. Switzerland has taken a unique path around I-voting, one which appears

to be not merely a case of stagnation and accidental failure, but rather one that is a tale of caution for e-governments everywhere.

3.3 Correlation Betwixt Voter Turnout And E/I-Voting

In the parliamentary election of 2007, 3.4% of all Estonia's voters cast their ballot online, or 5.5% of the participating voters. In the local and European Parliamentary elections of 2009, those numbers were 9.5% and 6.5%, or 15.8% and 14.7%. In the 2011 Estonian parliamentary elections, 21.2% of participating voters decided to cast their ballots through the i-voting system, over half of whom did so in advance, before election day.

Today, "Estonia is a global leader in terms of employing electronic voting in elections" (Musiał-Karg, 2017, p. 78). In terms of national elections, Estonia has had, time and time again, high voter turnout, ranging from 57.4% at its lowest to 67.8% to its highest (Valimised, n.d.b), though it should be noted that the parliamentary elections on average had a turnout of 62.7 per cent by 2014, whilst local elections had a turnout of 55.3 per cent, and European Parliament elections had the lowest of the three, with only 40.2 per cent (Torn, 2014), with trends remaining similar in later years (Valimised, n.d.b). Additionally, I-voting has had "the greatest impact on voter turnout" on the Estonian diaspora (Valimised, n.d.d). In the 2015 Estonian election, Estonians voted "from 116 different countries" (Stakeholder Community Once-Only Principle for Citizens, n.d.).

Of course, the correlation between e/i-voting and voter turnout is not as well-researched as it could be, in large part due to the low number of countries that participate in active, longer-term I-voting and the relatively short amount of time in which I-voting has been an option for participating countries' citizens.

Studies and reports are only now coming in for what is, at most, a little more than a two decades long project, and the findings often contradict one another. In Japan and Switzerland, DRE or on-site voting led to higher turnout (Dandoy & Umpierrez, 2021, p. 30), albeit only amongst some groups (Petitpas, Jaquet, & Sciarini, 2021, pp. 3 - 4, 7, 9 - 10), whilst in Belgium it led to lower turnout (Dandoy, 2014). In the majority of small

pilot I-voting projects, I-voting "has not been found to increase turnout" (Hall, 2012, p. 157).

In India, it also led to a lower turnout, but this is suspected to be due to the fact that "under the paper ballot system [. . .] ballot boxes were stuffed with fake ballots which resulted in unusually high voter turnout" (Debnath et al, 2017, p. 29). In fact, that particular study found that the introduction of e-voting machines "led to 3.5 percent decline in voter turnout", with larger declines "in states prone to electoral fraud and [...] politicians fac[ing] serious criminal charges" (Ibid, p. 3). The ability of the illiterate, women, scheduled castes[8], and other marginalised and vulnerable people to vote significantly improved after DRE was made available to them (Ibid). Although not I-voting, e-voting in India has made lives better, leading to greater voter turnout, a more competitive electoral process, less fraud and intimidation, a decline in crime rates, and even, later, a greater availability of electricity in those constituencies using DRE "than their counterparts using paper ballots" (Ibid, p. 4, 29 - 30). It is important, however, to remember that the research and the data of this particular system in this particular place is very limited and thus other elements that might be significant or even largely responsible for the rise in electricity access or the lowering of crime rates might have been overlooked.

In Brazil and the Netherlands, another study found, however, that DRE voting had done nothing to improve or worsen the voter engagement situation. I-voting had "no effect on domestic voter turnout in Estonia [...] and Switzerland" (Dandoy & Umpierrez, 2021, p. 30) but led to a voter turnout increase in Brazil and Canada. Non-domestic voter turnout is rarely discussed and even more rarely researched, with minor exceptions (Ibid, p. 34 - 35). One study found that the existence of an I-voting option for non-domestic voters registered in West Virginia increased voter turnout by three to five per cent, with similar results in Switzerland (Ibid), the latter of which does not implement I-voting in most of the cantons. In the cantons that allow i-voting in at least some capacity, numbering four at time of writing, "a maximum of 30 percent of cantonal voters and 10 percent of national voters can use e-voting", though "[t]here is no such upper limit for Swiss

---

[8] Scheduled castes are "historically marginali[s]ed groups of people in India who face continual social and economic discrimination" and "fall outside of India's four-tier Varna caste system" (Bullard, 2025).

citizens living abroad and people with disabilities" (E-Voting Informationsplattform der Kantone, 2025). Even these are not full-fledged programmes but, rather, are referred to as "e-voting trials" and are made complicated to access (Ibid). Unlike the Estonian system, in which a voter may change their i-vote "by voting online again during advance polls, or by voting at the polling station during the days of advance voting" in which "case, the last i-vote cast or the vote given at the polling place is taken into account" (Valimised, n.d.d), making I-voting redundant (E-Estonia, n.d.). Switzerland doesn't allow repeats or changes (Ch.ch, n.d), which also means that fraud, voting coercion, and threats are more easily committed and gotten away with. Switzerland also makes it harder for voters to participate in the e-voting trials, with the "the cantons requir[ing] a basic permit" from the voter-to-be, which is "usually granted for a maximum of two years" by the government (E-Voting Informationsplattform der Kantone, 2025).

In a study conducted in Ecuador, "two electoral districts abroad used e-voting", one used DRE whilst the other one used Internet voting (Dandoy & Umpierrez, 2021, p. 34). The authors found that "Internet voting had a positive and significant impact on non-resident citizens' voter turnout", as well as that turnout "increased as compared to previous elections and neighboring electoral districts" (Ibid, p. 35). Additionally, the study showed that the and that that "increase [was] even higher in the case of the presidential elections" (Ibid). All in all, voter turnout was found to be "higher by 13% in" those districts which used I-voting as compared to those which did not (Ibid, p. 34). A 2018 study also found "that e-voting is the preferred method for voting", at 42 per cent, for those EU voters living in an EU country which they are not a citizen of (Mildebrath, 2024, p. 3).

A study which looked at Geneva, Switzerland, and which was largely based upon "a rich set of registered participation data covering 30 direct democratic votes and a period of eight years" (Petitpas, Jaquet, & Sciarini, 2021, p. 1) found that the choice of several systems, including postal, i-voting, and on-site e-voting, "increases participation among abstainers and – to a lesser extent – among occasional voters" but did "not contribute to lower the age gap" (p. 9). In fact, "[t]he only [age] category of seldom voters benefiting from" i-voting availability was that "born before 1930" (Ibid, p. 10). The same study,

however, notes that its results reaffirm "the positive contribution of e-voting to the equality of participation" (Ibid, p. 9) as found in the 2016 study by Solvak and Vassil.

Each country is different, not only in the laws and methods which they employ for I-voting, nor only for the enthusiasm or dread with which their respective governments engage the voting system with. Matters of education, quality of life, and culture produce different effects with I-voting, too. Seemingly simple factors also play a key role. As the authors of the Ecuadorian study have said, their case "seems to indicate that gender is an important variable" (Dandoy & Umpierrez, 2021). Time and time again, authors find different results in different places; from one country to another or even from one district to another.

Furthermore, the method of the studies themselves may be erroneous and the topic itself is very difficult to measure. "Existing studies [...] did not or could not assess the effects of the availability of e-voting on political participation on the individual level" because "studies relying on aggregate data are by definition ill-suited to detect fine-grained effects among citizens or groups of citizens" and, also, "individual data taken from surveys do not provide valid measures of e-voting effects" (Petitpas, Jaquet, & Sciarini, 2021, p. 1).

Scholars are not just disagreeing whether voter turnout would drop or rise thanks to e/i-voting but also how and why it would do that. "Some argue that e-voting may reduce inequalities by increasing turnout among groups that participate less" (Ibid). Other authors argue that such a system will only make it harder to reduce voter inequalities, instead "favo[u]ring well-educated and wealthier citizens" (Ibid). Are they wrong?

A study from the University of Tartu found that "in the first three [Estonian] e-enabled elections, e-voters were indeed clearly distinct, they were younger, with better computer skills and mostly ethnic Estonians" (Solvak & Vassil, 2016, p. 166). Should that have been it, the critics would have been proven correct. Estonia, though, continued its work. After those three elections, "these differences started to disappear, meaning that e-voters became progressively less distinct from regular paper voters" (Ibid). By 2015, one can not really "differentiate between e-voters and paper voters based on a list of

socio-economic characteristics and can safely say that e-voting has become a tool of the masses, with all [...] groups engaging in this type of voting" (Ibid).

It is not as if its supporters believe I-voting to be a perfect system which brings about 100 per cent voter turnout and zero per cent poverty. Systems take time to build up and can always be improved. In addition, low turnout "is less likely to be a result of the high costs of voting than of a general dissatisfaction with politics" and "general distancing from politics" (Directorate-General for Internal Policies, p. 9 - 10). That being said, it is important to note that some studies "suggest that a reduction in transportation costs would increase voter turnout" (Acuña-Duarte & Salazar, 2024, p. 14) and that such costs are still a part of the overall problem.

Switzerland seems to be an exception to the current pattern. Whereas insignificant changes in voter turnout stemming from the use of I-voting systems is often the result of short-term or early-cut pilot tests (Hall, 2012, p. 157). Though there was political will for I-voting in Switzerland in the early 2000s (Trechsel, 2002) and less so in 2010s (Ibid, p. 162), it was not very widespread and the idea was often criticised, at least in the forms that Switzerland had wished to proved it in (Trechsel, 2002, p. 18).

As the Tartu academics put it, "[a]s with anything, it simply takes time for regular voters to get comfortable [...] Politicians are well advised to be patient and not discontinue e-voting [...] when they do not see immediate wide usage, as was very much the case in Norway" (Ibid, pp. 166 - 167).

3.4 Vote for Me, But Not For Thee

Why does one I-voting system work when another one does not? It is difficult to answer this question definitively but, as mentioned above, time and political will has a lot to do with making an instance of I-voting work. Finding a correct balance of security, usefulness, political will, and voter-friendliness is difficult and time consuming and thus, often, i-voting pilots and programmes are cut before they have truly had the chance to grow (Solvak & Vassil, 2016, pp. 166 - 167).

Such cases can be found in many countries, including "Britain, France, the Netherlands, Finland, and Norway, Spain, Portugal, and Greece" (Lust, 2018, p. 65 - 66). These pilot programmes "have eventually been discontinued because of security problems, including the ease of hacking" both PCs and government servers, and due to "the weak encryption of electronic votes" (Ibid, p. 66). Critically, these projects also "failed to increase electoral turnout"—an important issue facing modern democracies—either because voters have little reason to acquaint themselves with new and likely very temporary voting systems "or because political interest has more influence on turnout than the convenience of voting" (Ibid).

Until early 2025, all foreign citizens who had permanent residence in Estonia were granted the right to vote in local elections (Estonian Public Broadcasting, 2025; Waldrauch, 2003, pp. 18, 24, 28). By 2003, the right vote on a local level unrestricted to a certain territory or citizenship had been accorded to foreign residents of 13 countries, seven of which "explicitly require[d] a minimum duration of residence between one [...] and five years" or "of two and three years" (Waldrauch, 2003, p. 24). Importantly, non-citizens were not accorded the right to be candidates in local elections in Estonia, as was the case in some of the other countries (Ibid, p. 25). By 2023, "14 countries ha[d] adopted i-voting in binding political elections to some groups of citizens" (Chatten & Karlsson, 2023, p. 1).

Specifically in the two cases which the author here has laid out, the differences are many and the reasons for their success and failures are reflected within those elements. The voters of Switzerland, ut dicitur, rely heavily upon the postal service for all their electoral needs (Hall, 2012, p. 162). Even the Genevian I-voting instances had relied on snail mail, as the voting cards which voters must reference and use to vote online, are sent to them by mail (Torn, 2014, p. 29) and they can also check their vote via mail too (Maurer et al, 2024, p. 54). Additionally, three weeks prior to the referenda, by way of snail mail, "the government sends out a booklet presenting the arguments for and against the question being put to the vote", thus communicating with the public their analysis of the issues on the table (Thoele, 2016). Finally, by the mid-90s, Geneva and Zurich had both introduced "automatic postal voting, whereby voters are automatically

mailed their ballot papers and can return them by post" (Germann & Serdült, 2017, p. 6).

Switzerland is also an outlier in terms of sex. Individuals who are assigned female at birth and women make up approximately half the world at any given time and thus are not a minority. They are, however, a marginalised group, often facing issues in voting and exercising their rights.

In I-voting trials or systems which go on for more than one elections, the most frequently observed dynamic is the following: in the first election, the average I-voter is a well-educated man, usually with higher income, whilst in following elections, the dynamic flips and the average I-voter becomes a woman. As mentioned previously, this was the case in Ecuador. The Ecuadorian study looked at two consecutive elections which made use of paper ballots, DRE machines, and I-voting, and how districts with the latter did when compared to those which used only paper and the machines. The voter turnout for male voters "increase[d] by 8.31% and no less than 13.80% among female voters" (Dandoy & Umpierrez, 2021, p. 33).

In Estonia, gender was either not significant in the analysis, with only an occasional slight imbalance towards men under the age of 40, in studies published by 2011 (Serdült et al, p. 33) or, when looking at official data from the Estonian government, was significantly leaning towards representation of women (Valimised, n.d.c) as seen in Table 2 below. As Serdült et al (2015) found in their study of I-voters' characteristics, studies on Estonian I-voters income and education levels often contradict one another (p. 32).

A study set in Ecuador found that "[v]oter turnout using Internet voting increased as compared to previous elections [...] in the case of female voters" inter alia (Dandoy & Umpierrez, 2021, p. 35). Contrary to the Ecuadorian study, a study set in Geneva, Switzerland found that "offering e-voting thus tends to contribute to the inequality of participation between men and women" (Petitpas, Jaquet, & Sciarini, 2021, p. 10).

As these two investigations contradict, additional sources might shed some light on the issue. As Ehin et al. (2022) point out in their study of Estonia, even though the I-voters of the first election largely consisted of males, the "proportion started to reverse itself

relatively quickly [...] with female voters making up 54 per cent of i-voters in the 2019 elections". Already by the 2009 election, the majority of the votes cast online was cast by women, as seen below in Table 2.

Election	Men	Women
Local elections 2005	5,061	4,256
Parliamentary elections 2007	15,681	14,594
European Parliament elections 2009	28,879	29,735
Local elections 2009	49,343	55,070
Parliamentary elections 2011	65,396	75,450
Local elections 2013	63,963	69,845
European Parliament elections 2014	50,000	53,151

(Valimised, n.d.c)

As seen in Table 2, after the first election which made use of I-voting, the number of women I-voting overtook the number of men.

Even e-voting instances which do not make use of the WWW, ut dicitur, often have a similar effect, as was the case in India (Debnath et al, 2017, pp. 3, 15).

In Switzerland, however, well-educated, high-income men remain over-represented in I-voting (Serdült et al, 2015, p. 30).

It is also important to note that Switzerland and Estonia are very different countries, too. Whilst Switzerland is a federal direct democracy (About Switzerland, 2024), Estonia is a "highly centrali[s]ed nation" (Alvarez et al, 2009). Both countries are relatively small, which should serve as an advantage

Switzerland's example provides lessons. Putting aside the technological capabilities of the nation and its people, a number of other factors can influence the success or failure of this and other electoral systems. The decentralised cantonal systems, the public and

expert distrust in the government, and the lack of political will are all important issues to study in order to understand what went wrong (and what is still going wrong) in Switzerland.

Chapter 4: Discussion, Conclusions, and Future Research

4.1 A Chance for Democracy?

Overall, I-voting is efficient when compared to paper ballots—"counting and recording of votes tends to be faster and more accurate" and "it might be a more cost-efficient technology in the long-run, since it may" reduce personnel, material, and other costs (Directorate-General for Internal Policies, 2016, p. 10).

I-voting could be particularly useful to places like the EU. As mentioned earlier, eight million EU citizens were living in another EU member state in 2016 (Ibid, p. 9) and that number has risen to 13.7 million people since (United Nations Regional Information Centre for Western Europe, 2023). Increasing voting availability to these individuals and the minimisation of the discrepancies between Member States' electoral procedures are important goals for the EU, and reports by various institutions of the EU have already suggested the use of I-voting as a solution to this and other issues (Ibid, p. 9, 11).

The potential effects might appear small at first glance but to understand the importance of it, we might use an example to better understand the opportunities for democratisation that I-voting brings with it. Nearly three million Spanish nationals live abroad and about 60 per cent of those live on the continent of Europe (Instituto Nacional de Estadistica, 2024). Of the three million, 42.5 per cent of them are aged 16 to 64 years old and over 15 per cent are under 16 (Ibid). The number of those living abroad is also noticeably rising year to year, with a 4.2 per cent rise between 1 January 2023 and 1 January 2024 (Ibid). With so many still so young, they will have the right to vote for decades to come, whether they already have that right or if they will gain it in a matter of years and months. The question here is how difficult it will be for them to exercise their right to vote in the years to come and whether, by refusing to develop I-voting systems, governments are actually preventing a better and more representative democracy in which the people have the power and, thus, where the people have a better life.

Expats, emigrants, and the diaspora in general can be important parts of elections when allowed and able to vote. Exempli gratia, Moldova just barely avoided democratic backsliding, Russian influence, and swerving from the path to the EU thanks in part to an engaged diaspora, whose turnout was 35 per cent higher than in the previous round and over 80 per cent of whom voted for the incumbent president (Centre for Eastern Studies, 2024).

Many studies published in the early and mid-2000s have found that it is of great import that governments do not only offer a "'pure' e-voting module to the electorate", (Trechsel, 2007, p. 177) such is the case in Switzerland, by way of which the voters may only vote and do no more, but also to build these online spaces in a way that allows the voter to, inter alia, learn more about the issues and parties and set up "their own political attitudes and match them with those of candidates" (Ibid).

4.3 Future Directions and Research

Though this investigation has explored many avenues of this particular political knot which affects so many nations and regions of the Earth, there remain many questions. Future investigations could attempt to procure a more specific method by which I-voting could seek to alleviate issues global democracy is facing at this moment. Furthermore, an investigation might be able to propose a detailed and constructive method by which I-voting could be used to democratise regional, supranational, and global governance and provide further chances for voters to engage with decision-making at those levels.

Additionally, further investigations into how different age groups interact with I-voting are necessary, as it remains unclear whether age is a truly important factor in how voters interact with I-voting or whether it is statistically insignificant. This is especially important to look into on a scale of years and decades, rather than singular elections, as this investigation has found that statistics of I-voters take time to equalise and then settle.

Some studies found that "[y]ounger citizens are more likely to adopt i-voting as their main form of voting, compared to older citizens" (Chatten & Karlsson, 2023, p. 17). However, "middle aged voters are more likely to adopt i-voting than younger voters,"

who "are more likely to abandon i-voting after using it than older voters" (Ibid). The paper continues, saying that "older citizens were becoming more common amongst i-voters" (Ibid). Another study found that the youngest generation was often not the one most likely to use I-voting (Serdült et al, 2015, p. 38). This indicates that trends amongst age groups could easily shift, not only with individuals aging *and* retaining their computer literacy, but also due to government programmes, changes in how I-voting is conducted, and a change in other pertinent elements. Gender in terms of I-voting, on the other hand, remains the least clear socio-demographic element (Ibid, p. 39).

Expatriates are "perhaps the least understood population of voters who" could benefit from I-voting (Hall, 2012, p. 157) and the most successful expatriate voting trials have occurred in Estonia and Switzerland (Ibid, p. 158; Germann & Serdült, 2017, pp. 12 - 13).

Further research is necessary into how specific instances of e- and I-voting affect not only crime rates but also how they affect voters and democracy in specific areas. Although Estonia is very well-documented and well-researched, it is a rare gem in the academic research area of I-voting. This means that it provides a lot of relevant and important research data but it also means it provides the plurality of it, too, if not the majority. Its success story is a point of attraction to many scholars which results in a lot of focus on it and not enough on other instances.

When it comes to understanding why people do or do not vote online, socio-demographic variables should be taken into an account only to a certain degree. To assume that the old will always lack computer literacy, that the young will always love a touch-screen, and that the marginalised will forever remain fenced off would be a grave error for any future researcher to make. People gain new skills, grow old, and change. Instead, the author of this work suggests, future research ought to be focused more upon the technological and safety issues that nations will need to overcome to make voting fair for all.

4.2 Conclusions

The author can draw several conclusions from this investigation, findings which directly address the overarching research questions concerning I-voting's impact on voter engagement and democratic vitality. I-voting offers compelling prospects for enhancing democratic participation, accessibility of voting rituals—particularly for marginalised demographics and non-residents—and the lessening of voter fraud and disengagement. Its implementation, however, often involves a series of complex security challenges which demand both robust technological solutions and also transparent governance practices.

The unique trajectory of I-voting in Switzerland, when contrasted with Estonia's sustained success, emerges not merely as a case of stagnation but as an instructive outlier. I-voting in Switzerland continues to be ridden by frequent interruptions, sudden changes, and bureaucratic processes set heavily against its favour. This suggests that a successful adoption of an I-voting electoral system and, by extension, benefits such as better civic engagement, is less about superiority of technology or of the state, and more about its careful and thoughtful integration into a nation's unique political culture, its capacity to build and sustain public confidence, and the consistent commitment to addressing security vulnerabilities transparently and effectively.

Without uninterrupted political will, transparency in governance and development, and consistency in the electoral system itself, the voters will neither trust the government nor the system. Voters remain largely uninterested in using a system which they are barred from fully understanding, beyond the point that it seems likely to disappear within a single electoral cycle.

Bibliography

About Switzerland. (2024, March 1). Political system.

https://www.aboutswitzerland.eda.admin.ch/en/political-system

Abram, C. (2024, October 28). *Why Can't I Vote Online?* [Video]. YouTube.

https://www.youtube.com/watch?v=LrHaXyv8eO0&t=411s&ab_channel=CleoAbr

am

Accelerate Estonia. (2024). *Accelerating Novel Food Approval.*

https://accelerate.ee/projects/novel-food/

Acuña-Duarte, A. A., & Salazar, C. A. (2024). Travel Cost on Election Day and

Voter-Turnout in Chile: Exploring University Students' Willingness to Cast a

Hypothetical Online Vote. *SAGE Open*, *14*(2).

https://doi.org/10.1177/21582440241252057

Al Jazeera. (Feb 10, 2025). Why have Baltic states unplugged from Russia's electricity

grid?

https://www.aljazeera.com/news/2025/2/10/why-have-baltic-states-unplugged-fro

m-russias-electricity-grid

Alvarez et al. (2009). Internet Voting in Comparative Perspective: The Case of Estonia.

PS: Political Science & Politics, *42*(3), 497–505.

doi:10.1017/S1049096509090787

Bastos, M. (n.d.) Social media 'bots' used to boost political messages during Brexit

referendum. City St. George's.

www.citystgeorges.ac.uk/research/impact/case-studies/social-media-bots-used-to-boost-political-messages-during-brexit-referendum

Belinfante, A. (2000). *TELEPHONE SUBSCRIBERSHIP IN THE UNITED STATES.* Federal Communications Commission. https://transition.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/subs1199.pdf

Berkeley Initiative for Young Americans. (2025). The Risk Generation: How new forms of risk are shaping the youngest generations. https://youngamericans.berkeley.edu/risk-generation/

Budnitsky, S. (2022). A Relational Approach to Digital Sovereignty: e-Estonia Between Russia and the West. *International Journal of Communication, 16*. https://ijoc.org/index.php/ijoc/article/view/16896

Berg, E. (1999). *Writing Post-Soviet Estonia onto the Modern World.* Copenhagen Peace Research Institute. https://ciaotest.cc.columbia.edu/wps/bee01/

Bruce, R., Kessides, I. & Kneifel, L. (1999). *Overcoming Obstacles to Liberalization of the Telecom Sector in Estonia, Poland, the Czech Republic, Slovenia, and Hungary.* World Bank. https://documents1.worldbank.org/curated/pt/774401468759582457/pdf/multi0page.pdf

Bullard, E. C. (2025). Scheduled Castes and Scheduled Tribes. EBSCO. https://www.ebsco.com/research-starters/social-sciences-and-humanities/scheduled-castes-and-scheduled-tribes

Centre for Eastern Studies. (2024, November 4). *Moldova: diaspora votes propel Maia Sandu to re-election.*

https://www.osw.waw.pl/en/publikacje/analizes/2024-11-04/moldova-diaspora-votes-propel-maia-sandu-to-re-election

Ch.ch. (n.d.) *e-voting.* https://www.ch.ch/en/political-system/political-rights/e-voting

Channel 4. (2025, January). *Gen Z: Trends, Truth, and Trust.*

https://assets-corporate.channel4.com/_flysystem/s3/2025-01/Gen Z Trends Truth and Trust_0.pdf

Charlton, E. (2024, July 26). *5 charts that show the state of global democracy in 2024.* World Economic Forum.

https://www.weforum.org/stories/2024/07/global-democracy-charts-2024-trends-insights-election/

Chatten, D. & Karlsson, J. (2023). *Putting the I in I-voting. Department* of Computer and Systems Sciences, Stockholm University.

https://www.diva-portal.org/smash/get/diva2:1784446/FULLTEXT01.pdf

Cheung, Y. M. (2023). Voting along the ethnic line? Ethnic minority voters in Estonia and Lithuania. Johan Skytte Institute of Political Studies.

https://dspace.ut.ee/items/f77e90b2-1a08-4da2-abd7-15d9d7975d88

Chowdhury, M. J. M. (2013). Comparison of e-Voting Schemes: Estonian and Norwegian Solutions. International Journal of Applied Information Systems, 6(2).

https://research.ijais.org/volume6/number2/ijais13-451020.pdf

Clark, D. (2025, January 10). Voter turnout in general elections and in the Brexit

referendum in the United Kingdom from 1918 to 2024. Statista.

https://www.statista.com/statistics/1050929/voter-turnout-in-the-uk/

Dandoy, R. (2014). The impact of e-voting on turnout: Insights from the Belgian case.

2014 First International Conference on eDemocracy & eGovernment (ICEDEG),

29 - 37, doi: 10.1109/ICEDEG.2014.6819940.

Dandoy, R., & Umpierrez de Reguero, S. A. (2021). E-voting and non-resident citizens'

voter turnout: a quasi-experiment in Ecuador. *Proceedings Of The 14Th*

International Conference On Ict, Society And Human Beings 2021, 30-36.

https://hdl.handle.net/1887/3484716

Debnath et al. (2017). The Impact of Electronic Voting Machines on Electoral Frauds,

Democracy, and Development. Brookings Institution India Center.

https://www.brookings.edu/articles/working-paper-using-technology-to-strengthen

-democracy/

DeCarlo, M. (2018). *Scientific Inquiry in Social Work.* Press Books.

https://pressbooks.pub/scientificinquiryinsocialwork/

Derksen, N. et al. (2018). *Increasing Youth Voter Turnout.* London School of Economics

and Political Science.

https://www.lse.ac.uk/PBS/assets/documents/Increasing-Youth-Voter-Turnout.pdf

Difford, D. (2025, February 20). *YouGov's final MRP of the 2025 German election*

shows Merz on course to be next chancellor. YouGov.

https://yougov.co.uk/politics/articles/51654-yougovs-final-mrp-of-the-2025-german-election-shows-merz-on-course-to-be-next-chancellor

Directorate-General for Internal Policies. (2016). *Potential and Challenges of E-Voting in the European Union.* European Parliament. https://www.europarl.europa.eu/RegData/etudes/STUD/2016/556948/IPOL_STU(2016)556948_EN.pdf

Dressler, M. (2024, October 15). *Youth turnout in the 2024 European elections: a closer look at the under-25 vote.* Foundation for European Progressive Studies. https://feps-europe.eu/youth-turnout-in-the-2024-european-elections-a-closer-look-at-the-under-25-vote/

E-Estonia. (2023, March 7). *How did Estonia carry out the world's first mostly online national elections?* https://e-estonia.com/how-did-estonia-carry-out-the-worlds-first-mostly-online-national-elections/

E-Estonia. (2024, October 23). *Estonia is at the top of the United Nations e-government ranking.* https://e-estonia.com/estonia-is-at-the-top-of-the-un-e-government-ranking/

E-Estonia. (n.d.) e-Democracy & open data. https://e-estonia.com/solutions/e-governance/e-democracy/

E-Voting Informationsplattform der Kantone. (2025). *E-Voting in der Schweiz*. https://www.evoting-info.ch/gut-zu-wissen/e-voting-in-der-schweiz

Ehin, P. et al. (2022). Internet voting in Estonia 2005–2019: Evidence from eleven

elections. *Government Information Quarterly, 39*(4).

https://doi.org/10.1016/j.giq.2022.101718

Estonian Public Broadcasting. (2025, March 9). *President Karis approves removal of*

third-country nationals' voting rights in Estonia.

https://news.err.ee/1609658303/president-karis-approves-removal-of-third-countr

y-nationals-voting-rights-in-estonia

Estonian Public Broadcasting. (2013, September 27). *Center Party Petitions European*

Human Rights Court Over E-Voting.

https://news.err.ee/108344/center-party-petitions-european-human-rights-court-o

ver-e-voting

European Commission. (n.d.) *Novel Food*.

https://food.ec.europa.eu/food-safety/novel-food_en

Federal Chancellery FCh. (n.d.). *E-Voting.*

https://www.bk.admin.ch/bk/en/home/politische-rechte/e-voting.html

Firsova, T. & Tankersley, J. (24 February, 2025). *How TikTok Helped the Far Left*

Surprise in Germany. The New York Times.

https://www.nytimes.com/2025/02/24/world/europe/germany-election-die-linke.ht

ml

Funk, P. (2010). SOCIAL INCENTIVES AND VOTER TURNOUT: EVIDENCE FROM

THE SWISS MAIL BALLOT SYSTEM. *Journal of the European Economic*

Association, *8*(5), 1077–1103. http://www.jstor.org/stable/25700915

Gannon, M. (2016, February 5). Race Is a Social Construct, Scientists Argue. Scientific

American.

https://www.scientificamerican.com/article/race-is-a-social-construct-scientists-ar

gue/

Gaudot, E. (2024, May 7). *A Disaffected Generation? The Youth Vote and Europe's*

Future. Green European Journal.

https://www.greeneuropeanjournal.eu/a-disaffected-generation-the-youth-vote-an

d-europes-future/

Germann, M., & Serdült, U. (2017). Internet Voting and Turnout: Evidence from

Switzerland. Electoral Studies 47.

https://michagermann.github.io/publication/germannserduelt2017/GermannSerdu

elt2017.pdf

Gorodnichenko, Y. et al. (2021). Social media, sentiment and public opinions: Evidence

from #Brexit and #USElection. *European Economic Review, 136.*

https://www.sciencedirect.com/science/article/abs/pii/S0014292121001252

Hall, T. (2012). Electronic voting. In N. Kersting, M. Stein, & J. Trent (Eds.), *Electronic*

Democracy (1st ed., pp. 153–176). Verlag Barbara Budrich.

https://doi.org/10.2307/j.ctvddzwcg.10

Helger's Cryptoblog. (2011, March 5th). *Who groks in beauty?*

https://helger.wordpress.com/2011/03/05/

Högselius, P. (2002). THE CONTEMPORARY HISTORY OF ESTONIAN

TELECOMMUNICATIONS – A EUROPEAN PERSPECTIVE. *Acta Historica*

Tallinnesnsia, *6*(1), 174–195. https://doi.org/10.3176/hist.2002.1.10

Holt, T. C. (1990). The Political Uses of Alienation: W. E. B. Du Bois on Politics, Race,

and Culture, 1903-1940. *American Quarterly*, *42*(2), 301–323.

https://doi.org/10.2307/2713019

Impelli, M. (2024, March 13). *Nancy Pelosi Goes Viral With 'Tic-Tac-Toe' Speech.*

Newsweek.

https://www.newsweek.com/nancy-pelosi-goes-viral-tic-tac-toe-tik-tok-speech-ho

use-vote-1878937

Information System Authority. (2025, February 17). I-voting: 20 years of progress.

https://www.ria.ee/en/i-voting-20-years-progress

Information System Authority. (2025, January 15). *Tasks and structure of the authority.*

ria.ee/en/authority-news-and-contact/authority-and-management/tasks-and-struct

ure-authority

Instituto Nacional de Estadistica. (2024, January 1). *Statistics of Spaniards Residing*

Abroad (RSRA). https://ine.es/dyngs/Prensa/en/PERE2024.htm

International Foundation for Electoral Systems. (2013, July 17). Internet Voting: Past,

Present and Future.

https://www.ifes.org/news/internet-voting-past-present-and-future

Jourdain, M. (2023, March 6). *Five takeaways from the Estonian elections, where*

security trumped inflation by a landslide. Atlantic Council.

https://www.atlanticcouncil.org/blogs/new-atlanticist/five-takeaways-from-the-esto
nian-elections-where-security-trumped-inflation-by-a-landslide/

Kaczmarczyk, A., & Czajkowski, R. (2001). E-Głosowanie – niezbędny element
elektronicznej platformy do obsługi procedur w demokracji w społeczeństwie
informacyjnym [E-vote – an essential element of electronic platform for services
for democratic procedures in the Information Society]. *Instytut Maszyn
Matematycznych.*

Kamenou, N. (2025) Queering the ballot: the lesbian, gay, bisexual, trans* and queer
vote in troubled times and contexts. *European Journal of Politics and Gender,
8*(1), 26–54, DOI: 10.1332/25151088Y2024D000000038

Kochetkova, E. (2021) Technological inequalities and motivation of Soviet institutions in
the scientific-technological cooperation of Comecon in Europe, 1950s–80s,
European Review of History: Revue européenne d'histoire, 28(3), 355-373, DOI:
10.1080/13507486.2020.1835829

Ledgerwood, E., & Lally, C. (2024, April 10). *Election turnout: Why do some people not
vote?* UK Parliament.

https://post.parliament.uk/election-turnout-why-do-some-people-not-vote/

Logan et al. (2012). The Impact of Race and Ethnicity, Immigration, and Political
Context on Participation in American Electoral Politics. *Social forces; a scientific
medium of social study and interpretation*, *90*(3), 10.1093/sf/sor024.

https://doi.org/10.1093/sf/sor024

Lust, A. (2018). I-Vote, Therefore I Am? Internet Voting in Switzerland and Estonia. *The SAIS Review of International Affairs*, *38*(1), 65–79. https://www.jstor.org/stable/27001472

Macron, E. [@EmmanuelMacron]. (2025, January 22). *Merci pour l'alerte @Saint @MASDAK.* [Video]. TikTok. https://www.tiktok.com/@emmanuelmacron/video/7462817364279643414

Martynova, M. (1999). The Political Aspects of the Russian Minority in Estonia. In Trifunovska, S. (ed.), *Minorities in Europe: Croatia, Estonia and Slovakia.* (pp. 85- 104). T.M.C. Asser Press.

de Varennes, F. (1999). Non-Citizens and Minorities in Estonia and Their Economic and Social Opportunities. In Trifunovska, S. (ed.), *Minorities in Europe: Croatia, Estonia and Slovakia.* (pp. 123 - 142). T.M.C. Asser Press.

Mendez, F. & Serdult, U. (2017). *What drives fidelity to internet voting? Evidence from the roll–out of internet voting in Switzerland.* University of Zurich. https://www.zora.uzh.ch/id/eprint/138030/1/Mendez_Serdult_GIQ_2017.pdf

Mildebrath, H. (2024). *The arrival of e-voting and campaign technologies in Europe: Promise, perils and preparedness.* European Parliament. https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/762321/EPRS_BRI(2024)762321_EN.pdf

Milic et al. (2016). Haltungen und Bedürfnisse der Schweizer Bevölkerung zu E-Voting = Attitudes of Swiss citizens towards the generalisation of e-voting. *Zurich Open Repository and Archive.* https://doi.org/10.5167/uzh-127938

MIT Election Lab. (2023, April 21). *Voting technology.*

https://electionlab.mit.edu/research/voting-technology

Montagu, A. (1962). The Concept of Race. *American Anthropologist*, *64*(5), 919–928.

http://www.jstor.org/stable/666943

Musiał-Karg, M. (2017). Challenges of i-voting – practices, rules and perspectives.

Examples from Estonia and Switzerland. *Przegląd Politologiczny, 15*(4). DOI:

10.14746/pp.2017.22.4.6

Nadler, G. (1990, March 30). Estonia declares transition to independence. *United Press*

International.

https://www.upi.com/Archives/1990/03/30/Estonia-declares-transition-to-indepen

dence/1809638773200/

Office for Democratic Institutions and Human Rights. (2024). *Handbook for the*

Observation of Information and Communication Technologies (ICT) in Elections.

OSCE. www.osce.org/files/f/documents/c/9/558318.pdf

Maurer et al. (2024). Risk Assessment and Feasibility Study on Alternative Forms of

Voting in Post-War Elections in Ukraine With a Focus on Internet Voting. Council

of Europe. https://rm.coe.int/ukr-ra-fs-eng-web-copy/1680b3e20c

Oja, U. (2011, March 11). Paavo Pihelgas: Elektroonilise hääletamise vaatlemine on

lihtsalt võimatu. Forte.

https://forte.delfi.ee/artikkel/41933409/paavo-pihelgas-elektroonilise-haaletamise-

vaatlemine-on-lihtsalt-voimatu

Page, D. D. (2017). When Does Sexuality-Based Discrimination Motivate Political

Participation? The Cupola: Scholarship at Gettysburg College.

https://cupola.gettysburg.edu/poliscifac/39/

Perrella, A. M. L., Brown, S. D., & Kay, B. J. (2012). Voting Behaviour among the Gay,

Lesbian, Bisexual and Transgendered Electorate. *Canadian Journal of Political*

Science / Revue Canadienne de Science Politique, *45*(1), 89–117.

http://www.jstor.org/stable/41472544

Petitpas, A., Jaquet, J. M., Sciarini, P. (2021). Does E-Voting matter for turnout, and to

whom? *Electoral Studies, Volume 71*.

https://doi.org/10.1016/j.electstud.2020.102245

Political Rights Section (2020, November 30). *Redesign and relaunch of trials: Final*

report of the Steering Committee Vote électronique (SC VE). Federal Chancellery

FCh.

Political Rights Section. (2023). Vote électronique: Catalogue of measures by the

Confederation and cantons. Federal Chancellery FCh.

Rang, A. (2020). *The naked truth about business in Estonia: Skype wasn't really*

founded by Estonians. Invest in Estonia.

https://investinestonia.com/skype-wasnt-founded-by-estonians/

Remnick, D. (1988, November 16). 'SOVIET ESTONIA'S LEGISLATURE DECLARES

ITS 'SOVEREIGNTY'. *The Washington Post.*

https://www.washingtonpost.com/archive/politics/1988/11/17/soviet-estonias-legis

lature-declares-its-sovereignty/2747afae-97a0-4d88-a006-c67871909d0a/

Rigendinger, B. & Ridard, E. (2023, June 21). Voters and cantons enthusiastic about

'successful' e-voting trial. Swissinfo.ch.

https://www.swissinfo.ch/eng/business/voters-and-cantons-enthusiastic-about-su

ccessful-e-voting-trial/48602554

Riigi Teataja. (2003, May 4). *Eesti Informaatikakeskuse põhimäärus.*

https://www.riigiteataja.ee/akt/26714

Roonemaa, M. (2017, April 18). Global lessons from Estonia's tech-savvy government.

UNESCO.

https://courier.unesco.org/en/articles/global-lessons-estonias-tech-savvy-govern

ment

Scott, T. (2019, October 9). *Why Electronic Voting Is Still A Bad Idea.* [Video]. YouTube.

https://www.youtube.com/watch?v=LkH2r-sNjQs&ab_channel=TomScott

Selwyn, N. (2009). The digital native – myth and reality. *Aslib Proceedings, 61*(4),

364-379. http://dx.doi.org/10.1108/00012530910973776

Serdült, U. (2019, September 30). *Switzerland: i-voting and direct democracy.* Agenda

Publica.

https://agendapublica.es/noticia/14036/switzerland-i-voting-and-direct-democracy

Serdült et al. (2015). Who Are the Internet Voters? In E. Tambouris, & et al. (Eds.),

Electronic Government and Electronic Participation (pp. 27-41). (Innovation and

the Public Sector; Vol. 22). IOS Press.

https://doi.org/10.3233/978-1-61499-570-8-27

Sheeter, L. (2005, October 14). Estonia forges ahead with e-vote. *BBC News.*

news.bbc.co.uk/2/hi/europe/4343374.stm

Sillasoo, S. (2024). *Estonia's first public novel food tasting accelerates sustainable food*

production. Trade With Estonia.

https://tradewithestonia.com/estonias-first-public-novel-food-tasting-accelerates-s

ustainable-food-production/

Solvak, M., & Vassil, K. (2016). *E-voting in Estonia:Technological Diffusion and Other*

Developments Over Ten Years (2005 - 2015). Johan Skytte Institute of Political

Studies University of Tartu.

https://skytte.ut.ee/sites/default/files/2023-02/E_voting_in_Estonia_Solvak_Vassil

_2016.pdf

Springall, D., et al. (2014). Security Analysis of the Estonian Internet Voting System.

CCS '14: Proceedings of the 2014 ACM SIGSAC Conference on Computer and

Communications Security, 703 - 715.

https://dl.acm.org/doi/10.1145/2660267.2660315

Stakeholder Community Once-Only Principle for Citizens. (n.d.) *Estonian Internet*

voting. https://scoop4c.eu/cases/estonian-internet-voting

Statistics Finland. (n.d.). *Value of money converter.*

https://stat.fi/tup/laskurit/rahanarvonmuunnin_en.html

Statistikaamet. (n.d.) Demographic and ethno-cultural characteristics of the population.

https://rahvaloendus.ee/en/results/demographic-and-ethno-cultural-characteristic

s-of-the-population

Stokes et al. (2013). What Killed Vote Buying in Britain and the United States? In

    Brokers, Voters, and Clientelism: The Puzzle of Distributive Politics (pp.

    200–242). chapter, Cambridge: Cambridge University Press.

Swissinfo. (2018, February 24). How risky are flawed e-voting systems for democracy?

    https://www.swissinfo.ch/eng/swiss-politics/online-security_how-risky-are-flawed-

    e-voting-systems-for-democracy/43919774

Swissinfo. (2019, January 25). Opposition against e-voting project gathers pace.

    https://www.swissinfo.ch/eng/politics/online-democracy_opposition-against-e-voti

    ng-project-gathers-pace/44708930

Swissinfo, & Romy, K. (2018). Opponents of e-voting suffer setback in parliament.

    https://www.swissinfo.ch/eng/business/boost-for-expat-swiss-group_opponents-o

    f-e-voting-suffer-setback-in-parliament/44395904

Thoele, A. (2016, February 9). Direct democracy also has its user guide. Swissincho.ch.

    https://www.swissinfo.ch/eng/business/direct-democracy-also-has-its-user-guide/

    41773098

Thomas, M. (2023, November 8). Election Technology Through the Years. The Council

    of State Governments.

    https://www.csg.org/2023/11/08/election-technology-through-the-years/

Torn, T. (2014). SECURITY ANALYSIS OF ESTONIAN I-VOTING SYSTEM USING

    ATTACK TREE METHODOLOGIES. *Tallinn University of Technology.*

Trechsel, A.H. (2007). E-voting and Electoral Participation. In de Vreese, C.H. (eds) *The*

　　Dynamics of Referendum Campaigns. Palgrave Macmillan, London.

　　https://doi.org/10.1057/9780230591189_8

United Nations. (n.d.) THE 17 GOALS. https://sdgs.un.org/goals

United Nations Regional Information Centre for Western Europe. (2023, December 14).

　　Migration to the EU: facts, not perceptions.

　　https://unric.org/en/migration-to-the-eu-facts-not-perceptions/

Valimised. (n.d.). *Principles of checking an i-vote with a smart device.*

　　https://www.valimised.ee/en/internet-voting/more-about-i-voting/principles-checki

　　ng-i-vote-smart-device

Valimised. (n.d.) *Riigikogu Elections.*

　　https://www.valimised.ee/en/archive/riigikogu-parliament-elections/riigikogu-electi

　　ons

Valimised. (n.d.) *Statistics about Internet voting in Estonia.*

https://www.valimised.ee/en/archive/statistics-about-internet-voting-estonia

Valimised. (n.d.) *Questions about the reliability of i-voting.*

　　https://www.valimised.ee/en/internet-voting/frequently-asked-questions/questions

　　-about-reliability-i-voting

Vasu, N., et al. (2018). Dissemination Techniques in Disinformation Campaigns. In

　　FAKE NEWS: NATIONAL SECURITY IN THE POST-TRUTH ERA (pp. 9–14). S.

　　Rajaratnam School of International Studies.

　　http://www.jstor.org/stable/resrep17648.6

Wahlkreisprognose. (2025, February 05). *Bundestrend: Ansehensverluste für Merz und Scholz – Unionsparteien vergrößern Abstand zur AfD*. https://www.wahlkreisprognose.de/2025/02/05/ansehensverluste-fuer-merz-und-scholz-unionsparteien-vergroessern-abstand-zur-afd/

Waldrauch, H. (2003). *Electoral rights for foreign nationals: a comparative overview of regulations in 36 countries.* European Centre for Social Welfare Policy and Research. http://hdl.handle.net/1885/41780

Wahlrecht. (2025, February 23). *Wenn am nächsten Sonntag Bundestagswahl wäre … .* Forsa. https://www.wahlrecht.de/umfragen/forsa.htm

Wetherall-Grujić, G. (2023, August 7). *Switzerland Resumes i-Voting Trials Ahead of Federal Election.* Democracy Technologies. https://democracy-technologies.org/voting/switzerland-resumes-i-voting-trials-ahead-of-federal-election/

Work in Estonia. (n.d.). *Digital Estonia.* https://workinestonia.com/everyday-life/digital-estonia/

World Bank. (2025). *Individuals using the Internet (% of population)*. https://data.worldbank.org/indicator/IT.NET.USER.ZS

YLE. (2017, May 27). *Ex-President Koivisto secretly funnelled money to support Estonian independence*. https://yle.fi/a/3-9613509