Mapping the Literature: 
Socio-cultural, Organizational and Technological 
Dimensions of E-voting Technologies

Nina Boulus-Rødje

Technologies in Practice Research Group 
IT University of Copenhagen 
Rued Laanggaardsgade 9 
2000 
bou@itu.dk

Abstract: As the utilization of various e-voting technologies has notably increased in the past few years, so has the amount of publications on experiences with these technologies. This article will, therefore, map the literature while highlighting some of the important topics discussed within the field of e-voting. Particular attention will be paid to the non-technical dimensions of implementation, including the socio-cultural, organizational, and political dimensions.

1 Introduction

The recent popular uprising in the Middle East has given us the possibility to witness how technology (i.e., social media) can be used as a strong weapon for democracy. However, when it comes to e-voting technologies, it remains unclear as to whether they are encouraging or discouraging democracy. E-voting technologies are imagined as having the capacity to do a wide range of things: increasing overall voter turnout, increasing the efficiency and accuracy of the electoral process, as well as reducing waiting time and costs. Such idealistic visions are familiar from other domains, for example, the field of healthcare, where similar rhetoric can be heard regarding the implementation of Electronic Patient Records (EPRs).

In both fields, we find that some of the visions are disputed (e.g., saving costs and increasing efficiency). The great difference, however, is that there is a general agreement that implementing EPRs is a goal that all healthcare institutions should strive to achieve. However, with e-voting technologies we still find ambiguous messages from both politicians and scientists, expressing reservations toward procedural and technical aspects. One of the main concerns is that these technologies “black box” the electoral process, removing current public control and accountability mechanisms and making the process inaccessible for verification. In contrast to the implementation of other technologies (e.g., EPRs), mistakes made by e-voting technologies cannot be compensated and these can have devastating consequences on our democracy.
Although the field of e-voting is relatively young, it has been advancing rapidly and so has the number of issues that have been brought to the table. E-voting technologies have been introduced in new countries and with regards to different types of elections. The literature has been growing and we have more real-life, practical experiences to draw upon. In order to have a better overview of the current state of knowledge and to identify areas requiring future research, this article will map out the literature highlighting some of the main topics discussed within the field.

Recently, there has been greater focus on not only technical dimensions (e.g., hardware, software, cryptographic methods and protocols, and certification and evaluation systems), but also on the socio-cultural, organizational, and political dimensions of e-voting. Particularly, there has been greater focus on the impact of a voter’s demographic attributes has on confidence in the electoral process and the e-voting technologies [e.g., Al09b; Cl08; GH09; SAH10]. Most studies that focus on non-technical dimensions draw upon Election Day voting experiences, and almost all studies draw upon quantitative research methods (i.e., statistical analysis of survey data). Collecting data on individual voting experiences is a very recent practice amongst e-voting researchers [SAH10].

This article begins by listing briefly some of the expectations behind e-voting technologies and compares them to the research findings thus far. This will be followed by section 3, which synthesizes and maps some of the main topics discussed in the literature, particularly within studies that focus on non-technical issues. This literature review is divided into two main sub-sections, where the first one (3.1) focuses on the medium, the actual e-voting technology. The second sub-section (3.2) focuses on dimensions that are beyond the medium, including voters’ trust in e-voting technology, voters’ trust in the electoral machinery, and the influence of other relevant stakeholders. This will be followed by section 4, which discusses the studies presented above and where I propose a typology that distinguishes between findings that are context dependent and findings that are (systematically) repeated across different contexts, allowing them to be generalized to a certain extent. In other words, while section 3 synthesizes and maps the different specific topics discussed across the research projects, section 4 provides a typology, a broader, general map classifying and clustering the different topics into more general themes. Finally, a few concluding remarks will be made regarding the current state of our knowledge of e-voting projects, followed by directions for further studies.

2 E-voting Technologies: Expectations and Status Quo

When reviewing the media and policy discourses surrounding e-voting technologies, we quickly find that the transition from a traditional paper-based voting system to e-voting technologies is often viewed as necessary and inevitable [Ca06]. Although the idea of electronic voting is not new, the implementation of e-voting technologies has turned out to be an unexpectedly long and challenging process, in which many of the goals have yet to be met. Furthermore, the possibility of reaching some of these goals has been
questioned or problematized. Nevertheless, expectations are high and so is the amount of money being spent on the different e-voting projects in several countries. E-voting technologies are expected to improve accessibility for all voters (e.g., disabled voters, elderly people, and illiterate voters) [Al09a; OV04]. However, it has also been said that e-voting may bring about unintended effects by excluding large groups of citizens from participating in the democratic process, specifically those groups with less access to and familiarity with computers [OV09]. Another expectation held by many policy makers is that e-voting will increase overall voter turnout by providing a longer period to vote on Election Day [DP07]. However, researchers claim that extending the voting period does not necessarily increase voter turnout [Be03]. E-voting is also expected to increase overall voter turnout by increasing the motivation of people to vote, including youth voters [An09]. However, the capacity of e-voting technologies to increase the motivation of people to vote has been doubted by several researchers [DBoT11; OV09; Wi08]. Researchers argue that e-voting can encourage those voters who vote occasionally, but it does not increase the political participation of non-voters [MM06]. Instead, some researchers claim that e-voting (particularly I-voting) seems to increase inequalities in voting participation [BV10]. In conclusion, the assumptions that e-voting systems will improve the level of voter turnout have either been proved to be incorrect or have hardly been tested empirically. Some researchers found that while e-voting may indeed increase voter turnout in the beginning, it will either decrease or go back to the original level as soon as people get used to the technology [Be03]. Finally, we are repeatedly reminded that voter turnout may be quickly reduced by organizational and technical constraints [Be03].

Researchers claim that e-voting may foster greater political participation through increased transparency of the electoral process, improved accessibility for all voters, as well as increased voter turnout [KR10]. The issue of whether e-voting can indeed empower citizens has been questioned because e-voting removes the current public control inscribed in the traditional voting process, even though voters can both verify whether their ballot has been taken into account and participate in controlling the electoral process [Be07]. However, although some algorithms do provide voters with a way to check if their votes have been taken into account, they “can neither access the code, nor see the type of algorithm used, nor check that the machine is well configured and that the administration or other third parties do not manipulate voters” [Be07, pp. 32-33].

A very important argument behind e-voting technologies is the expectation of improved accuracy and elimination of spoiled votes [DP07] as well as increased efficiency and reduced waiting time. This solves the problem of finding volunteers and election officials [DP07]. Furthermore, with e-voting, election results could theoretically be determined a few minutes after the poll stations have closed [An09]. Increased efficiency is viewed as crucial for dealing with the current high costs related to elections [DP07]. The ability of e-voting to reduce costs has, however, been dismissed or doubted in various reports due to lack of strong empirical evidence [DBoT11]. Furthermore, when considering the rewards offered by the different e-voting technologies (e.g., in term of convenience and efficiency), it is questionable whether these are worth the additional
security risks (e.g., fraud, loss of citizens’ confidence) imposed on our democracy [Be07].

3 Highlights from the Literature

Literature within the field of e-voting has been growing rapidly. E-voting constitutes a relatively young field of research where a large part of the studies originated in the U.S. [Ba06], although the number of European studies is increasing. These studies vary in many different ways. Some of the studies are about e-voting in supervised environments, while others are about I-voting over the Internet. Some studies report experimentations, while others are about real elections. Finally, the studies have often conducted in different contexts [Be03] with different samples of the population. Furthermore, while there has initially been a strong focus on technical dimensions related to the introduction of e-voting technologies [Be03], we now find a number of studies that focus on non-technical dimensions (i.e., socio-cultural, organizational, and political dimensions). The literature that focuses on non-technical dimensions comes from a wide variety of fields and disciplines (e.g., sociology, political science, communication, and Information Systems), drawing upon different theories and methods [Ba06]. This literature can be broadly divided into two domains: one that addresses issues related to the medium, the actual e-voting technology, and one that moves beyond the medium to address different issues, including organizational and legal aspects, the individual voters, traditions and rituals, etc. I will now provide highlights from these two domains, but will focus predominantly on the latter.

3.1 The Medium: E-voting Technologies

One of the main issues with e-voting technologies is that they challenge the basic fundamental principles necessary for democratic elections, for example, the principle of public control. Voting and tallying processes, which are currently under public control, become “black-boxed” behind computers, providing the public with limited access. This implies, among other things, that it is difficult for the public to detect failures and/or tampering incidents [Ba10; GH07; Lo08]. The principle of anonymity and secrecy of voters has continuously been threatened, especially by I-voting, which has not been able to provide a way to verify that the cast ballot indeed belongs to the correct voter. Thus, we can neither be sure that votes will remain secret, nor can we prevent vote buying or family voting (with I-voting) [Be07]. It has been said that the secret ballot “is the jewel in the democratic crown” [BP90, p. 311], providing an indispensable value which must not be compromised.

Security is one of the main evaluation criteria and topics discussed across the literature. This refers to the technical security of the actual technology (e.g., cryptographic verification and mathematical calculations to ensure voter verifiability, ballot box accuracy, etc.), but it also refers to issues related to voters (e.g., eligibility, privacy protection, anonymity, and secrecy of voters) [Be03; PM07]. Usability is another central topic that has been discussed since e-voting’s earliest stages. Usability refers to
preventing voting errors, the system’s ease of use, as well as accessibility [PM07]. These studies investigate interface design and the implications of graphical elements on usability and accessibility for voters [SLL09]. Some of the findings conclude that basic universal usability concepts and plain language address many of the problematic issues. For instance, the chronological order of candidates may influence people’s voting [SLL09]. Finally, some researchers investigate ways in which ballot graphics can help voters with cognitive disabilities (e.g., verbal comprehension, reading ability, etc.) [SLL09].

If we look at the traditional paper-based system, most of the processes are in fact behind the stage and hidden from most voters. The practices of casting a ballot form a well-oiled “machine” and fades into the background: “its efficiency and its acceptance by the citizenry is signified by its disappearance in the sense that it becomes a routine taken for granted and not an ‘issue’” [Ca06, p. 194]. Thus, it is this invisibility that, to some degree, allows the system to work smoothly. A similar argument has been made about e-voting technologies and about how important it is that these are ‘invisible’ to users [Be03].

### 3.2 Beyond the Medium: Socio-cultural, Political and Organizational Changes

Although most projects focus predominantly on technical aspects, recently there have been more studies that focus on social, organizational, political, and legal issues [Be03; WVM07; XM04]. It has been said that although technical dimensions are indeed important, “trust in the system seems to be more important than the technical characteristics themselves” [Be03, pp. 725-726, emphasis added]. However, what does trust mean in this context, and what does the system refer to?

The concepts of trust, reliability, and confidence are central to e-voting literature. However, their definition and usage vary across the articles and the disciplines. For example, Besselaar et al. [Be03] use the concepts trust and reliability interchangeably to refer to two domains: trust in the technology (in terms of safety, internal fraud, external hackers, etc.) and trust in the electoral process (e.g., protection of anonymity and secrecy of all the votes). However, many of the existing definitions focus on just one of these domains. For example, the concepts of trust and confidence have been defined as the confidence that the election process produces fair outcomes and that the ballot was counted accurately [AHL08; HMP09] a viewpoint mainly concerned about trust in the electoral process. Taking into account the different definitions of trust, these can be divided into two main categories: trust in technology [Be03; Ru05] and trust in the very mechanisms of our democracy, i.e., the actual electoral machinery and the process that records and counts votes [AHL08; HMP09; Ru05].

#### 3.2.1 Voters’ Trust in the Technology

Many studies investigate the effects of socio-demographic, geographic, and technical factors on voters’ evaluation of the different e-voting technologies [Al09a]. They investigate how the voters’ trust in e-voting technologies is influenced by individual
variables. So far, the most common demographic variables are gender, age, income, and education. There are also different findings for each of these variables. For example, when it comes to gender, there are no straight answers: one study, which tested the same e-voting system across several countries in Europe in different settings, found that women tend to be more positive about the usability of e-voting systems [Be03]. However, many other studies do not find gender to be a significant factor affecting trust in e-voting [AKP11; MM06]. When it comes to age, according to several studies, young people are more interested in technology than in politics; elderly voters are less confident with e-voting but motivated to participate in elections [Ca06]. One study found that youth, to a greater extent than the elderly, were inclined to cast their ballot using e-voting [MM06]. However, a number of studies found that older voters tended to be more confident with e-voting even if they found it more difficult to use [AHL08]. This has been attributed to their greater familiarity with participation in electoral processes [AKP11]. Furthermore, several researchers found that younger voters are more likely to be critical of e-voting because they are equipped with better computer skills and are more aware than their older counterparts of the vulnerability of technologies [AKP11; OV04]. One study found that the positive effect of education on voter confidence in e-voting is statistically significant [AHL08]. Another study found that highly-educated people tend to oppose e-voting technologies [SAH10], while yet another study found that education in itself has a limited direct impact on voters’ trust in technology, as it is only those who have no or very little education who were significantly less in favour of e-voting [Ca06]. When education and profession are correlated with age, we find that educated people under the age of 50 are more in favour of e-voting [Ca06]. Finally, language can be significant in some contexts and countries. For example, in the parts of Estonia, where the population only speaks Russian and would, therefore, be unable to use an I-voting system implemented in Estonian [BV10].

A few studies have tested e-voting technologies across several countries. For example, Besselaar [Be03], who tested an e-voting application across four countries and five different settings, found that the rural community network in eastern Finland was more positive toward e-voting technologies than the Italian trade union. It is, however, difficult, if not impossible, to draw clear conclusions about different countries based on the various findings because the samples often tend to be either too small and/or too different; thus do not provide sufficient grounds for comparison. Some researchers agree that it is not easy to directly extrapolate such findings to other local contexts [AKP11].

We also find many studies that investigate the effects of different e-voting technologies on voters’ confidence [Al09a; Be07; HMP09; SAH10]. The findings of these studies vary by country and the political context. For example, researchers found out that voters in Italy, France, and Finland tend to trust I-voting more [Be03]. There are, however, relatively consistent results across the studies (at least in the U.S.) when it comes to the impact that the voting medium has on voters’ confidence. Voters often tend to have more confidence in paper ballots than in e-voting machines [AHL08; AS07; HL10; St09] and they, female voters especially, tend to view the paper ballot as the most anonymous way of voting [JHG08]. Furthermore, voters tend to have more confidence in optical scan when compared to e-voting machines [Ha09; St09]. However, recent studies conducted in the U.S. and in the Netherlands reveal that more voters expressed confidence in the
direct recording electronic (DRE) voting machines than in paper ballot voting [HL10; SAH10]. Finally, several researchers found that people tend to be more confident if they vote using the technology they like [SAH10]. Other attributes that have been correlated to people’s confidence in e-voting are computer literacy, Internet use, and experience with equipment [Be03]. Several researchers claim that having a paper audit trail when deploying e-voting increases voters’ confidence [Lo08], but there have been several studies recently that either point to a lack of empirical evidence [Ba06] or claim that there is no difference in voters’ perceptions between voting machines with or without a paper trail [JHG08].

3.2.2 Voters’ Trust in the Electoral Process: Individual and Universal Level

The second category of trust refers to the basic machinery of democracy—the actual mechanisms that record and count the votes. In reviewing the literature, public trust in the electoral machinery can be further divided into individual trust and universal trust. Individual trust implies confidence that every individual voter can verify that her ballot was counted accurately and as intended [AHL08; HMP09; So09]. While this focuses on the individual voter and her experiences, universal trust has a broader focus on the public and the general mechanisms for fulfilling the basic principles of democracy, for instance, public control, which implies that anyone has the possibility to witness, control, and/or scrutinize the correctness of the voting and tallying process [Ca06; So09]. The trust of the general public in the traditional procedure is influenced by the fact that the process is open to public control, and it is based on the simple mechanism of counting the paper ballots [Ca06].

There are various procedures for ensuring the principles of democracy and these are supported by complex chains of regulations. Elections are always carried out by different surveying authorities. For example, representatives of each political party, election officials, and volunteers are on-site, guaranteeing public control and overseeing the counting process. These procedures, which ensure the public nature of elections, are also supported by national laws that are rigorously enforced by different procedures (e.g., handling paper ballots, ballot boxes, voter identification, recount, etc. [DBoT11; So09; XM04]. Replacing paper ballots and pencil regulations implies that many of these regulations and laws will have to be reconfigured to accommodate the new technology [DBoT11; Lo08]. The principles of democracy are also enforced by the physical properties of the different materials. For example, the principles of anonymity and secrecy are enforced by the physical properties of the polling booth [XM04]. This will have to change when introducing e-voting [Ca06; XM04].

Although paper-voting systems have evolved throughout the years, they have always maintained a self-evident simplicity enabling everyone to easily understand the counting system without any special technical knowledge [Ru05; So09]. This will not be the case when deploying e-voting technologies, where IT knowledge is necessary [Ba10].

Recently, several researchers have investigated the relationship between voters’ confidence in voting systems and other variables [GH09; St09]. Thus, the literature focusing on voters’ attitudes, experiences, and expectations has increased rapidly [Ca06;
Several researchers found that there are significant differences in voter confidence along both racial and partisan lines [HL10]. This seems to apply mostly to studies in the U.S. For example, Alvarez et al. [AHL08] found that African-Americans have less confidence in the electoral process than white people. Voter confidence can also be influenced by ‘the winner effect,’ which implies that voters for winning candidates tend to express greater confidence than those who voted for losing candidates [HL10; SAH10]. It has been noted that this phenomenon applies more to the American context, as political views were rather significant in the U.S. [St09], but that was not the case in Europe [HL10].

Voters’ familiarity with the electoral process can also influence their view of e-voting [AHL08]. But this is related to a voter’s experience at the polling place as well as their experience with election officials and poll workers. For example, voters’ view of e-voting can be influenced by whether they experience having to wait in long lines [HMP09]. Little attention has been given to the role of the administration in the electoral process [Ha03; HMP09], even though poll workers have been described as “the Achilles’ heel of the elections process” [HMP09, p. 508]. A number of studies have been investigating how voters’ confidence is affected by their experiences at the polls and the experiences they have with poll workers [AHL08; CI08; GH09; Ha09; HMP09, SAH10]. Voters’ experiences with poll workers are important, as it is an integral component of the voting process [HMP09, 510]. A recent study shows that voters who rate their interaction with poll workers highly are more likely to be confident that their votes will be counted correctly [HMP09]. Another important variable that influences voter trust is the mode of voting [AAH07; Al09b; AS07; Ha09; St09]. Researchers found that voters who cast their ballot in-person on Election Day have significantly higher confidence than those who cast absentee ballots [HL10; SAH10; AHL08].

Several studies link voters’ confidence to voters’ general trust in government [AHL08]. For example, in a pilot study in Columbia, researchers found the percentage of respondents who claimed to trust e-voting was exceptionally high, and they point out that this probably relates to the relatively low level of public confidence in elections across several countries in Latin America [Al09a]. A couple of studies in the U.S. found that African-American voters tend to have less confidence in voting; researchers point out that this is most likely shaped by the historical discrimination that these voters experienced [Ha09; SAH10]. However, it has been argued that voters’ trust in the government is not a sub-category of voter confidence and the two concepts are not necessarily the same [AHL08]. While voter confidence in the electoral process does not necessarily stem from a voter’s general trust in government [HMP09], a general faith and trust in politicians appears to foster an acceptance of e-voting.

While the above research has focused on the interactions with election officials, other researchers argue, that voters’ beliefs about and perceptions of privacy may be more critical. For example, Gerber et al. [Ge09] view the act of voting as an individual political behaviour that is influenced by voters’ perception of ballot secrecy. They found out that there is a correlation between the belief that ballots are actually kept secret and race and education [Ge09].
A new article by Karpwotiz et al. [Ka11] focuses on voters’ perceptions of privacy and its relationship to the political norms of the communities where voters live. The study shows how a community’s political norms have great influence on voter behaviour. For example, voters who are told that the norm in the neighbourhood is to vote are more likely to vote. They conclude that concerns about privacy are prevalent among those who are against their community’s political norm [Ka11].

The introduction of e-voting challenges conceptions of democracy, with its emphasis on efficiency, a trend that corresponds to new public management [Qi10]. The different forms of political participation and voting rituals anchored in political cultures are widely debated in some articles. These civic rituals and forms of political participation are manifested in different ways across the various cultures and countries. For instance, some countries in Europe (e.g., Switzerland) tend to value the opportunity given to citizens to be frequently consulted (e.g., through referendum) [Tr07]. Some scholars emphasize that the act of voting is more than simply indicating a political preference but rather a necessary public ritual that is part of a social solidarity binding citizens together [MG01]. Furthermore, concerns have been voiced about the impact that e-voting technologies may have on our governing and electoral procedures, which have been shaped by traditions, symbolic rituals, and material customs [Ca06]. Some researchers are concerned that these traditions may be lost or destroyed by e-voting technologies and that it may have a negative influence on the political culture [OV04]. This includes creating a larger gap between government and citizens and decreasing voter participation and turnout [OV04; OV09].

3.2.3 Influence of Other Relevant Stakeholders: Media, Politicians and Vendors

As can be seen above, several researchers have started to gradually move away from focusing solely on technology and have begun focusing on the voters and the role of administration and management. There are, however, other stakeholders who are equally important and powerful. One of the stakeholders with outsized influence is the media [R08]. A recent study shows how a communication campaign before the electronic voting stimulated citizens’ curiosity and interest in elections [Ca06]. Furthermore, several studies have noted the importance of political support [Be03]. Similarly, Xenakis and Macintosh [XM04] describe how trust in the system of counting was developed through special reference to Commission’s report regarding the Deputy Returning Officer and the acceptance that the project gained due to his good leadership.

One of the most dominant topics in the literature is the relatively strong influence privately-owned vendors have had thus far [Ru05]. In the U.S. most e-voting initiatives have been vendor-led. Therefore, several articles highlight the importance of moving away from vendor-led developments to initiatives led by scientists and/or another qualified, trusted third-party body to preserve public trust and ensure, among other things, that profit is not the dominant motive behind e-voting innovations. In an interesting article, Rubin [Ru05] refers to an editorial in the New York Times that draws similarities between election machines and gambling machines, as in both cases it is not easy for the user to verify the activity performed. However, while e-voting vendors claim their software is a trade secret, The Gaming Control Board has copies of every
piece of gambling device software currently being used. Rubin [Ru05] refers to Dark source—an artwork displaying the source code of a commercial electronic voting machine—to reflect upon our current state, in which the critical infrastructure of democracy is becoming privately owned. It has, therefore, been repeatedly argued in the literature that the software (e.g., algorithms and codes) running our democracy should be opened to public scrutiny [Be07; Ru05]. As Raymond says: “Given enough eyeballs, all bugs are shallow” [Ra00, p. 30]. Several articles have suggested different ways of dealing with the controversial topic of privately-owned vendors and the maintenance of public control. For example, several suggest having an independent, official authority, a qualified and trusted third-party, as well as legal regulations [DBoT11; So09] to formally certify the chosen solution [An09]. Some of the problems with the (re)certification process is that it takes such a long time that vendors are often too slow to fix their systems [Ba10]. Nevertheless, many researchers encourage the participation of all stakeholders, including policy-makers, technologists, and, most of all, citizens [Ca06; VSD11]. Finally, there are different incentives for outsourcing e-voting initiatives, some of which are aimed at reducing costs and improving efficiency. Oostveen [Oo10] who studied e-voting initiatives in the Netherlands (drawing upon action research) points to government agencies’ lack of knowledge in identifying appropriate voting technologies, enforcing security requirements, and monitoring performances. She criticizes the Dutch government for losing the ownership over the election process to the private sector.

4 Discussion and Conclusion

So far, I have synthesized and mapped the different specific topics that are discussed across the research projects. I will now provide a typology, a broader, more general map classifying and clustering the different topics into themes. The three main interrelated themes that the different studies investigate are: political participation in general (e.g., voting behaviour and turnout), trust in e-voting technology, and use of e-voting technology. These studies investigate which factors have a significant impact on each of these themes and the extent of this impact. These factors can be grouped into five broad categories. The first category refers to the voting method (mode of voting) and the medium used to cast the ballot. This includes investigation of different modes of voting (e.g., voting at polling stations vs. remote voting), different media (e.g., absentee ballots, papers, DREs, I-voting); and different voting locations (e.g., home, workplace). The category of voting method also includes other variables, for example, design and usability of the system, the use of paper audit trail, as well as transparency of the code behind the software. The second category refers to the voter. This includes the voters’ socio-demographic characteristics (gender, age, income, education, race, ethnic origin, and regional classification (urban vs. rural)), as well as their knowledge, expectations, and experience with computers. Another important factor is the voters’ trust in government and politicians in general, and more specifically, their trust in the electoral process, including the fulfilment of the secrecy principle (i.e. privacy and anonymity of election decisions) and accountability (i.e. the ability to verify the vote). The voters’ knowledge, expectations, and experience of the electoral process also have an influence, including their familiarity and previous experience of interactions with poll workers and
election officials. Finally, in some studies, voters’ political preferences have also been included as a variable. The third category refers to civic rituals, traditions, and norms surrounding political participation and elections. Finally, the forth category refers to the type of election (e.g., national, European election, local election), and the fifth category refers to the influence of other stakeholders, including the media, vendors, and support of governmental institutions and/or political parties.

The different studies then investigate the influence of these categories and factors on political participation, as well as trust and use of e-voting. For example, a study typically investigates the influence the voting method, the characteristics of the voter, and the type of elections on political participation (e.g., in terms of voter turnout) has on the trust voters may express toward e-voting, and/or on use of e-voting technologies.

Many of the findings presented above are context-dependent, while others seem to be repeated across different contexts and can therefore be generalized to a certain extent. I will now use the typology presented above in order to provide a better overview of the findings that is generalizable - i.e., can travel beyond a specific setting. When it comes to the voting medium, one of the repeated findings is that technical and organizational issues (e.g., poor design and usability, installing hardware, software, registration) can reduce voter turnout [Be03]. The voters’ level of trust and confidence changes depending upon the voting medium used and the specific setting (e.g., type of elections, country). However, one can detect general repeating patterns, whereby voters often tend to have more confidence in paper ballots than in e-voting technologies. Furthermore, the confidence of those who vote in-person seems to be relatively higher than those who vote remotely (e.g., absentee ballot, I-voting). When looking at the influence of the e-voting system on voter turnout, most studies seem to dismiss the correlation between the two. There is a correlation between voter turnout and the type of election, whereby turnout is consistently higher at national elections than at local elections. When it comes to the correlation between voter turnout and e-voting technology, the research findings are not completely consistent. Several studies claim that e-voting seems to have an impact on turnout; however, some claim that the impact is temporary and/or insignificant.

If we look at the voters and their impact on political participation, trust, and use of e-voting technologies, we can identify several interesting correlations. For instance, gender, age, and education seem to have some impact on voters’ trust in e-voting. However the extent to which this impact is significant is rather unclear and cannot be generalized. One of the main findings that can be drawn in relation to age is that it influences the level of political participation. This finding refers to the general phenomenon of decline in younger voters [OV04]. Several studies confirm that there is a significant correlation between people’s confidence in e-voting and computing literacy, Internet use, and experience with equipment. Furthermore, voter confidence in the electoral process, including expectations, familiarity, and experiences (e.g., interactions with poll workers) have some influence on their view of e-voting. Trust in the electoral process is related to the voters’ general trust in government and politicians, but whether it is a positive or negative impact depends on the context. For example, Columbia reported high level of confidence in e-voting [Al09a], while African-Americans in the
U.S. reported less confidence in e-voting [SAH10]. It is clear that voters’ trust in government and politicians have influence on their trust in e-voting; however, the degree of this influence varies across the particular countries and settings. These were the findings identified as generalizable; however, many of the different studies’ findings are bound to their specific contexts. For example, the ‘winner effect’ as well as the differences in voter confidence along partisan and racial lines are phenomena that can so far only be applied to the U.S. One of the challenges with such findings is that it is often difficult to draw clear conclusions from the different findings, as these cannot be directly extrapolated to other contexts [AKP11].

There is a need for further studies that provide in-depth investigations of the non-technical aspects and the social impact of e-voting technologies. Most of the studies conducted so far draw upon quantitative methods (e.g. statistical analysis and surveys), with very few exceptions of studies that use ethnographies, case studies and other qualitative methods [e.g., Ba06; Ca06; MG01; OV04, OV09]. While quantitative studies are indeed valuable in explaining what happens when introducing e-voting technologies into a particular setting, they tend to come short in explaining why things happen. This leaves many questions unanswered. Why some variables are significantly relevant in particular contexts but not in others? For example, why do women tend to be more positive than men about the usability of e-voting systems [Be03]? Why are there differences between the attitudes of voters coming from diverse countries and different communities? For example, the differences identified by Besselaar [Be03] of a rural community network and a trade union from different countries.

In some studies, the researchers try to answer the question of why these things happen, but because their quantitative data does not enable them to form such conclusions, they end up proposing what they view as potential interpretations to the phenomenon. For example, it has been said that voters who cast their ballot in-person on Election Day have more confidence than those who cast absentee ballot [HL10; SAH10]. The authors propose a potential explanation that points to the fact that with absentee ballots, voters have to send their ballots through the postal service and can thereby not be sure whether their ballot was received in the time frame required for counting the ballots [HL10]. However, these are potential interpretations and explanations that are not directly based upon the empirical data collected. Similar examples can be found in studies [e.g., Al09a; SAH10] that try to explain a relatively surprising finding (e.g., high or low level of trust in e-voting) by referring to contextual or historical factors—variables and data that was not collected in the study (e.g., confidence in elections in general or to historical discrimination experienced by voters). In order to gain a more critical and in-depth understanding of such contextual and historical factors, there is a need for detailed qualitative studies into the various ways in which e-voting technologies change the way in which we practice democracy, focusing on election practices and the voters’ political participation. Furthermore, there is a need for detailed qualitative studies of real-life experiments with e-voting technologies [e.g., OV09]. We know from the field of healthcare IT that studies of real-life experiments can inform discussions about design and implementations in a more critical and reflective way than those discussions that are grounded in real-life experiences and expectations.
Acknowledgement

The author was supported in part by grant 10-092309 from the Danish Council for Strategic Research, Program Commission on Strategic Growth Technologies. The author would also like to thank Kjetil Rodje for his careful feedback.

Bibliography


