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DOCTEUR DE L'UNIVERSITÉ DU LUXEMBOURG

EN SCIENCES POLITIQUES

by

Leo FEL
Born on 2 September 1996 in Virovitica (Croatia)

BETWEEN REJECTION AND ADOPTION: A COMPARATIVE STUDY OF I-VOTING IN FIVE EUROPEAN DEMOCRACIES

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Born on 2 September 1996 in Virovitica (Croatia)

Between Rejection and Adoption: A Comparative Study of I-Voting in Five European Democracies

Affidavit / Statement of originality

I declare that this thesis:

- is the result of my own work. Any contribution from any other party, and any use of generative artificial intelligence technologies have been duly cited and acknowledged;
- is not substantially the same as any other that I have submitted, and;
- is not being concurrently submitted for a degree, diploma or other qualification at the University of Luxembourg or any other University or similar institution except as specified in the text.

With my approval I furthermore confirm the following:

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- I have documented all methods, data, and processes truthfully and fully.
- I have mentioned all the significant contributors to the work.
- I am aware that the work may be screened electronically for originality.

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Chapter 1: Introduction

“Narrator: Civilized man refused to adapt himself to his environment; instead, he adapted his environment to suit him. So, he built cities, roads, vehicles, machinery, and he put up power lines to run his labour-saving devices. But somehow, he didn't know where to stop. The more he improved his surroundings to make life easier, the more complicated he made it” (The Gods Must Be Crazy, dir. Jamie Uys, 1980).

1.1 **Background**

As a child of about five or six, there were two things I wanted to be when I grew up. The first was a rubbish collector, and the second was an astronaut. These occupations seemingly have no connection. The aptitudes required for each are very different, as is their social prestige. I did not pay this much attention at the time, but as I approached the end of my doctoral studies, it was as if the pieces began to fall into place, lines to connect, and cloudy lenses to clear. I wondered what would lead a child to want to be a rubbish collector, an astronaut, or both. Is there something that connects the two? The most compelling conclusion I reached, which echoed quietly in my mind like a “eureka” moment, was that these two occupations are linked to the state of order. How I perceived rubbish (it should be noted that in the early 2000s in Croatia it was not sorted) was as a heap of things of different purposes, properties, and materials, with one common feature that was ultimately decisive in their ending up in the same bag: they were no longer needed. By contrast, being an astronaut meant, to me, having a front-row seat in an imaginary cinema from which to observe the vastness of the universe. The celestial bodies and galaxies that make it up represent a strange kind of untidy order. They are governed by laws of nature invisible to the eye, which manifest in what appears to be a dappled expanse, as if paint had been splashed across a canvas, yet they remain an order of relations and forms. Although I ultimately became neither a rubbish collector nor an astronaut which, to be honest, I did not particularly try hard to become (though it is never too late), I eventually took up work that also deals with order and disorder. Such is the work of one who goes into research: creating some order out of a messy, confusing, tangled and contradictory world by sorting what matters from what does not, setting the essentials in relation to one another, and giving them meaning. The dissertation that follows is, quite literally, an exercise in and an expression of my lifelong striving to find clarity and structure in this complex world.

What awakened research curiosity and what directed this dissertation is the dissonance between early predictions, hopes, and aspirations of both policy-makers and the scientific community

related to i-voting during the internet revolution in the 1990s and early 2000s, and the fact that some twenty-five to almost thirty years later i-voting is an extremely rarely adopted voting method in the world. To count the countries in which it is used in politically binding elections, one needs roughly the fingers of one hand. When speaking of hands, on the one hand, i-voting was in that period observed, as time has shown, naively in terms of what consequences it would have. A few of the most obvious examples are the increase in turnout, attracting younger voters, and the need for research in that area because voters would supposedly inevitably demand it. On the other hand, numerous objections that are given to i-voting today were not seriously mentioned or considered. Awareness of the disruptiveness of i-voting as a public policy, which is also a democratic technological innovation, did not exist. Instead, the reference points or counterparts of the time were considered to be e-banking or e-commerce. To a large extent, i-voting was perceived primarily as an IT project and as part of the wider digitisation or "internetisation" of society and the creation of new online habits. Possible difficulties were reduced to certain technical matters for which it was believed they would be (routinely) resolved during the development of i-voting systems, and much less attention was given to questions of compatibility with electoral principles, whether i-voting can from a technological side at all reconcile the requirements that arise from those principles, and what the non-technological but social prerequisites for adoption are. The approach to i-voting was often framed by a "why not?" perspective, operating under the assumption that there was a natural, default demand for it among the electorate. It must be acknowledged that such optimistic assumptions were largely held by politicians more than by the scientific community, which nevertheless adopted a more moderate stance regarding i-voting. Their focus was not so much on the possibilities it would provide or the increase in turnout it would achieve, but rather on technological feasibility and its alignment with the requirements of democratic elections.

1.2 **Defining i-voting**

Electronic voting (e-voting) has been a subject of interest as a new voting method for more than thirty years. It is defined as "the use of electronic means to cast and/or count the vote" (Driza Maurer, 2017, p. 153). The definition is borrowed from the Council of Europe, which added counting to the definition in the 2017 Recommendations on standards for e-voting, which was not the case with the 2004 Recommendations (Council of Europe, 2004, 2017). The definition encompasses both in-person and remote e-voting. In-person or on-site e-voting requires physical attendance in polling stations, while ballots are cast with the help of electronic devices of different types and settings: direct voting machines (DRE), optical mark recognition

(OMR) systems, and electronic ballot printers (EPBs) (Górny, 2021). On the other hand, remote e-voting or internet voting (i-voting) is more similar to postal voting, where voters are given an opportunity to express their preferences from remote, distant locations, often prior to election day. Usually, voters cast their ballots using personal computers or mobile phones. Kiosks may also be provided, allowing voters to cast their vote on a device they do not own, either in ordinary polling stations or in commonly used public locations such as transport hubs or shopping centres. E-voting can also be voluntary or compulsory, depending on whether elections are single-channel or multi-channel. In some countries, voting can be conducted exclusively by a single electronic channel (e.g., the USA, Brazil, India), while other countries allow voters to opt between paper-based and electronic voting (e. g. Estonia).

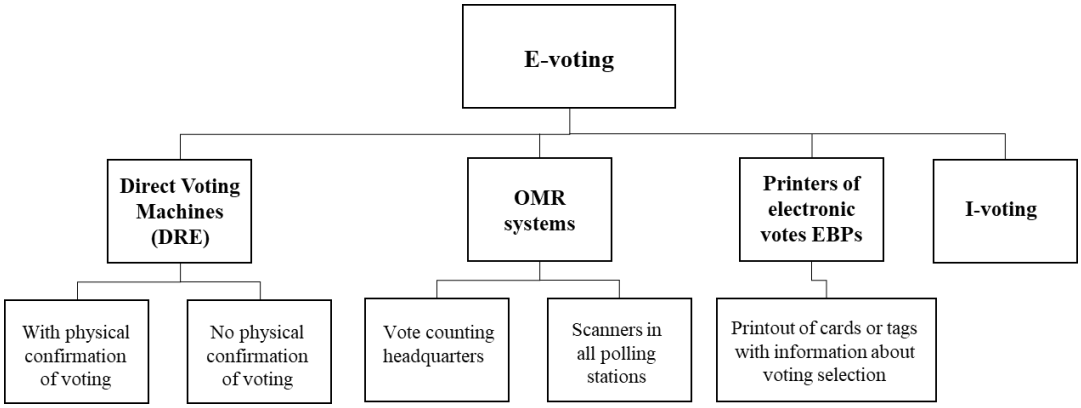

Figure 1.1 Typology of e-voting, adopted from Górny (2021, p. 134), based on Musiał-Karg (2018).

For a voting method to be considered i-voting, it is not necessary that all steps are carried out via the internet, as is perhaps the general perception. The purest form of i-voting is a vote in which voter authentication, the act of voting, and verification all take place via the internet, most often through electronic, smart or mobile identity cards. Experience teaches, however, that such a concept is very rare in practice. A not uncommon example of i-voting is one in which the delivery of voting materials for authentication is carried out by post, and only the voting itself, or let us call it the return of the ballot paper, takes place via the internet. Or the authentication data are sent through two channels, for instance e-mail and SMS. Therefore, for a form of voting to be considered i-voting, it is not important, either for the definition of i-voting set out above or for this research, that all steps take place via the internet. It is sufficient that the act of voting itself takes place via the internet.

1.3 **Overview of the history of i-voting**

The first ideas about i-voting and its first attempts at use came from across the pond, from the United States of America.[1] In 1992, Ross Perot, the Reform Party's presidential candidate, proposed that the internet could be used to increase citizen participation by holding electronic town hall meetings (Alvarez & Hall, 2004). A few years later, in 1996, the party conducted one of the earliest political uses of i-voting by allowing its members to use it to select the party's presidential nominee (R. K. Gibson, 2005). Bill Gates, the founder of Microsoft, envisaged in his 1995 book The Road Ahead that "voters will be able to cast their ballots from home or their wallet PCs" (Licht et al., 2021). The first person to vote from space was American astronaut David Wolf in 1997, from the Russian space station Mir (J. P. Gibson et al., 2016).[2] In 2000, John Chambers, the then President and CEO of Cisco Systems, predicted that i-voting would be adopted in the United States by the 2004 presidential election (McNeal & Tolbert, 2004).

The year 2000 was the "year of online elections" in the US, with the Alaska Republican straw poll in January, the Arizona Democratic primary in March, and the Voting over the Internet (VOI) pilot in November (Solop, 2004). While Republicans in Alaska attracted only 35 voters, the Democratic primary in Arizona was the first state to use the internet as a mode of voting in a binding primary election (Alvarez & Hall, 2004; R. K. Gibson, 2005; Solop, 2004). Later that year, the Federal Voting Assistance Program (FVAP) conducted a small-scale pilot for military and overseas voters (UOCAVA voters) in the presidential election, with 84 votes recorded (Alvarez & Hall, 2004).[3] The 2000 presidential election, which ended with a narrow and questionable victory for George W. Bush, underscored the necessity for a more rigorous approach to voting methods and electoral integrity (Jones, 2003; Tokaji, 2015). This scandal in Florida, involving hanging chads, efforts to determine voters' intent, and the U.S. Supreme Court's decision to halt the vote count, prompted the passage of the Help America Vote Act (HAVA) of 2002, leading to the replacement of punch cards, the establishment of the Election

[1] A historical overview of i-voting is provided by Krimmer (2012) in his doctoral dissertation. Therefore, this overview is limited to what is essential for the context of this doctoral dissertation. The reader is referred to Krimmer's dissertation for more details on the history of i-voting.

[2] American astronauts continue to have the opportunity to vote from space, as exemplified by the case of astronaut Kate Rubins in 2020 (Nasa.gov, 2020).

[3] The Uniformed and Overseas Citizens Absentee Voting Act (UOCAVA) is a federal statute from 1986, amended by the Military and Overseas Voter Empowerment (MOVE) Act in 2009, which requires federal states to enable specified categories of voters (e.g., military and diplomatic personnel, US citizens residing overseas) to register and vote absentee in federal elections (Smith, 2014; U.S. Election Assistance Commission, 2011). The Federal Voting Assistance Program (FVAP) was established to operationalise this mandate, and it serves in supporting absentee voting by providing standardised tools like the Federal Post Card Application and by coordinating with state and local election officials to facilitate and streamline absentee balloting procedures.

Assistance Commission, and the creation of minimum election administration standards (Govinfo.gov, 2002).

In the immediate wake of Bush v. Gore, many viewed e-voting as a "potential panacea to solving the problems that had occurred in Florida" (Alvarez & Hall, 2008, p. 34), because computers do not allow for ambiguous marks or overvotes, and they offer an automated and precise count. However, time has shown that while e-voting at polling stations became established, this was not the case for i-voting. Just as the first ideas about i-voting and the first experiences of its use came from the United States, the first sceptical voices also came from there, and it was concluded relatively early that using i-voting in political elections is not a good idea. This was reinforced by two studies conducted by the California Internet Voting Task Force and the National Science Foundation (NSF), which had a decisive impact on the debate on remote i-voting in the US (Alvarez & Hall, 2004). The California Internet Voting Task Force was mandated to assess the feasibility of i-voting in the federal state of California, and the study was published in January 2000 (California Secretary of State, 2000). It adopted a very cautious stance towards i-voting due to voter identification and computer security concerns, stating that in the near future i-voting could not replace the existing voting system. At the same time, it recommended that i-voting should first be used in monitored environments, and that it could later be extended to allow voters to vote from any polling station within the state, regardless of their address. In 1999, President Bill Clinton issued a memorandum directing the NSF to conduct a study on the feasibility of i-voting, and its findings were presented in March 2001 (Alvarez & Hall, 2004; Internet Policy Institute, 2001). The conclusions were unfavourable to i-voting in the sense that it poses significant risks to electoral integrity, some of which are related to cyber attacks, and that remote i-voting "should not be fielded for use in large scale public elections until substantial technical and social science issues are addressed" (Alvarez & Hall, 2004, p. 23).

Building on the 2000 VOI pilot, the FVAP launched the Secure Electronic Registration and Voting Experiment (SERVE) project, which was intended to enable i-voting for 100,000 overseas citizens and military personnel in the 2004 presidential election from seven federal states, and it is regarded as the largest attempt to deploy i-voting in US history (Alvarez & Hall, 2004, 2008; Hall, 2012; U.S. Election Assistance Commission, 2011). Prior to deployment, a security review was conducted by a panel of computer scientists, whose report was published in January 2004 with the following recommendation:

> "Because the danger of successful, large-scale attacks is so great, we reluctantly recommend shutting down the development of SERVE immediately and not attempting anything like it in the future until both the Internet and the world's home computer infrastructure have been fundamentally redesigned, or some other unforeseen security breakthroughs appear" (Jefferson et al., 2004, p. 3).

In February 2004, Deputy Secretary of Defense Paul Wolfowitz ordered the termination of the SERVE project due to the stated security concerns and a lack of public trust in the i-voting system's integrity (Alvarez & Hall, 2008). Although i-voting has not been adopted in the US as an official voting method, over the past twenty years there has nevertheless been a quiet expansion of a limited form of remote i-voting among small groups of absentee voters, primarily military personnel, through so-called "return ballots" sent by email or fax. This option exists in 31 states, but it usually requires a waiver of the right to a secret ballot, since the ballot is exposed to election staff (Simon, 2020; Smith, 2014).

When compared with the United States, where a degree of optimism towards i-voting had begun to fade, the general sentiment regarding i-voting within Europe at the start of the 2000s was considerably more positive. Interest in i-voting existed at the level of the European Union. In 2000, the European Commission funded the "Cybervote" project to explore the possibilities of secure voting via the internet through personal computers and mobile devices (Alvarez & Hall, 2004; R. K. Gibson, 2005). The project's objective was to develop an i-voting system usable across EU member countries, and to increase overall participation across Europe in the long term. In December 2002 and January 2003, three trials were conducted in France, Germany, and Sweden. Although the project was considered technically successful, it revealed the cost and logistical challenges of distributing card readers, as well as lower-than-expected citizen participation in the trials. In the United Kingdom, Robin Cook, the former Leader of the House of Commons, saw the 2002-2003 local i-voting pilots as a step toward i-voting for general election as early as 2006 (R. K. Gibson, 2005). German experts surveyed in 2000 expressed confidence that by 2010, all elections could be conducted via the internet alongside traditional methods, though by 2002, this optimism had diminished, and the feasibility of i-voting seemed to be less optimistic (Karger, 2004). In 2001, Otto Schily, the German Minister of the Interior, outlined the government's ambition to adopt i-voting in a limited manner in 2006 and fully by 2010 (R. K. Gibson, 2005). Public opinion polls have also shown differences in perception among American and European voters. A Rasmussen Research poll in 2000

indicated that 60% of Americans would use i-voting if it were available for the presidential election, while a 2001 MORI poll in the UK showed that 53% of Britons supported new voting methods, including i-voting (R. K. Gibson, 2005). However, the Rasmussen poll found that 90% of Americans expressed concerns about election fraud in i-voting. Nevertheless, security anxieties appeared less pronounced in Europe, with only 31% of the UK respondents declaring that they do not favour i-voting due to fraud concerns (R. K. Gibson, 2005). Surveys in the Netherlands showed that among internet users, those who would like to vote online, the percentage is 62–79%, with the difference in percentages ascribed to how the questions were formulated (Pieters, 2006).

Almost every European country has at least some evidence of interest in i-voting, and politicians or electoral candidates have at some point argued in favour of adopting it. Numerous countries have launched i-voting projects, some of which have remained limited to general studies of i-voting, its prerequisites for adoption, and its benefits. Very often, working groups were established, and some initial feasibility studies were commissioned to brief policy-makers on whether and how to proceed. Some have run pilots in non-political elections, such as pupil councils or student unions, and a few have even used i-voting in politically-binding elections. Of the European countries for which it can be said that they "took the bait" more seriously, at least for a time, we can name the following twelve: Austria, Estonia, Finland (Åland Islands), France, Germany, Lithuania, the Netherlands, Norway, Russia, Spain, Switzerland, and the United Kingdom. Below, some of these countries are discussed, while the countries that are part of the research will be largely omitted and addressed later (the Netherlands, Norway, Switzerland, France, and Estonia), with the exception that France and Estonia will be mentioned in brief as countries where i-voting has been adopted.

The United Kingdom conducted several local election trials during 2002, 2003 and 2007, which, in addition to i-voting (in the sense of this research), included some other new voting methods (SMS voting, kiosk voting, and digital TV) (Mendez, 2010; U.S. Election Assistance Commission, 2011). After an evaluation was carried out by the Electoral Commission, it was concluded that the trials were not adequate in terms of the security of the voting methods, and their recommendation was to stop further such trials until a robust regulatory framework is introduced (The Institution of Engineering and Technology, 2020). Additionally, the fact that the adoption of i-voting and the very legitimation of the trials were framed as a way to increase turnout after the very low turnout for the 2001 general election, which did not materialise to

the extent that policy-makers expected, contributed to the lack of stronger advocacy for continuing the trials (R. K. Gibson, 2005; Mendez, 2010). In Spain, several non-binding i-voting pilots were conducted. The first time, it was used for a local referendum in the municipality of El Hoyo de Pinares (Cosuleanu & Gaindric, 2007). In the same year in Catalonia, i-voting was used alongside binding paper voting for the Catalan parliament, and it could be used by expatriates (Riera & Cervelló, 2004). It passed technically correctly but did not result in significant participation. Two years later, in 2005, an i-voting pilot was held during the referendum on the European Constitution in 2005, which was marked by low participation of only about 10,000 voters out of 2 million eligible (Noisette & Perline, 2008). In neighbouring Portugal, a non-binding i-voting trial was held during the 2005 parliamentary elections for expatriates who were first sent a letter by post containing the information for voting via the internet (U.S. Election Assistance Commission, 2011). Due to an alleged lack of interest in i-voting among the politicians of the time, the Portuguese government did not continue with i-voting (Freire et al., 2021).

The Åland Islands, an autonomous province within Finland, planned to adopt i-voting for expatriates in the 2019 parliamentary elections, but despite years of preparation, i-voting was cancelled the night before voting began due to technical difficulties and security problems observed during testing (Duenas-Cid et al., 2020). The Austrian experience with i-voting is closely linked to the elections of the Austrian National Students' Union, which began during non-binding test elections in 2003, 2004 and 2006, before binding i-voting was adopted for those elections in 2009 (Prosser et al., 2004; U.S. Election Assistance Commission, 2011). However, in 2011, the Austrian Constitutional Court declared the i-voting regulations unconstitutional and annulled them because they did not contain all the necessary elements that would allow the election process to be verified without relying on external technical experts (Reiners, 2017). In Lithuania, multiple legislative proposals for the adoption of i-voting were proposed and rejected on several occasions (2006, 2008, 2009, 2010, and 2014), and the reasons for rejection were related to, among other things, data security, capabilities, and secret voting (European Commission, 2018). During 2018, the Ministry of Justice initiated a project to establish an i-voting system to enable i-voting for the 2020 parliamentary elections (European Commission, 2018). Nevertheless, according to the latest available data, i-voting in Lithuania has not yet been adopted. In the meantime, Lithuania has introduced another electoral innovation: voters can choose to vote at any polling station within the country regardless of their place of residence or registered address (Venice Commission, 2020).

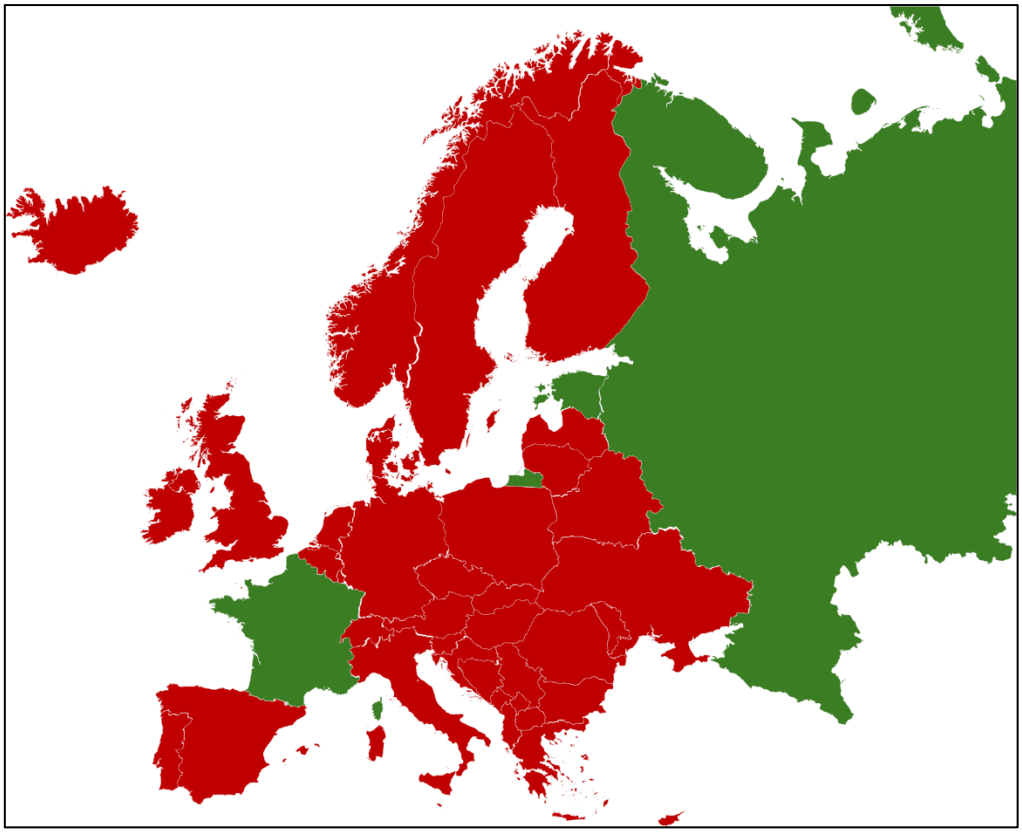

Figure 1.2 Map of Europe illustrating the status of i-voting adoption as of 2025 (author's map).

As of late 2025, (only) three European countries have adopted e-voting in various forms and at different scales: Estonia, France, and the Russian Federation. Estonia is the first and only country in the world that has adopted full-scale remote e-voting (i-voting), from municipal to European elections, offering it to all voters within the country and abroad. More precisely, Estonia has i-voting which was adopted in 2005, when only 1.85% of voters cast their ballots via the internet (Breuer & Trechsel, 2006), and it later reached a record high of 51.1% of voters in the 2023 parliamentary elections (Valimised.ee, 2025). Estonia has so-called multi-channel elections, allowing voters to opt between internet and paper-based voting, and i-voting is conducted as early voting, a few days prior to the election day, allowing voters to change their mind and physically cast their ballot on election day in polling stations, thereby cancelling cast i-vote (Hall, 2012). The French case of i-voting differs in the sense that i-voting is exclusively used by expatriates since 2012 in consular and legislative elections (Guéraiche, 2023; Ministère des Affaires étrangères et européennes, 2022). I-voting was not available for the 2017 legislative elections due to alleged cybersecurity risks (Reuters, 2017), but it has been used in all subsequent elections since then. In July 2015, during a youth forum, Russian President Vladimir Putin endorsed the concept of i-voting (Yarygin et al., 2019). Four years later, in 2019, an i-voting trial was conducted for the parliament of the city of Moscow which,

interestingly, used a private blockchain ledger intended to provide immutability and transparency of the vote count. In 2020, following the COVID-19 pandemic, during the national referendum on constitutional amendments, citizens of Nizhny Novgorod were enabled to vote via the internet alongside Muscovites (Gaudry & Golovnev, 2019; Khutkyy, 2020). The opposition stated that they did not see i-voting as a positive innovation, but rather as a means of manipulation by those in power (Romanov & Kabanov, 2020). The Moscow trial was exposed to criticism by experts who stated that there was a lack of independent oversight over the i-voting system (Gaudry & Golovnev, 2019). A federal law in May 2020 adopted the general adoption of i-voting and postal voting for all elections and referendums (Romanov & Kabanov, 2020). However, unlike other European countries that adopted i-voting, Russia is not a democracy, so there may be hidden motives behind enabling (remote) i-voting for its citizens. For instance, the Chinese example of "networked authoritarianism" shows that technologies that seem to support openness and participation can also be used for repression (DeNardis, 2020), and the same can happen to i-voting if adopted by authoritarian regimes.

1.4 **Rationale for research and qualitative approach**

Rationale for research. This research, which revisits various i-voting projects with different outcomes in European democracies, is important and relevant for several reasons. First, i-voting feasibility reports, trials, and deployment – integral parts of the broad term 'i-voting projects' – are the best way to improve i-voting solutions and generate new knowledge on this matter. Second, the outcomes of i-voting efforts transcend boundaries and influence others who look attentively at feasible policy solutions in role-model countries. Third, this orientation is in line with recent research suggestions, which encourage the investigation of reasons for i-voting (non-)adoption and conducting comparative case studies (Darmawan, 2021). Fourth, i-voting projects that do not end in adoption are much more common than those that end in sustainable adoption. Considering both within a single study is far more important and useful for scholars and policymakers than simply juxtaposing cases that end in adoption. This research aims to understand better political, legal, and technological factors that led to divergent i-voting adoption in selected European democracies and their interplay. That helps to elucidate all the challenges policy-makers encounter when designing public policies on new technologies, particularly those linking democratic processes with technology. Therefore, the research formulates policy recommendations for a sensible i-voting adoption to support policy-makers who seek sound advice to decide whether to adopt i-voting. Lastly, this research provides valuable information to researchers interested in studying i-voting in European democracies.

Rationale for qualitative approach. The research approach, whether quantitative, qualitative, or mixed, should be determined concerning the posed research questions or, in other words, problem-driven rather than method-driven (Halperin & Heath, 2020). The questions I seek answers to in this research call for employing a qualitative approach, which enables us to "study social phenomena in their entirety, in the context in which they occur, while considering the meanings that those being studied give to their actions and to the actions of others" (Rich et al., 2018, p. 75). Additionally, Devine sees this approach's main strength in illustrating "multi-causal processes which shape political attitudes and behaviour in a particular time and place" (1994, cited in Harrison, 2001, p. 87), and i-voting (non-)adoption is undoubtedly such a process. Hence, i-voting adoption in European democracies and factors contributing to different adoption outcomes can be studied by utilising a design/strategy of inquiry called case studies. In this research, units of analysis or cases "bounded by time and activity" (Creswell & Creswell, 2017, p. 51) are selected European democracies of relevance in the i-voting context. The selection of research approach goes together with all the strengths and weaknesses of each, which must and will be further discussed in Chapter 3.

1.5 **Research questions**

Research questions are:

(1) What are the reasons behind the divergent outcomes in the adoption of i-voting among selected European democracies?
(2) What lessons can European policy-makers draw from i-voting experiences when deciding whether to pursue i-voting?

The first question is also the main research question and directs the research to look historically and analytically at the reasons behind the divergence. The second question naturally follows from the first and provides a forward-looking perspective, reflecting on the policy lessons that can be drawn from this research.

1.6 **Scope and boundary-setting**

1.6.1 **Assumptions**

It is assumed that respondents are truthful and forthcoming about their knowledge and experience regarding the subject of this study. Still, there is a probability that some of them might be driven by their material or personal interests (e.g., private vendors' representatives, persons directly involved in i-voting projects under scrutiny), thus affecting their

trustworthiness and willingness to participate in the study to some degree. Also, as the cases studied were events from a while ago (time-distance), it could be a case that participants are wholly or partially unable to recall some facts, as well as that a phenomenon of false memories occurs.

1.6.2 **Limitations**

Some constraints outside the researcher's control should be clearly communicated (Terrell, 2016). For instance, the qualitative approach affects the generalisability of the results as it emphasises a thick description of a particular case. Given that this research examines i-voting projects, some of which date back almost twenty years, the passage of time can make it harder to reconstruct all the important events. It can also complicate access to documents and audiovisual materials, as well as the identification of relevant individuals who were contemporaries of those projects and who can provide data that are important for the research.

1.6.3 **Delimitations**

Some limitations are actively put into place by the researcher. In this research, the qualitative paradigm is employed. Thus, qualitative analysis (e.g., statistical analysis) is out of the research focus. Although i-voting is used in a range of private and business contexts, this research is concerned solely with i-voting in politically-binding elections. For the purposes of this research, politically-binding elections are defined as elections, referendums and similar votes whose outcome is regarded as politically-binding on the public authorities and institutions, in the sense that the results are expected to be implemented in practice (e.g., through the formation of a governing body, the allocation of mandates, or the implementation of a decision). The subject of this research is first-level (national) and second-level (regional and local) elections, as defined by Krimmer et al. (2007), while the other three levels (third: organisations, associations, and companies; fourth: shadow or parallel elections; and fifth: technical tests) fall outside the scope. Another delimitation is that only i-voting (and not other forms of e-voting) will be studied. This refers to i-voting as a form of remote voting that takes place via the voter's device at a location of their choice, which excludes the kiosks mentioned previously. The motivation for this decision is threefold. First, i-voting is the most controversial type of e-voting because it entails various challenges of different voting methods, such as e-voting and postal voting. Second, i-voting could possibly provide more benefits to all stakeholders than on-site voting machines, in other words, i-voting might theoretically comprise convenience, accessibility, staff and cost cuts, instant and precise counting, and spoilt ballots reduction.

Third, general interest in i-voting and its attractiveness to policy-makers is much higher than other e-voting types. The idea of broad adoption of voting machines in Europe is somehow obsolete, and scholarly interest has shifted mainly to i-voting.

1.7 **Research design**

Qualitative research methods "aim to develop an understanding, an interpretation, of the way in which those they study understand their actions and the context in which they act" (Ercan & Marsh, 2016, p. 309). Researchers who employ these methods depart from the interpretivist epistemological position, the position that "there is no world independent of our understanding or interpretation of it" (Ercan & Marsh, 2016, p. 311). The researcher departs from the social constructivist worldview, which is characterised by emphasising an understanding of individuals' meanings of lived experiences, the complexity of those meaning, social and historical construction, the researcher's role in the research, and inductive theory generation (Creswell & Creswell, 2017, p. 46). Positivists criticise qualitative approach as unsystematic, with non-generalisable, non-reproducible, and non-reliable results (Ercan & Marsh, 2016, p. 319). In response to criticism, qualitative researchers highlight that they are judged against standards they do not embrace. On top of that, it is argued that qualitative research can achieve systematicity and reliability if the researcher is well trained and cautious about generalisability claims, concepts are well defined and clearly operationalised, methods are transparent so enabling replication, data analysis is clear and suitable for the particular research (pp. 319–320).

This research will be carried out in the form of a case study, which is "a research strategy based on the in-depth empirical investigation of one, or a small number, of phenomena in order to explore the configuration of each case, and to elucidate features of a larger class of (similar) phenomena, by developing and evaluating theoretical explanations" (Vennesson 2008, cited in Seha & Müller-Rommel, 2016, pp. 420–421). The boundedness of the system, within which a phenomenon is explored, is a particular characteristic of case studies (Creswell & Creswell, 2017). More precisely, a most-similar research design will be employed. In short, this type of research design builds upon an anomaly that "two cases are apparently quite similar and yet demonstrate surprisingly different outcomes" (Gerring, 2017, p. 81). In this setting, cases share common background factors (Z), while they differ in outcomes (Y), so the research strives to determine the causal factor(s) that has an influence on Y (X) (Gerring, 2017, pp. 80–81).

There are different ideal types of case studies, and this research will be an explanatory case study. The focus will be on theory-guided explanation-building, and for that reason the research will have to "look beyond the confines of the case[s] under investigation" (Seha & Müller-Rommel, 2016, p. 423). Each case will be first analysed to map context-specific factors, and cross-case analysis will be done to find common factors that are not context-dependent and can be expected whenever a European democracy launches an i-voting project.

1.8 **Case selection and justification**

This research employs the following case selection criteria or background factors, all of which must cumulatively exist for a case to be selected for analysis:

a. Countries geographically located in Europe;
b. Democratic countries with free and fair elections;
c. Highly developed e-government;
d. Prior experience with i-voting.

The first criterion is geographical: the research narrows down spatial boundaries, so the case study countries should be in Europe, defined as a continent, while membership in different multinational organisations (e. g. EU, OECD, NATO) is not relevant. Second, those European countries should have stable and democratic electoral systems, measured by the Electoral Democracy Index (V-Dem, 2022). This guarantees that the idea of i-voting in a particular country is perceived as a tool for repairing or improving democracy, and not for imposing surveillance on citizens or political repression. Third, selected cases should also entail a high level of e-government services, they should have a wide array of electronic-based public services offered to its citizens. This can be measured with the E-Government Development Index (EDGI), an index that presents the current development of e-government in the UN member states (UN E-Government Knowledgebase, 2023). It captures three components of e-government: online services, human capital, and telecommunication infrastructure. By doing so, it is possible to assume that cases under investigation have rich and extensive experience in developing e-services and that those e-services are part of citizens' daily life. Finally, the last criterion is experiential one. Countries should have previous experience with i-voting in a manner that they at least trialled it during a more extended period. It is important for two reasons. On the one hand, it displays certain seriousness in devoting resources to developing i-voting as a voting method. In many countries, i-voting was superficially discussed without any following steps towards its realisation. On the other hand, prior experiences leave behind traces

in the form of different sources susceptible to scientific research. As more or less planned and structured processes, i-voting projects are satisfactorily documented, thus serving as a starting point for further investigation.

Based on the given criteria, five countries emerged as possible case studies: Norway, Netherlands, Switzerland, France, and Estonia. These countries have had somewhat dissimilar "the i-voting pathway", with different adoption outcomes. The said cases are perceived as prominent in the European i-voting landscape. They are well-documented, with many documents available in the English language, making those cases researchable and providing a solid point of departure for further investigation.

	Norway	**Netherlands**	**Switzerland**	**France**	**Estonia**
European country	Yes	Yes	Yes	Yes	Yes
Democratic countries with free and fair elections (0-1, where 1 is highly democratic)	Yes (0.90)	Yes (0.86)	Yes (0.89)	Yes (0.87)	Yes (0.89)
Highly developed e-government (> 0.75 is very highly developed)	Yes (0.8879)	Yes (0.9384)	Yes (0.8752)	Yes (0.8832)	Yes (0.9393)
Prior experience with i-voting	Yes	Yes	Yes	Yes	Yes
Current state of i-voting	Rejected	Rejected	Protracted experimentation	Partially adopted	Fully adopted
(Planned to) allow voting for	All voters	Expatriates	All voters	Expatriates	All voters
I-voting project period (from–to)	2006–2014	1999–2008	2003–	2000–	2005–

Figure 1.3 Overview of i-voting in five case study countries, based on UN E-Government Knowledgebase, n.d., V-Dem, 2022, and own research.

Norway. The first steps were undertaken in 2003 and 2005 when i-voting in a supervised environment was used for school elections (Riise, 2006). In the following year, the government

ministry established a working group to provide recommendations on possibilities for e-voting in Norway (Skagestein, 2006). In January 2006, the group published the report "Electronic voting – challenges and possibilities" (Riise, 2006), which was followed by the launch of the national i-voting project in 2008 (Nore, 2012). In the period 2009-2011, the project underwent different stages, from procurement to software development, configuration, and i-voting deployment (Nore, 2012). The first trial was carried out during the 2011 local and regional elections when around 28 thousand voters in 10 municipalities cast their ballots via the Internet (Nore, 2014). The second trial took place two years later in the 2013 parliamentary elections, with 70 thousand cast ballots in twelve municipalities (Nore, 2014). However, i-voting was rejected in 2014 by the Ministry of Local Government and Modernisation with an explanation that "there was no broad political desire to introduce internet voting, [so] the Government concluded that it would be inappropriate to spend time and money on further pilot projects" (Regjeringen.no, 2019). Interestingly enough, evaluations from the 2013 trials showed that 9 out of 10 voters from districts where trials were conducted favour i-voting adoption, while 7 out of 10 voters share this opinion countrywide (Institutt for samfunnsforskning, 2013). The Norwegian i-voting project was launched the latest of the five, and Norway had the privilege of drawing on numerous lessons learned from its European counterparts. That particularly included more transparent procurement procedures with a competitive dialogue embedded, disclosure of source code, and introduction of individual verifiability by implementing so-called "return codes" in the form of SMS text messages (Vegas & Barrat, 2016). However, that was not enough to guarantee sustainable adoption and resulted in i-voting rejection. Afterwards, i-voting has been used by some counties for local referenda (Smartmatic.com, 2022), but there are no signals that i-voting trials might be readopt again on the national level.

The Netherlands. The Netherlands is one of the e-voting pioneers, with the first provisions on voting machines in 1965, but the broad-ranging deployment of voting machines in the late 1990s, along with specific legal requirements for voting machines (Jacobs & Pieters, 2009) . By March 2006, 99% of voters in polling stations voted electronically (Loeber, 2008a). In parallel to the adoption of voting machines, an investigatory i-voting project kicked off in 1999 (Loeber, 2008a). As in France, i-voting was initially intended for voters from abroad with one slight difference – the ultimate idea was to offer i-voting also for mainlanders. Two KOA i-voting trials were conducted, which enabled Dutch expatriates to vote remotely from around the globe in the 2004 European Parliament election and the 2006 parliamentary election (Jacobs & Pieters, 2009). During the first KOA experiment, i-voting was conducted via the KOA

system, which was replaced with the KOA-RIES during the 2006 trial. RIES stands for "Rijnland Internet Election System" (RIES), a system developed by and used for the 2004 election of the water board of Rijnland when 120,000 voters cast their ballots online (Jacobs & Pieters, 2009). In the 2006 parliamentary elections, approximately twenty thousand voters cast their votes via the internet, and 99% of those who responded to a follow-up survey stated that i-voting should be adopted permanently (Loeber, 2008a). Interestingly, the fate of i-voting in the Netherlands was closely connected to what happened to physical voting machines. Namely, a civil society organisation "We don't trust voting computers", demonstrated critical vulnerabilities of NEDAP and SDU's voting machines: lack of proper verifiability tools (e.g. paper audit trail), easy software manipulation, and potentially jeopardised secrecy of vote by radiation transmitted from those machines that could be intercepted (Loeber, 2008a, 2014; A.-M. Oostveen, 2010). Additionally, media investigations revealed other doubtful practices, especially machines stored in poorly protected facilities. The debate on voting machines spilt over to i-voting as the issue of certification was raised by the Parliament, and ultimately the State Secretary stated that "the instalment of such a procedure would cost a lot of time and money and that it was therefore not possible to allow voters from abroad to vote via internet in the 2009 EP elections" (Loeber, 2008a, p. 28). These events did not halt further discussions on i-voting and possibilities for its adoption, as the Netherlands ordered research on i-voting feasibility. The conclusion was that i-voting was not a feasible voting method because different issues concerning risks, cost efficiency and unclarities about the actual impact of i-voting on turnout rates arise (Loeber, 2014). At present, Dutch voters have at their disposal paper, proxy, and postal voting (for expatriates only), with no types of i-voting in place.

Switzerland. The Swiss path to i-voting adoption can be described as lengthy. Legislative work on i-voting began in 2000, and over 300 electronic referendums and elections were held from 2003 to 2018 (Górny, 2021, p. 137-138). First i-voting initiatives have begun at the cantonal level with the Geneva canton's leading role. In the first period, i-voting was used for local elections, and in 2014 in the cantons of Geneva, Luzern, and Basel, it was enabled to vote online for national elections. This bottom-up approach displayed weaknesses in 2018 when Geneva decided to discontinue its CHVote system for financial reasons (Ciancio & Kämpfen, 2023). What is more, the i-voting system developed by Swiss Post and Scytl was suspended in early 2019 due to the discovery of serious technical vulnerabilities (Federal Chancellery, 2020). After the suspension in 2019, it was expected to take up to five years to relaunch the i-voting project. Surprisingly, in the 2021-2022 period, a considerable advancement of the Swiss Post

i-voting system was made, which was confirmed by the first independent analysis released in April 2022 (Federal Chancellery, 2022a). Therefore, Switzerland is reintroducing i-voting trials, with the solid support of the Federal Chancellery, guaranteeing an adequate level of financial aid and expert assistance. New legislation on i-voting came into force in July 2022 and includes a set of trust-building measures. Public and experts' involvement is required in the trial phase, not only in the system examination but also in ongoing monitoring. Requirements for disclosing information have been introduced, and dialogue with the academic community is planned to be continued. Switzerland has a full transparency approach in i-voting, with source code published as open access code (Górny, 2021, p. 134). This allows experts to independently assess the Swiss (Post) i-voting system, communicating their findings with the public and EMBs. By publishing source code, citizens can get experts' opinions on whether i-voting systems guarantee an appropriate level of security, and EMBs are provided with feedback on the technical robustness of the system. The common source code is used in New South Wales, a southeastern Australian state, for their i-voting system with the distinction that sharing of source code is criminalised, so it would mean that Swiss officials could face imprisonment according to NSW legislation (Culnane et al., 2019, p. 68).

France. Particularly concerning the French i-voting case, i-voting was from the earliest debates and initiatives exclusively designated for expatriates to enhance their political participation. In that sense, The Internet Rights Forum recommended that the government not adopt i-voting for mainland voters (The Internet Rights Forum, 2003b). The same report states that i-voting (or electronic distance voting as they call it) should be possible for local referendums and the French diaspora in CSFE (Conseil supérieur des Français de l'étranger) elections. With regard to the report, i-voting was initially trialled in 2003 when French expatriates residing in the USA were offered to cast their votes for the Assembly of the French Citizens Abroad (CSFE) elections, a body that elects 12 members of the French Senate, and more than 50% of eligible voters took advantage of that option (Buchsbaum, 2004). As a result, the workload of French consulates was decreased, although it did not lead to higher turnout. In 2004, CSFE was renamed to AFE (Assemblée des Français de l'étranger) as a body with advisory competencies regarding the French diaspora and France's presence in the world (Dandoy & Kernalegenn, 2021). The first high-scale deployment of i-voting happened in the 2006 AFE election with about 525 thousand eligible voters, of whom 28,138 voted online – as AFE elections regularly have low turnout rates, i-votes constituted one-third of all cast votes (Cosuleanu & Gaindric, 2007). I-voting was also used in the 2009 elections and the 2010 by-election (Dandoy &

Kernalegenn, 2021). Because of a constitutional amendment of 2008, French expatriates have 11 reserved seats in the National Assembly, the lower house of the French Parliament, and the first legislative elections under the new constitutional regulation were held in 2012 (Rodríguez-Pérez, 2020). In two rounds of voting, i-voting was the most popular voting method, with 57% and 54% of voters opting for this method, respectively, although 5% of voters reported not being able to cast their vote due to problems related to connection to the i-voting website (Collard & Fabre, 2014). From 2014 on, the AFE is no longer directly elected by expatriates, but instead, its members are selected by consular councillors, a body that expatriates elect in 130 constituencies (Dandoy & Kernalegenn, 2021). In the consular elections of 2014, i-voting was used by 43.21% of voters, and in the aftermath of the elections, the Senate published two reports outlining problems with i-voting, such as difficulties with obtaining email addresses of voters and receiving needed information, then connection problems and, finally, the network congestion in the last hours of voting (Dandoy & Kernalegenn, 2021). I-voting was not offered in the 2017 legislative elections, reportedly because of possible Russian interference in the election processes (Reuters, 2017). It showed that discontinuation was temporary, as i-voting was reintroduced in the 2021 consular and 2022 legislative elections. Moreover, i-voting is not enabled for all elections, especially not for high-stakes elections (e.g., presidential and EP elections). Over the years, some proposals were given to extending i-voting to all politically binding elections in which expatriates are eligible to participate (Collard & Fabre, 2014). President Macron, in his visit to Canada in 2018, "announced the expansion of internet voting 'hopefully' for the next European elections in 2019 and 'for sure' for the 2022 presidential elections" (European Commission, 2018, p. 196). However, to this day, expatriates still cannot use i-voting for presidential and EP elections. On the other hand, it seems that i-voting is attracting the increasing interest of mainland voters, as a survey from 2021 suggests that 60% of French citizens who reside in France would be willing to use i-voting if offered (Odoxa, 2021). Interestingly, there were some legislative proposals for extending i-voting to presidential and EP elections for expatriates (Collard & Fabre, 2014) and even to allow all citizens, irrespectively of their residence, to vote online, but none of those proposals were accepted.

Estonia. I-voting was adopted in 2005 when 2% of voters cast their ballots online for municipal elections (Kitsing, 2014). Eighteen years later, in the 2023 parliamentary elections, 51.1% of those who voted chose to cast their vote via the internet, which remains, to this day, the highest share of i-votes recorded (Valimised.ee, 2025). Regarding the reasons or motives for the i-voting adoption in Estonia, literature provides various explanations, from turnout increase,

efficiency enhancement, and cost reduction to making voting more accessible for specific groups and more convenient for the whole electorate (Kitsing, 2014; Reiners, 2017). An important part of the Estonian i-voting system is a national ID-card which serves for online identification not only for electoral matter, but it also grants access to many e-services provided by the government. In 2011, mobile ID was introduced for parliamentary elections. This is important because there is a notion that it would be wise to use a platform for i-voting that is not solely created for i-voting but has other functionalities. Two arguments can be found here: first is the argument of familiarity with the online environment, and from this argument stems the other, which is trust-based: people are more eager to vote online if they already have prior (positive) experiences with platforms through which voting would be done. This phenomenon is known as a path dependency (Licht et al., 2021). The Estonian i-voting system is far from being technically perfect, and an independent analysis from 2014 has discovered various potential threats and system weaknesses that could be exploited by dishonest insiders or hijackers backed by a hostile state (Halderman, 2017). Officials are aware of those technical constraints, which is not discouraging them from continuing with i-voting. They try to mitigate mentioned technical limitation and absence of end-to-end verifiability (E2E) by establishing a "complicated set of procedural controls" (p. 163) to build the electorate's trust. The Estonian i-voting system has a number of safeguards guaranteeing adherence to election principles of free, universal, direct, secret, and equal suffrage (Kitsing, 2014). In Estonia, i-voting has not replaced traditional polling stations, so voters can choose a form of voting technology that suits them and trust the most. Even if the voter casts a vote online, it is possible to go to a polling station to vote with paper and pen, and an online vote would not count. Those measures are coercion-resistance and enable smooth election conduct in situations when employed technology fails. The Estonian i-voting system has had a high level of trust among citizens. Trust in i-voting has remained constant throughout the years, with 70% of citizens trusting i-voting in 2005 and the same percentage of citizens expressing their trust in 2019 (e-Estonia, 2021). In contrast to other European democracies, Estonia is apparently the only one that has found the "magic formula" for sustainable full-scale i-voting adoption. In other words, the Estonian case is the closest to what i-voting was imagined in the early beginnings of the internet revolution. This was primarily achieved thanks to the high internet adoption rate, supportive legal framework, electronic identification system (eID cards), and political culture sympathetic towards i-voting (Alvarez et al., 2009a). Additionally, as a relatively small country with a population of about 1.3 million, the Estonian administration has certain advantages over larger countries' administrations in dealing with various public issues (Cepilovs & Dueñas-Cid,

2020). What is also worthwhile to mention is that i-voting as a public service is a component of a more comprehensive country's strategic direction to become the world leader in digital transformation and the most digitalised world nation (Freire et al., 2021).

1.9 **Data collection**

Three data collection instruments or types were utilised: interviews, documents, and audiovisual digital materials. The multiplicity of data sources contributed to the quality of this research. Detailed explanations of every instrument follow.

1.9.1 **Interviews**

This data collection instrument has both advantages and limitations (Bogdan and Biklen 1992; Creswell and Poth 2018; Merriam 1998; all cited in Creswell & Creswell, 2017, p. 264). Interviews are a fair substitute when direct observation cannot be conducted. However, interviews are not conducted in natural field settings, and the researcher may influence participants' responses. Participants are a valuable source of historical information, and the researcher is in command of the whole process by controlling the interview settings. Still, participants have their 'filtered vision' which provide a researcher with indirect information, and differences in articulation and perceptivity of participants can be noticeable. With this in mind, said limitations were overcome with the inclusion of other data collection instruments, also known as triangulation (Terrell, 2016, p. 174).

In order to qualify as an interviewee, a person has to belong to one stakeholder group: politicians/candidates, election management, inventors/vendors, media/observers, civil society, academia, independent experts, international organisations, or judiciary. This is in accordance with Krimmer's "E-voting mirabilis" conceptual framework presented in Chapter 2, which is extended by adding additional stakeholder groups from Fel (2025). The researcher first composed an extended list of potential participants based on his assessment of their relevance and usefulness in answering research questions. Then, these participants were approached and asked to participate, and a convenient time and venue were established. The process concluded at saturation. As described, purposive sampling was accompanied by snowball sampling, so participants were asked to recruit other participants whose contribution could be beneficial (Terrell, 2016, pp. 75–76).

As participants are located in different European countries, interviews were mainly conducted via video call platforms. This contributed to efficient time management, responsible project

budgeting, and easier audio-video recording. For this purpose, the researcher conducted interviews via Webex, a tool generally accepted and broadly used at the University of Luxembourg. Still, as some of the participants might not have installed this tool, alternative platforms were offered. In addition, two study visits were conducted to the Netherlands and Estonia, and most of the Dutch interviewees and all Estonian interviewees were interviewed in person.

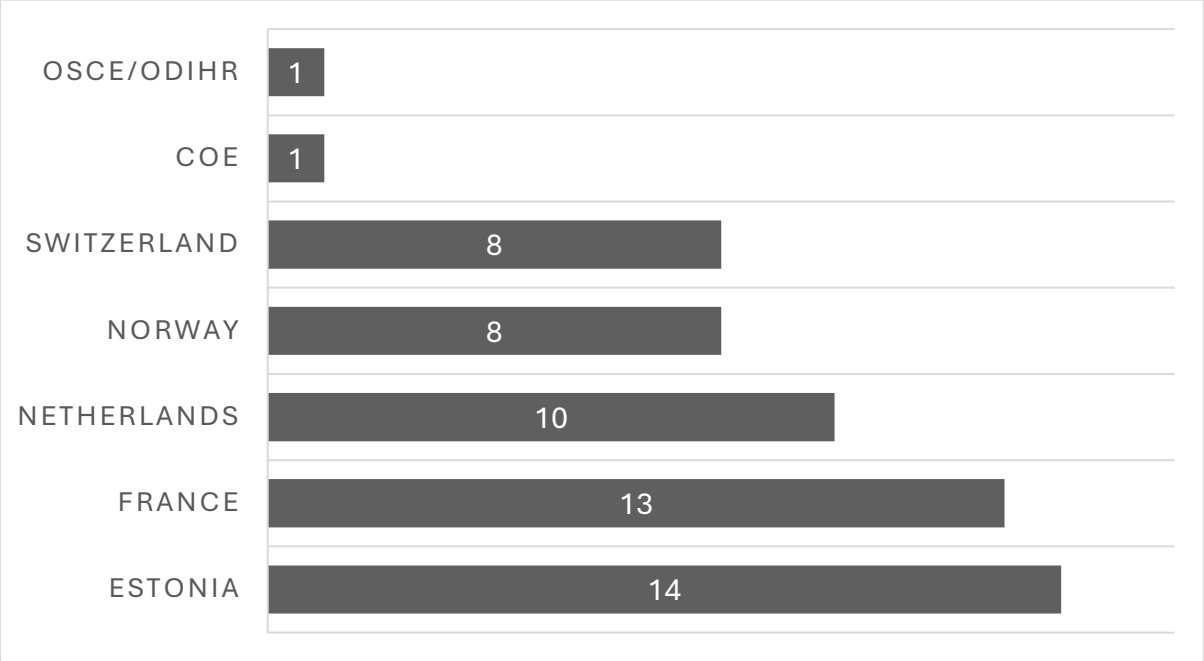

Figure 1.4 Interviewees by country and institution.

The research estimated that a high single digit number of interviews per case study would be conducted, 28 to 36 interviews in total. In any case, that plan was exceeded, and in the end 55 individuals were interviewed from all five case study countries, as well as one person from international organisations, a former employee of the Council of Europe, and a then-employee of the OSCE/ODIHR. Each interview lasted approximately 60–70 minutes.

Interviews were designed in a semi-structured form with open-ended questions, which interview prompts and probes supported. Consistency of questions was maintained as much as possible, bearing in mind the particularities of different cases. An extensive interview protocol was developed, consisting of sections recommended by Creswell & Creswell (2017, p. 267): 1. Basic information about the interview; 2. Introduction; 3. Opening questions; 4. Content questions; 5. Probes; 6. Closing instructions. Interviews were conducted as far as new and interesting data was incoming. At some point, when the researcher found that subsequent interviews would not add to what is already collected, the decision to conclude with

interviewing was made. In academic terms, this is called data saturation (Terrell, 2016, p. 257). Transcription of recorded interviews was done via specialised computer software in order to spare time for other tasks. The researcher verified automatically transcribed interviews to guarantee correct and accurate transcripts for data analysis.

1.9.2 **Documents**

I-voting projects have produced significant amounts of documents in different forms (feasibility studies, reports, minutes, guidelines, legally binding rules, and news articles). It is apparent that i-voting projects that produce public documents prevail, while private documents could include correspondence between different stakeholders during i-voting initiatives, as well as documents produced by private vendors or NGOs. The researcher dominantly used publicly available documents, such as open-publish and open-archival documents. In addition, some non-governmental organisations used provisions of acts on freedom of information to disclose documents of interest for this research (e.g., the Netherlands).

Due to the time distance of about 10–25 years from when the phenomenon under investigation had occurred, locating some documents on the internet could be challenging. However, the researcher is familiar with tools such as "Wayback Machine"[4], which makes it much easier to access data from seemingly deleted or expired web domains. This tool demonstrated to be assistive in that task, allowing the researcher to access various historical websites related to i-voting in case study countries, which could not be feasible without utilising it.

1.9.3 **Audiovisual digital materials**

There are many different interesting audiovisual digital materials. For example, some of these are video-recorded lectures on i-voting and news reports. The researcher accessed publicly available videos published online thematising the five case study countries, which helped to obtain some background information not available in public documents.

1.10 **Data analysis**

It is agreed that there is no consensus about 'the right way' for qualitative data analysis (Terrell, 2016). Actually, data collection and data analysis are simultaneous procedures in qualitative research (Creswell & Creswell, 2017). However, even though these two processes take place simultaneously, a clear and concise plan should be set to secure qualitative validity and

[4] The tool is available at the following link: http://web.archive.org/.

reliability. For this reason, I use the figure below to visualise all procedures and steps in qualitative data analysis in this research.

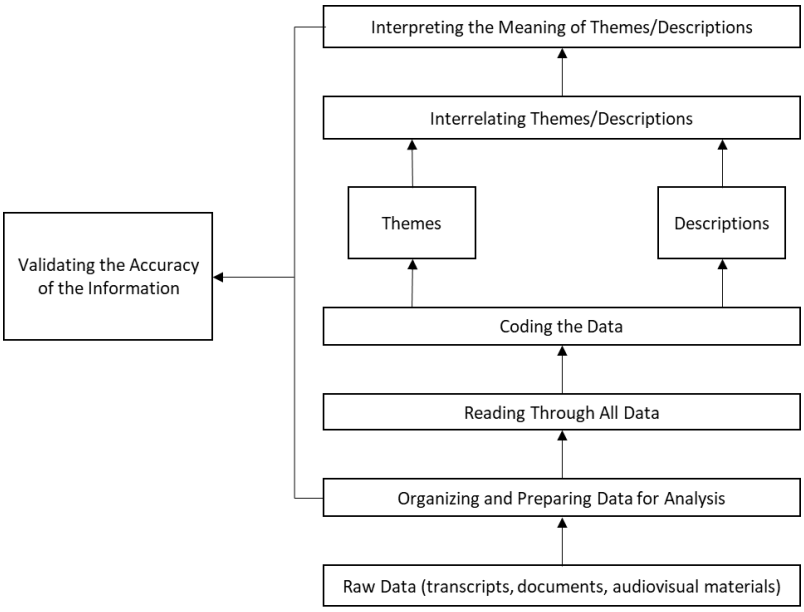

Figure 1.5 Procedures in qualitative data analysis, adapted from *Creswell & Creswell, 2017, p. 269*.

After the data collection phase, the researcher had at his disposal numerous pieces of different raw data in the form of interview transcripts, documents, and audiovisual material. Not all of these were needed for analysis, so the research first 'winnowed' the data, i.e. select some data and disregard others (Guest, MacQueen & Namey, 2002; cited in Creswell & Creswell, 2017, p. 268). Selected data were then divided into a few themes coinciding with the boundaries of each case study.

The data should be adequately organised to facilitate data analysis. The researcher made sure that all data was searchable (e.g., using optical character recognition (OCR) technology), which is particularly relevant for documents from various sources. Audiovisual material was catalogued with a brief description of its contents, while handwritten and voice notes taken by the researcher were transcribed, compiled, and uploaded in a separate file. Data were divided not only by type but also by case studies countries. As all collected data were uploaded on a cloud server (Microsoft OneDrive), they were searchable and accessible for the researcher at any time. This is followed by reading through all data. By going through it, the researcher reminded himself of the data content (nota bene: the timeframe of doctoral research is measured in three to four years), and he got a general sense of what is contained in the data. This guided the researcher in answering the following questions (Creswell & Creswell, 2017, p. 269): "What general ideas are participants saying?; What is the tone of the ideas?; What is the

impression of the overall depth, credibility, and use of the information?" Data coding was the next step in data analysis. For that purpose, the researcher used specialised software (MAXQDA), and coding was based on emerging codes. Themes and descriptions were interrelated based on within- and cross-case evidence.

Interpretation is the last step which consists of (Creswell & Creswell, 2017, p. 273): a. summarising the overall findings; b. comparing the findings to the literature; c. discussing a personal view of the findings; d. stating limitations and future research. Data analysis of qualitative data can be conceptualised as two layers, the first of which is basic and includes more general procedures in data analysis. In contrast, the second layer is advanced and includes an analysis of the characteristics of the selected design (Creswell & Creswell, 2017, p. 272). In the case study research, a detailed description of the case comes first, followed by data analysis for themes and issues (Stake, 1995; Wolcott, 1994; cited in Creswell & Creswell, 2017, p. 272).

In the end, collected and analysed data were used to present comprehensive stories of i-voting in selected countries, with a thick description of each case and with comparative analysis of all cases in pursuit of answers to formulated research questions.

1.11 **Ethical considerations**

As interviews focus on topics related to participants' professional capacities, there is no obligation to obtain any prior approval from the Ethics Review Panel (ERP) for conducting such interviews. Each participant is familiarised with the purpose of the interview and how the data is used, all in accordance with the principle of informed consent. Interviewees have the right to withdraw, and confidentiality is assured by pseudonymisation. Verbatim transcripts of interviews are produced, and those transcripts are made available to participants. The researcher adheres to best practices in conducting interviews and processing personal data, including GDPR and other relevant regulations and guidelines. This project is financially supported by the Institute for Advanced Studies of the University of Luxembourg, and there are no declared conflicts of interest.

1.12 **Background of the researcher**

The researcher has a legal background, as he holds a Master's degree in Law from the University of Zagreb. He has a keen interest in constitutional law and electoral systems. In the 2020 elections for the Croatian Parliament, the researcher was a member of the polling board, and observed the 2021 local elections.

The motivation for studying i-voting comes primarily from the fact that Croatia, the researcher's homeland, has a large diaspora throughout the world. The expatriates have a right to vote in elections, although in practice, it is daunting to exercise this right as there is no means of postal or i-voting. Moreover, the researcher is a digital native, meaning he has been familiar with ICT from early childhood. Therefore, he expected that i-voting would be broadly adopted in contemporary European democracies. However, although generally open to new technologies and their utilisation in everyday life, he is aware that new voting technologies have some negative sides. Research on i-voting is a way to obtain empirical evidence that can form the basis for deciding whether it should be adopted in a particular country.

1.13 **Outline of the dissertation**

This dissertation is divided into ten chapters, which can be further divided into three main parts of the dissertation with their respective chapters:

(1) Foundation (Chapter 1 "Introduction", Chapter 2 "Literature review and theoretical framework")
(2) Empirical analysis (Chapter 3 "Netherlands", Chapter 4 "Norway", Chapter 5 "Switzerland", Chapter 6 "France", Chapter 7 "Estonia")
(3) Synthesis and contribution (Chapter 8 "Discussion", Chapter 9 "Policy guidelines", and Chapter 10 "Conclusion").

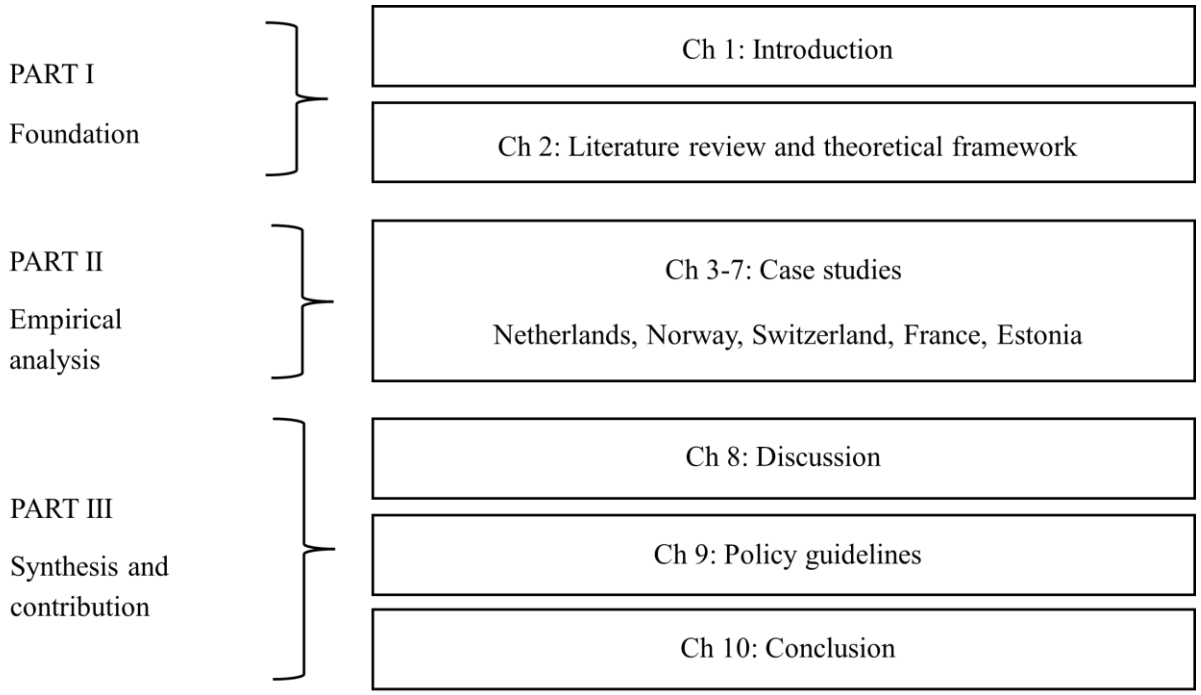

Figure 1.6 Outline of the doctoral dissertation structure, divided into three parts containing ten chapters.

Part I, Foundation, sets the intellectual stakes of the dissertation: what the i-voting adoption puzzle in European democracies is, why it matters, and what kind of explanations the dissertation will treat as credible. It defines the object of research and key definitions so that empirical chapters do not talk past each other (e.g., what i-voting is, what politically binding elections are, what counts as adoption, trial, rejection, and discontinuation, and what the unit of analysis is). Furthermore, it provides an explanatory lens, grounded in theory, for interpreting i-voting adoption outcomes that can be applied across cases without flattening the national context. It justifies the research design and evidence gathering strategy (why these cases, what kinds of data support process tracing and cross-case inference, and how credibility and triangulation are handled). Finally, this part provides the reader with a roadmap of the concepts, expectations, and analytical categories that the case study chapters will operationalise, thus enabling a cumulative rather than descriptive empirical approach.

Chapter 1, "Introduction", lays the foundations for the research by presenting the background of i-voting as a novelty that attracted the attention of numerous countries worldwide, including European countries, at the end of the twentieth and the beginning of the twenty-first centuries. It provides the necessary definitions and directs the research exclusively towards adoption outcomes of i-voting for politically binding elections in European democratic countries. It clearly presents the scope of the research, as well as assumptions, limitations, and delimitations. It identifies and presents the research gap, frames the problem statement, and provides the rationale for undertaking this research, as well as for choosing a qualitative approach through a comparative case study research design. It sets expectations for the research, presents the research design and the five case study countries (the Netherlands, Norway, Switzerland, France, and Estonia), and justifies why these countries are the most suitable case studies for answering the two research questions defined in this chapter. Finally, this part provides the dissertation outline, gives the reader a bird's-eye view of the dissertation's structure, facilitates an understanding of its internal structure, and, as such, serves as an orientation before reading.

Chapter 2, Literature review and theoretical framework, has a twofold purpose. The first is to present existing e-voting and i-voting scholarship to show what is well understood and where gaps remain, and that is especially around the adoption of i-voting as a political outcome. The second is to construct an integrated theoretical framework that will guide data collection, within-case and cross-case analysis and comparison. The literature review section shows that e-voting research is extensive but uneven, with mainly research from technical disciplines, distinguishes major strands of research, and clarifies why i-voting necessitates its own analytic

treatment within "e-voting" as a more general term, because of remote, unsupervised settings, different threat models, and different questions that it raises that a country has to address prior to its adoption. It then narrows down from a general e-voting research to niche research on the (non-)adoption of i-voting. It is demonstrated that existing research lists drivers and barriers of i-voting adoption as static categories rather than explaining how configurations of these produce certain adoption outcomes over time, and this is the limitation this research attempts to correct. Because single-country case studies cannot distinguish what is idiosyncratic from what is generalisable, a comparative design is needed. In a similar vein, the theoretical framework section departs from the assumption that no single theory suffices for answering the main research question. Hence, a set of four theories (Multiple Streams Framework, Diffusion of Innovations, E-voting Mirabilis, and Sociology of Expectations) is a set of component theories that is first presented on its own, reconciled, and finally serves as a building block of an integrated theoretical framework. This framework is the template that the empirical chapters will instantiate, which will enable cross-case comparison later in the dissertation.

Part II, Empirical analysis, comprises five case study chapters (the Netherlands, Norway, Switzerland, France, and Estonia) that provide a thick description of how and why i-voting trajectories diverged in the respective countries. The integrated theoretical framework from Chapter 2 is operationalised consistently across these chapters, thereby creating comparative leverage for Part III by delivering within-case findings that are comparable and can be synthesised into cross-case patterns.

Chapter 3 presents the first case study country, and that is the Netherlands. The chapter situates i-voting in the Netherlands within the context of the legacy of the 2006 e-voting computer scandal, which had a decisive impact on i-voting's fate. In other words, it shows how a separate, although to some extent similar, democratic innovation is entangled with the reputational and political fate of another democratic innovation. Two occurrences of i-voting are explained, one within the KOA project (the 2004 and 2006 parliamentary elections).

Chapter 4, Norway, shows how electoral principles of secret and free suffrage can pose an insurmountable barrier to i-voting adoption in a high-trust electoral context. The lack of prior remote voting and reluctance towards such a practice are among other factors, as the Norwegian voting system is already deemed accessible and working well, which makes i-voting unnecessary. Two trials in 2011 and 2013 showed no increase in turnout, which was an official reason for exploring i-voting possibilities, but, in the public discourse and political debates,

proved to be a commonly used argument. The chapter also delves into political support for i-voting, which was mainly backed by two junior coalition partners of the Red-Green Coalition (2005–2013) and by individuals from the responsible ministry, while the main opposition parties strongly opposed, and ultimately stopped further trials after coming into power in late 2013.

Chapter 5 positions Switzerland as a case in which the institutional environment (federalism, decentralised electoral administration, and a tradition of direct democracy) produces incrementalism and multiple veto points for any democratic innovation. Postal voting, which has been widely used and is the most dominant voting method in Switzerland, is treated as a baseline condition that reduces the marginal convenience gains of i-voting domestically, shifting the problem frame towards a well-organised diaspora, the most outspoken proponent of i-voting adoption. The chapter provides an account of nearly 25 years of experimentation with i-voting, which has yet to be adopted as a voting method, and I term this a state of "protracted experimentation".

Chapter 6, France, explains how and why France pursued i-voting specifically for expatriates, not as a universal voting method, and why it was limited to legislative and consular elections, not to presidential and European parliamentary elections, in which expatriates are eligible to take part. The chapter traces the relationship between France and its diaspora and the system of representation that has been developing since the post-World War II period, culminating in the 2008 constitutional reform that granted reserved seats for 11 French expatriates worldwide. Although i-voting in France has had its ups and downs, and was even discontinued in 2017, the chapter shows a clear commitment from the top policy-makers, more precisely French presidents Chirac, Sarkozy, and Macron, to facilitate their participation in the political life of France, making France a case of partial or niche adoption of i-voting.

Chapter 7 traces the pathway of Estonia, a small post-Soviet country, from its regained independence in the early 1990s, through its state (re)building closely connected to digitalisation, with its most advanced, and at the same time most radical, digital service, which is i-voting. Estonia, as the only country in the world to have fully and sustainably adopted i-voting for the whole electorate and for all elections since 2005, often stands out among the most advanced countries in terms of digitalisation, while the chapter reveals the Estonian "e-" story, i-voting included, is much stratified, and that i-voting is more contested than perceived from outside. The pre-existing eID infrastructure, push from top policy-makers, a strong

narrative about digital Estonia, and no less important good timing for adoption, all of that as a confluence of factors that led to adoption, are discussed in the chapter.

Part III, Synthesis and contribution, is the final part that integrates the findings from Part II into a coherent answer to the main research question about why i-voting adoption differs across European democracies. It moves from description to theory building by identifying cross-case patterns, causal mechanisms, and adoption outcome configurations (e.g., which combinations of conditions tend to produce full adoption, niche adoption, prolonged experimentation, or rejection). Furthermore, findings are translated into actionable policy guidelines for policy-makers across Europe who might consider adopting i-voting. In short, Part III delivers theoretical, empirical, and practical/policy contributions to the adoption of i-voting in European democracies.

Chapter 8, Discussion, is the chapter where the dissertation answers the first and main research question on different i-voting adoption outcomes in European democracies through introducing what is coined as "the dials on the lock", a conceptual model comprising five dials (problem frame, path dependency, actor agency, narrative, and policy window) whose simultaneous alignment is a precondition for the adoption of i-voting. In simpler terms, the chapter argues that i-voting adoption is best explained as configurational: outcomes emerge from alignment or misalignment across the five dials rather than any single factor. As the argument is that for i-voting adoption, all of those dials have to be aligned, this explains why non-adoption is dominant or even a default outcome, while adoption is an exception.

Chapter 9, Policy guidelines, addresses the second research question: what other policy-makers can learn from i-voting adoption in European democracies so far. It is an applied, or practical, contribution that translates the dissertation's findings into sound policy advice for policy-makers in other European democracies interested in i-voting. The goal of the chapter is not to advocate for i-voting. On the contrary, the stance is agnostic, and what is provided are decision points for consideration. The basic idea is to provide food for thought rather than a generic good practice list, mainly because there are many blind spots in i-voting adoption. I-voting is treated as a complex socio-technological system whose adoption is undertaken as a long-term project that goes beyond mere technical issues (the least developed in the chapter) and transcends politics, law, sociology, organisational sciences, and more. The previous chapters inform the chapter and also include the author's distilled insights from his four-year PhD student experience, which adds additional value.

Chapter 10, Conclusion, restates the dissertation's findings and answers to two research questions concisely, without reopening the full argumentative work already done in Chapters 8 and 9. Three sorts of contribution are presented: empirical, theoretical, and practical. The most important limitations are stated, and it is clarified where the conclusions are most likely to lead. Also, boundaries and limitations are briefly discussed. The chapter ends with a succinct reflection on what the findings imply for the future of i-voting in European democracies, not "will it happen", but under what configurations it might be revisited and sustainably adopted.

Chapter 2: Literature review and theoretical framework

"I remember seeing an elaborate and complicated automatic washing machine for automobiles that did a beautiful job of washing them. But it could do only that, and everything else that got into its clutches was treated as if it were an automobile to be washed. I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail. In a word, I had either to give up my questions or else to invent new ways of answering them. I preferred the latter course" (Maslow, 2002, p. 15).

2.1 Introduction

The preceding chapter introduced the central research question of this study. The purpose of this chapter is to define the conceptual and theoretical basis upon which the empirical analysis will rest. The discussion proceeds from the assumption that systematic and theoretically grounded reasoning is essential for drawing valid and defensible conclusions. Accordingly, the chapter pursues two aims:

(1) to review the body of i-voting literature in order to summarise existing knowledge, identify research gaps, and note areas that require further research,
and
(2) to define and construct a theoretical framework that provides the lenses for the research.

The chapter is divided into two main sections. Section 2.2, Literature review, offers an overview of e- and i-voting scholarship and examines prior studies on i-voting (non-)adoption. It classifies the literature and identifies where disciplinary divisions, and methodological constraints have limited comprehensive understanding. It also summarises the directions for further research proposed by earlier authors. Section 2.3, Theoretical framework, develops the theoretical framework used in this research by reviewing, reconciling, and synthesising four theoretical models into a single integrated framework guiding this research.

2.2 Literature review

2.2.1 E/i-voting research

The study of e-voting, a broader term than i-voting, began several decades ago, originally in cryptography, a branch of computer science (Volkamer, 2009). Over the years, the research has spread to other disciplines, and e-voting is now in the focus of political scientists, sociologists,

legal scholars, and even philosophers. Even so, technical disciplines still comprise almost three-quarters of all e-voting research worldwide (72.4% during the 2009–2018 period) (van Oostveen & van den Besselaar, 2019), while social science has more humble contributions. This is also reflected in the E-Vote-ID Conference, the world's leading conference on the subject, where the technical track receives the majority of submissions.[5] The field of e-voting is "interdisciplinary in nature" and "requires a comprehensive approach that reflects upon technical, legal, social as well as political aspects" (Lindner et al., 2016, p. 14). However, research, especially that of the technological sciences, often observes i-voting as a mere artefact, which neglects the human and organisational complexities that it carries with it, and it can be viewed as a complex socio-technical system that has two components: social (the people and the organisations) and technical (the technology or the artefact itself) (Spycher-Krivonosova, 2022).

To the best of the author's knowledge, the literature does not contain an official division of the branches of e-voting research. An orientation towards Krimmer's (2012) dimensions of e-voting (technology, law, politics, society) can serve this purpose. One could derive that research is divided, by scientific branches, into: (1) technological sciences (computer and information science, engineering, mathematics), (2) legal science, and (3) social sciences, within which it can then branch into a part that deals with the institutional (political science and organisational science) and a part that deals with society and individuals (sociology and psychology). Goos et al. (2016) offer a different division of e-voting research, combining the technical and legal dimensions, considering them inseparable and necessarily linked in order to achieve viable i-voting, and thus identify three distinct types of i-voting research: (1) Legal theory and computer science (the technical properties of i-voting and their alignment or conflict with five legal electoral principles), (2) The socio-cultural context (non-technical, human-centric aspects of i-voting such as the digital divide, the symbolic meaning of elections, and social identity and trust), and (3) The socio-political context (almost entirely focused on voter turnout through research into types of non-voters and explanations for non-voting). Another classification is possible according to the tracks of the recently mentioned E-Vote-ID conference, which divides papers into three areas: (1) security, usability and technical issues, (2) governance issues, (3) election and practical experiences (E-vote-id.org, n.d.). It is a kind of epistemic-thematic

[5] For further information about the E-Vote-ID Conference, consult the official website: https://www.e-vote-id.org.

typology that encompasses the techno-scientific (positivist, experimental), the socio-political and legal (interpretative, institutional), and the practical (empirical-evaluative) dimension.

A division is also possible into research that deals with e-voting (in the broader sense) as all the determinants that exist in the most diverse e-methods of voting, then e-voting (in the narrower sense) as voting by (standalone) voting computers/machines, and i-voting as the most radical of all variants of e-voting, which entails voting from the voter's device from a location of their choice via the internet.

2.2.2 **Research on the (non-)adoption of i-voting**

The research on e-voting also focuses on e-voting adoption in general, its effects, and the factors that affect it (Darmawan, 2021). There has been an increase in published research over the last few years, although e-voting adoption has decreased (Darmawan, 2021), and the adoption rate remains relatively low. Borucki & Hartleb (2023) have identified "a general trend toward increased mentions in the electoral programmes" (p. 5) of e-voting from the 2010s onwards, noting that parties are most in favour of adopting this voting method for expatriates. Given the evident decline in the number of (newly) launched i-voting projects in Europe precisely after the 2010s, that is an interesting finding. Examples of adopted i-voting attract greater academic attention than non-adoption cases, as is visible by the higher citations per publication in studies featuring Estonia compared to those on other countries (Krimmer et al., 2019).

This phenomenon is also commonly present in research dealing with innovation diffusion, where research of 'successful diffusion' prevails, and rejected and discontinued innovations are not likely to be investigated because they do not leave behind many reconstructable traces (Rogers, 2003). It is related to pro-innovation bias, that is, "the implication in diffusion research that an innovation should be diffused and adopted by all members of a social system, that it should be diffused more rapidly, and that the innovation should be neither re-invented or rejected" (Rogers, 2003, p. 476). For instance, in Goos et al. (2016), we find an illustrative case of a pro-innovation bias, or at the very least, a perception of i-voting as inevitable:

> "In the long run, however, it should not be underestimated that people will ask for the opportunity to vote via the Internet as they become used to doing more and more things online. Governments and public institutions should, therefore, be prepared to offer this possibility in the years to come." (p. 179).

In the same vein is Hall (2012, p. 172), who states that "(...) there is one clear trend in the area of Internet voting, which is that countries with Internet voting systems – Estonia and Switzerland – will continue to use them and many other countries, including Norway, jurisdictions in the United States, and other European nations, will continue to experiment with this voting technology".

Darmawan (2021) detects non-traditional ways of e-voting adoption research, those including "the questions that have evolved more than just simply about e-voting adoption, having more complex ideas such as perception and rejection of e-voting adoption" (p. 490). A large part of the research approaches i-voting as an independent variable (a cause) in terms of how it affects electoral outcomes, while approaches that treat i-voting as a dependent variable (a policy outcome) are rarer:

> "Somewhat surprisingly there has been little research (...) on the potential of ICT-enabled political experimentation to generate conflict and political contestation"(Mendez, 2010, p. 460).

Similarly, Krimmer (2012) recognises that "the field lacks holistic research about e-voting that integrates these multidisciplinary perspectives with theoretical and practical approaches and gives an insight into the motivating and influencing factors for using voting technology in elections" (p. 6). He addresses this deficiency in his doctoral thesis, which produced the E-voting mirabilis framework. This dissertation will draw on it, and it will be discussed in more detail in a dedicated section.

Research often focuses on a single-country case study, with incidental comparisons between the main country of research and the experiences of others (Vinkel & Krimmer, 2017). The positivist paradigm prevails, and there is a geographical focus on the United States, or on Estonia and Switzerland in Europe (Darmawan, 2021). Alongside the single-country case study, there are also small-number case studies where two states are often juxtaposed (e.g., Braun Binder et al., 2004; Pieters & van Haren, 2007; Goodman & Smith, 2017; Freire et al., 2021; Górny, 2021), as well as three (e.g., Mendez, 2010) and more (e.g., Hall, 2012; Goos et al., 2016; Morel, 2018). Case studies with different units of comparison can also be found, as is the case with Goos & Korthagen (2020), who address i-voting in one political party (the European Green Party) and two countries (Estonia and Switzerland), while Gerlach & Gasser (2009) compare three different i-voting projects within Switzerland. At times, within different case studies both e-voting in the narrower sense and i-voting are addressed together (e.g.,

Morel, 2018). Furthermore, case studies are often limited to a specific stakeholder group (e.g., Mahrer & Krimmer, 2005), a particular e-voting type (e.g., Licht et al., 2021), post-transitional contexts (e.g., Kassen, 2020), and individual rather than institutional factors (e.g., Schaupp & Carter, 2005).

Case studies with two or more states often have certain common shortcomings. Early research often dealt both with e-voting in the narrower sense, primarily on-site e-voting on voting machines/computers, and with i-voting, as well as with other alternative forms of e-voting (SMS and digital TV voting) (e.g., Pieters & van Haren, 2007). Some research deals only with insights from an existing case of i-voting application on the applicability and potential adoption in another country (e.g., Freire et al., 2021). A sufficient thick description of the case is often not provided, which results in a more general and sometimes simplified presentation of the case itself, and one of its causes is probably the constraint imposed by the publication formats. In addition, case studies are to a certain extent treated in a hermetic, case-by-case manner with each of them presented separately (which in itself is fine in terms of clarity), but with a synthesis that is often laconic and superficial, and authors often do not engage in deeper analyses and the provision of broader conclusions. The same is actually not possible without the use of a larger number of cases that are purposively selected in terms of certain characteristics that would enable the research to be designed as, for example, a most-similar or most-dissimilar design. The temporal component should not be overlooked either, because many case studies were conducted while the consideration or adoption of the i-voting project in question was still ongoing, and when the entire story had not been brought to a close and completed, so that each individual case study could then be clearly delimited in time and analysed retrospectively.

While Mendez (2010) acknowledges the comparative approach as relevant to i-voting, he views its application as feasible only in the event that i-voting becomes more broadly adopted, thereby overlooking cases of non-adoption as suitable subjects for comparison. A small number of cases cannot reflect the diversity of Europe and cannot provide general lessons (Goos et al., 2016a). However, this may be possible if a different and suitable theoretical framework is used, and if the focus is placed on what causes the diversity of outcomes. After all, cases where early interest and even trials of i-voting lead to non-adoption are so frequent that adoption itself has become, in fact, a marginal phenomenon when compared to the total number of European countries and the high hopes held at the beginning of the century. Using a comparative approach can provide policymakers with insight into the challenges and good practices (the author uses

the term “best” practices) they will inevitably encounter when considering i-voting, which in turn enables higher quality legislation (Loeber, 2017).

The policy framing used to promote i-voting matters because i-voting is judged against what it was promised to deliver. If it fails to fulfil what was proclaimed (e.g., increasing turnout), it becomes susceptible to failure (Mendez, 2010). Political will and public debate, not technology, determine the fate of i-voting (Goos et al., 2016a). A clear example is Germany, which has remained “aloof” towards any form of e-voting to this day, primarily due to these two factors (Fitzpatrick & Jöst, 2022). In a similar vein are Pieters & van Haren (2007), who state that perceived technological risks and benefits are socially constructed and context-dependent, not objective, e/i-voting solutions for elections are not “one-size-fits-all”, and a country’s e/i-voting discourse is an expression of its “deeper cultural and historical settings” (p. 289). Therefore, i-voting cannot be seen merely as a technical upgrade because it entails political conflict and contestation (Mendez, 2010). The conflict is so intense because it leads to the logic of redistributive politics, which occurs when i-voting is perceived as being biased towards a specific group of voters or political parties rather than being neutral (Mendez, 2010). The nature of the conflict is not purely political but also legal, as it requires the compliance of i-voting with existing principles of democratic elections (Goos et al., 2016a). In addition, the nature of public trust plays an important role, that is, the way in which the judiciary interprets electoral principles in each individual country (Morel, 2018). Mendez (2010) similarly adds that no single variable can explain the divergent outcomes and suggests instead that the differences are best understood by examining the institutional framework and preconditions within each respective country. At the same time, scaling up i-voting to the level of politically binding elections and referendums “(...) requires major efforts with regard to legal, technical and social aspects” (Goos & Korthagen, 2020, p. 273).

From the mid-2000s onwards, an awareness of the complexities of adopting i-voting has been observed, with challenges spanning various spheres (social, political, legal, and economic) (A. M. van Oostveen & van den Besselaar, 2019). In developed democracies, the scholarly debate is more balanced in terms of the advantages and disadvantages of e-voting, whereas in emerging democracies, hybrid, and authoritarian countries, it is much more technologically focused and much less critical of the disadvantages (A. M. van Oostveen & van den Besselaar, 2019). One of the most recent and comprehensive research on general factors of i-voting adoption is done by Licht et al. (2021). The research aims to create a general inventory of drivers and barriers to i-voting adoption through an exploratory, inductive approach based on

expert interviews and desk research. The analysis is thematic and inductive, grouping findings into two-level categories (political and individual) of drivers and barriers to i-voting.

Political level drivers
1. Universal access (Expatriate & overseas staff voting, voting in territorially challenging locations)
2. Accessibility
3. The political will to appear modern and innovative
4. Contactless democracy
5. Vendor's commercial drive
6. Increase turnout / prevent further decline
7. Strong lobby groups
8. Perception of technology as neutral third party
9. Cost reductions
10. Process improvements
11. Integrity improvements in administrative operations
12. Socioeconomic status and high technological infrastructure (geographics)
Political level barriers
1. Middleman Paradox
2. Political crisis
3. Change of government (related to middleman paradox)
4. Security concerns
5. Theoretical technical vulnerabilities
6. Strong opposition from academia & CSOs
7. Lack of a framework
8. Lack of technological infrastructure / Digital divide
9. Lack of verifiability
10. Procedural barriers
11. Change of legal requirements

Figure 2.1 Political level drivers and barriers of i-voting, adopted from Licht et al. (2021).

The research clearly states that the listed factors are presented as stand-alone, static categories and notes the following: “Further detailed case studies in selected countries could shed new light on how these drivers and barriers interact in particular administrative and political contexts and bring to the final decision of implementing or not i-voting” (Licht et al., 2021, p. 103).

2.3 **Theoretical framework**

As this research is rooted in the interpretivist tradition, theories are “narratives about the world and how it works”, and therefore, “one narrative may be dominant, but it is not ‘true’” (Ercan & Marsh, 2016, p. 312). Hence, theory will be used as a lens through which i-voting adoption outcomes will be spectated. Four theories that are the backbone of the theoretical framework (Multiple streams framework (hereafter: MSF), Diffusion of innovations (hereafter: DOI), E-voting mirabilis (hereafter: EVM), and Sociology of expectations (hereafter: SoE)) will be first separately exhibited and critically assessed, which will be followed with reconciliation of potential contrary or nonadherent elements, and finally with an integrated theoretical framework in which particular elements from all of those four theories are borrowed.

2.3.1 **Component theories of the framework**

2.3.1.1 **Multiple streams framework (MSF)**

Public policy-making can be thought about as a set of processes: setting the agenda, specifying alternatives, choosing from those alternatives, and implementing the decision (Kingdon, 2011, p. 3). Kingdon challenges traditional models that tend to portray policy-making as a structured, sequential progression from problem identification to solution selection, understanding it as messy, unpredictable, and non-linear. The most plastic description of the policy-making process he offers is waiting for the waves to surf on the right wave, meaning one needs to learn to surf, not to control the waves, but to take advantage of them (Kingdon, 2011, p. 181). That is a more balanced understanding than promoting a certain policy solution as “a tsunami that all resistance is futile” (Drechsler, 2018, p. 16). Policy-making is, in another vivid example, “an organised anarchy” (Kingdon, 2011, p. 86). That is a term borrowed from Cohen et al. (1972), who used it in their article on organisational choice conceptualised as a ‘garbage can model’, which Kingdon then adapted to the context of public policy-making.

Kingdon’s main theoretical contribution is Multiple streams framework (MSF) (Kingdon, 2011). He delineates his research on agenda setting (identifying problems for attention) and specification of alternatives (generating choices). Agenda represents the list of subjects or

problems that capture policy-makers' attention and are being prioritised for potential (policy) action. It is the "what" of policy-making. On the other hand, alternatives refer to the potential solutions or policy options, i.e. various approaches that could be taken to solve the identified problem, which are being considered to address the issues on the agenda. These are the "how" of policy-making.

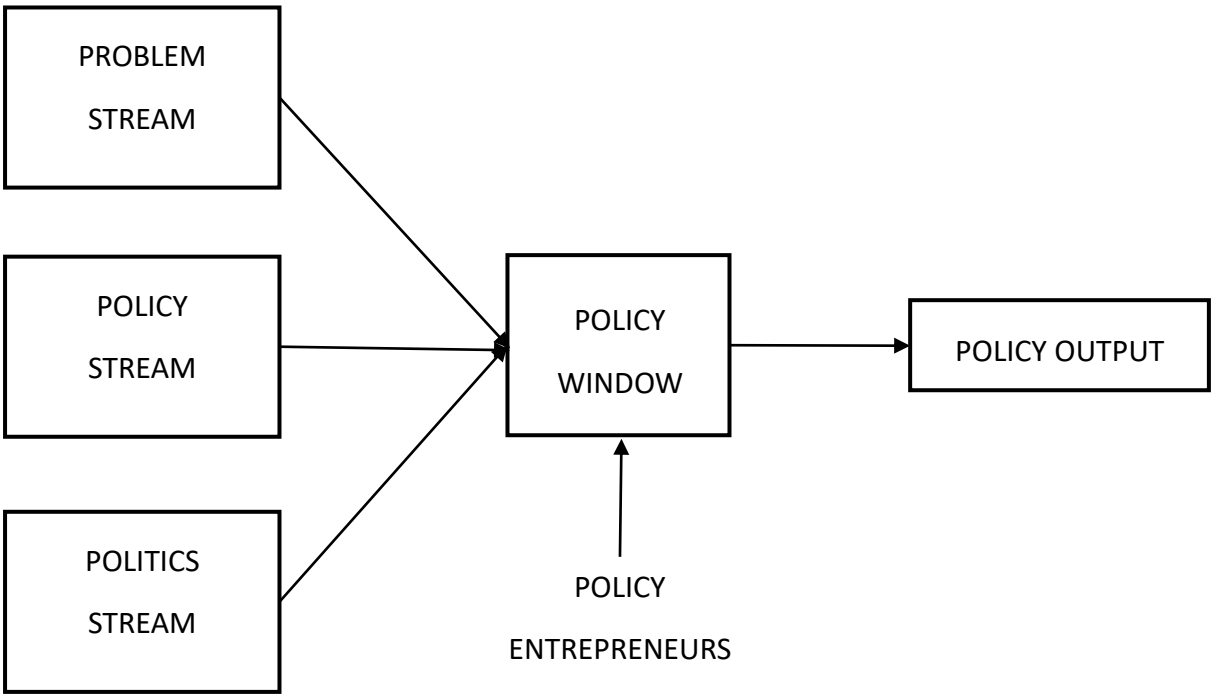

Figure 2.2 Multiple Streams Framework, adopted from Kingdon (2011).

However, not all problems urge to be solved. People live with dozens of problems that public policies may address, yet years and years pass by, and they are still there. Problems that last for some time become more durable and bearable and are not a stone in a shoe that is irritating but many more conditions people manage to live with. In Kingdon's words, "conditions become defined as problems when we come to believe that we should do something about them" (Kingdon, 2011, p. 109). Problems fade from the policy agenda for several reasons, such as successful (or perceived successful) government action, fluctuations in public attention, failure to implement solutions, shifts in problem definition or categorisation, and the emergence of new problems during implementation. If people are willing to tolerate a problem, the perception of urgency can diminish, and the public attention shifts away to more captivating issues that constantly emerge. This puts policy-makers in a situation of strategic calculations regarding the costs and benefits of addressing a particular problem, they weigh both the costs of action and potential benefits and may choose to keep living with the problem for a while longer.

What is more, problems do not always precede solutions, as solutions can exist independently of problems. They can float in what Kingdon calls "policy primeval soup" (p. 116), consisting of ideas, proposals, and potential solutions, often with little connection to immediate problems or political demands. The interplay between three independent and distinct streams (Problem, Policy, and Politics) becomes evident when a policy window opens, presenting a fleeting opportunity for policy entrepreneurs to couple their preferred solutions to the problem at hand and to gain their proposal with favourable political forces. The streams are not isolated but exhibit certain connections and interactions.

Problems stream

The problems stream examines how certain conditions rise to prominence to capture policy-makers attention and become framed as problems necessitating government (re)action. The mechanisms through which conditions transform into problems include (1) indicators, (2) focusing events, and (3) feedback. Indicators can be statistical data and trends that can serve as compelling evidence of a problem, although the interpretation of those is not always unambiguous and straightforward, as different stakeholders may use the same data to support different problem definitions. Focusing events, on the other hand, are crises, disasters, or highly publicised events that suddenly focus attention on a problem, making it seem more urgent and demanding immediate action. However, those events often have a temporary effect unless they are accompanied by more substantial evidence of a widespread problem. The last is feedback, defined as information about the performance of existing policies that can point at problems requiring attention. Positive feedback can encourage the expansion or adoption of a policy, whereas negative feedback can generate pressure for policy change.

Furthermore, for a condition to be treated as a problem, its perception and interpretation must support the belief that something should be done about it. This is shaped by (1) values, (2) comparisons, and (3) categorisation. A condition that aligns with prevailing values and societal priorities will likely be elevated to the problem status. Comparisons with other countries or different population groups follow this. If a country lags behind its peers in a particular area, this discrepancy can be framed as a problem requiring policy (re)action to close the gap. The final step is categorisation, that is the way a condition is categorised and framed and the policy solution considered.

Policy stream

Policy ideas, proposals (alternatives), and counter-proposals are generated, debated, and refined in the policy stream, which is primarily inhabited by a policy community and a network of specialists, experts, and advocates engaged in specific policy areas. Those are academics, researchers, career bureaucrats, (congressional) staffers, and analysts, all deeply immersed in the intricacies of their respective domains, possessing knowledge, expertise, and a shared understanding of the issues. In a "policy primeval soup" their ideas and proposals float, being continuously generated, debated, and modified. Not all ideas that enter this "soup" survive or gain prominence, but there is an evolutionary selection process in play instead, akin to natural selection in biology. Some flourish, others fade away.

Kingdon detects three main criteria for the prospect of surviving and actually becoming considered to be adopted as policy: (1) technical feasibility, (2) value acceptability, and (3) anticipation of future constraints. First and foremost, proposals must be workable and implementable, as technically unsound or impractical ideas are likely to be discarded or significantly modified. There is a more underneath, invisible layer of intrinsic societal values that an idea has to comply with, so those in clash with the values are unlikely to gain traction. Lastly, since members of the policy community see further than others and are attuned to potential future constraints, ideas regarded as unlikely to overcome these constraints may be modified or abandoned.

Policy ideas undergo a process of "softening up", where the policy community builds public acceptance for their ideas by disseminating research findings, publishing articles, presenting at conferences, testifying before legislative committees, engaging in media outreach, and cultivating relationships with key policy-makers. Over time, policy-makers deem a short list of viable and well-developed ideas to be ready for serious consideration. Still, this list is not necessarily a consensus on a single best solution but rather a set of leading contenders that have garnered sufficient support within the policy community. That makes the list waiting for a policy window to open. The readiness and preparedness of available alternatives to address identified problems increase the likelihood that, when a policy window opens, the problem will move onto the agenda and ultimately be addressed through policy action. This reservoir of (well-thought-out) ideas then supplies the problems stream.

Politics stream

A diverse array of elements that shape the agenda and influence policy-makers' receptivity to proposals is contained in the politics stream: (1) national mood, (2) organised political forces,

(3) governmental events, (4) turnover, and (5) jurisdiction. Policy-makers use a variety of channels (e.g., public opinion polls, media coverage, and direct communication with constituents) to gauge the public's pulse. Shifts in the pulse or national mood are often subtle and difficult to measure but can profoundly impact which issues are gaining prominence and which proposals are likely to be embraced or rejected.

Furthermore, organised political forces include interest groups, political parties, and social movements that possess varying levels of resources, influence, and public support, and whose activities (lobbying, campaigning, public demonstrations) shape the political landscape. Policy-makers are sensitive to the balance of organised forces for and against specific policies, weighing the potential costs and benefits of aligning with or opposing particular groups. Events within government itself (e.g., changes in administration, shifts in the partisan composition of a representative body, or bureaucratic turf battles) can impact policy agendas and the receptivity to specific proposals. New administration brings distinct priorities and policy preferences that create policy windows for certain issues to rise to prominence while simultaneously hindering others. Turnover of key personnel is also impactful, especially changes in administration and congressional composition on policy agendas. This can lead to reordering priorities, receptiveness to new ideas, and a willingness to reconsider existing policies. Turnovers are related to alternating the individuals but can also lead to shifts in power dynamics, committee structures, and access points for policy entrepreneurs.

In the US context, Kingdon recognises jurisdictional boundaries, which define the scope of authority of different governmental actors and influence their ability to act on specific issues. The political stream is not solely a realm of external pressure or power dynamics. Persuasion and consensus-building also play a role, albeit through a mechanism different from the policy stream. While policy specialists rely on reasoned arguments and evidence to build consensus, political actors engage in bargaining and coalition-building, trading concessions and striking deals to garner support for their proposals. This bargaining process involves appeals to shared values, pragmatic considerations, and political gain or loss calculations. The political stream can act as both a promoter and an inhibitor of agenda change. When the political climate is favourable, aligned with public sentiment and the balance of organised forces, it can propel certain issues to prominence. Conversely, an unfavourable political environment can be a formidable barrier, preventing even well-defined problems with readily available solutions from gaining traction.

Policy window

A policy window can be defined as "an opportunity for advocates of proposals to push their pet solutions, or to push attention to their special problems" (Kingdon, 2011, p. 165). It is a temporary opportunity for policy change (remember the surfing analogy, it is the wave), and coupling by the policy entrepreneur is the deliberate action to link the separate streams when that opportunity arises (that is the surfer who is waiting ready for the wave). That wave rises or the window opens in two ways: (1) political windows, and (2) problem windows. The first opens due to a change in the political streams (e.g., a change of administration, a shift in the partisan or ideological distribution in a representative body, or in the national mood), while the second opens because new problems capture the attention of policy-makers and appear to be pressing (e.g., a focusing event which demands a response). They can be (1) predictable (e.g., adoption of the budget) or (2) unpredictable (e.g., a crisis or disaster).

Problems or politics separately can set the governmental agenda (the list of things policy-makers pay attention to), the probability that a given matter will be on the decision agenda (the list of things up for deciding) is greater if all three streams are joined together, if they are coupled. If coupling is incomplete, the subject's place on the decision agenda is fleeting, and the window closes quickly. They close if among participants there is a perception that the problem has already been addressed, if they fail to act and then become unwilling to invest further resources, if the event that prompted the opening passes from the scene, or lastly, in the case that there is no available alternative.

Participants in policy-making arena

Participants (actors) can be divided with regard to their visibility and to their position in relation to government. In terms of visibility, two sets of participants can be identified: (1) a visible cluster, and (2) a hidden cluster. The visible cluster includes actors who receive significant media and public attention (e.g., government, the president, high-level appointees, prominent members of parliament (Congress in Kingdon's case), the media, and election-related actors like political parties and campaigns). They primarily influence agenda-setting, as they have the resources and incentives to bring attention to certain issues, which can involve highlighting problems, advocating for policy goals, and shaping public opinion. The hidden cluster includes specialists who operate with less public visibility (e.g., academics, researchers, career bureaucrats, (congressional) staffers, and lower-level administration appointees). They are more influential in alternative specifications, as their expertise allows them to develop and

refine policy proposals (e.g., conducting research, drafting legislation, and providing technical analysis). While the visible cluster of participants operates within the political and problem streams, those in the hidden cluster are most often found in the policy stream.

It is also possible to distinguish (1) government actors and (2) external actors. Among the latter, interest groups have an important place. They use lobbying in order to achieve their goals. In that sense, a substantial portion of their activity consists of negative blocking, i.e. seeking to preserve status quo, to a certain extent in influencing or adapting the alternatives considered, and more rarely involved in inserting their preferred alternatives. They can be found in both clusters, depending on their activities, they might engage in public advocacy to influence the agenda or work behind the scenes with the hidden cluster to shape policy details. It is important to distinguish these from policy entrepreneurs in such a way that interest groups are necessarily outside government and that they are most successful in the negative, blocking actions or in inserting their preferred alternatives once agenda is already set.

Policy entrepreneurs, on the other hand, can be found anywhere (outside and within government) and their role is proactive. They are "advocates who are willing to invest their resources-time, energy, reputation, money-to promote a position in return for anticipated future gain in the form of material, purposive, or solidary benefits" (Kingdon, 2011, p. 179). Admittedly, they can be within or affiliated with interest groups and rely on their resources, but it is precisely the policy entrepreneur who are tasked with coupling three process streams (problems, policy, and politics) together when a policy window opens. Their role is, in simpler terms, to find the right timing to push for their "pet" solutions as responses to pressing problems or align them with the prevailing political climate. Even if their solution does not immediately gain traction, the chance of being adopted increases when the conditions become favourable through "softening up", a long and often exhausting process of gestation and preparatory work undertaken to build acceptance for their solutions.

2.3.1.2 **Diffusion of innovations (DOI)**

Rogers' Diffusion of innovations explains how innovations spread within and across social systems (Rogers, 2003). It transcends specific disciplines, offering a comprehensive framework applicable to diverse fields, from agriculture to public health, marketing, and technology adoption. The theory's focus expanded from agriculture to encompass the diffusion of diverse innovations, including communication technologies (e.g., the internet and cellular phones). The theory's roots lie in rural sociology, specifically in Bryce Ryan and Neal Grass's 1943 study of hybrid corn adoption among Iowa farmers. Building on this early work, Rogers recognised the

universality of the diffusion process, observing similar patterns in diverse contexts, such as the adoption of kindergartens among schools and antibiotics among doctors. Diffusion of Innovations, his seminal book, synthesises existing research, proposes a general model, and standardises key concepts, and solidifies DOI as a distinct field of study (Rogers, 2003). Over time, DOI has evolved through five book editions.

Innovation attributes

An innovation is defined as "an idea, practice, or object perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 36). Rogers' theory posits that the rate at which an adopted innovation is influenced by how potential adopters perceive its attributes. There are five attributes of innovations: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Each represents a characteristic that potential adopters evaluate during their decision-making process. Understanding these attributes is a precondition for analysing how new ideas spread and gain acceptance within a social system.

Relative advantage is "the degree to which an innovation is perceived as better than the idea it supersedes" (Rogers, 2003, p. 229). What constitutes an "advantage" hinges on the potential adopter's individual or organisational needs, values, and context, manifesting in various forms (e.g., economic gains, social status, convenience, satisfaction, or reduced discomfort). It is not about the innovation's "objective" superiority but how individuals perceive its value compared to their current solution or practice. The characteristics of relative advantage are threefold: (1) subjectivity, (2) comparative nature, and (3) multidimensionality. Perceptions vary across individuals and groups due to differences in needs, priorities, experiences, and values. The evaluation always occurs in relation to an existing alternative, considering tangible aspects (e.g., cost or efficiency), and less quantifiable factors (e.g., social prestige or convenience). Benefits can manifest across various dimensions: (1) financial (gains, cost reductions, improved efficiency), (2) social (enhanced status, prestige, recognition), and (3) functional (increased convenience, satisfaction, ease of use). Innovations aimed at preventing future problems can face challenges in demonstrating their relative advantage, as benefits will be realised in the future and may not occur for everyone. A higher perceived relative advantage acts as a powerful motivator, which encourages individuals and organisations to overcome their inherent resistance to change. The promise of tangible benefits reduces uncertainty and incentivises adoption, leading to faster diffusion within a social system. However, in some cases, this can lead to overadoption, where individuals adopt an innovation even when experts advise against it.

Compatibility represents "the degree to which a potential adopter perceives an innovation as being consistent with their existing values, past experiences, and needs" (Rogers, 2003, p. 240). It measures how well an innovation "fits" into a potential adopter's life, with a better fit leading to faster adoption and less uncertainty and resistance. In contrast, a poorly fitting innovation creates friction and requires more integration effort, slowing down the adoption process. An idea incompatible with a social system's values and norms will not be adopted as rapidly as an innovation that is compatible, often requiring the prior adoption of a new value system, a typically slow process. Compatibility is a perception formed by potential adopters (not an inherent quality), influenced by cultural values, previous experiences, individual needs, and the existing technological landscape. The level of compatibility varies depending on the social system and target audience. What might be highly compatible in one context could be entirely incompatible in another, as innovations are always judged in relation to the existing practices they aim to replace or improve upon. Compatibility's influence manifests throughout Rogers' innovation-decision process. During the knowledge stage, alignment with values and experiences increases attention to information. In the persuasion stage, compatibility helps develop positive attitudes as the innovation feels familiar and less risky. During decision-making, perceived compatibility influences adoption choices, while in implementation, compatible innovations integrate more easily into existing routines and practices. The alignment with values and beliefs impacts adoption rates. Previous experiences and adopted ideas strongly influence how individuals interpret and evaluate new innovations. Strong alignment with previous ideas can sometimes lead to overadoption or incorrect usage. The extent to which an innovation addresses felt needs within the target audience also influences adoption. When potential adopters perceive the innovation as directly solving a problem they experience, the chances of adoption increase substantially. The interaction between relative advantage and compatibility influences adoption outcomes. When effectively communicating an innovation's benefits, messages must be tailored to address the specific needs and values of different adopter segments. The adoption decisions of others, especially opinion leaders and near peers, have a powerful impact on an individual's perception of both relative advantage and compatibility. Positive experiences shared through interpersonal networks can amplify perceived benefits, while negative experiences can diminish them. Cultural, social, and technological contexts shape compatibility perceptions. Cultural norms and beliefs heavily influence what is considered compatible, making it essential to understand these nuances when tailoring innovations to specific audiences. The social structure, existing networks, and communication patterns within a community impact the diffusion process, while compatibility

with existing technological infrastructure plays an important role in adoption decisions. Innovations aligning with prevailing norms, values, and practices are more readily adopted, as compatibility minimises the need for behavioural change, thereby increasing the perceived relative advantage. When the results of an innovation are easily observable, potential adopters can directly witness its benefits, increasing confidence and accelerating adoption through both enhanced perception of relative advantage and demonstrated compatibility with existing systems.

Complexity refers to how "an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, p. 257). Like compatibility, complexity is not inherent but rather a perception formed by potential adopters, varying across different individuals or groups based on their experience and expertise. Innovations can be classified along a complexity-simplicity continuum, with simpler innovations generally adopted more rapidly than those requiring new skills and understandings. Complexity influences adoption in several ways. It contributes to uncertainty about an innovation's consequences, prompting information-seeking behaviour among potential adopters. Perceived difficulty can affect attitudes towards the innovation, potentially leading to rejection even when observable advantages exist. Several factors can mitigate complexity's influence on adoption. A strong relative advantage may motivate potential adopters to overcome complexity barriers. Compatibility with existing systems reduces perceived complexity, while trialability – the ability to experiment with an innovation on a limited basis – helps demonstrate practicality and reduce uncertainty. The visibility of positive results (observability) can also mitigate complexity concerns. Change agents play an important role in managing both compatibility and complexity challenges. Clear explanations, training, and support can reduce perceived difficulty and enhance understanding of how innovations align with existing values and practices. The ability to modify or adapt an innovation to specific needs (re-invention) can reduce perceived complexity and enhance compatibility, allowing users to customise the innovation to their unique context. The interplay between compatibility and previously adopted ideas merits particular attention. Individuals interpret new ideas based on their past experiences, using previous practices as benchmarks for evaluation. While this association with familiar concepts can accelerate adoption, the sources caution about potential drawbacks. A highly compatible innovation requiring minimal change from existing practices might have less immediate impact but can serve as a valuable stepping stone, facilitating the adoption of subsequent, less compatible innovations within a cluster. Interestingly, lower compatibility in aesthetic innovations (e.g., artwork) might accelerate

adoption, as works too similar to existing pieces are less likely to achieve critical or commercial success. The impact of compatibility is most effective when coupled with other innovation attributes. While compatibility considerably influences adoption rates, empirical research suggests that relative advantage might be even more influential, though some studies find these factors empirically intertwined despite their conceptual differences. The clarity of relative advantage, combined with effective communication and opportunities for trial and observation, can help overcome minor compatibility issues. The role of change agents extends to identifying and addressing felt needs within their client systems. However, this process requires careful consideration, as potential adopters may not recognise their need for an innovation until exposure. While change agents might work to create awareness about needs, this must be done ethically, ensuring that addressed needs are genuine rather than reflections of the change agent's agenda. The effectiveness of communication channels in addressing complexity and compatibility concerns varies. Interpersonal channels involving direct interaction and experience exchange prove particularly effective in addressing complexity concerns and demonstrating compatibility. Clear communication of benefits, tailored to specific stakeholder groups' needs and interests, becomes essential for successful adoption. Both perceived compatibility and complexity impact adoption rates, though in opposite directions. While compatibility positively correlates with adoption rates, complexity demonstrates a negative one. Understanding these relationships helps in developing strategies to promote innovation adoption effectively, particularly when considering the implementation of significant technological or social changes.

Trialability refers to "the degree to which an innovation can be experimented with on a limited basis" (Rogers, 2003, p. 258) before fully committing to adopting it. It allows potential adopters to experience the innovation firsthand, reducing uncertainty and building confidence in its potential benefits. Trialability reduces uncertainty about an innovation's consequences by providing tangible evidence of its benefits and drawbacks through direct experience. Innovations that can be broken down into smaller components or stages for trial are generally more readily adopted, allowing individuals to integrate the innovation into their lives or practices gradually. Additionally, innovations that offer flexibility in implementation, allowing adopters to adapt or modify them to suit their specific needs, enhance trialability by making the innovation more approachable and enabling individuals to test different approaches. Innovations with low entry costs and minimal risks during the trial are more likely to be experimented with, while high upfront investments or potential negative consequences can

deter individuals from the trial, hindering adoption. Trialability facilitates "learning by doing", enabling individuals to gain practical knowledge and skills related to the innovation's use, a process often more effective than simply receiving information, as it allows individuals to internalise and adapt the innovation's workings to their specific context. When an innovation is trialable, early adopters can share their experiences and observations with their peers, creating a ripple effect within their social network. This social proof can encourage others to try the innovation as they see its benefits demonstrated by trusted sources. Change agents can enhance trialability by offering free samples, trial periods, demonstration projects, or training programmes to reduce barriers to trial and encourage experimentation.

Observability represents "the degree to which the results of an innovation are visible [and easily discernible] to others" (Rogers, 2003, p. 258). Observable innovations have visible results that are readily apparent to potential adopters, making it easier for individuals to evaluate the innovation's potential benefits and assess its suitability for their own needs. The more observable an innovation, the faster it tends to be adopted, as this visibility reduces uncertainty about the innovation's effectiveness and provides tangible evidence of its value. Several factors can enhance or limit an innovation's observability. The nature of the innovation itself plays an important role as some innovations are inherently more observable than others. Complex innovations may have lower observability, even if their results are tangible, as potential adopters may struggle to grasp the connection between the innovation and its outcomes. The way an innovation is communicated can influence its observability. Demonstrations and testimonials from early adopters can enhance observability by providing tangible evidence of the innovation's benefits, while mass media campaigns can increase awareness and visibility. The visibility of an innovation's results encourages peer discussions, accelerating information sharing and influencing adoption decisions, as individuals observing positive outcomes experienced by others are more likely to consider adopting the innovation themselves.

Radical innovations

A radical innovation, also referred to as a "disruptive" or "discontinuous" innovation, is "a major change that represents a new paradigm for carrying out some task" (Rogers, 2003, p. 426). They substantially alter existing systems, structures, and processes, thus reconfiguring the whole system rather than simply fitting into existing frameworks. That creates compatibility issues and necessitates extensive modifications, adding to the complexity and cost of adoption. Such innovations have a high degree of uncertainty which can cause more difficulties in

implementation and can even lead to adoption through an unstructured and unroutine innovation process, as is more likely to be rejected or discontinued. Radical innovations may not be immediately recognised as such, and their complexity leads to intricate cost-benefit analyses where investment costs, unforeseen expenses, and implementation time must be weighed against benefits that may not be immediate or quantifiable. This uncertainty can trigger resistance to adoption, stemming from concerns about job security, the need for knowledge acquisition and skill development, or a general aversion to change, particularly when the required expertise is scarce, or the learning curve is perceived as too steep.

Several strategies that work together can facilitate the adoption of radical innovations. Innovation champions, often possessing charisma and influence within an organisation, play an important role in overcoming resistance by advocating for innovation, securing resources, and building stakeholder support. Effective communication of benefits and addressing concerns requires messaging tailored to the needs and interests of different stakeholder groups. Offering pilot projects and trials allows potential adopters to experiment with the innovation in a controlled environment, which helps reduce uncertainty and demonstrates its benefits in a tangible way. Adoption of disruptive innovations requires strong organisational support through resource allocation, clear implementation plans, and leadership that creates a culture that embraces innovation and experimentation, even with associated risks. Understanding disruptive innovations entails a multi-faceted approach that considers various perspectives and levels of analysis, including the role of power dynamics, social networks, institutional structures, and cultural norms in shaping the adoption process.

Stages of adoption

Decisions related to the adoption of i-voting have to be made on the institutional or organisational level. Roger's model of five stages in the innovation process in organisations helps in understanding what each of those stages entails (p. 421):

1. Agenda-setting: the perceived need for innovation due to a general organisational problem.
2. Matching: defined problem fits with innovation, and the match is planned and designed.
3. Redefining/restructuring: the innovation re-invented to fit the organisation's needs and structures or the other way around.
4. Clarifying: with broader usage of the innovation, different aspects of innovation become clearer to the organisation.

5. Routinisation: the innovation loses its separate identity as being used more regularly; related to the concept of sustainability (degree of usage continuation after initial adoption).

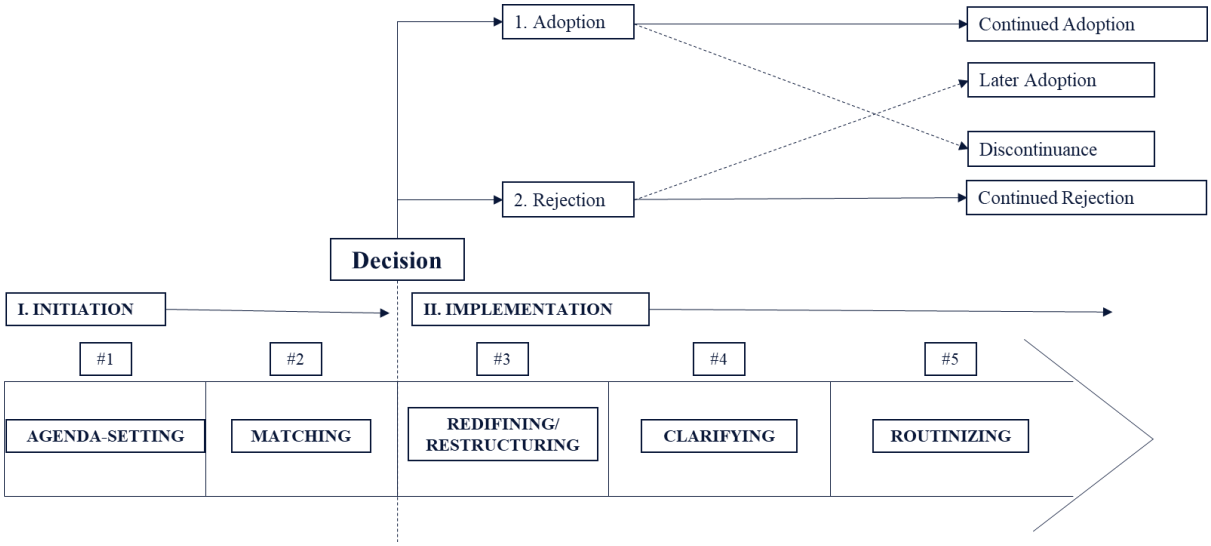

Figure 2.3 The Innovation Process in Organizations adapted from (Rogers, 2003, p. 421) and complemented with the outcomes of the decision on the adoption of an innovation, based on the model of five stages in the Innovation-Decision Process (Rogers, 2003, p. 170).

Those stages can be further divided into initiation and implementation phases. The first two stages (agenda-setting and matching) fall under the initiation, understood as "all of the information gathering, conceptualisation, and planning for the adoption of an innovation, leading up to the decision to adopt" (p. 421), whereas stages three-five (redefining/restructuring, clarifying, routinisation) are elements of implementation which consist of "all of the events, and decisions involved in putting the innovation into use" (p. 421). Besides adoption as one possible outcome of the innovation process, discontinuation and rejection may also occur. Discontinuance is a decision to reject an already adopted innovation, while rejection can be active (consideration of adoption, even with trials, ending in deciding of non-adoption) or passive (no consideration of adoption).

2.3.1.3 **E-voting mirabilis (EVM)**

Krimmer's E-voting mirabilis offers a conceptual model for analysing the implementation and impact of Information and communication technology (ICT) on elections (Krimmer, 2012). It acknowledges the multidisciplinary nature of elections and shows how various aspects are interconnected when new voting technologies are introduced. A graphical representation of the model resembles a mirabilis flower, with the four petals symbolising the four macro-dimensions: (1) technology, (2) law, (3) politics, and (4) society. The centre of the flower is

nestled within the elements of the electoral process that are influenced by the introduction of e-voting, namely (1) voter register, (2) ballot box, and (3) vote, while five stakeholder groups are depicted as leaves on the stem: (1) citizens and voters, (2) media and observers, (3) inventors and vendors, (4) politicians and candidates, and (5) election management.

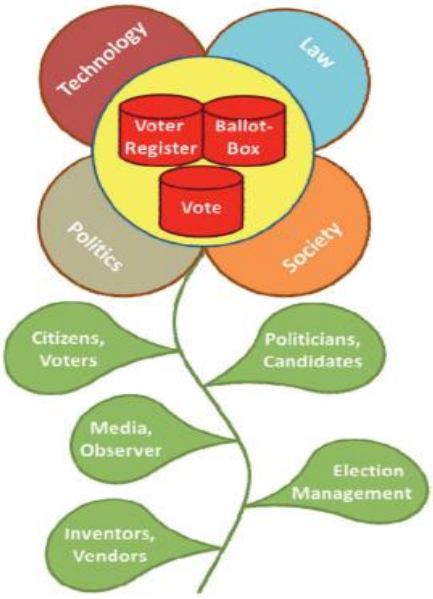

Figure 2.4 E-voting mirabilis, a conceptual model for the analysis of ICT in elections (Krimmer, 2012, p. 13).

Dimensions

The four dimensions are independent yet deeply intertwined, as events in one dimension can have repercussions in others. For instance, adopting a particular technological solution for e-voting might necessitate changes to a legal framework, spark political debate, or influence public perception. This works the other way around: a legal framework can set limits or requirements for technological solutions applied to e-voting, just as people's notions of privacy and trust in the government do.

The technology dimension encompasses the technical infrastructure and its ability to support e-voting. This involves evaluating existing infrastructure, such as polling station equipment, voter registers, election management systems, and digital ID systems. It also means identifying areas that might need new forms of identification or where internet access or digital signature capabilities may be limited. The legal dimension focuses on the legal framework governing elections and its capacity to accommodate e-voting. This involves examining how electoral codes can be adapted to include electronically cast votes and to ensure voter accountability,

data privacy, and proportionate data handling, while ensuring e-voting offers the same possibilities as paper-based voting. The political dimension contains the political implications and impacts of implementing e-voting. Central questions in this dimension involve the potential effects on voter turnout, trust in election outcomes, and the perceived legitimacy of the electoral process. It also considers the public and political perception of the technology and whether it promotes thoughtful voting or simply faster, possibly rash decisions. The societal dimension examines societal factors that influence the acceptance and effectiveness of e-voting. A central question is whether voters sufficiently understand the technology to trust it, necessitating effective voter education and training. Another consideration is the system's usability and whether voters, regardless of their IT literacy, can use it to cast their votes as intended, thus highlighting the questions of accessibility and the digital divide.

Stakeholder groups

Krimmer recognises the role of five stakeholder groups in shaping the adoption of and impact of e-voting. These groups have distinct interests, motivations, and potential concerns related to e-voting. For voters, e-voting might increase accessibility and convenience, especially for those who could not otherwise participate or whose participation would be much more challenging, such as expatriates and individuals with disabilities. As computers run e-voting, this new voting method can minimise errors in vote recording and counting, leading to more accurate election results. It also speeds up counting, expediting the tabulation process in parallel with manual counting. Transparency is another important potential benefit, and incorporating individual and universal verifiability features can enhance it. This is just one side of the coin, as potential challenges include security and privacy concerns, including disclosure of the content of their vote, potential vote manipulation or data breaches. One topic that may be more relevant some 10-15 years ago is the digital divide: not all voters have equal access to technology or digital literacy, which may result in a new form of disenfranchisement. While e-voting might enhance transparency, it might also work the other way around, as e-voting systems are complex for a layperson to comprehend, and a lack of transparency and understandability can undermine their benefits. As remote e-voting (i-voting) occurs in an uncontrolled, unsupervised environment, the risk of coercion or undue influence increases.

Politicians and candidates might see benefits in early adoption of e-voting, which can create a perception of advantage among tech-savvy voters and portray a modern, forward-thinking image. E-voting can potentially increase voter turnout by making voting more accessible and

convenient, which could benefit specific candidates or parties, and in the long run, e-voting could reduce election administration costs. However, politicians, who are the very actors responsible for adopting e-voting, can become the primary obstacle due to their fear of being displaced by more direct forms of citizen participation, which is known as "the middleman paradox"(Mahrer & Krimmer, 2005). E-democracy in general, and e-voting particularly, can be perceived as diminishing the role of elected officials as intermediaries between the populace and policy-making, and politicians act as gatekeepers to e-democracy initiatives, who may express their concerns (like security, privacy, digital divide, manipulation), which, while valid, can also serve as convenient justifications for maintaining the status quo. While politicians are expected to act in their constituents' best interests, they also have a vested interest in maintaining their own positions of power and influence, which can lead to prioritising e-government projects that enhance service delivery without fundamentally challenging existing power structures. Moreover, introducing a new voting method carries inherent uncertainty and risks, making politicians hesitant to embrace e-voting, especially if it could impact election outcomes. Also, they may fear losing control over the electoral process if they perceive e-voting as less transparent or more susceptible to manipulation.

E-voting can streamline election administration, automate tasks, and reduce manual counting, which is considered beneficial to election management bodies (EMBs) responsible for administering and overseeing the electoral process. However, that also requires specialised technical expertise and adds a layer of complexity. Well-designed e-voting can improve security measures and reduce opportunities for fraud compared to paper-based systems, and real-time data and monitoring capabilities allow for quicker responses to issues and better overall management. That is possible only with additional training for election officials and poll workers to operate and troubleshoot e-voting systems. Finally, EMBs must maintain public trust and ensure transparency in e-voting processes, which requires clear communication, robust audit trails, and accessible verification mechanisms.

2.3.1.4 **Sociology of expectations (SoE)**

The last of the four theories is the Sociology of expectations (SoE), which Sovacool & Hess (2017) cover in a clear manner in their research seeking to find the most useful theories or concepts (14 in total) for explaining the sociotechnical change that comes with the adoption of new technologies. SoE "assesses how visions or expectations about future benefits affect and structure technology" (Sovacool & Hess, 2017, pp. 20–21). It is an interpretivist, meaning-centred theory in which expectations, viewed as a sociological rather than psychological

phenomenon, are described as a “force” and a “common resource” providing “legitimation, coordination, and guidance” (Van Lente, 1993, 2012, as cited in Sovacool & Hess (2017, p. 21)). SoE is a highly specialised and more manageable subset of Discourse theory. Its focus is on future-oriented discourse, which consists of (1) promises, (2) visions, (3) hopes, and (4) fears.

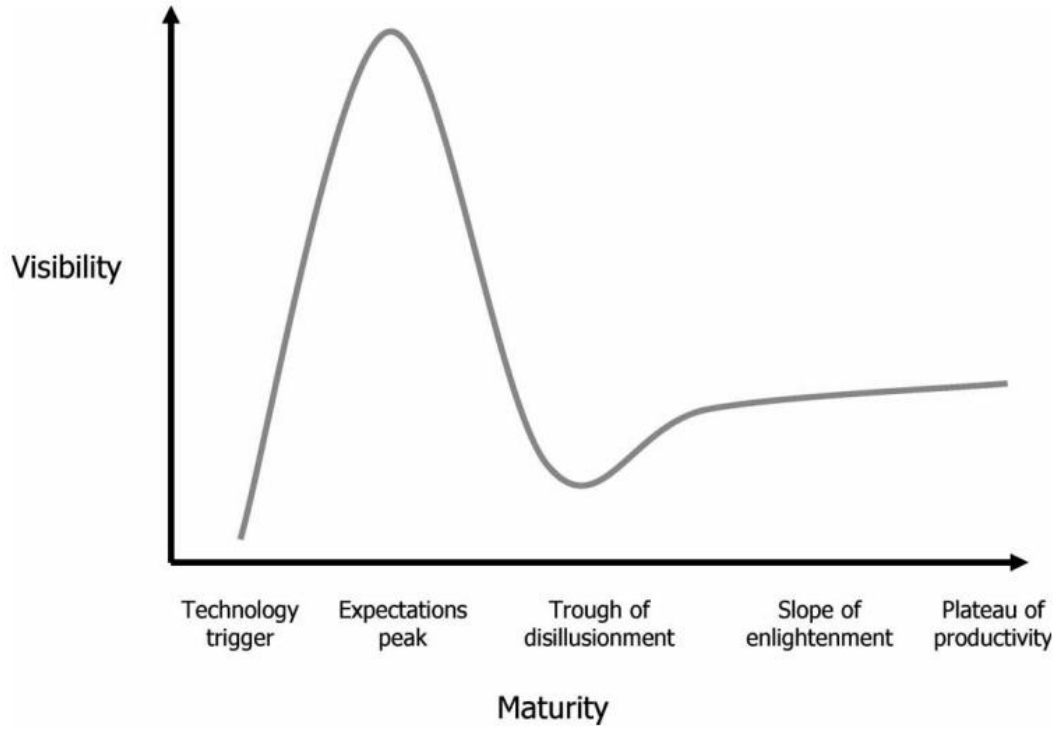

Figure 2.5 The Gartner hype cycle, adapted from Borup et al. (2006).

The theory is grounded in the following concepts (Sovacool & Hess, 2017):

(1) Rhetorical vision – the shared fantasies advocates hold about a technology that feature dramatic elements (e.g., plot lines, stories, and characters).

(2) Convergence – the process through which groups arrive at a shared understanding or common experience via these narratives.

(3) Promise-requirement cycle – how promises and expectations set an agenda, which in turn germinates into a mandate for engineers and other actors to develop their technology.

(4) Hype cycle or promise-disappointment cycles – a visual model representing the ups and downs of technological expectations. This cycle moves from a technology trigger to a peak in expectations, plummets into a trough of disillusionment, rises on a slope of enlightenment, and finally levels off on a plateau of productivity.

Although Sovacool & Hess (2017) note that SoE has a narrow scope, therein lies, somewhat paradoxically, its greatest strength for this research on i-voting. This is because it is most suitable precisely for researching new or emerging technologies, while it is largely inapplicable to existing, successful technologies. SoE is designed to analyse the discourses, rhetorical visions, and hype cycles that provide legitimacy for, and structure to, a technology's development. It is useful for examining how future-oriented promises shape present-day actions and commitments, which makes it highly applicable to this research.

2.3.2 **Reconciling theoretical frameworks**

2.3.2.1 **Levels of analysis**

MSF focuses on the macro-level of analysis, i.e. the policy environment. The framework consists of three independent streams (problems, policy, and politics) that flow through the policy-making system and converge to create agendas. DOI, in contrast, spans from macro to micro levels of analysis. While it is commonly used to explain the adoption of innovations by individuals, Rogers also recognised the relevance of his theory for understanding organisational innovation adoption, including policy adoption. At the macro level, Rogers acknowledges the role of broader societal factors (e.g., cultural norms and communication infrastructure) in influencing the rate and pattern of innovation diffusion. Rogers' analysis spans the meso level (organisations' adoption processes) and micro level (the attributes of an innovation). In the context of i-voting, this refers to the decision-making process within organisations like EMBs or political parties. Rogers' five stages of the innovation-decision process in organisations are particularly relevant: agenda-setting, matching, redefining/restructuring, clarifying, and routinising. At the micro level, Rogers examines the characteristics of the innovation itself and how they influence individual adoption. The five attributes of an innovation (relative advantage, compatibility, complexity, trialability, and observability) explain the qualities that determine its adoption. EVM is context-specific and consists of four dimensions (technology, law, politics, and society) that intersect across the macro, meso, and micro levels. Finally, SoE bridges macro- and meso-level. At the macro-level, it analyses broad, societal narratives and hype cycles surrounding a technology (e.g., "i-voting is the inevitable future" vs. "i-voting is a threat to democracy"), whereas at the meso-level, it analyses how actor-networks (e.g., politicians, academics, vendors, NGOs, etc.) construct and perform these expectations to mobilise resources and shape the debate.

2.3.2.2 **Timeframes**

MSF focuses on agenda setting and policy change, and conceptualises the process as three streams flowing independently through the system. Its primary concern with time is the concept of "policy windows", opportunities to push proposals when the three streams converge. Kingdon argues that these windows are open for only a short time before closing, which creates a sense of urgency for policy entrepreneurs. Hence, the importance of timing for policy change is emphasised, and Kingdon argues that change is most likely when a problem becomes salient, a solution is available, and the political climate is receptive. This implies a sequence of events, although each stream's development timeframe is not explicitly defined. Kingdon recognises that the political stream, with its electoral cycles and shifts in public mood, has its own temporal dynamics. He also acknowledges that problem recognition can be triggered by focusing on events or indicators accentuating a problem's urgency. However, the MSF does not delve deeply into the time required to develop policy solutions, nor how the timing of their availability affects the opening of a policy window.

DOI explains how innovations spread through social systems over time. Central to the theory is the "innovation-decision process", the steps an individual or organisation goes through from first knowledge of an innovation to its adoption or rejection. Rogers introduces the "rate of adoption", the relative speed with which an innovation is adopted, depicted by an S-shaped curve that reflects the time it takes for different adopter categories (innovators, early adopters, early majority, late majority, and laggards) to adopt the innovation. The innovation-decision process has five stages: knowledge, persuasion, decision, implementation, and confirmation. This linear sequence underscores the time it takes for individuals or organisations to move through the process. The adoption rate varies with innovation attributes and system characteristics. Early adopters have shorter innovation-decision periods than later adopters, which acknowledges individual variations in processing time. DOI also acknowledges the role of communication channels in influencing adoption speed.

EVM is largely atemporal, as it provides a static snapshot of a system's components. However, it recognises that the factors influencing i-voting adoption can change over time, which may lead to shifts in policy decisions and adoption outcomes. On the other hand, SoE has a much more temporal dimension as it introduces a future-oriented timeframe focused on how future expectations (promises, visions, hopes, and fears) shape present actions. It also provides the concept of the hype cycle, a period of inflated expectations which may open a policy window,

followed by a trough of disillusionment that can cause an innovation to be rejected or discontinued.

2.3.2.3 **Process linearity**

MSF stands out for its emphasis on the non-linearity and fluidity of the policy process. It challenges the notion of a neat, sequential policy adoption process. Instead, it presents a chaotic, unpredictable system in which policy change occurs in bursts and jumps rather than in smooth progressions. Kingdon's view of policy-making is the analogy of surfing. Policy entrepreneurs cannot control the waves (problems, politics, and solutions), but they can learn to ride them skilfully when a favourable opportunity arises. Thus, the timing and recognition of those moments when the streams converge (or can be converged) are important. Kingdon describes policy-making as an organised anarchy, emphasising the lack of centralised control and the fluidity of participation. The independent and unpredictable nature of the streams further contributes to the non-linearity of the process. MSF aligns (in the part of agenda setting that is non-incremental, whereas alternative specification is more gradual) with the concept of punctuated equilibrium, in which long periods of stability are interrupted by sudden bursts of change when policy windows open. This challenges the idea of a gradual, incremental adoption process.

DOI, in contrast, leans towards a more linear, incremental, and stage-based understanding of the adoption process. Rogers outlines five stages (agenda-setting, matching, redefining/restructuring, clarifying, and routinising) through which organisations progress as they adopt an innovation. It is a sequential flow in which each stage builds on the previous one. The S-shaped curve depicting cumulative adoption of an innovation over time further reinforces the idea of a gradual, relatively predictable diffusion process. The curve implies a linear progression from early adopters to late majority and laggards. Despite the predominantly linear structure, Rogers acknowledges that the adoption process can be influenced by various factors that introduce complexity. He points at the role of re-invention, where adopters modify the innovation to fit their needs, and recognises that the social system and communication channels can impact the diffusion process.

EVM does not explicitly address process linearity. However, it emphasises the contextual and multi-dimensional nature of e-voting adoption, which implicitly acknowledges linear and non-linear elements. Four dimensions (technology, law, politics, and society) interact and influence one another throughout the adoption process, through an iterative, cyclical process in which

developments in one dimension can trigger changes in others. Stakeholders' interactions, negotiations, and conflicts contribute to the non-linearity of the adoption process.

In a similar vein, SoE posits a non-linear, recursive process in which narratives (expectations) influence actions (e.g., policies), which in turn create new realities (e.g., adopted or rejected i-voting) that then feed back to reinforce or undermine the original narrative. That non-linearity is caused by the battles over narratives, which helps explain the chaotic "policy primeval soup" found in Kingdon's MSF.

2.3.2.4 **Roles of actors**

In MSF, policy-makers' decisions are influenced by the streams which operate independently but can converge to create policy windows. Policy entrepreneurs are actors who recognise and seize the opportunity when the three streams converge, which creates favourable conditions for advancing their pet solution. Characterised by their motivation, resources, and skills, policy entrepreneurs are not idea inventors, but they skilfully connect problems, policies, and politics to create opportunities for change. However, MSF acknowledges the existence of policy anti-entrepreneurs (e.g., interest groups) who actively oppose, allowing for the potential for conflict between different actors.

DOI recognises the role of change agents in facilitating innovation adoption. They bridge the gap between innovation development and adopters. Their characteristics are knowledge, communication, and a network within the social system to promote innovation. Change agents engage with individuals and organisations across different adopter categories, from innovators to laggards, to encourage adoption. Their understanding of the innovation-decision process and ability to tailor communication to different audiences are important for successful diffusion.

EVM provides a map of five stakeholder groups (citizens/voters, politicians/candidates, election management, inventors/vendors, media/observers). It is acknowledged that e-voting adoption is influenced by an interplay of various dimensions, shaped by the motivations and actions of these actors called stakeholders. Each stakeholder group brings its own set of interests, perceptions, and influence on the process. In the context of this research, a few additional stakeholder groups will be included (NGOs, academia, independent experts, international organisations, and judiciary), as recognised by Fel (2025).

SoE re-frames actors as narrators or discursive entrepreneurs whose power lies not only in their resources or position (like in MSF or EVM), but in their ability to construct and project a compelling narrative of the future. An MSF's policy entrepreneur is successful when they

become a discursive entrepreneur who convinces others to share their expectations of the innovation's promise.

2.3.2.5 **Causal mechanisms**

MSF posits that policy change occurs when three independent streams converge, thereby opening a policy window that, when joined by a policy entrepreneur, causes an issue to reach the decision agenda. Policy entrepreneurs play a key role in coupling these streams and driving agenda change. MSF focuses on the macro-level policy environment, while DOI addresses meso and individual levels. DOI is mainly concerned with successful innovation diffusion, while MSF acknowledges that policy windows may close without leading to adoption. EVM cuts across levels, emphasising the interplay of macro-level contextual factors with micro-level implementation details. All three theories acknowledge the importance of problem recognition as a driver for change. Whether it is declining voter turnout, accessibility issues, or security concerns, identifying a problem creates a demand for solutions and opens the door (or a window) for i-voting to emerge as a policy option. Both Rogers and Krimmer acknowledge the importance of context in shaping adoption outcomes. For SoE, the central causal mechanism is performativity, which treats expectations as performative and actively shapes reality. A strong, shared expectation of technology success (e.g., i-voting) causes success by mobilising political will, investment, and public trust. An expectation of fear causes failure by mobilising opposition, eroding trust, and leading to rejection or discontinuation.

2.3.2.6 **Context specificity**

Kingdon developed MSF in the context of the U.S. federal government in the 1980s. He characterises the policy-making environment as an organised anarchy, which shapes his focus on the seemingly random convergence of problems, policies, and politics as a main driver of agenda change. While Kingdon's work offers interesting insights into agenda-setting dynamics, its U.S.-centric origins require adaptation for studying the adoption of i-voting in European democracies. The diverse societies, political systems and electoral traditions necessitate a more nuanced consideration of context.

DOI emerged from studies of agricultural innovation adoption among U.S. Midwest farmers in the 1950s and 1960s. These studies sought to understand why some farmers readily adopted new hybrid corn varieties while others resisted change. That shaped Rogers' focus on the innovation's attributes and the individuals and social systems involved in the adoption process. While initially grounded in agricultural innovation, DOI has been applied across various fields, including technology adoption. However, its linear model of the innovation-decision process

requires adaptation for studying i-voting, which is driven by institutional decisions and involves complex political dynamics that go beyond a straightforward adoption process.

EVM was explicitly developed for analysing e-voting (in a broader sense) and its use in elections. Recognising that e-voting is more than just a technological solution, Krimmer acknowledges the interplay of technological, legal, political, and societal dimensions in shaping its adoption. Krimmer developed a multi-layered framework that underscores the need for a holistic, context-specific approach to studying e-voting. EVM addresses the need to analyse i-voting adoption within its specific context, which recognises that the same technology can yield vastly different outcomes depending on a country's social, political, legal, and technological dimensions. SoE is also highly context-specific, scope-narrow, and best suited for researching new or emerging technologies. It is focused on discourse and future-oriented narratives (expectations) that function as tools actors use in the present to realise the expectations they promote for the future.

2.3.3 **Integrated theoretical framework**

The integrated theoretical framework for studying i-voting adoption, which recognises i-voting as simultaneously a radical innovation, democratic innovation[6], and policy, combines elements from four theories (MSF, DOI, EVM, and SoE) that complement each other while operating at different analytical levels, across four dimensions (technology, law, politics, society). The four theories are not competing but complementary and answer different parts of the central research question:

(1) **MSF** asks, "Why did i-voting get on the agenda *at all*?"

(2) **SoE** asks, "What *narratives* and *expectations* fuelled this agenda and shaped the debate?"

(3) **DOI** asks, "What *innovation process* did an i-voting project follow, with what outcome ((full or partial) adoption, rejection, discontinuation), and how was the innovation *perceived*?

(4) **EVM** asks, "What *dimensions* and *actors* were involved in this process?"

The integrated theoretical framework allows for a division into the following components:

[6] Democratic innovations are "processes or institutions that are new to a policy issue, policy role, or level of governance, and developed to reimagine and deepen the role of citizens in governance processes by increasing opportunities for participation, deliberation and influence" (Elstub & Escobar, 2019, p. 15).

(1) agency (stakeholders from E-voting mirabilis expanded with several additional groups; visible and hidden participants as well as policy entrepreneurs from Multiple streams framework),
(2) dimensions (four dimensions from E-voting mirabilis),
(3) structure (streams from Multiple stream framework; innovation process stages from Diffusion of innovations),
(4) relations (coupling from Multiple streams framework), and
(5) meaning (expectations of technology from Sociology of expectations; innovation attributes from Diffusion of innovation).

The integrated framework is highly applicable for this comparative case study across five European democracies (the Netherlands, Norway, Switzerland, France, and Estonia). It enables examination of how various actors and factors interact to produce divergent adoption outcomes across these countries

THEORY	E-VOTING MIRABILIS (EVM) (Four dimensions)			
	TECHNOLOGY	**LAW**	**POLITICS**	**SOCIETY**
MULTIPLE STREAMS FRAMEWORK (MSF) **(Agenda-setting)**	What technical problems were identified? What specific i-voting technology was proposed? Was the technical solution seen as politically feasible?	What legal or constitutional barriers were identified? What legal reforms were proposed? Were the proposed legal reforms politically viable?	What political problems were identified? What other alternatives were considered? Was the political climate favourable (policy window)? Who were the (anti-) policy entrepreneurs?	What societal problems were identified? What societal solutions were proposed? Was the public mood favourable or sceptical?

SOCIOLOGY OF EXPECTATIONS (SoE) **(Narrative forces)**	What promises were made about technical benefits (e.g., security, efficiency)? What fears were articulated about technical risks (e.g., vulnerabilities, complexity)? What technological hype or narratives of modernity were constructed?	What promises were made about legal compliance or benefits (e.g., enfranchisement)? What fears were articulated regarding legal challenges (e.g., secrecy, data protection)? Was there a broader narrative of legal modernisation?	What narratives were constructed around political gains (e.g., increased legitimacy, national prestige)? What rhetorical visions (e.g., "digital democracy") framed the project? What political fears were expressed (e.g., manipulation, loss of control)?	What promises were made to citizens (e.g., accessibility, convenience)? What societal hopes (e.g., engagement) and fears (e.g., exclusion, distrust) were prevalent?
DIFFUSION OF INNOVATIONS (DOI) **(Stages of the innovation process in organisations & Attributes of innovation)**	How was the technical problem defined and matched? How was the technology redefined during pilots? How was technical performance clarified and routinised?	How was the project matched to the legal framework? How were legal rules redefined during adoption? How were legal standards clarified (e.g., by courts)?	How was the project initiated on the political agenda? How was the innovation (re)structured to secure political support? How did the project become (or fail to become) a routine part of the political system?	How was the project matched to perceived societal needs? How was the innovation clarified for the public? How was social acceptance (trust) built or eroded?
	Relative advantage	**Compatibility**	**Relative advantage**	**Relative advantage**

	To what extent was i-voting perceived better than existing voting method(s)? **Complexity** To what extent was i-voting perceived as difficult to understand, operate, or manage? **Trialability** To what extent were pilots/trials projects used to test i-voting under real conditions and reduce uncertainty? **Observability** How visible were the results and perceived benefits of i-voting?	To what extent was i-voting assessed as compatible with electoral principles? **Relative advantage** What new legal benefits were attributed to i-voting (e.g., enfranchisement), and how persuasive were they?	What political gains or losses were attributed to i-voting? **Compatibility** How well did i-voting fit with prevailing political values and traditions? **Observability** How visible were political benefits and political costs?	To what extent was i-voting perceived as more accessible or more convenient than existing voting method(s)? **Compatibility** To what extent was i-voting assessed as compatible with the existing voting culture? **Complexity** To what extent was i-voting perceived by laypersons as easy to use and easy to trust?
E-VOTING MIRABILIS (EVM) **(Stakeholder groups)**[7]	Election management Inventors/vendors	Politicians/candidates Judiciary Election management	Politicians/candidates Political parties Media/observers	Citizens/voters NGOs Media/observers

[7] Extended by additional groups in Fel (2025).

	Academia/independent experts	Academia/independent experts International organisations	International organisations	Academia/independent experts

Figure 2.6 An integrated theoretical framework, synthesising Multiple streams framework (MSF), Diffusion of innovations (DOI), E-voting mirabilis (EVM), and Sociology of expectations (SoE).

2.4 **Conclusion**

The chapter first provided an overview of research in the e-voting field, with a brief historical summary and its representation across disciplines. Following that, a literature review related to e/i-voting adoption research was conducted. This review showed that single-country case studies prevail (though some small-n case studies also exist), that i-voting is often treated as an independent variable (a cause), and that there is a noticeable pro-innovation bias reflected in the primary interest on cases of (successful) adoption. Although the literature outlines factors that influence the (non-)adoption of i-voting, these factors are presented as isolated, standalone categories. Their mutual interaction within the European context, which would be necessary to explain the divergence in i-voting adoption in European democracies, has not been researched and represents a research gap that needs to be filled.

Then, four theories were presented separately (Multiple streams framework, Diffusion of innovations, E-voting mirabilis, and Sociology of expectations), along with their basic premises and most important elements that inform the theoretical framework of this research. It is shown that i-voting can be understood and approached as a radical innovation, a democratic innovation, and a policy that requires consideration of technical, legal, political, and social dimensions.

The theories were reconciled through an analysis of several different dimensions (level of analysis, timeframes, process linearity, roles of actors, causal mechanisms, and context specificity). This showed that the theories, although originating from different fields of research, are mutually complementary, and that they can be combined into a cohesive, integrated theoretical framework. The framework will serve as a lens for answering the central research question.

Chapter 3: The Netherlands

"The promise of the future is always more exciting to contemplate than the disappointments or partial achievements of the past and, unsurprisingly, governments have always been more interested in the new and exciting than in the grinding detail of the mundane" (Bannister & Connolly, 2012, p. 212).

3.1 Introduction

The first case study is the Netherlands, an early European pioneer of e-voting[8] and i-voting, yet it has since retreated to paper ballots, which it has used since 2009 to this very day. The Netherlands conducted three i-voting trials: in 2004 for the European Parliament elections, when i-voting was offered for the first time to expatriates; later that year, for water board elections, when all resident voters were eligible to take part in i-voting; and, finally, for the 2006 parliamentary elections, with expatriates offered i-voting. These trials were part of two parallel projects, one of which was KOA, which sought possibilities for modernising the Dutch electoral system and under which expatriates took part in i-voting on two occasions, while water boards, as an archaic and distinguished Dutch institution competent for water management, trialled i-voting for their elections, in which all voters could take part. Those trials received positive feedback from voters, but i-voting was overshadowed by, and its fate was tied to, voting machines and controversies around their technical vulnerabilities, which were brought to light in the days before the 2006 parliamentary elections. This event was a turning point that reshaped the Dutch perspective on voting methods and the use of ICT-based voting methods for politically binding elections.

The chapter first presents the voting methods currently in use in the Netherlands, with an additional discussion of e-voting, namely voting machines, which are no longer used but are inextricably intertwined with i-voting. It focuses on the events related to the voting machine scandal in 2006, which ultimately led to the discontinuation of such machines in 2008. That is the backdrop against which i-voting in the Dutch context has to be understood. What follows are two parallel i-voting projects (KOA and RIES), their rationale, operationalisation, and the

[8] In this chapter, the term "voting machines" is used. It should, however, be noted that the NGO "We do not trust voting computers" insisted in its communications on the use of the term "voting computers". Bearing in mind that the devices in question are computers rather than (analogue) machines, the former term is adopted for reasons of readability.

trials conducted. The chapter then follows the aftermath of these trials and how the voting machine scandal spilt over into i-voting, how it raised the bar too high for i-voting at the time, and how that led to the halt of any further trials and, consequently, to the rejection of i-voting in the Netherlands. A brief account of the period from then to this day, and of some ideas about i-voting adoption that have been revived from time to time, is provided. After the empirical reconstruction, which describes the e-voting legacy and the Dutch story of i-voting, and how they unfolded over time, the Discussion section applies the integrated theoretical framework to interpret this empirical material and to provide a compelling explanation of why i-voting was rejected. Finally, the Conclusion section restates the Dutch i-voting story, the main findings, and provides key takeaways from this chapter.

3.2 **Voting in the Netherlands**

The Netherlands' electoral system is decentralised to a certain extent. The central state, through the Ministry of the Interior and Kingdom Relations, sets the legal framework through the Electoral Act and associated regulations, thereby establishing requirements for voting methods and procedures. The Electoral Council is an independent body with a dual mandate (Castenmiller & Uijl, 2017; Election Process Advisory Commission, 2007). It acts as the central authority for general elections, elections to the Senate, and European Parliament elections, and it aggregates totals from electoral districts[9], calculates seat distribution, and determines election results. In addition, it advises the government and parliament on the franchise and the conduct of elections (Election Process Advisory Commission, 2007). Municipalities, around 400 of them, are the backbone of the Dutch electoral system and are responsible for the actual conduct of elections (Ruthrauff & Goldsmith, n.d.). They select polling station locations, recruit poll workers, distribute polling cards, count the votes, transmit reports to the Principal Electoral Committees, and the mayor of each municipality aggregates the local totals (Castenmiller & Uijl, 2017). While the Dutch electoral system is decentralised, the administration of postal voting is functionally centralised, with the Municipality of The Hague serving as the national electoral office for the diaspora. It manages a permanent register

[9] To bridge the gap between hundreds of municipalities and the (central) Electoral Committee, the Netherlands utilises 20 electoral districts, which roughly correspond to provinces, with more populous provinces subdivided. The Principal Electoral Committees in these districts aggregate municipal results before transmitting them to the Electoral Council, and there are 19 such committees in the Netherlands and 1 for overseas (Castenmiller & Uijl, 2017),

(introduced in April 2017) of expatriate voters, distributes postal ballot packages, and receives and counts returned ballots (de Groot & Vink, 2018; VKA, 2014).

3.2.1 **Polling station paper voting**

This voting method has become the most common in the Netherlands since the European Parliament elections in 2009, the first election without voting machines after decades of their use (Loeber, 2008b). Resident voters receive a polling card by post from their municipality based on their place of residence, while non-resident voters must actively register with the Municipality of The Hague (de Groot & Vink, 2018).

The electoral calendar is standardised, and voting takes place on Wednesdays, reflecting a tradition that emerged to accommodate religious groups that observe Sunday and school schedules in which children were off on Wednesday afternoons, which allowed parents to vote (Interviewee-NL-8, 2023; Interviewee-NL-6, 2023). Voting takes place on a single day, except during the COVID-19 pandemic, when three days of voting were permitted (Interviewee-NL-3, 2023; Interviewee-NL-8, 2023). The act of voting is carried out using a red pencil and paper (Loeber, 2008b). A distinctive feature of Dutch elections is that a voter may vote at any polling station within their municipality, provided they present their polling card and identity card (de Groot & Vink, 2018; Interviewee-NL-8, 2023).[10] This is the only adopted innovation from the KOA project, which will be discussed later in the chapter in the section on the i-voting trials. Across the Netherlands, there are approximately 10,000 polling stations, with around 40,000 people serving on polling station committees (Interviewee-NL-6, 2023). Because the Netherlands is small and well-connected, many citizens live close to their polling stations:

> "Infrastructure is relatively good. So, you can travel to all the country within one day. There are good roads. We travel by bike, we travel by car. There is always everywhere telephone, WiFi, no problem. So, it is not too difficult to have it all concentrated in one day, and to expect that it can be done because our infrastructure should be able to manage that" (Interviewee-NL-5, 2023).

Although voting is accessible in terms of polling station availability, a problem for both voters and municipalities conducting elections is the size of paper ballots. The origin of this problem lies in electoral legislation drafted at a time when it was assumed that many parties would not compete in elections. Nowadays, ballots include 30 to 40 parties, and because a preferential

[10] This should be distinguished from a voter card, which can be requested (that is, it is not received automatically by post) for voting outside one's municipality, e.g. for general or European Parliament elections (de Groot & Vink, 2018; Election Process Advisory Commission, 2007).

system is used in which voters may also vote for individual candidates, this can result in over 1,000 candidates (Interviewee-NL-5, 2023). Ballots are the size of a bed sheet or tablecloth, and "people were complaining that the ballot was so big because it did not fit the table" (Interviewee-NL-8, 2023). This ballot design creates a major challenge for municipalities as well, where vote counting is carried out by municipal civil servants (whose work is largely a non-remunerated civic duty; they may receive a day off) and volunteers:

> "But because the counting process has become so intensive, and therefore it takes so much time, that this has become the weakest link. The counting begins, and it may last till 2, 3, 4 o'clock in the next morning, so people get really exhausted. Therefore, mainly the municipalities say, 'This has to change. This is not good anymore. We ask too much of our people.'" (Interviewee-NL-5, 2023)

To address this, a two-stage counting process is applied: only votes per party are counted on election night, and a fresh team of counters completes the work the next day by counting preferential votes (Interviewee-NL-8, 2023). For this reason, pressure for digitalisation comes from municipalities seeking relief from manual labour, and they are calling for the adoption of ballot scanners to automate the counting process (Castenmiller & Young, 2018). Finally, it should be noted that one measure introduced is that municipalities can request permission from the Ministry of the Interior to skip counting at the polling station entirely, and sealed ballot boxes are transported to a central municipal location for counting the next day (Interviewee-NL-5, 2023).

3.2.2 **Proxy voting**

The Dutch electoral system permits voting by authorisation, that is, proxy voting. It has a long tradition in the Netherlands, dating back to 1928 (Jacobs & Pieters, 2009). The tradition of proxy voting is linked to the Netherlands' strong maritime tradition, as a seafaring country with many sailors and fishermen whose work did not allow them to participate in midweek voting (Interviewee-NL-5, 2023). In addition, proxy voting is also used by people who cannot vote in person because of disability or illness (Interviewee-NL-8, 2023; Interviewee-NL-1, 2023). Initially, it enabled them to authorise close relatives, relatives by marriage, or housemates to cast a ballot on their behalf. Over time, eligibility to act as a proxy expanded beyond these close connections, and proxy voting came to be seen as a way of broadening electoral participation: "It comes from a tradition where citizens trust each other, but not the government. (...) I can give my voting card to you. You vote for me, I trust you" (Interviewee-NL-2, 2023).

A voter may authorise another person to cast a ballot on their behalf using a form on the back of the polling card, which the proxy must present at the polling station together with an identity card. Proxies may vote for up to two other people in addition to casting their own vote, although in the past this number was not limited, so someone could vote on behalf of dozens of voters (Interviewee-NL-2, 2023). At that time, cases of so-called vote-gathering were reported, in which people would come to voters' doors and ask them to vote on their behalf (Interviewee-NL-1, 2023). Estimates suggest that 10% to 15% of all votes are cast by proxy (OSCE/ODIHR, 2010). For example, in 2006, approximately 12% of voters requested a proxy (OSCE/ODIHR, 2010), which doubled among non-Western voters (Council of Europe, 2014). The practice of proxy voting has been criticised by the OSCE/ODIHR (Interviewee-NL-8, 2023), and the Electoral Council is also reluctant towards it, yet it continues:

> "The Electoral Council is always against proxy voting. I myself have always argued against proxy voting. Once again, it is something that stems from tradition. Therefore, we have proxy voting still. It is a complicated procedure, so there are many mistakes. It always gives some problems, and even yet, that procedure has vulnerabilities against misuse" (Interviewee-NL-5, 2023).

While proxy voting increases accessibility, primarily for those who cannot attend a polling station, it simultaneously raises concerns about coercion, family voting, ballot secrecy, and the concentration of voting power: "It is how women in religious communities lose their democratic rights" (Interviewee-NL-6, 2023). These concerns have prompted discussions about further limiting the number of proxy votes a person may cast.

3.2.3 **Postal voting**

Whereas in Switzerland postal voting is treated as a matter of convenience and accessibility, in the Netherlands it is not available to domestic voters. Voting from an uncontrolled environment is tolerated only when physical attendance is impracticable (for expatriates) or would entail health risks (for older voters during the COVID-19 pandemic). The requirement for absolute ballot secrecy is relaxed to ensure enfranchisement (Interviewee-NL-4, 2023), permanently for expatriates and temporarily for the vulnerable group of older people during the pandemic.

Since 1983, Dutch expatriates and those temporarily absent from the Netherlands have been permitted to vote by post, provided they submit a timely request (Election Process Advisory Commission, 2007; Jacobs & Pieters, 2009). Category 1 expatriates (living abroad) can

participate in European Parliament and House of Representatives elections but not in provincial or municipal elections, whereas Category 2 comprises those temporarily absent from the Netherlands on election day. The reliability of postal services varies across countries, creating unequal opportunities for participation depending on a voter's location (Interviewee-NL-9, 2023; Interviewee-NL-10, 2023). Postal ballots are frequently delayed and may arrive too late to be counted. Postal voting from, for example, parts of Africa can be a major obstacle, but the government has partly addressed this by emailing ballots, so that only the return is by post (Interviewee-NL-8, 2023; Interviewee-NL-9, 2023; Interviewee-NL-10, 2023). The process requires ballots to be posted weeks before election day and forces expatriates to make decisions earlier than domestic voters, without the benefit of following late campaign developments, as seen in the 2003 general election:

> "The campaigns were very exciting, (...) particularly in the last weeks, there were some discussions on debates which really made an enormous change in the polls. (...) People were hearing these debates (...) [but] were not able anymore to change the vote after that happened." (Interviewee-NL-10, 2023).

As a mitigating measure, the option was introduced to send postal votes to Dutch diplomatic missions (consulates and embassies), which then forward them to the Netherlands via diplomatic mail (Interviewee-NL-10, 2023). This speeds up the time it takes for ballots to reach the locations in The Hague where postal ballots are counted. During the COVID-19 pandemic, postal voting was enabled on an ad hoc basis for voters aged 70 and above, but this was a temporary measure and was not later converted into a permanent option. In other words, it was primarily a crisis measure that did not gain sufficient political momentum to retain domestic postal voting in the post-pandemic period. Finally, regarding the aggregation of municipal totals and the calculation of seat allocations, the Electoral Council developed OSV software, first used in 2009 during the European Parliament elections (Castenmiller & Uijl, 2017). In 2017, computer experts exposed severe vulnerabilities, which led Interior Minister Ronald Plasterk to prohibit its use, stating: "I don't want a shadow of doubt over the result in a political climate like the one we know today" (Politico, 2017).

3.2.4 **E-voting via voting machines**

To understand the Dutch experience with i-voting, it is necessary to consider the use of e-voting, namely voting machines, in Dutch elections. Although voting machines had been in use well before the i-voting trials, the events that unfolded rapidly in 2006 and 2007, and ultimately

led to their discontinuation, overlapped with those trials and, in effect, determined the fate of i-voting in the Netherlands.

The first, albeit unsuccessful, attempt dates back to 1903, when an experiment was conducted during Rotterdam's municipal elections (van Driel & de Jong, 2014). This voting method was then set aside until the early 1960s, when Van Ommen Kloeke, the secretary of the Electoral Council, became interested in voting machines during a study visit to the United States and found support in Edzo Toxopeus, the then Minister of the Interior (van Driel & de Jong, 2014). Soon afterwards, in November 1965, the Electoral Act was amended and laid the legal groundwork for the use of voting machines in Dutch elections (Jacobs & Pieters, 2009; Ruthrauff & Goldsmith, n.d.; van Driel & de Jong, 2014). However, the initial use of voting machines did not proceed smoothly, as shown by a case from March 1966. Thirteen local authorities introduced American mechanical voting machines for provincial elections, which resulted in a high number of blank votes, as a consequence of hasty adoption and inadequate voter education (Ruthrauff & Goldsmith, n.d.). Motivated by this experience, the Netherlands pursued the development of its own voting machines. In 1968, rules were adopted for their approval, and the Ministry of the Interior tasked the Dutch Organisation for Applied Scientific Research (TNO) and Samson Kantoor Efficiency with designing the voting machines, while the Dutch Apparatus Factory (Nedap) was tasked with production (later, Nedap also designed and developed them) (Ruthrauff & Goldsmith, n.d.). The first voting machines were "with little-to-no-software" (Kiniry et al., 2007, p. 245), in other words, mechanical machines.

What would be considered true electronic voting machines began to be used in the Netherlands in the second half of the 1980s. In this light, the 1989 amendment to the Electoral Act can also be understood: in anticipation of future technological development, very detailed provisions on voting machines dating back to 1966 were omitted (Loeber, 2008b; Ruthrauff & Goldsmith, n.d.). To reduce frequent legislative amendments, it was decided to retain only general provisions in the Electoral Act, while leaving more detailed regulations to a lower-level Decree, which was simpler to update. In 1990, TNO published a draft report outlining requirements for voting machines, which producers informally followed, but formal regulation did not occur until 1997 (Ruthrauff & Goldsmith, n.d.). This final instrument, which formed the legal framework for the use of voting machines, was the Regulation for the Approval of Voting Machines, with TNO as the certification agency (Ruthrauff & Goldsmith, n.d.). It later became apparent that the regulation lacked security features or anti-manipulation measures, and no paper trail was mandated, since the State Secretary presumed the machine printout would

match votes cast and saw no need for verification (Ruthrauff & Goldsmith, n.d.). In 1996, a new player entered the voting machine market, Sdu (formerly VUGA), but it did not significantly disrupt Nedap's monopoly, which remained at around 90–95% (A.-M. Oostveen, 2010; Ruthrauff & Goldsmith, n.d.).

By the end of the 1980s, 60 municipalities in the Netherlands were using 1,200 voting machines (Ruthrauff & Goldsmith, n.d.), and by the mid-1990s, voting machines were used in 90% of Dutch municipalities (Tweede Kamer der Staten-Generaal, 2016). Municipalities were drawn to voting machines for perceived advantages such as fewer unintentional errors, reduced staff requirements for vote counting, and faster determination of results (Jacobs & Pieters, 2009; 2008; Interviewee-NL-5, 2023). The adoption of voting machines proceeded uncontroversially:

> "Little attention was paid at the time to security and verification possibilities. The main concerns were related to the usability of the machines, especially for elderly people. How the votes were counted and how the result was calculated did not seem to be of much public interest" (Jacobs & Pieters, 2009, p. 123).

However, issues related to tabulation and recounts (especially during local elections) attracted parliamentary inquiries and media scrutiny in 1998 (Ruthrauff & Goldsmith, n.d.). A sub-commission in 1999 identified software calculation errors and supplier-exclusive access to source code, ultimately recommending a certification procedure (Ruthrauff & Goldsmith, n.d.). Despite these warnings, parliament took no legislative steps. Criticisms intensified after 2000, revolving around source code secrecy, the inaccessibility of evaluation reports (TNO's reports were made public), and the lack of verifiability (Jacobs & Pieters, 2009). In 2004, doubts over reliability and security reappeared, notably in Ireland, which decided not to use Nedap's machines for its European Parliament elections. Questions were raised in the Dutch Parliament, but the Minister dismissed them, asserting that Dutch machines were reliable (Ruthrauff & Goldsmith, n.d.). As the 2000s progressed, voting machines attracted increasing attention from academics and IT experts:

> "(…) These voting machines were introduced very early on, in the late '80s, the early '90s, at a time when there was not so much, let's say, suspicion about the usage of computers, so the idea of computer security was not so clear. They were closed-source machines. This fact that they were closed-source was absolutely uncontroversial at the time when they were introduced. But this changed over the course of twenty years, and

people, and in particular computer specialists, started becoming much more suspicious about what was going on there" (Interviewee-NL-2, 2023).

The decisive events for e-voting, which led to its very rapid discontinuation, took place between 2006 and 2008. By 2006, 97.7% of Dutch municipalities had adopted voting machines (Election Process Advisory Commission, 2007), which leads to the conclusion that e-voting had evolved into a nearly universal and effectively mandatory voting method. The Netherlands' largest city, Amsterdam, adopted voting machines relatively late, doing so for the first time in the municipal elections in March 2006, and it chose Sdu's voting machines (Loeber, 2014; Ruthrauff & Goldsmith, n.d.). In July 2006, prompted by the adoption of voting machines (or voting computers) in Amsterdam's municipal elections, Rob Gonggrijp and fellow computer experts launched the campaign "We don't trust voting computers" (Wij vertrouwen stemcomputers niet) (Pieters & van Haren, 2007).[11] They filed Freedom of Information requests to expose security flaws and to detail the extent of the government's reliance on equipment suppliers (A.-M. Oostveen, 2010). Furthermore, they obtained and reverse-engineered Nedap voting machines and, on 4 October 2006 (just a few weeks before the general election scheduled for 22 November), demonstrated on national television that program chips could be replaced, which enabled inaccurate vote counts or other malign activities (Jacobs & Pieters, 2009; Pieters, 2009; Ruthrauff & Goldsmith, n.d.). They also discovered the feasibility of eavesdropping on Nedap voting machines via a TEMPEST attack (compromising radiation) (Jacobs & Pieters, 2009; Ruthrauff & Goldsmith, n.d.).[12]

In response, the government tasked the secret service with assessing TEMPEST vulnerabilities. The results showed that, while Nedap machines remained within acceptable radiation limits (5 metres), Sdu machines could emit radiation up to 30 metres (Loeber, 2008b). Consequently, on 30 October 2006, the government withdrew approval of the Sdu devices (affecting over 30 municipalities) just three weeks before the election, because the risks posed by the (alleged) uncontrollable TEMPEST vulnerabilities could not be mitigated (Hermans & Van Twist, 2007; OSCE/ODIHR, 2007). Findings by the NGO emerged too close to election day for a complete withdrawal, and compromised voting machines nonetheless made an appearance in the 2006 general election. For the November 2006 general election, a crisis team supported the affected

[11] It started as an informal group and soon after was transformed to an NGO.

[12] TEMPEST stands for "Telecommunications and Electrical Machinery Protected from Emanations Security".

municipalities: ten used Nedap machines, while twenty-two (including Amsterdam) reverted to paper ballots (Loeber, 2008b).

Following the November 2006 general election, Minister Nicolaï formed two expert commissions:

(1) Voting Machines Decision-making Commission, also referred to as the Hermans Commission (named after its chair, Loek Hermans), to investigate historical decision-making on e-voting devices up to 7 March 2007.
(2) Election Process Advisory Commission, also referred to as the Korthals Altes Commission (named after its chair, Frits Korthals Altes), to examine the current organisation of the election process and make recommendations.

The Hermans Commission reviewed the decision-making process up to 7 March 2007 and published its report, "Voting Machines, an Orphaned File", on 16 April 2007(Hermans & Van Twist, 2007). The report identified regulatory shortcomings and inadequate political and administrative attention to e-voting systems. It concluded that the legal framework had not evolved with technological changes, failing even to guarantee vote secrecy. The Commission condemned the government's lack of in-house expertise, excessive reliance on external parties, TNO's dual roles as both designer and tester, and insufficient legal regulation, especially provisions related to security and the counting software. Certification and testing reports had been kept confidential, which limited the possibility of independent review. The Korthals Altes Commission was asked to evaluate the electoral process overall. Its report, "Voting with Confidence", released on 27 September 2007 (Election Process Advisory Commission, 2007), stressed that paper ballots used at polling stations maximised transparency and verifiability, while acknowledging the practicality of some e-voting methods. The Commission proposed a solution involving a stemprinter (voting printer) and an electronic vote counter, provided that transparency, verifiability, integrity, freedom, and secrecy could all be maintained.

Meanwhile, in March 2007, the NGO filed a lawsuit challenging Nedap's certification, which the District Court upheld on 1 October 2007, thereby decertifying all Nedap machines (Loeber, 2014; Ruthrauff & Goldsmith, n.d.). On 21 October 2007, parliament withdrew the 1997 Regulation for Approval of Voting Machines and amended the Decree of 19 October 1989, thereby removing the minister's power to approve new machines (Loeber, 2008b; Ruthrauff & Goldsmith, n.d.). Without certified voting machines, the Netherlands reverted to paper ballots, resulting in the first nationwide paper-based election in decades (Loeber, 2008b). In May 2008,

the Dutch government announced that future elections would rely solely on paper ballots and red pencils, but that software would continue assisting with vote counting (Castenmiller & Uijl, 2017; Loeber, 2008b).

3.3 **I-voting**

3.3.1 **The KOA project**

3.3.1.1 **Motivation and development**

The "Voting from a distance" project (Dutch: *Kiezen op Afstand*, hereafter KOA) was launched in 1999 by the Ministry of the Interior and Kingdom Relations (Loeber, 2008b). KOA was regarded as part of a broader governmental mission to integrate ICT into the electoral system and, in the process, to modernise democracy, driven by the broader technological optimism of the early 2000s. There was a prevailing sentiment that if citizens could conduct banking transactions and tax filings online, they should similarly be able to cast votes (Interviewee-NL-1, 2023; Interviewee-NL-2, 2023; Interviewee-NL-4, 2023). The government believed that electoral processes should evolve in step with other areas of public administration, and that technological developments should be adopted where appropriate (Jacobs & Pieters, 2009; A.-M. Oostveen, 2010). The central objective was to increase the accessibility and convenience of voting for all eligible Dutch citizens by experimenting with various electoral innovations, some technological and some organisational. This was intended to be achieved through the "redefinition" of the place and mode of voting, ranging from more flexible voting at different polling stations, through voting in high-traffic public spaces, to voting at a location of the voter's choice (Het Expertise Centrum, 2000). With regard to i-voting, the idea was first to trial it with expatriates and then to extend it to voters in the Netherlands (Loeber, 2008b).

The early vision, articulated in October 2000, was comprehensive and ambitious (Het Expertise Centrum, 2000). The government outlined plans to develop a national voter register and a virtual polling station, and also considered an e-ID card with biometric features for voter authentication, as KOA sought to alleviate physical constraints by exploring alternative voting methods to foster higher turnout and strengthen civic engagement (Het Expertise Centrum, 2000). In parallel, it addressed legal and administrative barriers within the Electoral Act that might discourage or prevent voting. KOA introduced three distinct voting modalities/methods (Het Expertise Centrum, 2000):

(1) voting from any polling station (Dutch: *Stemming waar men wil* or SWS),
(2) kiosk voting in public spaces,
(3) remote voting (i-voting and telephone voting).

The first modality, SWS, allowed voters to cast ballots at any polling station within their electoral district, irrespective of their official address (Het Expertise Centrum, 2000). Its aim was to accommodate individuals who might be away from home due to work, travel, or other commitments on election day. Implementing SWS required the creation of a centralised electronic registry of eligible voters that was accessible in real time at every polling station, which allowed staff to verify voter eligibility and prevent double voting. After a series of trial, SWS proved successful and was permanently adopted by many municipalities. The second modality was voting kiosks in public spaces (e.g., libraries, community centres, transport hubs, and other suitable public spaces) (Het Expertise Centrum, 2000). Although more restrictive than location-free i-voting, kiosks offered a supervised environment while still enhancing convenience compared to traditional polling stations. The aim was to serve citizens who lacked easy access to conventional polling stations or who preferred a more technology-driven experience. Kiosk voting did not achieve success. The third modality was remote voting, which included i-voting and telephone voting and allowed ballots to be cast from any suitably equipped location (Het Expertise Centrum, 2000). KOA's architects envisaged that remote voting would benefit Dutch citizens abroad, who had previously relied on postal ballots that were subject to delays and questionable reliability. In the long run, it was envisaged that it would assist voters with disabilities or those with packed schedules.

The original plan was for a large-scale trial during the March 2003 provincial elections, in which voters would cast electronic ballots via public kiosks (Ministry of the Interior & Relations, 2004). During 2002, a formal reconsideration was undertaken to assess whether KOA's aims could be fulfilled under current constraints. In a letter from February 2002, the Second Chamber was informed that kiosk voting might prove unfeasible for two reasons (Ministry of the Interior & Relations, 2004). First, the outcomes of the European tendering process showed that the ICT requirements for electronic remote voting were more complex and elusive than expected, which raised doubts about the availability and reliability of suitable technology. Second, escalating costs placed increasing strain on budgets, as the development and deployment of secure e-voting systems had become progressively more expensive. Following internal reviews, the government communicated the results to the Second Chamber

in June 2002 (Ministry of the Interior & Relations, 2004). Rather than pursuing a comprehensive transformation of electoral processes, the government now advocated a more cautious, incremental approach that focused on controlled experimentation. Accordingly, the Experimentation Act on Remote Voting was adopted in 2003, together with corresponding provisions in the Experimentation Decree, which formed the legal foundation for experiments under the KOA project (Election Process Advisory Commission, 2007). This legislation was expressly interim in nature and was intended to remain in force until 1 January 2008 (Election Process Advisory Commission, 2007), and reflected the experimental character of the KOA project and the expectation that sufficient evidence would be gathered within this period to inform further decisions on remote voting methods. The government decided to concentrate on manageable interventions, beginning with the 2004 European Parliament elections, and the recalibrated plan comprised experimentation with voting at polling stations of choice within municipalities, and with remote voting via the internet or telephone for expatriates (de Groot & Vink, 2018; Election Process Advisory Commission, 2007; Ministry of the Interior & Relations, 2004). This allowed the second and third modalities to be tested while minimising risks and directing resources towards the areas in which the benefits appeared most promising.

3.3.1.2 **The 2004 European Parliament elections**

Before 2004, expatriates could vote by post, by proxy, or in person at a Dutch polling station. The first KOA i-voting trial took place during the European Parliament elections in June 2004 and provided expatriates with a 10-day voting window (Election Process Advisory Commission, 2007; VKA, 2014). The i-voting system was developed by LogicaCMG and is referred to as “the KOA system” (Jacobs & Pieters, 2009). Conceived as a proprietary solution at first, an open-source version was subsequently developed, which represented one of the earliest government-sponsored open-source i-voting systems globally, with the source code released under the GNU General Public License in July 2004 (Kiniry et al., 2007).

Eligible voters registered by ordinary post and selected a personal access code for authentication purposes (Jacobs & Pieters, 2009). This two-factor approach combined something the voter knew (their chosen access code) with something they received (voter credentials by post). Upon registration, voters received customised information packets containing their identification code and unique voting credentials. Each candidate was assigned a set of unique random numbers, with one randomly assigned to each voter, which was intended to prevent a correlation between voters and their votes (Kiniry et al., 2007). A total of 15,991

voters abroad registered, of whom 12,030 voted (Election Process Advisory Commission, 2007). Roughly 6,695 used postal ballots, whereas 4,871 used internet and 480 telephone voting (Bokslag & de Vries, 2016; Election Process Advisory Commission, 2007).[13] The overall cost amounted to 3.5 million EUR, or around 650 EUR per voter, which prompted questions about the viability of scaling up such an approach (Tweede Kamer der Staten-Generaal, 2005a). Minister Pechtold deemed the trial a success in terms of user-friendliness, anonymity, and security yet concluded that it was not fully prepared for structural adoption, given unresolved technical, procedural, and financial challenges (Tweede Kamer der Staten-Generaal, 2005a). Turnout did not increase as much as policymakers had hoped, though the system seemed beneficial to expatriates (Election Process Advisory Commission, 2007; Jacobs & Pieters, 2009; Loeber, 2008b).

3.3.1.3 **The 2006 House of Representatives election**

The second i-voting trial under KOA took place during the general election on 22 November 2006 (Election Process Advisory Commission, 2007).[14] Telephone voting, which had drawn limited interest in 2004, was dropped. The Ministry introduced a modified version of RIES, referred to as RIES-KOA (Jacobs & Pieters, 2009; Jonker & Volkamer, 2007). This system allowed voters to verify their votes after the election and included a more user-friendly authentication system. The voting period was shortened from ten to five days (VKA, 2014). Of 34,205 registered overseas voters, 28,150 participated, with 19,815 using i-voting and 8,335 posting their ballots (Election Process Advisory Commission, 2007). Total budgeted costs for the trial amounted to approximately 2,0 million EUR, with costs per registered i-voter falling to 90 EUR (Tweede Kamer der Staten-Generaal, 2005b). Despite this reduction, per-voter costs remained higher than those of traditional voting methods. User experience data from the 2006 trial provided evidence of voter satisfaction. Of 19,815 i-voters, 11,003 (approximately 65%) completed a post-election survey, which revealed strong approval: 69% found i-voting easy to use, with only 1% describing it as complicated, 64% considered it a safe method, 99% preferred i-voting over postal ballots, and 94% expressed support for permanent adoption (Ministry of the Interior & Relations, 2007).

[13] In some sources, the total number of internet and telephone votes is reported as 5,335, reflecting a difference of 16 votes (Bokslag & de Vries, 2016).

[14] As of 2023, expatriates are allowed to vote for the Senate via an indirect electoral college. Previously, they could only vote for the House of Representatives and European Parliament (Interviewee-NL-3; Interviewee-NL-9; Interviewee-NL-10).

3.3.1.4 **Demise of KOA and rejection of i-voting**

At its inception, KOA sought to integrate voting at any polling station, kiosk voting, and remote voting (i-voting and telephone voting) into the Dutch electoral process in order to broaden participation and modernise established voting methods. The Experimentation Act on Remote Voting and its accompanying Experimentation Decree provided KOA's legal foundation, but only on a temporary basis. Recommendation from the Korthals Altes Commission was to make i-voting the default method for expatriates, while restricting postal voting to those either unwilling or unable to vote via the internet (Election Process Advisory Commission, 2007). Despite positive user feedback and improvements between the 2004 and 2006 trials, KOA's trajectory was altered by the publication of several reports and evaluations that revealed vulnerabilities in the RIES-KOA system and was further compounded by documentation gaps that complicated thorough analysis (Fox-IT, 2008; Gonggrijp et al., 2008; Hubbers et al., 2008). Gonggrijp et al. (2008, p. 6) noted the following:

"We are amazed to find a system so apparently well-studied yet so fundamentally and undeniably insecurely programmed. Scientific studies of RIES seem to have concentrated on the more scientifically 'sexy' theoretical security offered by the inventive cryptographic protocols while largely ignoring the threats posed by very straightforward and down-to- earth attack methods that are much more likely to be used in the real world."

In November 2007, Parliament adopted a motion mandating certification procedure for i-voting comparable to those required for voting machines, a requirement that seemed reasonable in principle but proved prohibitively costly and time-consuming, as acknowledged by the State Secretary in January 2008 (Loeber, 2008b). This decision *de facto* eliminated i-voting as an option for the 2009 European Parliament elections (Bokslag & de Vries, 2016; Loeber, 2008b, 2014). The Experimentation Act was extended in late 2007 until 2010, but it ultimately did not take hold, and, after its expiry, it was not renewed (Bokslag & de Vries, 2016).

The KOA trials generated mixed outcomes. While voting at any polling station proved successful and remains in use, kiosk voting and i-voting were rejected (Ministry of the Interior & Relations, 2007; VKA, 2014). Although KOA aimed to accommodate voters with disabilities, those living abroad, and those with limited time to attend polling stations, it was concluded that paper voting entails fewer risks and is more reliable.

As Pieters & van Haren (2007) observe, i-voting did not address any urgent dilemma that could not otherwise be tackled. Even for Dutch expatriates, postal voting, while not ideal, was not

deemed sufficiently pressing to motivate a full shift to i-voting (Loeber, 2018). The sense that no severe crisis existed deprived i-voting proposals of the urgency required for policy-making traction. The diaspora's concerns receive only limited attention. I-voting for Dutch expatriates simply was never a pressing political matter (Interviewee-NL-1, 2023; Interviewee-NL-9, 2023), and there is no powerful diaspora lobby to demand i-voting. Consequently, no major political faction has made i-voting for the diaspora a rallying cause. The only actors that were organised and demanded change were municipalities: "The only pressure even nowadays that comes from the mayors of the cities. They say: 'It is a hell to count all those paper ballots, please reintroduce electronic voting or at least electronic counting'". I-voting never quite landed in that debate, as municipalities simply wanted to reduce the burden of manual counting, not to incorporate any new voting method (Interviewee-NL-3, 2023; Interviewee-NL-5, 2023).

Turning to characteristics of Dutch politics, multiple interviewees singled out two factors: a "politics of compromising" and a reliance on expert opinions (Interviewee-NL-4, 2023; Interviewee-NL-8, 2023). Compounding that, Dutch politicians tend to defer to expertise (Interviewee-NL-8, 2023; Interviewee-NL-4, 2023). Once IT experts proclaimed i-voting "unsafe", many MPs saw no incentive to push forward, especially since they lacked the technical knowledge to refute that assessment (Interviewee-NL-8). Politicians became hesitant because they remember the fiasco and do not want to spark fresh criticism (Interviewee-NL-5, 2023). This wariness is accompanied by concern that expanding technology would increase the risk of attacks (Interviewee-NL-3, 2023), while no civil servant wants to stake their career on a system so fraught with risk (Interviewee-NL-6, 2023). More generally, officials and the public alike exhibit scepticism about the government's ability (including that of other state institutions) to manage IT projects. Interviewee-NL-2 (2023) remarked that there is ample ridicule directed at government-led IT projects:

> "In the Netherlands, this trust in the government is not there, especially not in ICT matters. So, I don't think also that there are government officials in the Netherlands who dare to step forward and say we can run in elections. They will be laughed at, they will be ridiculed, I'm pretty sure."

Although Interviewee-NL-8 (2023) acknowledged this sentiment but did not believe it necessarily influenced i-voting itself. IT experts have played a highly influential role in shaping the debate around i-voting. They have been vocal about the security and feasibility limitations of e- and i-voting, stressing that such voting methods expose election processes to serious vulnerabilities. Those experts consider i-voting as a bad idea, and their stance has carried

weight with policy-makers (Interviewee-NL-8, 2023). As Interviewee-NL-7 (2023) put it: "There's not much suspicion among experts about the stupidity of online voting in political elections". Minister van Boxel was apparently supportive at one point in the early 2000s, but when challenges emerged, the Ministry downgraded the KOA project in priority (Interviewee-NL-8, 2023). When describing the government's current position, Interviewee-NL-9 (2023) quotes the sentiment: "We don't want to experiment with democracy". Democracy outsourcing and loss of control have similarly been flagged as a big concern when it comes to any kind of e-voting in the Netherlands (A.-M. Oostveen, 2010). It is possible to conclude that there is an implicit consensus not to pursue an i-voting project any further:

> "And so, because there was much focus on the security of these, including confidentiality, especially of these voting machines, the whole topic of internet voting was seen as even much, much more complicated – if you can't get it right in these simple machines, let's not even touch the topic of internet voting. So, there was a clear sense at the time, also within the ministry, this is so difficult, we should not touch it. Even the ordinary voting machines, which were relatively simple, have been abolished in the Netherlands" (Interviewee-NL-2).

Any proposals that did surface were sporadic and rarely garnered meaningful parliamentary traction. While individual MPs such as Taverne occasionally advanced proposals following the discontinuation of the i-voting project, they did so without garnering parliamentary support (Interviewee-NL-2, 2023; Interviewee-NL-9, 2023). Lacking such support, i-voting failed to enter the political mainstream.

3.3.2 **Water boards election**

Water boards date back to the 13th century and are one of the Netherlands' oldest democratic institutions, functioning as semi-autonomous regional government bodies responsible for water management, flood control, maintaining water quality, and managing wastewater treatment across their respective jurisdictions (Gonggrijp et al., 2009; Jacobs & Pieters, 2009; Interviewee-NL-3, 2023). Unlike municipal, provincial, national or European Parliament elections, which operate under the Electoral Act, water board elections are governed by the Water Board Act and the Water Board Election Decree (Jacobs & Pieters, 2009; OSCE/ODIHR, 2010), which grants them more latitude for electoral innovation without requiring amendments to the more politically sensitive Electoral Act and enables them to function as a "hobby area" for election innovation (Interviewee-NL-2, 2023), a relatively low-stakes environment in which new voting methods can be tested.

However, this also meant that water board election experiments occurred without the same level of scrutiny, security standards, or public attention applied to other, higher-stake elections (Interviewee-NL-2, 2023). The Ministry of Internal Affairs, which oversees electoral processes, had limited oversight of water board voting methods, and this would later raise concerns, as an i-voting system developed without the sufficient security that might have been imposed under national electoral legislation (Interviewee-NL-2, 2023). Water board elections historically suffered from lower voter turnout compared to other Dutch elections, with turnout rates of 20 to 30% (Interviewee-NL-5, 2023). The combination of administrative autonomy and low participation created fertile ground for experimentation with alternative voting methods. Traditional paper ballot elections failed to engage the voters, even though they live in a country where water management is existentially important.

3.3.2.1 **RIES i-voting system**

The Rijnland Internet Election System (RIES) emerged from a convergence of academic research and water management needs. Developed in 2003-2004 for the Rijnland Water Board, RIES was designed as a simplified implementation of a cryptographic voting system proposed in the master's thesis of Herman Robers (Hubbers et al., 2005). Piet Maclaine Pont, working with the Rijnland Water Board, adapted it into a practical i-voting system (Hubbers et al., 2005). Voters received a unique secret key (voter key) via post, which they used to authenticate themselves on the voting website and generate a technical vote (Hubbers et al., 2005). After voting, the system displayed a cryptographic representation of their ballot (a technical code), which voters could use to verify that their vote was included in the final tally (Hubbers et al., 2005). RIES worked through a standard web browser with JavaScript enabled (Hubbers et al., 2005). Its first deployment was in the autumn of 2004, when it was used for water board elections in the Rijnland and De Dommel districts (Jacobs & Pieters, 2009). It targeted approximately 1 million eligible voters, with 120,000 people who participated, out of which roughly 70,000 chose to cast their ballots via the internet (Bokslag & de Vries, 2016; Jacobs & Pieters, 2009). While this represented an achievement in terms of scale for an i-voting system, i-voting did not increase overall turnout as hoped. Quite the contrary, turnout declined from 22% in 1999 to 17% in 2004, with about 31% of 2004 voters using i-voting (Hubbers et al., 2005).

3.3.2.2 **From RIES to RIES-KOA**

After its use in water board elections, RIES attracted interest from the Ministry of Internal Affairs, which saw potential in adapting the i-voting system to serve Dutch expatriates (Ministry of the Interior & Relations, 2007). The ministry had financially supported RIES's development and had secured rights to utilise the system for experimental purposes. This led to the creation of RIES-KOA, a modified version designed for expatriate voting in national elections. Adapting RIES for national elections required substantial modifications to comply with the electoral legislation. While water board elections mostly involved selecting a single representative, national elections featured multiple candidates affiliated with political parties, which required adjustments to the interface and processing. National elections also attracted higher security standards and greater public scrutiny. KPMG conducted evaluations, and CIBIT performed a source code review (Ministry of the Interior & Relations, 2007). These identified areas for improvement, but they did not uncover the fundamental security vulnerabilities that later emerged through more comprehensive evaluations.

RIES-KOA was first used during the 2006 general election and offered Dutch citizens abroad an i-voting alternative to traditional postal ballots. The system operated during a defined pre-election period from 18 to 22 November. The ministry contributed 100,000 euros to RIES's development in exchange for limited user rights for the 2006 House of Representatives elections (Ministry of the Interior & Relations, 2007). Policy-makers recognised that any expansion of i-voting would require further investigation into cost reduction strategies, as the expenses associated with the RIES application impacted the overall cost of providing i-voting to the target group (Ministry of the Interior & Relations, 2007).

Early evaluations focused on usability and basic functionality, with the user interface, the cryptographic design, and the server and network components evaluated by TNO Human Factors (Soesterberg), Cryptomathic (Aarhus, Denmark), and Madison Gurka (Eindhoven), respectively (Gonggrijp et al., 2008). As RIES developed and expanded, more thorough security audits became increasingly less favourable. In 2008, three separate evaluations contributed to RIES discontinuation. The Fox-IT evaluation, commissioned by the Ministry of Infrastructure and Environment, identified vulnerabilities that could enable malicious actors to influence election results or compromise vote secrecy (Fox-IT, 2008). Their report noted that it was possible to inject votes into the ballot box by relatively simple means, using the reference file as a basis. The Eindhoven Institute for Protection of Systems and Information (EiPSI) published findings on 24 June 2008, and these findings described methods for manipulating

elections that differed from those possible in postal voting (Hubbers et al., 2008). The last one was conducted by Rop Gonggrijp and colleagues after the source code was published in June 2008 (Gonggrijp et al., 2008). Their analysis was preliminary and took only a few days, but it revealed many security vulnerabilities.

3.3.2.3 **Discontinuation of RIES**

Despite initial optimism and international recognition, RIES's trajectory ultimately led to its discontinuation. The system was intended for use in combined water board elections scheduled for autumn 2008 (RIES-2008), but these plans collapsed after the deputy minister's decision to abolish voting machines and after Fox-IT's evaluation (Fox-IT, 2008). Electronic counting of postal ballots continued, but the i-voting system was deemed too insecure for adoption. The Union of Water Boards concluded that deploying the i-voting facility for water board elections would be irresponsible given the identified risks (Jacobs & Pieters, 2009).

This decision is part of a broader shift in Dutch attitudes towards e-voting following the 2006 e-voting scandal, which exposed vulnerabilities in voting machines used nationwide. That scandal heightened scrutiny of all e-voting systems and created a more sceptical environment for ICT use in elections. The Netherlands thus reverted to paper-based voting methods for both domestic and expatriate voters, with some modifications to improve the accessibility of postal voting for citizens abroad. Although i-voting did not help to increase turnout in water board elections, another organisational innovation did: they now coincide with the provincial council elections, which have higher turnout, so voters cast ballots for the water boards when voting (Interviewee-NL-1, 2023).

3.4 **Discussion**

The discussion primarily deals with i-voting for diaspora which was trialled twice under the KOA project. Water boards are mentioned where necessary and relevant, in order to complement the context of the Netherlands' overall i-voting project, which had two i-voting innovations that ran in parallel, and later merged into a single system, KOA-RIES, which tied their fates together and led to the complete rejection of i-voting in the Netherlands.

In the Dutch case, the fate of i-voting became inseparable from e-voting (voting machines), which almost entirely flooded Dutch polling stations. Amsterdam, the capital, remained an exception until 2006, when it, too, adopted voting machines. Although voting machines "sank" i-voting, they nonetheless help to open the policy window that placed i-voting on the agenda.

It was precisely the familiarity with using "e-" voting methods that led policy-makers to consider experimenting with location-independent voting, and thus the KOA project was launched in 1999. Through that project, there was an attempt to experiment with voting via kiosks in busy locations where people usually circulate, then to extend the possibility of voting at any polling station within a municipality, and, most importantly for this research, remote i-voting. In MSF terms, the problem stream did not contain a pronounced or clearly defined problem. Instead, the project sought to improve what already functioned relatively well. The notions of accessibility and convenience are more narratives about the future than problems if there is no identifiable group of voters who might benefit from them. However, it can be stated that the aim was to increase accessibility and convenience for voters, and the policy stream offered what seemed to be a plausible solution in the form of i-voting. This was a period of technological optimism, and a period in which the internet increasingly became part of communication with citizens, and it was "cool" to do digitisation projects. At the same time, there was a relatively low sense of risk associated with voting methods, and the policy window opened wide for i-voting to reach the agenda and, in DOI terms, to begin an adoption process.

The i-voting (sub)project within the broader KOA project began with the diaspora, primarily because it represented a bounded population assumed to have the greatest interest in, and benefit from, i-voting. The plan was to extend i-voting to other Dutch voters in the Netherlands in later phases. In hindsight, it can be said that even then, the policy window was wavering and susceptible to a stronger "wind", in the form of a sudden focusing event, that could shut it forcefully. This was because the problem was not clearly defined, but was very vague, and therefore did not attract stronger political support from parties that could have seen their own benefit in it, while the extension of i-voting to domestic voters appeared to be a distant prospect. In any case, the KOA project also conceived i-voting as a "third modality" in terms of the time and effort required to achieve it. The project could, even with partial success in one of the first two modalities, justify its existence and the money invested. Precisely for that reason, KOA cannot, overall, be described as a failed project, because the first modality, namely voting at any polling station within a municipality, remained a lasting (organisational) electoral innovation that facilitated voting in an already highly accessible Dutch system of polling stations. I-voting was trialled twice (in 2004 and 2006), and voter surveys showed that voters were extremely satisfied with i-voting and supported its adoption. Likewise, the trials did not report any significant technical difficulties, and it appeared, at least on the surface, that a third

trial would follow, which, by all indications, was to take place for the 2009 European Parliament elections.

However, 2006 witnessed a focusing event that, in a very short period, changed the way the Netherlands approaches voting methods and the use of technology in voting to this day. A group of activists in the NGO “We don’t trust voting computers”, supported by individuals from academia, during the autumn of 2006, revealed all the technical weaknesses of the voting machines in use, as well as the organisational weaknesses and failures related to their certification, auditing, storage, and overall negligent handling. Their actions redefined the problem stream, which until then had been concerned with "how to modernise elections", into "how to ensure electoral integrity against technological (and organisational) failures". At the same time, the policy stream, that is, the solution (the voting method), became discredited and reframed as a source of opaque risk. In the politics stream, that focusing event shifted incentives, and it became unpopular to express support for voting machines, which, for over twenty years (software-based ones, earlier ones had been mechanical), had been used without controversy and through which, in the end, the then-current politicians had been elected.

Voting machines had been mentioned occasionally in parliamentary debates, but only in passing and accompanied by assurances from whichever minister was in office at the time that everything was fine with them. Only 2006 was the turning point that changed the course of voting method history in the Netherlands. A relatively small group of activists managed, within a few months, to become highly successful anti-policy entrepreneurs, primarily against voting machines, and to win public support. Their success lay in their skill at translating expert claims into publicly resonant ones, so that it was clear even to lay voters that something was wrong with voting machines. Had the i-voting project not been halted by policy-makers themselves, they would undoubtedly have become more involved in campaigning against i-voting. Their leader and co-author of one of the evaluations of the RIES-KOA i-voting system was extremely critical of it.

Years of ignorant and complacent treatment of electoral integrity came due. Policy-makers decided, as is often the case, to establish commissions. It emerged that the Netherlands relied to a large extent on external vendors, that in-house expertise was lacking, that certification reports on voting machines were kept confidential, and, at the same time, that the technical rules for certification were outdated and did not follow technological development. Although one commission even proposed i-voting for the diaspora, that proposal was never implemented.

Voting machines were decertified, and the next suspect became i-voting. A motion was adopted in parliament requiring that any future i-voting system be certified, and, because this proved too expensive and time-consuming, the Netherlands abandoned both future water board elections via the internet and i-voting for the diaspora.

Thus, in the period 2006 to 2008 there was a change in rhetorical vision, which had initially been that ICT could modernise democracy and improve accessibility and convenience, but after the voting machine scandal, voting methods began to be viewed as associated with opacity, manipulability, non-verifiability, and with the loss of public oversight and control over elections as the most important democratic operation. There was damage to the credibility of the state institutions responsible for elections. To continue with e-voting, that is, i-voting, it would have been necessary to invest much more effort in building trust and demonstrating that the system could meet the standards of democratic elections under the scrutiny of numerous interested experts watching developments. Policy-makers began to act defensively and returned Dutch elections to "factory settings", readopting paper and the (red) pencil. This move was not received as a retreat or capitulation, but, on the contrary, as a form of responsibility and prudence. Dutch politics operates in a way that seeks compromise and takes expert opinions into account. In a situation in which it was clear that the only way out was to close the "policy window" for both voting machines and i-voting, they did so.

I-voting did not attract a supportive coalition within political parties, nor did the diaspora generate sustained pressure on policy-makers. For the diaspora, in MSF terms, the observability of benefits associated with i-voting was the highest of all groups. This was also shown by the post-election surveys after the trials, but it turned out that positive voter experience and high satisfaction were not the same as political mobilisation. The voice of the diaspora may also have been less audible because another organised group, namely municipalities, captured policy-makers' attention in the period after the rejection of i-voting. Numerous organisational and logistical tasks related to elections fall on their shoulders, including vote counting. It was precisely vote counting that became the new main problem of the Dutch electoral system, which municipalities framed successfully, thereby pushing other problems (accessibility or convenience) out of visibility and out of the scope of policy-makers. This is also a somewhat ironic situation that arose precisely because of the return to paper voting: the ballot paper turned out to be extremely large and impractical, and counting took a long time and relied on municipal staff and volunteers who were hard to recruit. By capturing the problem stream related to voting methods and defining the problem as one of vote counting rather than of voting

itself, the problem that could have been solved through i-voting was displaced. Finally, the water boards found a way to increase voter participation by making their elections coincide with the provincial elections.

3.5 **Conclusion**

The Netherlands was among the pioneering countries in i-voting. A distinctive feature of the Dutch case was its long tradition of e-voting via voting machines in polling stations, whose adoption and use remained uncontroversial for many years. Positive experiences with e-voting led policy-makers to launch the KOA project, which included three options: voting from any polling station, voting kiosks, and remote voting (i-voting and telephone voting). Initially, the i-voting trials were intended for expatriates, with a long-term plan to extend them to resident voters. The first i-voting trial was conducted in 2004 during the European Parliament elections, in parallel with telephone voting, and the next trial was conducted in 2006 during the elections for the House of Representatives. Around the same time, a parallel i-voting project began in the water boards, a Dutch institution responsible for water management with strong symbolic significance and real competencies, but which recorded low turnout in elections. Because the Electoral Act did not govern water board elections, the water boards were able to use their i-voting system, RIES, already in 2004. A modified version of that system, RIES-KOA, was used during the second trial with expatriates in 2006.

However, the 2006 voting machine scandal, in which the NGO "We don't trust voting computers" showed that the two voting machine models in use, Nedap and SDU, had numerous weaknesses, both in the code itself and in their storage between elections, changed the trajectory of electoral technology in the Netherlands. The latter was vulnerable to the interception of electromagnetic emissions at distances of up to 30 metres, thereby undermining the secrecy of the vote. This occurred shortly before the 2006 general election, and the activists' findings became a national story. Voting machines were decertified in 2008 and have since been fully replaced by paper and the (red) pencil. I-voting also became the subject of expert debate and analysis, and the RIES-KOA i-voting system was found to contain vulnerabilities that made it unsuitable for elections. In addition, a motion passed in parliament requiring that any i-voting system used in the future be certified, which the government considered time- and money-consuming.

As a result, the Dutch i-voting project was discontinued. The 2006 focusing event was strong enough to reshape the existing problems and related narrative (accessibility, convenience, modernity, and similar vague notions) into a new one (trust, electoral integrity, and security). In the absence of policy entrepreneurs, that is, policy-makers willing to support the continuation of the i-voting project, it quietly faded and did not return.

The absence of any pressing need, aside from expatriate accessibility, meant that neither policy-makers nor the public had sufficient motive to overcome the obstacles that adoption of i-voting would certainly entail. This was reinforced by the resilience of entrenched voting method, namely simple, well-understood, and trusted paper-based voting. The Netherlands continues to monitor international i-voting developments and periodically reconsiders electronic means for electoral operations. Still, the Dutch experience with voting machines stands as a case study in the tensions inherent in electoral modernisation. It shows that accessibility and convenience improvements, however desirable, cannot supersede the paramount requirement of electoral integrity, a principle captured in the Dutch government's approach to voting technology: progressive, but prudent, and risk-averse.

Chapter 4: Norway

„Test all things; hold fast what is good" (1 Thessalonians 5:21).

4.1 Introduction

The previous chapter demonstrated how i-voting in the Netherlands was overshadowed by voting machines and the scandal that led to the discontinuation of their use. I-voting was somewhat unsystematically trialled, in response to needs related to low turnout in water board elections, and to the diaspora's need to vote from abroad. Norway, on the other hand, presents a rather different case. The story of i-voting in Norway more systematic, and the motivation was not linked either to increasing already quite high election turnout levels nor to efforts to facilitate voting from abroad.

In this chapter, the Norwegian voting system is first outlined briefly, showing that elections are highly accessible, with very long advance voting periods. However, advance voting still takes place in official premises, and remote voting is limited to expatriates. After that, the Norwegian i-voting project is presented, which can broadly be placed in the period 2006 to 2014, and the circumstances that led to its ultimate rejection are outlined. The project left behind two trials, in 2011 and 2013, and many examples of good practice in i-voting (e.g., return codes, revoting, verifiability, competitive dialogue in public procurement, thorough documentation). Although the project was well managed, and was, in many respects, conducted more transparently than the Dutch project, this was not sufficient for the adoption of i-voting.

With the help of an integrated theoretical framework, a clearer and more nuanced picture is provided of what happened in Norway, and of the reasons for the eventual rejection of i-voting, or rather, the discontinuation of the trials and the entire project, thereby rendering the adoption of i-voting as one of the voting methods superfluous. In broad terms, the case of Norway is very peculiar, because some of the main obstacles to adopting i-voting turned out to be that voting in Norway is already exceptionally easy, that the principle of secrecy is strongly emphasised, and that remote voting is not socially acceptable (one of the opposition's main objections was that i-voting could lead to the disenfranchisement of immigrant women). Moreover, for the groups that were supportive of i-voting, for example persons with visual impairments who framed it as a matter of dignity, other solutions were found to enable dignified voting.

4.2 **Voting in Norway**

Norway is a country with a standardised election calendar that unfolds in cycles. These cycles consist of parliamentary and local elections held alternately every two years, on the second Monday of September (Interviewee-NOR-2, 2023; Interviewee-NOR-6, 2024). An elaborate and multifaceted ballot paper is used, allowing voters to rearrange, add, or remove candidates' names (Nore & Bull, 2012). Voting within Norway is conducted exclusively at designated and supervised polling stations, with the option of a very long advance voting window, even up to two months before election day (Interviewee-NOR-6, 2024; Interviewee-NOR-5, 2023):

> "If you walk around in Oslo, you will see there are advance polling stations many places, both in libraries or public buildings, but also in small, prefabricated huts that are especially placed in parks and everywhere for that purpose. It is not really difficult to vote if you want to vote" (Interviewee-NOR-4, 2023).

Postal voting is provided only for the diaspora, who may also vote at embassies, and who do not constitute a particularly significant part of the electorate (Interviewee-NOR-2, 2023). There are roughly 1,000 postal votes per election (Interviewee-NOR-7, 2024). Geographical and other challenges are therefore already mitigated, or resolved, by the option of advance voting, which does not create a demand for i-voting (Interviewee-NOR-6, 2024).

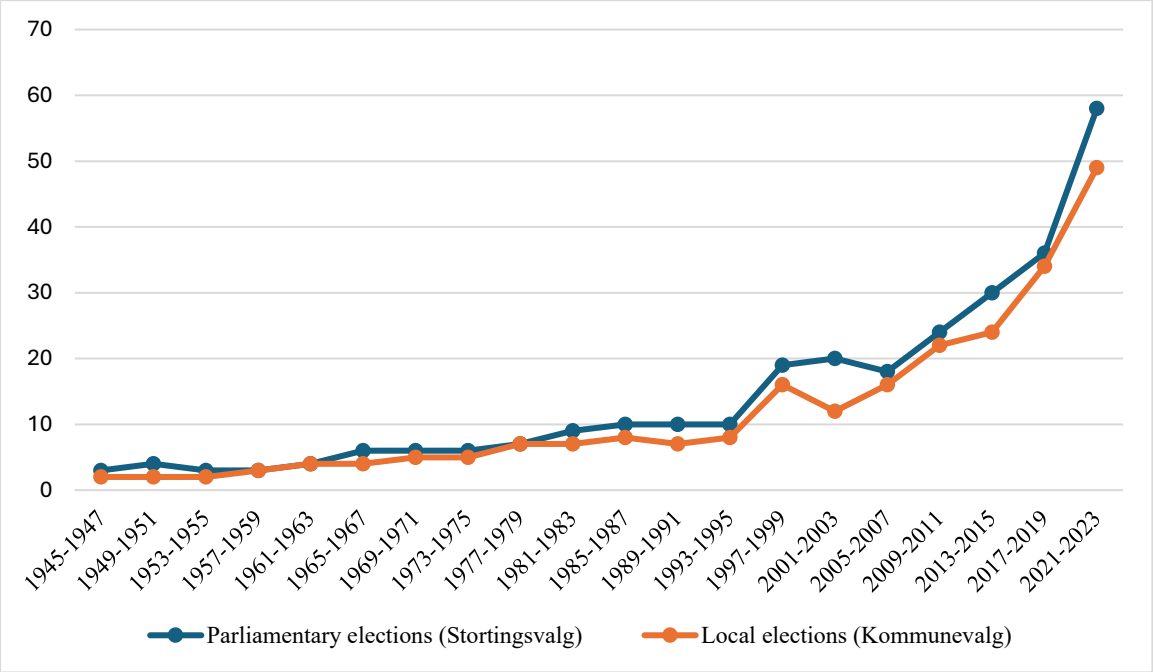

Figure 4.1 Share of advance votes in Norwegian parliamentary and local elections, 1945–2023 (Kleven, 2023).

Direct forms of decision-making are infrequent and used much less than in Switzerland. Norway has held only six referendums since gaining independence in 1905, and the last two of these were related to membership in the European Union, in which the answer on both occasions was 'no' (Interviewee-NOR-4, 2023). On the other hand, local referendums are of a consultative nature, and the Local Government Act authorises municipalities to hold these but provides no specific instruction, thus leaving this matter open to regulation by legal provisions in the form of statutes of local self-government units (Interviewee-NOR-8, 2024; Interviewee-NOR-7, 2024).[15] Although this is discussed later, it should be noted that i-voting is used, and not infrequently, in local consultative referendums in Norway. However, because the decisions are non-binding, and involve very different suppliers, there is certainly a much lower level of organisation and quality of preparation for the voting itself (Interviewee-NOR-6, 2024; Interviewee-NOR-8, 2024). This is mentioned only incidentally, to show how i-voting is used in a niche manner in numerous non-political, or political but non-binding, elections and referendums.

4.3 **I-voting**

4.3.1 **Early beginnings**

The initial seeds of the idea of i-voting as a new, supplementary voting method can be traced to the beginning of the 2000s, much like in other European countries. The first engagement with this topic occurred in May 2004, when the Ministry of Local Government and Regional Development[16] appointed an eleven-member working group, comprising from experts from various fields. Its task was "to elucidate the use of electronic means in casting a vote during national, regional and local government elections" (Ministry of Local Government and Regional Development, 2006, p. 6), which is further supplemented with the aim "to make it easy for voters to exercise their democratic rights and to reduce the costs related to this exercise" (Ministry of Local Government and Regional Development, 2006, p. 128). The systematic nature of the Norwegian approach is already evident in the working

[15] The precise wording of the provision is: „The municipal council or the county council itself may decide to hold advisory referendums on proposals that concern the business of the municipality or the county authority, respectively" (Section 12-2. Referendums, Act No. 83 of 22 June 2018 Relating to Municipalities and County Authorities (the Local Government Act), 2018).

[16] The Norwegian Ministries were restructured in 2014. Consequently, the Ministry of Local Government and Regional Development subsequently became part of the newly formed Ministry of Local Government and Modernisation (Goos et al., 2016b).

group's/committee's work[17], which was divided into four different subcommittees (technical aspects, economic and administrative aspects, democratic aspects, and legal aspects). Eleven joint meetings were held, along with additional individual meetings, and study visits were conducted to the then pioneers of i-voting (UK, Switzerland, the US, Estonia) (Ministry of Local Government and Regional Development, 2006).

The results of the committee's work were published in February 2006 in the form of a very detailed report entitled „Electronic voting – challenges and opportunities" (Ministry of Local Government and Regional Development, 2006). The report did not deal exclusively with i-voting as defined in this dissertation, but also considered other forms of e-voting in the broader sense of the term.

Thus, the recommendation for future pilots was to proceed in three steps (Ministry of Local Government and Regional Development, 2006):

(1) e-voting in controlled conditions supervised by election officials;
(2) e-voting in uncontrolled conditions with controlled hardware and software;
(3) e-voting via the internet on one's own electronic device (PC, mobile device).

Furthermore, a distinction was made between binding and consultative elections, and in this regard, the recommendation was that the first phase should experiment with consultative referendums. Only the second of the three pilot phases would be suitable for binding elections, specifically "voting experiments in uncontrolled environments from a controlled terminal" (Ministry of Local Government and Regional Development, 2006, p. 133). The third phase, contingent on the first two being successful and on a favourable technological and social environment, would include what is intuitively consider i-voting today. In the words of the report, this is "binding elections based on voting in uncontrolled environments from the voters' individual platforms (computers and software)", with the addendum that this applies "with a restricted number of eligible voters" (Ministry of Local Government and Regional Development, 2006, p. 133). Although the report had envisaged a three-stage sequence beginning with e-voting in polling stations, it was ultimately opted to proceed directly with i-voting on voters' own devices, at a location of their preference. Three considerations underpinned this decision (Kommunal- og regionaldepartementet, 2012). First, "the situation had changed since 2006" (Kommunal- og regionaldepartementet, 2012, p. 48): a revised security assessment indicated that compromising a single e-voting machine in a polling station

[17] Both names, 'working group' and 'working committee', occur in the literature.

could affect several hundred voters, whereas compromising an individual's device would have far more limited consequences. Second, the projected costs of equipping polling stations with the necessary technology were high, and voters already facing geographical barriers, or living with disabilities, would gain little benefit. Accessibility would therefore not improve. Third, experience from two non-binding referendums in Radøy and Re showed that deploying standard computers in polling stations for i-voting proved technically and resource demanding.

The rationale for the pilots themselves was threefold (Ministry of Local Government and Regional Development, 2006, p. 129): ensuring voters' confidence in voting operations[18], better understanding and resolving challenges associated with voting in an uncontrolled environment (undue influence, buying and selling votes), and ensuring that technical solutions met security requirements. However, it proved not to be quite so straightforward to distil the enabling factors for the i-voting project, and different sources offer contradictory accounts. In their presentation of the E-vote 2011 project, Nore & Bull (2012) explicitly state that piloting i-voting is possible due to, among other reasons, "no history of electoral fraud". On the other hand, Ministry of Local Government and Regional Development (2006) states that the Norwegian constitution from 1814 already allowed for advance voting for individuals unable to vote at polling stations. The form of voting was postal, and over time, more and more people used this option, so much so that during the 1930s, advance postal voting was almost abandoned due to fears of undue influence on voters. Advance votes could then only be cast if the voter personally submitted them to an authorised official at a designated place. Later, the same report states that "undue influence has not been a great problem in the history of general elections in Norway" (Ministry of Local Government and Modernisation, 2014b, p. 75).[19] In contrast to this, the same report refers to the 2005 elections where rules regarding personal assistance within the polling booth were tightened, although the text does not make clear the reason for this, nor how the rules were tightened (Ministry of Local Government and Regional Development, 2006).

[18] The word confidence is used in the original text, although this might more precisely be termed "voters' trust".

[19] This inconsistent statement between pages 50 and 75 of the report (Ministry of Local Government and Regional Development, 2006) suggests either that multiple authors working on the report did not harmonise the text, or that the claim that undue influence had not been a major problem indicates that, at least at that time, the contemporary generation had no recollection of events up to the 1930s. Consequently, there was no awareness that would have pointed to this problem, or that would have acted as a barrier to experimenting with remote voting methods, including i-voting.

In terms of the reasons for launching the i-voting project in Norway, two main ones were preparing Norwegian democracy for the future, and the dignity of voting for persons with disabilities (Interviewee-NOR-5, 2023). There was an ongoing international trend towards exploring new voting technologies, and a resultant desire to gain knowledge and experience in this area (Interviewee-NOR-7, 2024). Norway decided to adopt a proactive stance, keeping abreast of technological novelties and advancements, so that, when the time came, it would be able to adopt, and manage, i-voting with the benefit of knowledge gained through the trials. At the time, the question was less whether i-voting would be possible and more when, as a relatively optimistic atmosphere prevailed. This is an argument of contemporaneity, or a lifeworld argument, but also an anticipation of what the future might hold, so that Norway would not be caught unprepared. A somewhat secondary motivation, albeit one strongly supported by interest groups, was to increase accessibility for persons with disabilities, for whom i-voting represented an "opportunity to vote by themselves in secrecy", thus adding "more dignity to the voting process for those groups" (Interviewee-NOR-5, 2023). This is also confirmed by Interviewee-NOR-1 (2023), who adds that „the Association of the Blind in Norway has been a very strong voice for internet voting". It is interesting to note that the new Ministry in 2014, then led by a newly appointed Minister from the Conservative government Jan Tore Sanner, stated that the main objective of the trials "was to increase accessibility for marginal groups, such as disabled or expatriate voters" (Ministry of Local Government and Modernisation, 2014a). Connolley (2012), analysing local online newspaper coverage of i-voting, shows that the officially stated reasons for launching the trials diverged from what was communicated publicly, finds that "there was a discrepancy between what the KRD [the Ministry] actually stated and what the local online newspapers stated of the problem to be solved, namely, that the central problem was the perceived lack of democratic engagement, at least in respect of voter participation" (Connolley, 2012, p. 228). In the media, the main argument for i-voting was higher turnout, attributed to greater accessibility for persons with disabilities and those abroad, and to greater convenience for younger voters, immigrants, so-called sofa-voters, busy individuals, and those in rural areas (Connolley, 2012). However, while turnout did initially feature as a motivating factor, it was omitted from the final version of the project mandate (Interviewee-NOR-5, 2023).

4.3.2 **I-voting project**

In 2008, the Norwegian government, with parliamentary support, decided to launch an i-voting project, under which trials were to be conducted during the 2011 local elections, and

responsibility for the project was assigned to the Ministry of Local Government and Regional Development (Barrat Esteve et al., 2012). Nore & Bull (2012) provide an overview on the early beginnings of the i-voting project. The project was initiated in August 2008, with the project team's recruitment phase running from then until January 2009. Following this, the procurement stage commenced in February 2009, continuing through to November of that year, culminating in the contract being formally agreed in December 2009. Software development constituted the most protracted phase, spanning the period from the procurement contract's agreement until September 2011. During this timeframe, preliminary pilots were also undertaken, an example being the Ålesund Youth Council election pilot in September 2010. The period from May to September 2011 saw the execution of the configuration and deployment stage. This led to i-voting's initial use in politically-binding polls during the local elections of September 2011. Nevertheless, i-voting was also deployed during the advance polling window, meaning it was operational throughout August and September 2011. Norway did not develop its i-voting system independently, but in partnership with Scytl (Spain), which was responsible for code development and cryptography, and ErgoGroup (Norway), which was responsible for the election administration system (EVA) and for managing electoral roll services (Barrat Esteve et al., 2012; Gjøsteen, 2017; Stenerud & Nore, n.d.).

Prior to the official 2011 trials, a pre-pilot i-voting test election was held in each of the 10 municipalities between October 2010 and May 2011, which took the form of elections for youth councils or local referendums on various issues[20] (Barrat Esteve et al., 2012; OSCE/ODIHR, 2012). The test elections served to verify the functionality of the i-voting system and also provided an opportunity for its refinement before its use in the 2011 local elections. On 3 June 2011, a full software version was released for scrutiny, although the final version of the i-voting system used for those elections was released only after the elections, on 6 October 2011 (OSCE/ODIHR, 2012). The Ministry explained this by stating that "(…) time pressure had forced it to prioritize the management of elections over some aspects of transparency" (OSCE/ODIHR, 2012, p. 13). Problems also arose with the polling cards containing return

[20] Ålesund – youth council (15–18 October 2010), internet from home: 3,400; Bodø – youth council (October 2010), internet from home: 4,000; Vefsn – non-binding referendum (October 2010), internet + paper: 10,500; Mandal – non-binding referendum (November 2010), internet from home: 11,500; Sandnes – non-binding referendum (November 2010), internet + paper: 1,900; Hammerfest – non-binding referendum (November 2010), internet from home: 7,500; Bremanger – non-binding referendum (February 2011), internet from home: 3,000; Radøy – non-binding referendum (February 2011), internet from home: 3,500; Tynset – non-binding referendum (February 2011), internet from home: 4,100; Re – non-binding referendum (March 2011), internet + paper + scanning: 6,200 (Nore & Bull, 2012).

codes, partly because the process had not been comprehensively tested before the elections, which resulted in three parties being omitted from the codes, and partly due to data storage issues following the 22 July terrorist attack, which delayed the start of voting in two municipalities (OSCE/ODIHR, 2012).

The 2011 trial took place during the local elections in September 2011. Ten municipalities (Bodø, Bremanger, Hammerfest, Mandal, Radøy, Re, Risør, Tynset, Vefsn, and Ålesund) took part in the 2011 trial, which covered 168,000 voters and represented 4.5% of the population (Nore & Bull, 2012). Voters could vote via the internet from within Norway and from 35 different countries (OSCE/ODIHR, 2012). A total of 27,557 voters cast 53,481 valid i-votes across the municipal and county elections (16.4% of the electorate in the ten municipalities), which accounted for 72.4% of those who voted during the advance voting period (OSCE/ODIHR, 2012).[21]

Municipality	**Eligible voters**		**Voter turnout**		**Share of i-voters among all voters (%)**		**Share of i-voters among all advance voters (%)**	
	2011	**2013**	**2011**	**2013**	**2011**	**2013**	**2011**	**2013**
Sandnes	48,689	46,925	62.7	78.1	27.0	36.8	79.7	83.0
Bodø	36,635	36,310	65.9	78.7	29.1	42.2	70.2	76.9
Ålesund	34,535	32,320	60.0	76.7	26.4	40.1	70.3	76.7
Mandal	11,764	10,978	63.0	77.3	19.8	29.1	65.0	69.9
Vefsn	10,456	10,210	59.2	73.6	21.5	33.8	64.2	66.5
Hammerfest	7,752	7,031	56.4	70.9	25.9	34.8	62.5	67.9
Re	6,870	6,495	64.0	79.8	22.5	32.1	75.9	79.1
Tynset	4,163	4,031	68.9	79.8	31.6	45.2	79.3	84.3
Radøy	3,687	3,553	67.1	81.6	31.2	40.9	80.8	81.5
Bremanger	2,955	2,767	65.9	76.9	21.0	37.2	67.9	75.0
Larvik	n/a	32,405	n/a	78.0	n/a	29.8	n/a	73.0

[21] The figures presented by Nore & Bull (2012) are slightly different and are provided here for the sake of transparency: a total of 55,775 ballots cast, and 28,001 voters used i-voting. They also add several other interesting details: the highest number of votes cast by the same person using the revoting option was 5; 1,020 voters (3.6% of all voters who used i-voting) utilised this option; 1,775 multiple ballots (3.2% of all ballots) were removed; and 653 internet ballots (1.17%) were overridden by subsequent paper ballots.

Fredrikstad	n/a	57,134	n/a	75.7	n/a	34.9	n/a	79.1
Total	167,506	250,159	62.7	77.1	26.4	36.4	72.5	77.3

Figure 4.2 Trial municipalities in the Norwegian i-voting project, 2011 and 2013. Data from the Norwegian Ministry of Local Government and Modernisation (KMD), as cited in Segaard et al., 2014, p. 16.

The 2011 trial increased the proportion of advance votes cast but did not increase turnout in the trial municipalities (Segaard & Saglie, 2012). This figure represented slightly less than half of total turnout in the trial municipalities (62.3%) and was considered considerably high for Norway's first experiment with i-voting (Hall, 2012).

Parallel to the 2011 trials in Norway, there was an experiment with lowering the voting age to 16 in the municipalities of Hammerfest, Mandal, Re and Ålesund, where 16- and 17-year-olds were able to vote (Segaard & Saglie, 2012). Young people showed that they were, in principle, willing to use i-voting. However, when faced with an "either-or" question as to whether they wanted the option of i-voting or voting at 16, they gave preference to the latter (Interviewee-NOR-6, 2024). Although they see i-voting as a convenient and contemporary voting method, they nevertheless prioritise the extension of suffrage to 16-year-olds. Similarly, many young people want to try voting at physical polling stations to experience voting "the real way" (Interviewee-NOR-6, 2024). Subsequently, the idea of lowering the voting age to 16 was abandoned.

Trials of i-voting were, at the start of the i-voting project, planned only for the 2011 local elections, and, at the end of 2012, it was decided and announced that further trials would be conducted during the 2013 parliamentary elections (Ministry of Local Government and Regional Development, 2012). This decision was taken on the basis of evaluators' recommendations, which argued that, if the 2011 trial was to be regarded merely as an initial step in a longer process, further trials would be required to gather additional evidence on the impact of i-voting on elections and democracy more broadly, particularly long-term, far-reaching effects on turnout and ballot secrecy, on which sound conclusions cannot be drawn from a single trial (Kommunal- og regionaldepartementet, 2012; Stortinget, 2013a). The Ministry accepted this view, and, in December 2012, State Secretary Dag Henrik Sandbakken stated: "We still need to know more before we can conclude whether or not this should be a future way of voting for all voters in Norway" (Ministry of Local Government and Regional Development, 2012).

For the 2013 trial, two new "large-ish" municipalities were invited (Larvik and Fredrikstad), which was motivated by the desire to provide a larger dataset for social scientists, who were unable to identify negative impacts such as increased coercion or family voting in the 2011 trial (Bull, 2013). The trial was held during the parliamentary elections on 9 September 2013, and the i-voting window was between 12 August and 6 September (Segaard et al., 2014). The voter pool was increased from 167,506 to 250,159 through the inclusion of two additional, considerably larger municipalities, Fredrikstad and Larvik (Segaard et al., 2014).

I-voting proved to be a popular option among voters, in the sense that those who chose to vote via the internet rated their experience positively and expressed support for i-voting, with 92% of voters in the pilot municipalities in favour in 2011, and just over 90% in 2013 (Ministry of Local Government and Regional Development, 2012; Segaard et al., 2014). On the other hand, in other municipalities that did not participate in the trials, support stood at 75% in 2011 and 70% in 2013.[22] However, this support was not accompanied by action or a willingness to advocate for i-voting as a new voting method. A similar phenomenon is visible in countries that have not had any trials with i-voting at all, but where certain surveys have been conducted with citizens about their desire to introduce i-voting. For example, in Croatia, this willingness was 69.5% in 2023 (Pavlović Vinogradac et al., 2023), and although relatively high, since the survey was conducted, no further steps have been taken towards the operationalisation of i-voting, either by the citizenry or civil society, or by political parties and policy-makers. In other words, the perceived intention to use i-voting does not necessarily spill over into advocacy and demands for the adoption of i-voting. Quite the contrary, it is merely an opinion expressed incidentally, without deeper reflection on all possible aspects of i-voting, and without subsequent follow-up action that would lead to the institutionalised adoption of i-voting.

The trials in 2011 and 2013 did not lead to an increase in turnout in local and parliamentary elections in trial municipalities retrospectively. Post-election evaluations showed that i-voters are those voters who would have voted regardless (Segaard et al., 2014; Segaard & Saglie, 2012). It was a spillover effect that directed existing voters towards a new, more convenient, and simpler voting method than the existing traditional ones, which involve voters' physical presence at official premises, whether during advance voting or on election day. It is necessary

[22] Interestingly, a survey conducted during the 2003 local elections showed that approximately 60% of respondents supported i-voting (Ministry of Local Government and Regional Development, 2006), a difference of nearly 30 percentage points in the trial municipalities, and 10 percentage points in other municipalities, over a ten-year period.

to re-emphasise that increasing turnout was not stated as the official reason for initiating the i-voting project in the first place. However, turnout appears to have existed as a second-order reason (especially in the public discourse), the absence of which at least partly led to the conclusion that i-voting was probably not the path Norway should take, although the Ministry made a statement denying the BBC's article on the Norwegian discontinuation of trials, stating that “Internet voting was never intended or expected to raise voter turnout” (Ministry of Local Government and Modernisation, 2014a).

In terms of speed and efficiency in counting, it was shown that this process was faster in the pilot and control municipalities than it was in 2007 ((Barrat Esteve et al., 2012; Segaard et al., 2014)). However, when the 2007 data are analysed separately for the pilot and control groups, similar trends to those seen in 2011 are observed. Thus, it can be concluded that the differences between the pilot and control municipalities in 2011 cannot be attributed to i-voting but rather to the size of the municipalities, the remoteness of the polling stations within each municipality, the amount of resources (i.e., poll workers) mobilised for the task, the vote-counting method, and also problems that arose during the use of counting technology (Segaard et al., 2014).

The revoting mechanism, introduced similarly to the one in Estonia, proved to be unintuitive and incomprehensible to voters. More than a half of the respondents did not know which vote would be counted if a voter first voted online and then went to a polling station and voted using a paper ballot (Segaard et al., 2014). Although conceived as a countermeasure to potential undue influences associated with remote voting, it proved to be insufficiently communicated and also very poorly used, with only 3.6%[23] of individuals voting more than once (Nore & Bull, 2012).

4.3.3 **Governmental commitments and parliamentary debates**

The i-voting project itself overlapped with two Stoltenberg-led Red-Green Coalition governments (2005–2013), comprising the Labour Party, the Socialist Left Party, and the Centre Party, during which the project was conceived and implemented, only to be suspended in 2014 upon the Conservatives’ ascent to power. The impetus for i-voting came from the junior partners, namely the Socialist Left Party and the Centre Party (Interviewee-NOR-1, 2023). The Labour Party was indifferent to the issue of i-voting, and the whole story essentially gained

[23] This figure differs slightly from Barrat Esteve et al. (2012), where the number of persons using revoting is reported as 1,070 voters, corresponding to approximately 3.88%.

traction through pressure from coalition partners who wanted to ascertain whether i-voting could be a suitable voting method for Norway (Interviewee-NOR-1, 2023). The Centre Party is a party that attracts agrarian or rural voters, and the idea of i-voting seemed appealing to them because it would allow every Norwegian from their "green hillock" within a dispersed and sparsely populated country to vote very simply and conveniently (Interviewee-NOR-1, 2023). According to the party's calculations, this could be beneficial for them, and they could profit from it in terms of a better election result. Alongside it was the Socialist Left Party, which attracts somewhat younger and more progressive voters and generally has an open and favourable attitude towards technological novelties and innovations. They embraced the idea of i-voting as a possible way of attracting a larger number of younger and technologically literate citizens to participate in elections (Interviewee-NOR-1, 2023). In early 2010, the i-voting project faced its first hurdle:

> "(...) [It] was almost cancelled in April-May of 2010, but it was not because the two minority parties, the Socialist Left Party and the Centre Party, were very adamant internally in the government: 'We want to run this pilot, we want to see how this works.' And so, the Labour Party kind of said: 'Okay, we will do this once, and we will see how it works. But they were very, very sceptical'" (Interviewee-NOR-1, 2023).

In the autumn of that year, a heated parliamentary debate took place, initiated by a motion from three Conservative Party MPs (Erna Solberg, Michael Tetzschner, and Trond Helleland) to halt the i-voting trials, or, as originally termed, „trials of electronic voting outside polling stations" (Stortinget, 2010a). The main argument for halting the i-voting trials scheduled for 2011 lay in the very title. Allowing voters to vote outside designated polling stations was presented as problematic, because polling stations are public spaces under the supervision of electoral committees and observers, and their setup enables a person to vote independently. The trial itself was described as

> „a trial that trivialises democratic elections, weakens central and international principles for conducting elections, and which there is reason to assume is in conflict with applicable law and international legal rules that Norway is bound by" (Stortinget, 2010a, p. 2).

Moreover, the proposers stated that „Norwegian democracy functions well in general, and that there is little reason to experiment with democratic rights" (Stortinget, 2010a, p. 2), and they argued that there was no broad political consensus on i-voting. Regarding party stances during the 2010 parliamentary debate, the Socialist Left Party demonstrated the strongest support for

the i-voting trials. They argued that the trial could aid the development of democracy and contribute to democratic legitimacy. They taunted the Conservatives by recalling the latter's opposition to women's suffrage a century earlier, suggesting that „the Conservatives don't exactly have a good history to show when it comes to modernity" (Stortinget, 2010b, p. 757). They also framed it as an issue of municipal self-governance, noting that most parties in the participating municipalities supported the trial and that these municipalities had themselves expressed a desire to take part. The Christian Democratic Party voiced its support for the trial despite an awareness of the surrounding scepticism. Their support was linked to the party's programme, which included a commitment to investigate the possibilities of i-voting.

Speaking for the government, minister Liv Signe Navarsete of the Centre Party adopted what could be termed a defensive justification, supporting the trial while acknowledging concerns. She stated that there was no political decision on adopting i-voting after the 2011 trial, and that decisions regarding the electoral system rest with Parliament. A party colleague of hers pointed out that "the government has full opportunity to conduct trials with reference to trial legislation. There is no doubt about that; it is the government's prerogative" (Stortinget, 2010b, p. 754). As a kind of moral shield and justification, the Minister noted that one of the reasons for conducting the trials was the desire to increase accessibility for voters with disabilities.

In relation to the secrecy of the ballot, which constituted the Conservatives' main objection to the trials, the Minister stated that "voting in uncontrolled environments is (...) not unambiguously in conflict with international law" (Stortinget, 2010b, p. 752). She also cited what would literally translate from Norwegian to English as the "right to regret" (i.e., the revoting mechanism) as a safeguard for voting outside polling stations, and stated that the trials were being conducted in accordance with what she termed "a precautionary principle". Furthermore, the Minister referred to inherited commitments, tracing the project's inception back to 2004, when the then Minister Erna Solberg, now co-proponent of the motion to halt, appointed a committee to assess e-voting. This committee produced a report, funds were allocated in the 2008 budget which was supported, as well as in the annual local democracy reports for 2009 and 2010 (Stortinget, 2013a). Representatives of the Conservative Party did not fail to respond, stressing that the mere fact that former Minister Solberg had appointed a committee did not in itself constitute political endorsement of that committee's conclusions, and that political endorsement for the trial occurred under the second Stoltenberg government, which therefore bore responsibility for it. Although there was a very vigorous debate in parliament, the motion ultimately did not pass, with 44 votes in favour and 60 against

(OSCE/ODIHR, 2012). Interviewee-NOR-2 (2023) conveyed, second-hand, that the proposal was nevertheless adopted because the government did not want to allow the opposition to win the vote. It did not want to concede to them, or let them taste the sweetness of a small, yet still parliamentary, victory. Thus, the i-voting project set sail, without genuine support from the largest party in the coalition (the Labour Party), and only with the wind in the sails of the two smaller parties (the Socialist Left Party and the Centre Party).

In the spring of 2013, there was another parliamentary debate regarding the continuation of the i-voting trials. This arose when the Committee on Scrutiny and Constitutional Affairs, in which the opposition (the Conservative Party, the Progress Party, the Liberal Party, and the Christian Democratic Party) held a majority, put forward a proposal to halt the 2013 trial (Segaard et al., 2014; Stortinget, 2013b). Minister Navarsete, at least in the eyes of opposition MPs and some from the ruling parties, appeared to be a ventriloquist for the bureaucracy and acted more dutiful than enthusiastic, leading MP Foss to remark:

"I heard her read a long manuscript written by her own civil servants and researchers engaged by the department – and believes the Storting is wrong, but the researchers are right. It illustrates so very clearly that she misunderstands the opposition in the Storting. It is not a technological opposition, but it is an opposition to a lack of secrecy" (Stortinget, 2013c).

The majority defended the trial for two main reasons: the dignity of voting for persons with disabilities, and the modernisation and preparation of Norwegian democracy to keep pace with the times. This latter reason was further concretised through statements that it would be for young digital natives who grew up in entirely different (technological) times from the current generation of voters. The need for a new trial in 2013 was explained on the grounds that "the researchers (...) said that the trial does not provide a sufficient basis for assessing the democratic consequences that a possible introduction of an Internet solution as a supplement to voting in dedicated and public premises will have" (Stortinget, 2013c). While these were the arguments of the ruling parties, the opposition maintained throughout the project that, while these were indeed real problems, they could not be solved by the proposed solution. On the contrary, i-voting could be a cure worse than the disease, and questions were raised regarding the constitutionality of i-voting, and electoral integrity, which could be undermined by an erosion of high public trust, as well as the exposure of vulnerable members of immigrant families to the threat of disenfranchisement through the influence of heads of households, and other male adult relatives.

However, the governing coalition managed to secure backing at the parliamentary plenary meeting, by 50 votes for to 47 against, which allowed preparations for the 2013 trials to proceed (Segaard et al., 2014). Although the governing coalition scraped through and prevented the 2013 trial from being halted, Labour Party MPs expressed their scepticism publicly (Stortinget, 2013c). Nybakk stated that the parliamentary group was opposed to the trials by a large margin, but the coalition line prevailed, and that it nevertheless wished to support the acquisition of knowledge. Kolberg added that, although they would vote against the committee's proposal, they would block any future trials if the 2013 trial did not show that ballot secrecy was guaranteed.

4.3.4 **Family voting: The central concern**

What signed i-voting's death warrant was the issue of family voting. Although the risk of family voting in unsupervised environments during remote voting had already been mentioned in some previous reports, it became a subject of public debate from April 2010 (Nore, 2010). Norwegian policy-makers, through their previous political engagement, had the opportunity to witness the voting process at polling stations and encounter numerous situations, many of them anecdotal in nature (Interviewee-NOR-3, 2023). Thus, they had first-hand experience of how elections are conducted in practice. This experience translated into strong views regarding what they considered desirable or undesirable. In Norway's case, the possibility of family voting, at least from the perspective of i-voting opponents, represented a threat to the exercise of the right to a free and secret vote in families with a non-Western immigrant background, namely families originating from distinctly patriarchal environments without a tradition of free democratic elections. This fear was, explicitly or implicitly, part of the broader discussion on i-voting. Hence, the political debate was not framed around the technological aspects of i-voting but centred on how remote voting affects democratic and free elections: "Everything is here on the grounds on secrecy of the ballot. There are no real security concerns. It is all about: Can we do secret voting from home?" (Interviewee-NOR-1, 2023).

One of the most vocal critics in this respect was political scientist Frank Aarebrot from the University of Bergen, from whose texts it can be inferred that there was "the concern over family voting, where a head of family, of non-western origin, would be more able to ensure and enforce that the rest of the family will vote according to his wishes in the private setting of

the home" (Connolley, 2012, p. 229).[24] The city of Oslo, which was supposed to participate in the 2011 trials, withdrew precisely because of the fear of disenfranchisement within families by the "pater familias" (Interviewee-NOR-7, 2024; Interviewee-NOR-2, 2023). The following passage further illustrates this point:

> „For an immigrant woman who is a housewife, who perhaps does not speak Norwegian very well, who has never tried to log in using MinID, and who cannot necessarily go to the polling station on election day without this being noticed, it may in practice not be so easy to vote alone" (Saglie, 2012, p. 245).

On the other hand, such a danger of undue influence was not perceived as a problem by conservative politicians when it came to ethnic Norwegians (Interviewee-NOR-1, 2023). The assertion that Oslo withdrew in 2011 due to risks associated with possible undue influence connected to „foreign-speaking inhabitants" is also confirmed by Connolley (2012), who adds that Drammen also withdrew for these reasons. Saglie (2012) states that, with the withdrawal of these two municipalities, the i-voting project was left without any municipality with a large immigrant population, which consequently hampered, and probably also somewhat distorted, research on attitudes towards ballot secrecy. These points were further reinforced by statements made in 2014 by Jan Tore Sanner, then Minister of Local Government and Modernisation, regarding the discontinuation of the i-voting project. He stated the following:

> "There has been political disagreement about the pilots, and the Storting has discussed the issue on several occasions. The Government wants to make sure that the voters' high confidence in the Norwegian electoral process is safeguarded, and believes that political discord relating to the implementation of elections is unfortunate. (…) This shows how important it is that elections are conducted at polling stations where election officials make sure that the principle of free and fair elections and the secrecy of the vote is respected" (Ministry of Local Government and Modernisation, 2014b).

Reading between the lines, it can be concluded that concerns about the misuse of i-voting through family voting led to the decision not to proceed with the i-voting project. The discontinuation of further trials in 2014, following the Conservative Party's rise to power,

[24] Alongside this main argument against i-voting, there were two other reasons that appeared incidentally but did not have a decisive influence on the outcome of i-voting (trials) in Norway. The first of these related to the technological basis, namely that i-voting can be exposed to cyber threats (hacking and viruses), and the second that the solemnity of the act of voting is eroded and diminished by i-voting (Connolley, 2012).

should therefore be viewed in the context that, although there was an openness to experimenting, there was never a strong political will for the adoption of i-voting (Interviewee-NOR-7, 2024). The abandonment of future i-voting trials was to be expected, as it had also been announced by the Conservatives (Interviewee-NOR-7, 2024) who, along with the Liberals, „(…) took their stands before 2009, which kind of meant that this was never going to be successful. Because, unless we figured out something incredible, we were never going to succeed" (Interviewee-NOR-1, 2023).[25] However, there was no sense of urgency to find an extraordinary solution through i-voting, because voting in Norway is already very easy (Interviewee-NOR-5, 2023). No less importantly, visually impaired persons, for whom voting dignity had been one of the proclaimed reasons for the i-voting project, were later granted, through amendments to the Electoral Act, the option of choosing a trusted assistant to help them vote, which reduced the need to introduce i-voting for that group (Interviewee-NOR-4, 2023). Before these amendments, when assistance was needed, they were required to be assisted by an election official, which created a sense of forced trust, in that the voter had to reveal their political preference to a state representative (Interviewee-NOR-4, 2023).

4.3.5 **A decade later: Is i-voting a closed chapter?**

Although i-voting as a regular voting method has not taken root in Norway, there are multiple examples where i-voting is used in certain non-political, as well as political, votes. For instance, the Church of Norway used i-voting in September 2023 for their election (Interviewee-NOR-5, 2023), and it is also already used as the sole method (having even superseded paper-based voting) for elections to university bodies and student representatives (Interviewee-NOR-3, 2023; Interviewee-NOR-5, 2023; Interviewee-NOR-7, 2024). It is very interesting how i-voting is used for local consultative referendums, which fall entirely within the regulatory domain of local units and are not covered by the Norwegian Electoral Act. This unregulated space has proven to be fertile and convenient for the use of i-voting in diverse forms and ways.

Historically, local referendums have been used for a variety of purposes. These have encompassed, *inter alia*, matters pertaining to linguistic usage, local alcohol policy (a domain in which their application is now obsolete), and, in more recent times, questions of municipal amalgamation as well as proposed demergers or divisions (Interviewee-NOR-4, 2023). One

[25] At the national level, the Conservative Party consistently held an opposing stance on i-voting, while some of their prominent members at the local level, such as Norunn Østråt Koksvik, the mayor of Sandnes, spoke positively about i-voting (Connolley, 2012).

example is the referendum from February 2022 when citizens faced the decision on whether Innlandet county should continue to exist or be dissolved (Smartmatic.com, 2022; Strand, 2023). It should be noted that in local referendums, i-voting is often the only method of voting, as this reduces logistical burdens associated with multi-channel voting (in-person ballot papers, postal voting, i-voting). Norway seeks to keep abreast of developments in i-voting. In 2023, a report was published reiterating that i-voting introduces the risk of scalable attacks and compromises anonymity, and that paper voting provides far better safeguards (Oslo Economics & Norwegian Computing Centre, 2023).

4.3 **Discussion**

Norway did not, in fact, face any genuine, concrete problem for which i-voting would have served as a solution. Voting within Norway was already highly accessible, while the diaspora was small and politically insignificant. Instead, two issues were framed as problems in order to justify launching the i-voting project.

The first concerned the dignity of voting for persons with disabilities. The key policy entrepreneur outside Parliament was an organisation representing blind persons, which sought to articulate the demand for a right to vote independently, without requiring assistance. Its lobbying was successful in that the interests of this group were cited as one of the main drivers of the project, yet this proved insufficient to withstand the Conservatives' rise to power. A potentially paradoxical point should also be noted: the trials were conducted with the electorate at large, not only with persons with disabilities. This interpretation is supported by the analysis of parliamentary debates, which suggests that persons with disabilities were used as a moral shield by the Ministry to justify the continuation of the i-voting trials, rather than as the basis for a genuine motivation to introduce i-voting for this group. Over time, this problem was addressed to a greater extent through the possibility of selecting a trusted assistant during voting. The second concerned preparedness for the future of democracy. There was a sense that i-voting might be a development that Norway should explore in order to remain at the forefront of democratic practice. It was essentially a modernisation argument centred on being prepared for what the future of democracy might bring, a future that, at the time, seemed likely to include i-voting as a "natural" development. This preparedness, in turn, was understood to entail the capacity to respond to anticipated future demands from the electorate, which made it important to begin preparations in good time. At the same time, this can be read more broadly as reflecting Norway's general openness to experimenting with new ways of strengthening democracy and,

in line with emerging technologies and trends, keeping democratic participation attractive and responsive to citizens' needs in the digital age of the twenty-first century. Indeed, Norway has a tradition of democratic participation experiments, including the earlier trial of lowering the voting age to 16, which, like i-voting, was ultimately not adopted.

A third rationale concerned increasing, or at least maintaining, turnout, which should be noted was not an officially declared motivation, but was nonetheless mentioned both in the media and by politicians. It is telling that members of the ruling coalition repeatedly invoked turnout in parliamentary debates, alongside calls to examine i-voting's effect on turnout. However, the 2011 trials and the subsequent evaluation appeared to show that i-voting functioned more as a channel for convenient voting, shifting existing voters from one voting method to another, than as a tool for increasing turnout. For this reason, the turnout argument, while politically compelling and likely relevant to the electoral calculations of the junior coalition partners (concerning geographically remote voters, and younger and more progressive voters), receded into the background. The loss of enthusiasm within the governing coalition for a new trial in 2013 can be attributed, in part, to the absence of any observable turnout effect in 2011, which made it politically difficult to defend a project that delivered limited benefits while attracting criticism related to ballot secrecy, including concerns about family voting.

The debate was the least technical and the most principled, centring on whether secrecy and freedom of the vote could be safeguarded if i-voting were adopted in unsupervised environments. Opposition parties held an unequivocal view that the trials should not have been initiated, let alone that i-voting should be adopted as a general, standard voting method. Since many Norwegian politicians had direct experience of the electoral process at polling stations, that experience shaped their views of voter behaviour in practice. They were aware of informal practices that already tested the boundaries of the rules, such as spouses entering the voting booth together (even when this was not permitted). This, in turn, contributed to scepticism among opposition politicians (and some within the governing parties) about how voting would unfold when conducted away from public oversight. More bluntly, the fear was that remote i-voting could be misused within non-Western immigrant families by the head of the household and would lead to the undermining of women's electoral autonomy. The opposition's narrative, which, contrary to the ministry's vague vision of preparedness for the future of democracy, foregrounded coercion and disenfranchisement, shaped the i-voting trials and what was expected of them: to provide a scientifically grounded answer to the question of coercion in i-voting. However, the withdrawal of the municipalities in which there were significant

immigrant communities prevented researchers from providing such an answer. Thus, trialability was high, but the trials were shaped in a way that constrained what could be observed.

The main policy proponents were the two smaller parties in the ruling coalition and the administration within the Ministry that led the project. Even the largest party in the coalition, the Labour Party, did not show much enthusiasm for the project, but rather saw it as a one-off trial, which later extended to a further one. Although in 2010 there might have been a genuine belief among the coalition parties that the trial could provide answers to some questions regarding the anticipated benefits of i-voting, by the time of the parliamentary debate on the 2013 trials, one could get the impression that even within the coalition, there was no longer a conviction that they were on the right track. Cracks were already visible in 2010, and by 2013 they had become very apparent: the debate on the proposal was postponed as many as four times, certain members of the ruling Labour Party sounded more like opposition members, and the Minister defended the new trial before MPs with noticeably less enthusiasm. Nevertheless, party discipline and political bind prevailed, as did previously undertaken coalition commitments pushed by the Socialist Left Party and the Centre Party. The project had already been hanging by a thread and had lost momentum. The second, and ultimately final, i-voting trial, conducted in 2013, was driven more by researchers' requests for further evidence on coercion than by any genuine political will to adopt i-voting. It was the 2013 parliamentary elections that marked the end of the i-voting trials and the Red-Green Coalition, bringing to power the Conservative Party, which ultimately announced in 2014 that there would be no more trials. The Conservatives did what was generally expected of them upon taking office.

I-voting lacked a visible opinion leader within parliament, although it is possible that such a figure existed within the Ministry but was not visible to the wider public. Over nearly five years since the project's inception in 2008, a kind of bureaucratic ecosystem had formed within and around the Ministry leading the project. The project generated a number of (newly) employed individuals, external collaborators, and suppliers, and for some of them, the continuation of their work or collaboration depended on the project's continuation. The government thus continued with a policy that lacked genuine parliamentary support, where the majority was merely procedural, not substantive. The main burden of the project, as well as what might be termed the enthusiasm for the policy, rested squarely with the bureaucracy. It is possible to speak of a kind of technocratic takeover of the i-voting project, not to say capture, which might perhaps be too harsh and unfounded a characterisation. Indeed, among policymakers in

parliament, there was a feeling that the project was primarily advocated and led by the Ministry, or rather the bureaucracy within it, a small community of experts working on the project.

The policy window, which according to Kingdon (2011) opens when three streams converge, was never actually open in Norway. Perhaps it was partially ajar, but by no means wide open. Even if it had been partially ajar, over the next few years following the last trial in 2013, it was firmly shut due to certain internal and external circumstances. News of the controversial 2016 US presidential election and the 2016 Brexit referendum results, and related illicit forms of political propaganda and influence, followed by the 2020 US presidential election where voting technology was a central theme along with Donald J. Trump's defeat attributed to alleged electoral theft through various manipulations of voting technology, also reached Norway. The Norwegian media began to follow events related to Norwegian elections and the use of technology in them with much greater interest.[26]

4.4 **Conclusion**

In the early 2000s, Norway began to show a more intensive interest in e-voting generally, and in 2008, it was decided to initiate an i-voting project to implement i-voting trials scheduled for the 2011 local elections. That trial involved 10 municipalities with 167,506 eligible voters, of whom 72.5% of all those who voted in advance cast their vote via the internet. The subsequent and final trial took place during the 2013 parliamentary elections in 12 municipalities with 250,159 eligible voters, of whom 77.3% of those who voted in advance did so via the internet. Evaluations showed that i-voting did not contribute to an increase in turnout, although this was not a proclaimed (at least not publicly) aim of the project. Rather, the aims were to enable more accessible voting for persons with disabilities and to prepare Norwegian democracy for the possible adoption of i-voting, which was believed to be only a matter of time.

Although the trials experienced only minor technical problems of no great significance, the debate surrounding i-voting within the political arena was of an entirely different nature and concerned the fundamental democratic principles of free and secret elections. The main objection from the opposition, and also from some within the ruling coalition, related to voting in unsupervised environments generally, which is not necessarily linked solely to i-voting but can also apply to postal voting. They believed that in immigrant families (of non-Western

[26] A very interesting case occurred in 2017 when, as a repercussion of the aforementioned events, it was decided just before the parliamentary elections in Norway that, despite the availability of ballot scanners, the first count would be conducted manually, while scanners could be used for the control count (Interviewee-NOR-7, 2024).

origin) there would be a significant risk of family voting, i.e., the head of the family voting on behalf of all other family members, without the authorities or the public having any information about it, nor would it be possible to ensure the secrecy of the ballot within someone's household. This, on the one hand, disenfranchises vulnerable members of immigrant communities but also undermines electoral integrity. No less important was the opposition's objection that the government was usurping parliament's powers regarding the regulation of the electoral system, specifically the method of voting, and also that the constitutionality of i-voting was questionable, for which an opinion had not been sought from the relevant parliamentary committee.

As time went on, the i-voting project became an increasing burden for the government and led to disagreements within the ruling Red-Green Coalition (Labour Party, Centre Party, Socialist Left Party), especially within the largest party, the Labour Party, while the main impetus for the project had come from the two smaller junior partner parties. Although the effect on turnout was not the official reason for the trials, it can nonetheless be discerned that it was a rather important factor, and that enthusiasm generally waned after the results of the 2011 trial showed that i-voting was not a magic wand that automatically increases turnout. The second and final trial in 2013 coincided with the coming to power of the project's greatest opponents, the Conservative Party, which in 2014 resulted in the official announcement that future i-voting trials would be halted.

Chapter 5: Switzerland

"General Friedrichs: When were you born, Brixdorf?
Major von Brixdorf: 1877, in June.
General Friedrichs: A summer child.
Major von Brixdorf: Yes.
General Friedrichs: What about your father?
Major von Brixdorf: My family live in Holstein and he has a factory there.
General Friedrichs: Producing what?
Major von Brixdorf: Riding saddles, General.
General Friedrichs: Riding saddles. Something that will always sell. Your future is secure then.
Major von Brixdorf: I am indeed fortunate" (All Quiet on the Western Front, dir. Edward Berger, 2022, English subtitles).

5.1 Introduction

Switzerland is not particularly known today for producing riding saddles, which turned out not to be quite as secure a business as General Friedrichs believed. It is known for producing watches and chocolate, and this will, I assume, remain a sound business in future. For the purposes of this chapter, what matters is that Switzerland is also known for being a democracy, with the distinctive flavour of direct democracy, which in many respects makes it unique worldwide. It is also a country that began taking its first steps towards i-voting by the end of the twentieth century, yet has still not reached a final decision on adoption after almost three decades. This issue was resolved relatively quickly elsewhere: the Netherlands and Norway decided "no", while France and Estonia decided "yes", albeit only partially in France. The Swiss i-voting project has therefore lasted unusually long, which makes Switzerland a demanding case study. It is rich in sources and involves numerous events that must be distilled in order to extract what is essential for this case, and to provide the broader picture. Furthermore, care must be taken that in the necessary reduction of detail, things are not trivialised so as not to distort that same picture. Beyond the longevity of the i-voting project, Switzerland is also peculiar in its approach. In other countries, i-voting was pursued at the level of the central state, whereas in Switzerland, for the first ten years or so, the cantons played the main role. While others approached i-voting in a top-down manner, the Swiss, which is understandable given their institutional architecture, took a bottom-up approach.

In this chapter, Switzerland's experience with i-voting[27] is presented, beginning with the basic and perhaps even notorious elements of what makes Switzerland "Switzerland" in a political sense. Just as the Dutch case of i-voting is intertwined with the aftermath of voting machine discontinuation, the Swiss case is closely related to the widely used practice of postal voting, and, for that reason, this remote voting method is presented. What follows divides the past 25 years into several coherent historical stages of i-voting's development: origins and early development (late 1990s–2002), the initial trial phase (2003–2007), extended trials with an emphasis on the Swiss abroad (2008–2012), a greater federal role and an attempt at mainstreaming (2013–2019), and the redesign and relaunch of the Swiss Post i-voting system (post-2019).

The discussion offers a view of the Swiss case through the lenses of the integrated theoretical framework. It shows that Switzerland's situation is best described not as a settled outcome, but as a state of protracted experimentation. This is driven by a strong expatriate lobby, and by a culture of learning through experimentation in which mistakes are not fatal. Even major failures, which in other cases have led, or would have led, to the rejection of i-voting, have not prevented the continuation of the project. Furthermore, it reflects the social acceptance of remote voting, fostered by the very widespread use of postal voting. Not less importantly, it is reinforced by Switzerland's general slowness in adopting new electoral policies, given cantonal competence across 26 cantons, and by the availability of instruments of direct democracy, which always loom over the adoption of new policies. Finally, the conclusion section briefly describes what has been discussed and the findings of this case study.

5.2 **A federation with a tradition of direct democracy**

The Swiss political system is (con)federal and decentralised, with 26 cantons responsible for organising votes and elections, including maintaining electoral rolls and enacting electoral laws at the cantonal level (Interviewee-CH-4, 2023; Interviewee-CH-3, 2023; Interviewee-CH-5, 2023, Interviewee-CH-1, 2023; Interviewee-CH-2, 2023). The federal level sets the regulatory framework for elections and leaves the details to the cantons (Interviewee-CH-4, 2023; Interviewee-CH-2, 2023). Switzerland is known for its tradition of direct democracy through frequent popular votes, held roughly four times a year. In the context of new voting

[27] In Switzerland, official documents and communications use the term "e-voting", and this term is synonymous with what this dissertation refers to as "i-voting". Since "e-voting" does not denote voting machines in the Swiss context, the two terms are functionally identical. For the sake of terminological consistency and to avoid confusion, this chapter employs the term "i-voting" throughout, except in direct quotations and in proper names.

technologies, this frequency and the diversity among cantons make the country a good "testbed" (Interviewee-CH-3, 2023). There is also a downside, since any dissatisfaction regarding a particular issue can lead to threats of a referendum, which can slow the adoption of an innovation, making "a long breath and strong conviction" necessary to introduce new policies (Interviewee-CH-3, 2023; Interviewee-CH-4, 2023).

The (con)federal approach is evident in the adoption of postal voting, which began at the cantonal level, with a process that followed that lasted about 30 years from its beginnings to full adoption. Only one canton had not adopted it, whereupon the federal level required that last canton to do so in the name of voter equality (Interviewee-CH-2, 2023). Consequently, postal voting was adopted at the federal level on 15 November 1994 (Federal Council, 2002). It soon supplanted in-person paper voting and helped raise the average voter turnout at the national level, which had fallen below 40% in the period 1960s-1980s, to an average of 44.5% between 1995 and 2005 (Swiss Parliament, 2006). Postal voting resulted in a substitution effect, whereby many voters who were already voting switched from physical voting in a polling station to remote voting, but it also simultaneously showed a mobilising effect in attracting new voters. The share of postal voting in some cantons reaches up to 95% (Trechsel et al., 2003) and around 90% at the national level (Killer & Stiller, 2019). It is reported to have led to an increase in turnout of 4.1% on average (Luechinger et al., 2007).[28] The questions surrounding remote voting have already been addressed, and there is consensus that, within Swiss political culture, they are not a barrier to remote voting. (Hall, 2012; Trechsel et al., 2003). Undoubtedly, there are cases of abuse, some of which have resulted in court proceedings (Interviewee-CH-4, 2023), but these are not considered salient enough to outweigh the benefits that postal voting brings.

Switzerland's status as a neutral state plays an important role in the discourse surrounding the adoption of i-voting when considering its vulnerability to foreign interference and the integrity of its direct democratic processes (Interviewee-CH-3, 2023; Interviewee-CH-4, 2023). Historically, Switzerland is perceived to possess a "certain level of 'you don't touch Switzerland' privilege as a nation", which was particularly evident during the Cold War (Interviewee-CH-3, 2023). This perception continued, with many politicians and the general population believing that Switzerland was in a "protected bubble" and that large foreign powers

[28] Some proposals went even further to improve this voting method, such as introducing pre-franked reply envelopes to further facilitate the use of postal voting and encourage turnout (Federal Chancellery, 2021).

had no interest in interfering with its voting system (Interviewee-CH-4, 2023). However, the electoral controversies that engulfed the American presidential elections in 2016 and 2020, as well as the 2016 Brexit referendum, followed by the Russian aggression against Ukraine in 2022, have begun to change that perception and increase awareness (Interviewee-CH-4, 2023). If Switzerland were to hold votes on matters of "strong interests of other countries", even those considered friendly countries, let alone states like Russia, these countries "will do it" if they have the means to interfere (Interviewee-CH-4, 2023). There are numerous examples of referendums that could spark the interest of these states: sanctions against Russia, procurement of military equipment, support for the war in Ukraine, and even Swiss neutrality itself (Interviewee-CH-4, 2023).

The principle of "security over speed" is often cited in the context of i-voting in Switzerland, although it is a general feature of Swiss political culture.[29] Switzerland is "enormously stable and also brutally slow" (Interviewee-CH-3, 2023), which can be explained by iterative processes aimed at refining policy proposals and building public trust (Interviewee-CH-7, 2023). This stability and slowness support experimentation with new policy, whether postal or i-voting, even in the face of failure. Work can then continue with "a reorientation and slower progress" (Interviewee-CH-3, 2023). Strategic orientation is more important than temporary obstacles, which are part of the policy process, although it can be frustrating when decades of experimentation pass without a clear vision of when policy might finally be adopted. Yet this is typically Swiss, in the words of one interviewee: "The Swiss people refining something again and again and again and again until most people are actually happy with it is standard procedure" (Interviewee-CH-3, 2023).

5.3 **I-voting**

5.3.1 **Origins and early development (late 1990s–2002)**

In the late 1990s, a spirit of cyber-optimism took hold in Switzerland, driven by the arrival of the internet, the growing number of people using it, and the various possibilities it brought (Serdult et al., 2015). This was a period of general optimism about digitalisation and the possibilities offered by the internet (Interviewee-CH-1, 2023), and the debate on i-voting was largely a "technology friendly debate", with opponents perceived as "dinosaurs" (Interviewee-

[29] The "security before speed" (German: "Sicherheit geht vor Tempo") principle is found explicitly expressed from 2006 onwards (Swiss Parliament, 2006), although it can be argued that it was embedded as a guiding principle from the very beginning of the i-voting project (Federal Chancellery, 2022b).

CH-4, 2023). This somewhat romanticised, rose-tinted view of the early internet was not a uniquely Swiss delusion, but rather the global *zeitgeist*:

> "People had all sorts of wild ideas about what would happen, which in retrospect often sound naive. There was a widespread expectation that the internet would revolutionise democracy by allowing people to go online and have meaningful discussions with complete strangers. Today, on social media, people mostly shout at and insult each other" (Interviewee-CH-5, 2023).

Swiss authorities at the federal, cantonal, and commune levels, as well as politicians and parties, also took the opportunity to use the internet for the dissemination of information (Interviewee-CH-4, 2023). Interest in i-voting in Switzerland was linked to modernity and to portraying the state or the canton as technologically in step with the times (Interviewee-CH-4, 2023), to increasing participation (Interviewee-CH-2, 2023; Interviewee-CH-4, 2023; Interviewee-CH-5, 2023), and to engaging young voters (Interviewee-CH-4, 2023).

Arguably the most important motivation was increasing participation (Interviewee-CH-2, 2023; Interviewee-CH-5, 2023), which had declined over previous decades, leading to "a certain amount of hope that internet voting would lead to some improvements there" (Interviewee-CH-2, 2023). I-voting was envisioned as a supplementary voting method that responds to the needs of a society increasingly using the internet in daily life (from 7% of the population in 1996 to 44% in 2000), and not as a replacement for the other two existing voting methods (Federal Council, 2002). Early assessments from 2002 produced mixed estimates regarding the impact of i-voting on increasing turnout. For instance, the Centre for Research on Direct Democracy (C2D) estimated that the effect in the canton of Geneva could be up to 9%, while Professor Linder from the University of Bern estimated that the increase at the national level would be no more than 1.7% (Federal Chancellery, 2004). Data from a national survey in 2003 showed that 72% of Swiss citizens supported i-voting, including a majority of those without internet access (Federal Chancellery, 2004).

In 2002, the Federal Council set a very ambitious timeline which, as time has shown, was not realised. It consisted of several planned phases, including parliamentary deliberations and legal revisions in 2002, an evaluation of results and the continuation of pilot projects in 2003, further evaluation and the drafting of legal changes in 2004, and a final decision in 2005 (Federal Council, 2002). While in 2000 the order to establish a working group for the 2002 report stated that the objective was to introduce i-voting by 2010 (Federal Chancellery, 2000), this was

omitted from the 2002 report. The report set no deadline but instead acknowledged that it was "a highly ambitious project that will demand great perseverance over a long period" (Federal Council, 2002, p. 688). It was estimated as early as 2002 that the i-voting adoption across Switzerland would cost between 400 and 620 million Swiss francs (Federal Council, 2002), while in the medium to long term, savings would be made due to savings on return postage for postal votes and faster counting (and thus, by implication, fewer election staff) (Federal Council, 2013).

5.3.2 **Initial trial phase (2003–2007)**

Initially, the federal level permitted tests without defining detailed rules or mandating a single i-voting system. Early federal support for trials took into account "26 electoral laws" and "26 ways of maintaining a voter register" by choosing three cantons (Geneva, Neuchâtel and Zurich) with different approaches to electoral rolls (Interviewee-CH-1, 2023). The Federal Chancellery deliberately selected these three cantons because they represented different systems of electoral roll management (centralised, decentralised and municipal-level) in order to create a "federal laboratory" to gain experience, accumulate knowledge, and address the complexities of Switzerland's federalist structure (Interviewee-CH-5, 2023). Interestingly, the canton of Zurich was initially hesitant, since compared to the other two cantons it "lacked a clearly defined goal for the project", but it acceded to "friendly pressure" to join (Interviewee-CH-1, 2023). The federal push towards Zurich can be explained by its status as one of the richest and most influential Swiss cantons, often considered the "lighthouse of Switzerland" (Interviewee-CH-1, 2023), as reflected in the saying: "What's good for Zurich is good for Switzerland" (Interviewee-CH-1, 2023).

Each of the piloting cantons developed its own approach to i-voting and its own system, reflecting its respective methods of maintaining electoral rolls and its preferred designs (Interviewee-CH-1, 2023; Interviewee-CH-4, 2023). This approach allowed the federal level to leave the burden of initial errors and failures at cantonal level. When systems became mature and enough knowledge and experience had been gathered, the Federal Chancellery could then step in and take an increasingly active role in further development (Interviewee-CH-3, 2023). While the federal level created the framework and guidelines and provided initial funding, which was discontinued in 2005, the cantons had free rein in developing their i-voting pilot projects (Interviewee-CH-1, 2023). This fostered "local pride" and "local patriotism", giving cantons a strong incentive to develop solutions they believed were resilient and locally accepted (Interviewee-CH-2, 2023). Although it inevitably resulted in a slower, more fragmented

adoption process, it allowed for diverse experimentation and for learning from mistakes at the cantonal level, preventing potentially "bad" federal-level systems from being imposed countrywide (Interviewee-CH-3, 2023). The first i-voting trials were conducted for referendums and municipal elections, and it was used for federal elections for the first time in 2011, given the complexity of the federal electoral system (Mendez & Serdült, 2014).

There was an unspoken "sense of competition" among the cantons, each hoping that its system would be chosen by the remaining 23 cantons once e-voting was adopted at federal level (Interviewee-CH-1, 2023). The private companies behind the cantonal i-voting systems (Hewlett-Packard in Geneva, Scytl in Neuchâtel, and Unisys in Zurich) were aiming for "the biggest possible share of the cake" once other cantons adopted e-voting (Interviewee-CH-1, 2023). Each pilot canton, in partnership with its company, sought to attract the largest possible "customer base" among the remaining cantons (Interviewee-CH-1, 2023), which also created an environment in which cantons were not inclined to share "trade secrets" openly (Interviewee-CH-1, 2023).

While this bottom-up approach or piecemeal approach (Mendez, 2010) was the only way to launch i-voting pilots at the outset, developing three separate systems to accommodate the diversity of Swiss electoral rules ultimately proved to be a "false good idea", since "one system can very well accommodate every 26 legislations and every different way of holding and maintaining an electoral roll" (Interviewee-CH-1, 2023).

5.3.3 **Extended trials with emphasis on Swiss abroad (2008–2012)**

The primary motivation for i-voting, i.e. increasing turnout, was shown through trials to have had no effect on increasing participation among residents, as postal voting was already convenient and accessible (Germann & Serdült, 2017; Interviewee-CH-2, 2023; Interviewee-CH-5, 2023). The high level of use of postal voting, as a very convenient form of remote voting, has made i-voting "a solution to no problem" or, more simply, "no problem to be solved" (Interviewee-CH-1, 2023), at least with regard to domestic voters. This shifted attention towards niche groups within the electorate for whom i-voting was expected to provide more tangible benefits: Swiss citizens abroad (the so-called "Fifth Switzerland")[30] and people with disabilities (Interviewee-CH-4, 2023). That paradigm shift dates the period following the first

[30] The term derives from the fact that Switzerland has four linguistic regions, so the Swiss abroad are considered the "fifth Switzerland", and the label "27th canton" is also sometimes used (The Organisation of Swiss Abroad, n.d.).

trials conducted between 2003 and 2007, specifically from 2008 onwards (Germann & Serdült, 2014), when the canton of Neuchâtel became the first in Switzerland to allow expatriates to participate in i-voting (Driza Maurer et al., 2012). Germann (2021) has shown that for the Swiss abroad the availability of i-voting has "a substantially sized effect" of five to six percentage points, and that for this group "it makes voting easier and it brings some additional votes" (Interviewee-CH-5, 2023).

Almost 230,000 Swiss citizens abroad are currently registered to vote, representing a significant portion of the 'Fifth Switzerland', which comprises over 800,000 people or approximately 11% of the total population (Interviewee-CH-8, 2024). Since 1992, they have had the right to vote in Switzerland (Driza-Maurer et al., 2012). This vast community, with 64% residing in neighbouring European countries, is represented by the Organisation of the Swiss Abroad (OSA), a private foundation established in 1916 to advocate their interests to the public and authorities (Interviewee-CH-8, 2024). The OSA is noted for being well organised, possessing good connections across political parties, and being represented in various political bodies (Interviewee-CH-4, 2023), which makes it vocal and influential at national level (Interviewee-CH-2, 2023). It is recognised as the most powerful lobbying group promoting the adoption of i-voting as a "third channel" to enable the exercise of political rights of Swiss citizens abroad, since timely participation via postal voting has become very difficult or almost impossible (Interviewee-CH-8, 2024).

The OSA acts through lobbying at parliamentary level, submission of statements on consultation drafts, and engagement in dialogue with federal and cantonal authorities (Interviewee-CH-8, 2024; Interviewee-CH-4, 2023). Their activity keeps i-voting relevant and a "big topic" (Interviewee-CH-4, 2023), serves as an important driver for i-voting (Interviewee-CH-2, 2023), and ensures that "their lobbying will continue (...) and be efficient in the long run" (Interviewee-CH-1, 2023). The OSA maintains that i-voting as a necessary solution to the logistical difficulties that frequently hinder the timely delivery of physical voting materials to the Swiss abroad (Interviewee-CH-8, 2024). However, a 2023 parliamentary report showed that these problems, contrary to the earlier understanding of the issue as widespread and affecting almost all expatriates, are in fact primarily present among those in overseas countries (e.g., Australia, New Zealand, the Philippines, South Africa and Uruguay), which has shifted the OSA's lobbying focus towards expatriates living in those countries (Interviewee-CH-8, 2024).

5.3.4 **Greater federal role and attempt at mainstreaming (2013–2019)**

Once i-voting trials were underway, there was no political debate at federal level until around 2011–2012, when the systems reached technical readiness and conditions for broader adoption were met. It then became clear that technical readiness did not align with political readiness:

> "The time of the debate and the time of the trial were not aligned. There was a mismatch. When it was technically ready, it was not politically ready. Awareness of internet threats and the reality of risks on the web grew significantly after 2015 (…). The existing system was no longer sufficient at that point. The debate stopped the development of the system, and the system became outdated" (Interviewee-CH-1, 2023).

In 2013, the first federal ordinance with a technical annex was adopted, based on the experience of the three pioneering cantons (Federal Chancellery, 2013). This marked a transition from so-called first-generation systems (black-box systems with no external verification or control) to so-called second-generation i-voting systems, through the introduction of individual and universal verifiability.[31] Depending on which of these two features a system had, it could be used for a certain percentage of voters, and verifiability became a mandatory requirement for expanding i-voting trials (Hill, 2015). The federal ordinance was amended in 2017, with additional requirements for the publication of i-voting systems' source code, and for public intrusion tests, that is, mock elections in which ethical hackers are invited to attack the system and identify vulnerabilities (Federal Chancellery, 2020). The heightened security requirements, which translated into the need for greater financial expenditure to adapt existing cantonal i-voting systems, led to the gradual withdrawal of the three cantons and the discontinuation of their i-voting systems:

> "They came with this technical regulation, which meant several million. If I remember well, our estimation was five million francs investment in the system to comply with the federal regulation. (...) The government at this point thought it was not worth it. It was too much money and there was no point in going ahead. There are other priorities" (Interviewee-CH-1, 2023).

On the other hand, the federal ordinance provided a clearer and more comprehensive regulatory guide and "insurance for a company who would like to start an offering" (Interviewee-CH-7,

[31] Individual verifiability means that "a voter can verify that her vote is included in the set of all cast votes", whereas universal verifiability means that "an observer can verify that the tally has been correctly computed from the set of all cast votes" (Ali & Murray, 2017, p. 178).

2023). That was Swiss Post, a company owned by the Swiss Confederation. It should be noted that they entered the field of i-voting relatively late, almost fifteen years after the first trials began. The decision was also supported by the high level of trust the public has in Swiss Post, a multiple winner of the award for the world's best postal company and an indispensable part of every election because it delivers postal voting materials to voters. As traditional post volumes were decreasing, the company sought new business opportunities (Interviewee-CH-7, 2023). One of these was digital services, and the potential successful development and management of an i-voting system was seen as a way of demonstrating its capability to deliver the most sophisticated of all digital services in the field of e-government. As one interviewee put it, "if you can do internet voting, you can do everything" (Interviewee-CH-6, 2023). In the words of another interviewee, "people trust Swiss Post with the transport of information" (Interviewee-CH-7, 2023). This led to the obvious question: "Who would offer online voting if not Swiss Post?" (Interviewee-CH-3, 2023).[32] Strategic orientation towards i-voting became clearer during 2013 and 2014, with the establishment of a team for i-voting and the laying of the groundwork for development in 2014 and 2015 (Interviewee-CH-7, 2023). At that time, Swiss Post lacked the necessary experience and skills to develop a system as complex as i-voting and was therefore reluctant to act as the (sole) developer (Interviewee-CH-7, 2023). It decided instead to find a technological partner, which it found in the Spanish company Scytl, already experienced with i-voting in Switzerland through its cooperation with the canton of Neuchâtel (Interviewee-CH-7, 2023). The first Swiss Post–Scytl system was launched in 2016 (Interviewee-CH-6, 2023).

In 2018, there was a push from the federal level to "mainstream" i-voting. Walter Thurnherr, the then Federal Chancellor and a proponent of i-voting, called for its adoption, which led to the formation of an expert group that proposed making i-voting an ordinary voting channel (Interviewee-CH-6, 2023). Based on the expert group's positive assessments, Thurnherr stated the following: "The time is right for a broad discussion on e-voting and to take an informed decision. There are enough advantages, notably for the about 10% Swiss voters who live abroad" (Swissinfo.ch, 2018). Thurnherr is regarded as a "really competent person with strong IT knowledge and interests" (Interviewee-CH-4, 2023), seemed genuinely to believe that, after long experimentation, the time had come for the adoption of i-voting. His initiative can be

[32] Swisscom, the main telecommunications company, 51% owned by the Swiss Confederation, considered entering the market but decided against it, assessing that creating competition for Swiss Post could have unfavourable consequences for its business interests (Interviewee-CH-1, 2023).

viewed as “he went out of his line a bit” and as “an exception” to the Swiss security over speed approach (Interviewee-CH-3, 2023). Although critics of i-voting were present, they were not jointly organised or coherent until the push for mainstreaming i-voting by Federal Chancellor Walter Thurnherr prompted coordinated action:

> “His call woke them up, they rallied, and they immediately threatened with a referendum. They immediately threatened: ‘We’re going to collect signatures to force a popular vote, and then we’re going to end online voting for good.’ They threatened this for one or two years. You could say the threat of a national referendum was hanging like a sword of Damocles over online voting” (Interviewee-CH-3, 2023).

They gathered around the Initiative Committee “For a Secure and Trustworthy Democracy”, better known as the “E-Voting Moratorium”, led by Franz Grüter, a politician from the Swiss People’s Party (SVP) (Interviewee-CH-4, 2023; Interviewee-CH-6, 2023). Their main objective was to introduce a moratorium on i-voting at constitutional level for at least five years, to be achieved by collecting 100,000 signatures within 18 months in order to trigger a popular vote (Interviewee-CH-3, 2023). The harder route of a constitutional amendment was chosen, rather than the more attainable popular vote against a change in the law, which requires 50,000 signatures (Interviewee-CH-3, 2023).

Although winning the popular vote was an objective, a more immediate goal was to exert pressure on the government and to stimulate a broader public debate on i-voting so as to prevent its hasty mainstreaming. This strategic use of the popular vote as a pressure tool, which can yield results even without actually winning a popular vote, is common in Swiss politics (Interviewee-CH-4, 2023). The initiative “started a big discussion in the population” on what had previously been “a low-level topic”, brought i-voting into the mainstream media, and forced political parties to take a position (Interviewee-CH-4, 2023). Media and social media discourse largely reflected the initiative’s arguments, which in Switzerland is often a tailwind and a sign that signatures might be gathered. In the end, however, the necessary number of signatures was not collected (Interviewee-CH-3, 2023; Interviewee-CH-2, 2023). Reasons included weak organisation and timing, since the effort began in 2019 when federal elections diverted attention and resources from parties that might otherwise have helped with collection, followed by the COVID-19 pandemic in 2020 (Interviewee-CH-3, 2023; Interviewee-CH-4, 2023). Further factors were public indifference, since i-voting is seen as a “non-emotional topic” (Interviewee-CH-3, 2023), survey data suggesting that, despite the apparent dominance

of opponents in public debate, roughly two thirds of the population supported i-voting, and an underestimation of the difficulty of collecting signatures (Interviewee-CH-3, 2023).

In early 2019, Swiss Post undertook a public intrusion test and published the source code of its i-voting system (Interviewee-CH-2, 2023; Interviewee-CH-4, 2023, Interviewee-CH-6, 2023). While the public intrusion test was successful and no intrusions were recorded, academic experts identified three major vulnerabilities in the published source code (Interviewee-CH-6, 2023; Interviewee-CH-2, 2023), which were technical and cryptographic in nature (Locher et al., 2019; Pereira & Teague, 2019). There were considerable media coverage and visibility regarding the findings in the source code (Interviewee-CH-2, 2023), which fuelled the momentum of the ongoing e-voting moratorium initiative (Driza Maurer, 2019; Killer & Stiller, 2019). The discourse has shifted from an initial technology-friendly optimism to a strong focus on security. Media coverage has presented a distorted picture (Interviewee-CH-2, 2023) by amplifying skeptics' views (Interviewee-CH-3, 2023), which became prominent following calls for the adoption of i-voting and the campaign for an i-voting moratorium. In light of the 2019 findings, Swiss Post decided, and the Federal Chancellery approved the decision, to suspend its i-voting system temporarily and not offer it for the federal vote on 19 May 2019 (Federal Chancellery, 2025b), nor for the National Council elections on 20 October 2019 (Federal Council, 2019).

5.3.5 **Redesign and relaunch of the Swiss Post i-voting system (post–2019)**

It may seem peculiar that, after highly visible and dramatic security vulnerabilities were found in Swiss Post's source code, redesign began within about a year with the aim of developing a better system, correcting errors, increasing transparency, and introducing universal verifiability: "Overall, or you could say, probably in any other country, this would have meant the death of that system." (Interviewee-CH-3, 2023). In other countries, such findings ended i-voting, as in the Netherlands, or created years of uncertainty before any readoption, as in France. In Switzerland, individuals at cantonal level played an important role. Even after what was, at the very least, a serious setback for Swiss Post, they expressed willingness to continue, since without their interest a restart would not have been feasible (Interviewee-CH-3, 2023). On the Swiss Post side, Denis Morel maintained momentum and trust among cantons (Interviewee-CH-3, 2023). The problems were understood primarily as technical and cryptographic, and the Federal Chancellery initiated an expert dialogue in 2020 that brought together computer scientists, mostly cryptographers, to address the technical issues and to redefine the system's security (Interviewee-CH-3, 2023; Interviewee-CH-7, 2023).

The partnership with Scytl ended in 2019. Swiss Post decided to purchase Scytl's source code and the rights to use and further develop it, and continued developing a new i-voting system in-house (Interviewee-CH-6, 2023). This decision was driven by political pressure that the i-voting system should be developed in Switzerland. For instance, the SVP campaigned against Scytl as a foreign company managing Swiss elections, although it was not directly opposed to i-voting itself (Interviewee-CH-7, 2023; Interviewee-CH-6, 2023). It was "politically no more sustainable to work with a foreign system" (Interviewee-CH-6, 2023). Scytl's financial problems certainly did not hinder the decision (Interviewee-CH-6, 2023). Equally important, Swiss Post had, over the years, built up experience and decided to internalise the expertise. Given the very high technical and other requirements, as well as the generally unique demands specific to Switzerland which had to be met under the 2013 federal ordinance, delegating the development of i-voting was no longer seen as feasible (Interviewee-CH-7, 2023).

From its earliest trials up to the current Swiss Post system, i-voting in Switzerland has had a paper component, as access data and verification codes are sent to voters by regular post, while the return channel for the vote is electronic, that is, via the internet. I-voting in Switzerland has been conceptualised as an extension or digitalisation of postal voting (Interviewee-CH-7, 2023; Interviewee-CH-6, 2023), rather than as an entirely new voting method:

> "We go with electronic voting because it is relatively close to mail-in voting on a conceptual level. Switzerland would still send paper ballots to the entire eligible voting population, but the return channel would no longer be on paper, rather electronic. On a conceptual level, e-voting is a relatively small step, as the process essentially remains the same, with only the return channel changing" (Interviewee-CH-3, 2023).

Furthermore, Switzerland still does not have a general form of authentication, as the proposal to introduce a national eID was accepted in the referendum of 28 September 2025 (Federal Council, 2025), yet its practical implementation in i-voting remains pending, and "security argumentation slash trust argumentation really builds on the physical nature of the paper" (Interviewee-CH-2, 2023).

Swiss Post's system has become the *de facto* monopoly. Although other i-voting systems may exist, it is currently the only one used in Switzerland (Interviewee-CH-6, 2023). In redesigning the i-voting system, Swiss Post changed its pre-2019 approach, which had indirectly contributed to the discovery of vulnerabilities that stirred public opinion and led to suspension. Those findings were made by academics, with whom Swiss Post had not previously relied on

ongoing collaboration. The earlier emphasis had been on certification by a certification body (Interviewee-CH-6, 2023). It was recognised that future development required "a continuous review audit from academic people", not certification (Interviewee-CH-6, 2023). Full transparency was introduced, which helped to instil a "mindset of the developer", namely an awareness that the source code would be published and an openness to feedback (Interviewee-CH-7, 2023). The legal framework had already required universal verifiability, though it had not been implemented, and the redesign replaces individual verifiability with this requirement (Interviewee-CH-3, 2023; Interviewee-CH-6, 2023; Interviewee-CH-7, 2023).

Although i-voting has not yet been adopted, it should be stressed that Switzerland is the country with the most i-voting trials conducted during binding votes (referendums and elections) (Serdult et al., 2015), with over 300 trials in 15 cantons from 2004 to the present (Federal Chancellery, 2025a, 2025b). Trials were relaunched in three cantons (Basel-Stadt, St Gallen, and Graubünden) in 2023, and the canton of Graubünden joined them in 2024, with limits on the share of voters who may use i-voting (Federal Council, 2023; Federal Department of Finance, 2025).[33] Any amendment to the law, including that related to i-voting, must be approved by both chambers of parliament, yet the National Council remains opposed while the Council of States is supportive, resulting in an impasse. This explains why i-voting remains confined to repeated trials, as progressing further would require a majority in both chambers, which is unattainable under current party positions (Interviewee-CH-6, 2023). The general Swiss population is "favourable of online voting", but their "feelings are not so strong", so there is no public demand or people "knocking on our doors" for adoption (Interviewee-CH-2, 2023). This passive acceptance contributes to a gradual, and at times frustratingly slow, pace of adoption. The long-term goal is to create "a foundation for future decision" (Interviewee-CH-2, 2023) and "a foundation for secure and trustworthy and accepted internet voting" (Interviewee-CH-2, 2023), rather than push for forced adoption.

5.4 **Discussion**

The i-voting project began as a "federal laboratory" with three cantons, enabling learning and the development of i-voting solutions in a way that made sense locally. At the same time, early resistance to i-voting was reduced by keeping the project at the cantonal level. The cantons cooperated with private vendors who had incentives to protect trade secrets, in the hope that, if

[33] The limits are 30% at the cantonal level and 10% at the national level for the maximum share of voters permitted to use i-voting, with Swiss citizens abroad exempt from these limits (Federal Chancellery, 2020, 2021).

their i-voting solution proved best, it would later be accepted by other cantons as well. At the federal level, some financial resources were initially provided, but this was later stopped, and the financial burden of developing and trialling i-voting systems fell on the cantons. The federal level played a coordinating role, collecting lessons learned, and a regulatory role.

The beginning of the end for the first phase of the i-voting project, which was decentralised across three cantons and three first-generation i-voting systems, came with the 2013 federal ordinance that introduced new features the systems had to meet. This, sooner or later, led pioneering cantons to withdraw from the i-voting project, mainly due to the high financial outlays required for compliance with the new regulation. This substantially changed the governance model, because the Swiss Post system remained as the only i-voting system that met federal criteria. Although Swiss Post entered the field of i-voting relatively late, it brought its reputation and the trust it enjoys among Swiss citizens, as well as organisational and financial capacity that the cantons did not have. The greater federal involvement can be explained in two ways. The first is that the federal level let the pioneering cantons to go through various teething problems associated with i-voting in the initial phase, so that mistakes would not be attributed to the federal level but that a certain level of maturity would be achieved that would allow for consolidation and further development under federal leadership. The second explanation, which does not exclude but is rather complementary to the first, is the agency of individuals at the federal level who publicly called for the adoption of i-voting, a call that was made by Chancellor Walter Thurnherr several years later. In addition to his support for i-voting, one must bear in mind the constant lobbying of the OSA, which represents a politically significant part of Swiss voters who cannot participate in the electoral process on equal footing with their compatriots in Switzerland. It can be argued that they are one of the main reasons that the flame of i-voting in Switzerland is still burning, even twenty-five years after the first steps were taken. At least, this agency unifies and accelerates the development of the i-voting system and the gathering of experience at the federal level, which forms the basis for making political decisions about i-voting. Numerous resident voters and voters abroad have had the opportunity for direct experience and familiarisation with i-voting. Nevertheless, this involves a limited number of voters because, due to the “security before speed” principle, limits have been established on the percentage of the electorate that can vote in i-voting trials, while expatriates are exempted from these limits. While there is compatibility of remote voting with existing voting methods (i.e., i-voting being perceived as a digitised form of the widely used

postal voting), and trialability is high with more than 300 trials conducted in 15 cantons (Federal Chancellery, 2025a).

In terms of relative advantage, an early assumption that i-voting would increase participation of resident voters was not supported by empirical evidence from the trials. Therefore, the benefits concern accessibility (and convenience) for two groups of voters: the Swiss abroad, who face difficulties with postal voting, and voters with disabilities, who can vote autonomously while maintaining secrecy. A second advantage, not so much brought to the forefront but mentioned nonetheless, is the possibility to prevent accidentally invalid votes (Federal Council, 2013; Swiss Parliament, 2016). When it comes to costs, Switzerland has had no illusions from the beginning that i-voting would, at least in the short term, lead to appreciable savings compared to other voting methods.

Within the policy primeval soup, it is possible to find alternative proposals that can contribute to solving the identified problem of declining turnout. The liberalisation and full adoption of postal voting itself largely contributed to addressing declining turnout. It was an incremental, canton-led process that lasted three decades before it was ultimately adopted at the federal level in 1994. This lengthy, piecemeal approach is a feature of the Swiss political system and leads to solutions that, once adopted, are sustained due to the checks and potential obstacles that precede adoption, but it can also discourage innovation. One can pose a question: Is postal voting an enabler or a barrier to i-voting in Switzerland? Postal voting[34] is often cited in the literature as an enabler for the adoption of i-voting (Heindl, 2004; Oswald, 2015; Weill, 2017).[35] In the case of Switzerland, this is only partially correct. A shared characteristic of both voting methods is remoteness, which entails questions of voter authenticity, i.e., whether the person voting is indeed the one entitled to vote, and whether they are voting of their own free will, i.e., free from various forms of undue influence such as family voting, vote buying and selling, and other forms of brute coercion.

The idea of remote voting in uncontrolled environments has been socially processed and culturally normalised, and Swiss society has accepted the trade-offs it entails. Although postal voting normalised remote voting, it also, to a greater extent, resolved the original participation

[34] It can be argued that Switzerland already has entirely remote elections and referendums, considering the popularity of postal voting.

[35] Trust in postal voting is unchallenged, and there is a "lack of caution about postal voting" which has "inherent insecurities" that the general public is "not really aware of" (Interviewee-CH-3, 2023). Whether or not that trust is fully warranted, it influenced the perception of i-voting and facilitated the launch of i-voting trials.

problem among residents, thereby reducing the need and urgency for i-voting as a general voting method. From around 2008 onwards, this led to a repositioning, or recalibration, of the problem definition that i-voting, as a solution, was meant to address. This was found primarily among Swiss expatriates, who make up around ten per cent of the overall population and who have a strong lobbying organisation with good access to policy-makers, functioning as a policy entrepreneur, or an agenda-keeping actor, for the adoption of i-voting. A second group that should benefit is persons with disabilities, but this research found that they are much less present in public debates, and that the dominant discourse foregrounds Swiss expatriates.

It should be restated that i-voting in Switzerland differs from the Estonian or French systems. In the former, authentication is conducted via an eID, while in the latter it is done through a combination of SMS and email credentials. In Switzerland, the voting and verification codes first arrive by physical post at the home address and are then entered into the i-voting system. Even for the Swiss abroad, the voting material must first be delivered to their physical addresses. This involves the delivery of codes for accessing the vote rather than a physical ballot paper, as it is only the return channel that becomes electronic. Such a paper-based component of the i-voting process was also present in Norway. For these reasons, the level of convenience is not on par with that found in France, and especially not in Estonia. Three factors indicate that the Swiss version of i-voting will continue to have a paper component: (1) the framing of i-voting as an extension of familiar and accepted postal voting, and the resulting cultural acceptance of a paper component in remote voting, (2) the lack of alternative forms of voter authentication for i-voting, and (3) the security, and resulting trust, that paper provides.

Three further macro conditions shaped the approach to i-voting. First is direct democracy. On the one hand, there is a tradition of direct democracy and with it, the holding of frequent votes, an average of four per year, which opens up the possibility for i-voting as a form of adapting political processes to the new technological habits of contemporary society. But it is precisely the instruments of direct democracy that can also be used against i-voting. This was seen through the E-Voting Moratorium, which, albeit unsuccessfully, launched a signature collection campaign to trigger a referendum aimed at stopping the adoption of i-voting. Relatedly, at the federal level there is no clear political support, that is, no pro-adoption majority. The federal architecture, however, dictates the method of adoption, and the cantons have the final say.

Second is geopolitics. Switzerland perceived itself as protected by its neutrality, which, in the first period when cantons carried the development of the project, allowed i-voting to be treated

primarily as technocratic modernisation rather than as a security-sensitive policy. This has not been the case since the mid-2010s, as is visible in the E-Voting Moratorium campaign and its claims. Global events of the last decade have influenced how Switzerland sees itself and the world around it, and that it is no longer an isolated country whose decisions are untouched by outsiders. The understanding of a changing world, which has shifted the focus from greater inclusivity and accessibility in voting by leveraging ICT (as was the case from the start of the 21st century to the mid-2010s) to the prioritisation of electoral integrity and trust in the results, has also influenced the Swiss approach to electoral innovations. Such geopolitical events, the media image created during the period of the first adoption or "mainstreaming" attempt, and the political opposition to i-voting have created political pressure against the abrupt (and ill-considered) adoption of i-voting. They have further slowed the already not-so-fast adoption of innovations, which is a reflection of the structural characteristics of the Swiss political and institutional framework.

Third is the "security over speed" principle. It has been embedded in the Swiss approach to i-voting since the very beginning. The principle expresses a Swiss political culture of iterative refinements and prolonged deliberation, but it also has a positive side, in the sense that temporary failure is not necessarily fatal, that mistakes can be learnt from, and that they are part of the adoption process. It was precisely this principle that enabled a very rapid continuation of the Swiss i-voting project after the abrupt interruption caused by a focusing event in 2019, which revealed technical vulnerabilities in the Swiss Post i-voting system that was due to be used at the federal level later that year. While an approach that prioritises security over speed makes the i-voting project resilient against discontinuation, it also slows it down, because it legitimises slow and incremental progress and makes it easier for opponents to argue that postponing adoption is prudent. Moreover, it shifts the burden of proof onto proponents to demonstrate that i-voting is suitable for adoption within a context that continually evolves, above all geopolitically and technologically.

The convergence of the three streams (problem, politics, and policy), which would have opened a policy window, did not happen in the late 2000s or early 2010s. In the second half of the 2010s, specifically between 2016 and 2019, a convergence occurred between the perceived problems of postal inefficiency and the resulting disenfranchisement of the Swiss abroad, the need for inclusive voting for people with disabilities, and a general desire for modernisation. These issues aligned with the development of the Swiss Post and Scytl i-voting system and the political will generated by Walter Thurnherr's arrival as Chancellor of Switzerland. That

window was closed after the discovery of vulnerabilities in the i-voting system in the first half of 2019, which was supposed to have been used for the federal elections later that year. The discovery of these vulnerabilities demonstrated that the security of i-voting was not at a satisfactory level and served to sober up the policy-makers who had been pushing for its adoption. Very quickly, just a year later, it became clear that i-voting had not been abandoned as a possible solution, but now with noticeably more cautious announcements and calls for its adoption. The Swiss i-voting project continued and reportedly has been progressing solidly, and the current i-voting system is more advanced than the one from 2019. The 2019 episode was framed as a technical, that is, cryptographic difficulty, precisely because of an approach that emphasises learning, and learning also entails mistakes. Out of this mistake emerged a new knowledge regime through which i-voting is being legitimised. The door was opened for close cooperation with academia, while security is being pursued through openness and iterative refinements. The mindset of those who develop the i-voting system is now such that they know their system will be made public and subjected to scrutiny from experts through bug bounty programmes and public intrusion tests. This allows policymakers, as well as the public, to witness that the i-voting system has passed through rigorous tests by experts from around the world and that all possible measures have been taken to make it the best it can be. The development of the i-voting system under the leadership of Swiss Post continues, with its objective being not i-voting adoption *per se*, but rather the acquisition of experience and the creation of a technological solution that would enable an evidence-based, meaningful political debate on the final decision regarding i-voting in Switzerland.

Switzerland can keep i-voting in a long "soft coupling" between problems and policies, because trialling i-voting is politically defensible and can be framed as learning and the acquisition of experience (as groundwork for political decision-making). However, once policy-makers take a further step and "harden" that coupling by proposing adoption, this mobilises anti-policy entrepreneurs and forces political parties to articulate their positions. Switzerland, with regard to i-voting, finds itself in a state of protracted experimentation rather than adoption or rejection. This process has now lasted for a quarter of a century, and it is unlikely that a final decision on whether i-voting will become a standard third voting method will be made in the foreseeable future. There is a sustained political will to keep i-voting on the agenda through trials in different formats, from the earlier canton-led phase to the current situation in which Swiss Post's i-voting system is the only one in use. What matters to emphasise is that Switzerland is not necessarily "stuck" in some kind of deadlock. Rather, this is a particular equilibrium

between a permissive environment for trialling (federalism, cantonal autonomy, and a learning culture that tolerates mistakes) and a demanding environment for adoption (the presence of political opposition, instruments of direct democracy that can be weaponised against i-voting, and an evolving geopolitical context that underlines the need to prioritise electoral integrity). Put differently, protracted experimentation is a stable outcome that represents a compromise between trials that remain meaningful and politically legitimate, and adoption, which is one step away from a broader contest over electoral integrity. Although the problem for which i-voting is the solution exists among expatriates, there is still no problem that is simultaneously broad, urgent, and politically unifying, which does not help to facilitate trials, nor to bring about a definitive resolution and an answer on whether to adopt or not to adopt i-voting.

5.5 **Conclusion**

Switzerland is one of the pioneers of i-voting worldwide, with 25 years' experience, yet still without a final decision on adoption or rejection. The Swiss experience with i-voting cannot be understood without the political context of Switzerland as a federal state, where the adoption of new voting methods lies with the cantons, the tradition of direct democracy that takes Swiss voters to the polls roughly four times a year, a culture of caution and prolonged deliberation when adopting innovations, and a changing geopolitical context in which Switzerland's nominal neutrality no longer guarantees protection of the electoral process from external actors. The initial motivation for introducing i-voting was to increase turnout and to adapt voting to new trends and habits brought by the internet in the late twentieth and early twenty-first centuries. Early trials conducted at cantonal level, coordinated by the federal level, showed that i-voting did not increase turnout. This can be attributed to another existing remote voting method, namely postal voting, which, after being adopted at federal level in 1994, became the dominant method and made voting in Switzerland *de facto* remote.

In the late 2000s, greater focus was placed on two niche groups of voters: the Swiss abroad and people with disabilities. I-voting proved successful for the Swiss abroad, as there is empirical evidence of increased turnout among this group, which is attributed to previous difficulties in the postal delivery of voting materials. They are also represented through the OSA, which remains the strongest advocate of adoption i-voting. The federal level became more prominent from 2013, when it consolidated the accumulated experience of cantonal trials and established a legislative framework for further development of i-voting. Swiss Post soon emerged as a new provider (in partnership with Scytl, which ended in 2020), and remains the only provider to this day, owing to the withdrawal of the pioneering cantons. Between 2016 and 2019 there was

an effort to “mainstream” (i.e. adopt) i-voting at federal level, but the discovery of vulnerabilities in the Swiss Post i-voting system’s source code led to its suspension in early 2019. From 2020, a redesign phase began, and Swiss Post developed a new i-voting system, launched in 2023, which is currently in trial phases in several cantons. Switzerland therefore remains in a state of protracted experimentation, without a final decision on adoption, but with the clear guiding principle of “security before speed”.

Chapter 6: France

"There is in the year one day when he who obeys you sees himself as your peer, when he who serves you sees himself as your equal, when each citizen, entering the universal balance, feels and notes the specific weight of his civic right, and when the least counterbalances the greatest. There is in the year one day when the breadwinner, the day-labourer, the navvy, the man who drags loads, the man who breaks stones at the roadside, judges the Senate, takes in his hand, hardened by labour, the ministers, the representatives, the President of the Republic, and says: Power, it is I" (Extract from Victor Hugo's speech "Universal Suffrage", delivered in the French National Assembly on 21 May 1850, Assemblée nationale, n.d.).

6.1 Introduction

France is one of the cradles of democracy and republican government, as well as a country of revolutions from which the ideals of liberty, equality, and fraternity emerged. In terms of population and economic size, it is the largest, and in political terms the most powerful, of the five case-study countries. It is a major European power and the only nuclear power within the European Union, with a pronounced presidential system. At the same time, France is one of the first European countries to have shown an interest in i-voting, but also the only democratic state in Europe, alongside Estonia, to have adopted i-voting as a voting method. Admittedly not for all voters and for all elections like the Estonians, but for a specific group of citizens (those living abroad) and for specific elections (legislative and consular).[36]

Interest in i-voting began in the early 2000s, with strong support from President Chirac, and, following the 2008 constitutional reform that strengthened the diaspora's political participation, i-voting was introduced in 2012 for legislative elections and in 2014 for consular elections. With the exception of 2017, when the legislative elections were held without i-voting due to an unfavourable security assessment of cyber risks, France has otherwise used i-voting. From 2012 to 2024, France used i-voting six times: four times for legislative elections (2012 legislative elections, 2013 legislative by-elections, 2022 legislative elections, 2023 legislative by-elections, and the 2024 early legislative elections) and twice for consular elections (2014 and 2021). In the 2024 early legislative elections, 416,000 votes were cast online in the first

[36] It is perhaps improper, though not inaccurate, to speak of the French diaspora, but rather of voters on the consular electoral list (Interviewee-FR-1, 2023). However, in the context of this chapter, this simplification is not significant for the analysis of the French case.

round, and 460,000 in the second round (Assemblée nationale, 2025), which exceeds the number of i-votes Estonia has recorded in an individual election.

This chapter analyses France's path towards i-voting, tracing it from its early beginnings at the start of the century and the subsequent years of experimentation, through the adoption of i-voting as a standard method and its suspension for the 2017 elections, to its return in 2022, since when it has been offered again with every expectation that this will continue in the (near) future. It also briefly presents an episode from 2014, when the French Parliament debated i-voting for voters in metropolitan France. The discussion then considers France's adoption of i-voting through the lens of the integrated theoretical framework, first by examining how i-voting was adopted (as a rarity in the European context) and, second, why it resulted in a partial and niche adoption, and how this type of adoption relates to any potential expansion towards full adoption.

6.2 **Voting in France**

6.2.1 **Paper voting at polling stations**

French voters participate in presidential, legislative, European Parliamentary, regional, departmental, and municipal elections, as well as in national and local referendums (Collard & Fabre, 2014; Debré, 2020; Morel, 2018; OSCE/ODIHR, 2022). Across the country, there are around 70,000 polling stations (OSCE/ODIHR, 2022). Voting is conducted using a paper ballot in a voting booth (introduced in 1913), and the ballot paper is placed in a ballot box, which has been transparent since 1988 (Enguehard, 2007). It should be noted that, until 2008, voting machines were also used, but their use was placed under a moratorium, meaning that the 64 municipalities that had introduced voting machines may continue using them (but without any upgrades or other modifications), while other municipalities may not adopt voting machines (Anziani & Lefèvre, 2014b).

The understanding of the act of voting and the manner of voting, that is, voting at polling stations via paper ballots, carries not only a symbolic, romantic, and patriotic fervour based on empty tradition and the emotional element of participating in elections. Thus, the act of voting in France is described as a "republican liturgy", taking the form of a "shared priesthood" or a "communion" (Enguehard, 2007; Morel, 2018). Moreover, "(...) the current traditional paper ballot, booth, envelope and transparent urn in France is the result of decades, if not more, of frauds in all elections in France" (Interviewee-FR-6, 2023). Even nowadays, there are attempts

at certain forms of fraud to gain an advantage over opponents in French elections, and related to this is a charming saying, “Pas vu, pas pris” (English: “Not seen, not caught”) (Interviewee-FR-6, 2023), which further emphasises the importance of the transparency of every single element of the election, which is at the very least obscured, if not blackened, through the adoption of technology that hides parts of the entire process from view, often the most crucial ones. The paper existing voting system, therefore, is not an evolutionary atavism of a past, technologically surpassed era that needs to be removed, but is the fruit of the sedimented experience of generations who lived French democracy before the present one.

6.2.2 **Proxy voting**

Proxy voting is a regular voting method in France, similar to the one mentioned in the case of the Netherlands, and it allows a voter to designate another voter to cast a ballot on their behalf. The idea behind this method is to mitigate “forced” abstention[37] by enabling the participation of individuals who, due to various reasons, are unable to physically attend a polling station at the time of an election (e.g., persons with mobility issues, elderly or disabled persons, professional obligations, voters abroad who are distant from polling stations etc.) (Centre d’analyse stratégique, 2006; Forum des droits sur l’internet, 2003). From the available sources, it is not easy to date the historical emergence of this method in France, but it appears to have been made available to expatriates as early as 1913 when they were allowed to retain their voting rights after moving abroad (Collard & Fabre, 2014). However, they could *de facto* exercise this right only by proxy or by travelling to France to vote. For voters in France, proxy voting served as a replacement for postal voting, which was abolished in 1975 (Debré, 2020).

Data from the 2022 French presidential election demonstrates that proxy voting is a widely used method: a total of 3.3 million voters (6.7% of the total French electorate) used a proxy (Insee, 2022). For the first time, it was also possible to give a proxy to a voter registered in a different municipality from the principal (Insee, 2022). Since June 2020, the requirement for justifying the need to vote by proxy has been removed, introducing what is known as no-excuse proxy voting (Buffet, 2020). In the past, proxy voting was also the subject of electoral fraud, primarily through the accumulation of proxies by political parties (Interviewee-FR-2, 2023). Interestingly, it is perhaps even more advisable to give one’s proxy to a party member or a person with whom one is ideologically aligned, rather than to a family member (Interviewee-FR-13, 2024). The OSCE/ODIHR has previously made recommendations to reconsider proxy

[37] This term is also sometimes found as the neat neologism “circumstantial abstention”.

voting due to potential violations of voter equality and ballot secrecy. However, these did not find fertile ground in France, which considers it a "longstanding practice of proxy voting as a convenient tool for voter participation" (OSCE/ODIHR, 2022, p. 7). The number of proxies a person could hold in France, due to above-mentioned machinations, was reduced to just one. However, during the 2020 municipal elections, this number was exceptionally increased to two (Debré, 2020), with announcements that it might be increased to three in the future (Assemblée nationale, 2021). On the other hand, French citizens abroad can hold three proxies (Assemblée nationale, 2021; Buffet, 2020). Regarding its duration, for persons in France, a proxy can be limited to specific elections or a referendum, for a maximum of one year on national territory (Assemblée nationale, 2021; Buffet, 2020). For persons abroad, it is more flexible and can last for three years (Assemblée nationale, 2021; Buffet, 2020).

Proxy voting requires the procedure of giving a written proxy, the issuance of which required a physical visit to a police station or a gendarmerie brigade, if in France, or a visit to an embassy or consulate abroad (Assemblée nationale, 2014a). The great distances from one's place of residence to the polling station *de facto* prevented the exercise of voting, but also the giving of a proxy. Thus, the Court of Auditors has called for the simplification and standardisation of the varied voting methods, stating that "these various voting methods, which lack clarity, are a source of confusion for French citizens living abroad" (Anziani & Lefèvre, 2014, p. 45). The registration process has been somewhat simplified in recent years through the submission of an application via the online portal Maprocuration. However, it has not been fully "dematerialised", as it is still necessary after submitting the application to go in person to a police station, gendarmerie brigade, or another location designated by the prefecture in France, or to a French diplomatic mission if abroad (Assemblée nationale, 2014a; Frassa & Leconte, 2023; Sénat, 2021).

6.3.3 **Postal voting**

Postal voting was adopted in France as a voting method in 1946, but not as a general method (Buffet, 2020). Its use required presenting an accepted excuse (e.g., professional or legal obligations, illness, insurmountable obstacles) along with supporting documentation (Buffet, 2020). Through its use, it proved to be susceptible to numerous frauds, partly due to poor implementation (e.g., requests were decided by the mayor, who thus had a monopoly on mobilising postal voters; there was almost no identification) (Buffet, 2020; Collard & Fabre, 2014). Therefore, it was disabled at the end of 1975. However, it remained a voting method for

elections for French overseas citizens. This method was disabled for consular elections from 2013 onwards (due to i-voting), while for legislative elections it proved to be underutilised with 1.6-2% (two sources differ slightly, possibly referring to the first and second rounds) in 2012 (Deromédi & Détraigne, 2018; Sénat, 2013), 0.9% in 2013 (Deromédi & Détraigne, 2018), 6-7.26% (two sources differ) in 2017 (Assemblée nationale, 2025; Deromédi & Détraigne, 2018), and 0.41% in 2022 (Frassa & Leconte, 2023). For the snap legislative elections in 2024, postal voting was not enabled (Assemblée nationale, 2025), and it is likely that, in the pursuit of "simplification", it will be permanently abolished in future legislative elections. This is supported by a recommendation (Frassa & Leconte, 2023), and by a statement from Pauline Carmona, Director for French Nationals Abroad and Consular Administration, who stated that postal voting "(...) is very complex to implement, with many voters making mistakes in the order of the envelopes. Above all, it faces such transport constraints that the ballots arrive too late and are invalidated. Although it remains marginal, this voting method is complex and has a cost (...)"(Assemblée nationale, 2025, p. 3). It should be noted here that a postal voting pilot was conducted in France for prisoners for the 2019 European parliamentary elections, which increased their turnout from 2% to 8% compared to the 2017 presidential elections (Buffet, 2020). At the end of the same year, a law was passed giving prisoners the right to vote by post (Buffet, 2020). Before the adoption of postal voting, prisoners could vote either by proxy or by requesting temporary leave, the latter option being available only to some of them (Buffet, 2020).

6.3 **French diaspora**

Although the image of France is that of a country of immigration, it is also a country of emigration, with an estimated 2.5 million citizens living abroad (Guéraiche, 2023). The early French diaspora, which consisted of aristocrats who went into exile after the French Revolution, was not viewed favourably and they were considered traitors (Collard & Fabre, 2014)). However, through France's stronger colonial presence, and then after the Second World War due to their merits in the resistance against occupation and the liberation of France, this attitude changed and the diaspora began to be perceived positively (Collard & Fabre, 2014).

6.3.1 **CSFE/AFE**

In 1948, the Conseil supérieur des Français de l'étranger (CSFE) (English: the High Council of French Citizens Abroad) was established as a body representing French citizens outside France (Frassa & Leconte, 2015). This body was renamed the Assemblée des Français de

l'étranger (AFE) (English: Assembly of French Citizens Abroad) in 2004 (Anziani & Lefèvre, 2014a). The election for the CSFE by universal suffrage was established in 1982 (Frassa & Leconte, 2015). Until 2013, it had 190 members, of which 155 were directly elected, along with 11 deputies, 12 senators, and 12 'qualified personalities'(Deromédi & Détraigne, 2018). The reform of the AFE carried out in 2013 led to a change in its composition, so that the body has since consisted of 90 members designated from 15 constituencies, elected by consular councillors, which is a change to indirect suffrage (Deromédi & Détraigne, 2018). Deputies, senators, and 'qualified personalities' are no longer part of the AFE (Deromédi & Détraigne, 2018). The AFE meets at least twice a year in Paris (Deromédi & Détraigne, 2018). Its role is mainly consultative, and it can consult the government, the president of the National Assembly, or the president of the Senate on "any consular matter or issue of general interest, particularly in the cultural, educational, economic or social domains" concerning French citizens abroad (Loi N° 2013-659 Du 22 Juillet 2013 Relative à La Représentation Des Français Établis Hors de France, 2013, para. 12). It also has the right to initiate its own investigations. The government presents an annual report to the AFE on the situation of French citizens abroad and related policies, which is followed by a debate, after which the AFE can issue an opinion (Frassa & Leconte, 2023).

6.3.2 **Consular councils**

Consular councils were introduced in 2013 by the Law of 22 July 2013 to establish "local representation" for French citizens abroad (Frassa & Leconte, 2023). There are 130 consular councils with 443 councillors worldwide (Deromédi & Détraigne, 2018), and they are elected by universal suffrage for a six-year term. Their role is one of local consultation. They provide advice regarding consular matters of general interest (such as cultural, educational, economic, and social issues) concerning French citizens within their jurisdiction (Frassa & Leconte, 2023). Furthermore, they examine individual cases for social aid and provide opinions on requests for subsidies for local solidarity organisations (Frassa & Leconte, 2015).

6.3.3 **National Assembly**

Before the constitutional reform of July 23, 2008, the representation of French citizens outside France was provided for in the Senate, starting from 1946, which was formalised by Article 24 of the 1958 Constitution (Assemblée nationale, 2014a). The 2008 constitutional reform

reformed the representation of the French diaspora.[38] The direct election of 11 representatives to parliament was introduced, for whom the entire world was divided into 11 different electoral constituencies (Collard & Fabre, 2014). On the one hand, it was Sarkozy's "response to long-held demands by the French abroad for better political representation", while, on the other, it reflected an awareness that the diaspora was growing and politically inclined towards the Right, the camp to which he belonged, whereas the Left saw it as nothing more than a "manoeuvre by the Right to win more seats in the National Assembly" (Collard & Fabre, 2014, p. 181). Nevertheless, this was more of a symbolic reform, since the National Assembly has a total of 577 members (OSCE/ODIHR, 2022), and 11 members for the entire French diaspora is negligible.

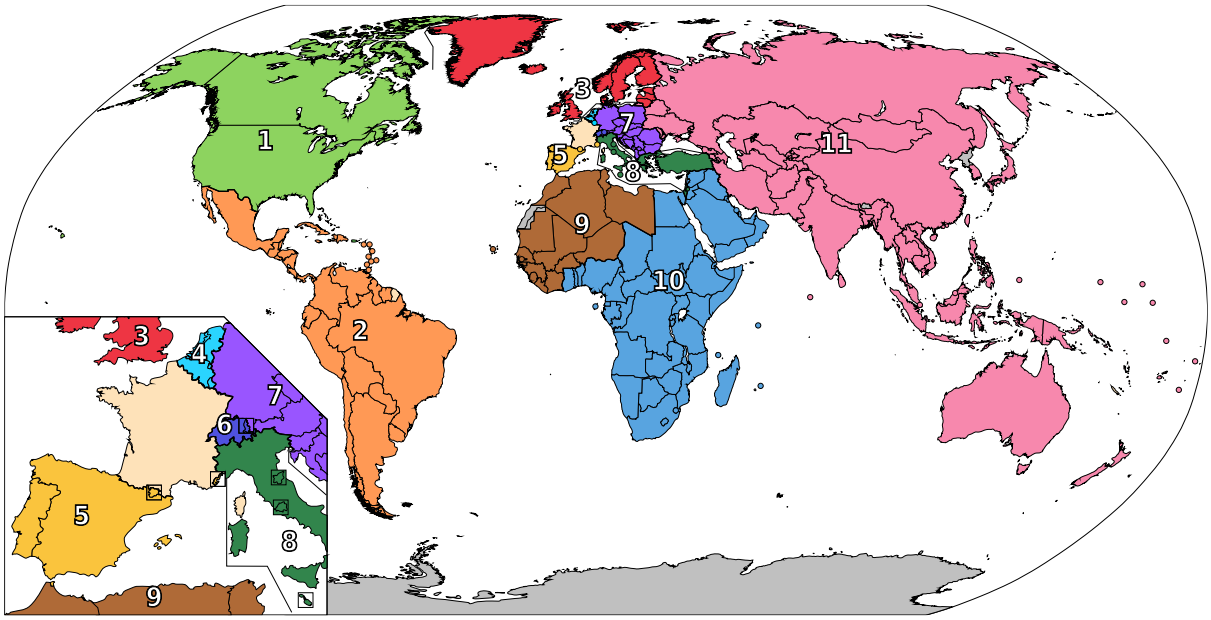

Figure 6.1 Map of the eleven legislative constituencies established for French citizens residing abroad for the purpose of electing deputies to the National Assembly (Beaudouin, 2012).

6.3.4 **Participation in elections**

Low voter turnout has, in many Western democracies since the 1980s, been understood as "a symbol of diminishing legitimacy of the political system" (Kersting, 2012, p. 16). France has not been immune to this. Among the French diaspora, "increasing non-participation in the 1990s" has been observed, which can also be expressed as a "steady withdrawal of the diaspora from political affairs" (Guéraiche, 2023, p. 231). For instance, elections for the CSFE/AFE saw

[38] It is important to note that this is not the entire "diaspora" in the strict sense of the term, but only those registered on the consular electoral list (Interviewee-FR-1, 2023). This means that someone who normally lives abroad, but happens to be in France during an election, may still be able to vote.

participation drop from 28.17% in 1994, to 24% in 1997, to 18.97% in 2000, and remain "very low at 15%" in a 2003 trial in the USA, while in a 2006 experiment only 6% of voters registered to vote online, and an even smaller number actually exercised that right (Collard & Fabre, 2014; Guéraiche, 2023). In presidential elections, which do not offer the option of i-voting but attract the greatest voter interest, a noticeable decline in voters is also apparent, from 75–78% as it was in 1981 (Collard & Fabre, 2014) to 44.3% and 45.8% in the first and second rounds of 2017, and an even more dismal 35.1% and 38.6% in the first and second rounds of the 2022 elections (Assemblée nationale, 2014b; IFES, n.d.). Abstention among French citizens abroad is higher than the national average (Collard & Fabre, 2014; Guéraiche, 2023).

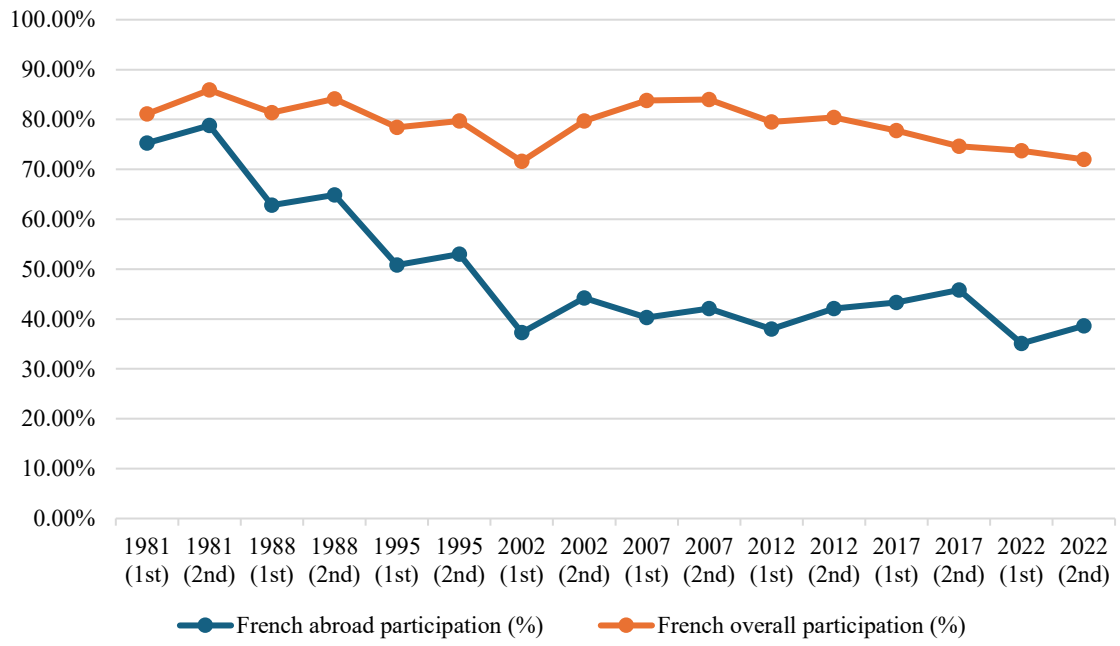

Figure 6.2 Participation in the election of the President of the Republic since 1981 (Assemblée nationale, 2014b; IFES, n.d.).

French citizens abroad have the right to vote in legislative, consular, European parliamentary, and presidential elections and in referendums with "very disparate [voting methods] from one election to another"(Assemblée nationale, 2014b, p. 11). For legislative elections, voters can choose between paper voting, proxy voting, postal voting, and i-voting (Assemblée nationale, 2014a). For consular elections, paper voting, proxy voting, and i-voting are possible (Assemblée nationale, 2014a). Finally, for European parliamentary and presidential elections and in referendums, they have two options: paper voting or proxy voting (Assemblée nationale, 2014a). The position of French expatriates is marked by "(...) dispersion across the world, distance from polling stations within the same country, difficult travel in some countries, and

often a cost for the voter" (Assemblée nationale, 2014a, p. 3), and it is also mentioned that there are "papers being sent to the wrong address, hefty administrative procedures or postal delays" (French Ministry of Foreign Affairs, 2012). For a certain portion of voters abroad, getting to a polling station is very demanding, if not impossible, partly due to the danger of travel in certain crisis hotspots. In addition, there are countries that do not allow French diplomatic missions on their territory to provide for elections, so voters would have to travel to another country (Interviewee-FR-13, 2024).[39] The debates contain vivid examples: for a French citizen living in Antalya, the nearest polling station is in Izmir, 450 km away (Assemblée nationale, 2014a), while in Russia there are only three polling stations, meaning a voter from Irkutsk would have to travel almost 3,000 km to Ekaterinburg and spend nearly 500 euros on a return flight (Deromédi & Détraigne, 2018). On the other hand, 150,000 French citizens live in Israel, of whom 70,000 are registered at the consulate, yet there are only 7 polling stations in the entire country (Assemblée nationale, 2014a). The sheer "remoteness from viable voting stations (the French consulates)" presented a practical impediment to voting for French citizens abroad (Guéraiche, 2023, p. 232).

6.4 **I-voting**

In September 2001, President Jacques Chirac stated: "I wish that, from the next national elections, Internet voting could be experimented with for thousands of French expatriates who, due to their distance from a consulate, are often deprived of the effective exercise of their right to vote"(Anziani & Lefèvre, 2014a, p. 38). Low turnout among French expatriates was framed by President Chirac as something for which "that exclusion from the vote and low turnout were simply unacceptable" (Guéraiche, 2023, p. 232). In a parliamentary question posed by Mr. Christian Estrosi in October 2001, it is stated that "the President of the Republic has recently called for internet voting to be trialled for French nationals abroad during the 2002 presidential and legislative elections" (Assemblée nationale, 2001). The then-senator Robert del Picchia proposed a bill which was passed in March 2003 as Law no. 2003-277, thereby enabling i-voting for members of the CSFE (Anziani & Lefèvre, 2014a). As Regis Jamin[40] explains, his experience advocating for i-voting for French expatriates at the beginning of the century illustrates the importance of agency and direct contact with the highest levels of policy-making:

[39] In parliamentary documents from 2014, examples of Brunei, Tajikistan, Kyrgyzstan, and Papua New Guinea are mentioned (Assemblée nationale, 2014a).

[40] The founder and director of Election.com, a company that was involved, among other projects, in the SERVE i-voting project in the USA.

> "Things change when the highest level is convinced. I was able to win the French expat to move to internet voting because I met Jacques Chirac, the French president, personally. We discussed that, he put it in his programme, and he decided to go for it. But it was really pretty much Chirac who said: 'We will do it, and we will do it with you, Mr. Jamin, because you have the technology, we use it for our party, so I am confident we can do it'" (Interviewee-FR-5, 2023).

Influence on top policy-makers in the French case provided a way to bypass the administrative maze and secure a political decision on adopting i-voting at the highest level, which the rest of the administration then had to follow and implement, whether it wanted to or not. In this sense, Jamin states:

> "You have to be able to show to the people who are at the top of the pyramid, the people who decide, what are their customers' needs, what it could solve for them. And you have to be able to convince them that technical issues are not such an issue, unless their technocracy thinks it is an issue" (Interviewee-FR-5, 2023).

I-voting was understood as a tool for "facilitating access and lowering abstention among French expatriates", or rather as a "response to their particular situation so that they can, in the best conditions, fully exercise their right to vote" (Anziani & Lefèvre, 2014a, p. 45; Assemblée nationale, 2014a). Traditional voting methods involved substantial costs for ballot papers, delivery, setting up polling stations, and appointing election officials. Postal voting was perceived as time consuming and challenging with issues regarding voters not receiving ballots or facing difficulties sending them back on time, leading to disenfranchisement.

The adoption of i-voting in France can be viewed through both publicly declared reasons and those more hidden, uncommunicated reasons that may not have been decisive but certainly moved the needle of policy-making towards adopting i-voting. At the level of individual reasons, there are several separate, yet intertwined and complementary reasons. Primarily, the aim was to enhance accessibility for French citizens living abroad by circumventing existing geographical obstacles. The endeavour was for this group to be able to truly exercise their right to vote, which was often not the case as they may reside "several hundred kilometers from the consulate where they can vote at the ballot box" (Interviewee-FR-1, 2023), which presented almost insurmountable logistical difficulties. This led to situations where it is possible that "people will not go to vote, not because they don't want to vote but because access to the ballot is so difficult" (Interviewee-FR-13, 2024). Therefore, the main reason was "(...) to make it

easier to access the ballot box, right, rather than increasing participation per se" (Interviewee-FR-13, 2024).

There are two reasons that were not explicitly communicated, but which interviewees cite as important. The first is cost savings, which is linked to "reductions in staff personnel in French diplomacy" (Interviewee-FR-3, 2023), and related to the fact that "the traditional French system relies on public servants or anyone really volunteering to give their time to manage and watch the election" (Interviewee-FR-6, 2023). The Ministry of Foreign Affairs faced drastic staff reductions (e.g., one-third between 2000 and 2020), with the "time devoted to the preparation of elections" drawing resources away from other diplomatic duties (Guéraiche, 2023, p. 235). The second is a much more mundane reason related to political calculations and projections of what i-voting could bring to a certain person in a policy-making position. French citizens abroad are perceived as having more conservative leanings in a greater proportion than their compatriots in France (Interviewee-FR-4, 2023). Thus, President Chirac, who first opened the topic of i-voting and was its advocate, did so with the understanding that "he knew that the French abroad were mostly right-wing" (Interviewee-FR-3, 2023).

On 26 September 2003, the Internet Rights Forum (*Forum des droits sur l'Internet*, FDI) published a report titled "Recommendation - What is the future of electronic voting in France?" (Forum des droits sur l'internet, 2003; The Internet Rights Forum, 2003a). The report aimed "(...) to shed light on the debates and issues surrounding electronic voting, and to demonstrate that this voting method could be adopted into the French electoral process through a gradual and reasoned approach" (Forum des droits sur l'internet, 2003, p. 43). It also sought to provide recommendations to Nicolas Sarkozy, who at the time held the position of Minister for the Interior and was responsible for elections, regarding e-voting in a broader sense in France (Collard & Fabre, 2014). The FDI's position was that the e-voting rollout should be conducted in a gradual manner, with a separate decision made for each specific election. Regarding remote i-voting, the FDI advised against it (the report uses the term "electronic distance voting") for political elections, proposing instead the use of i-voting via kiosks in any polling station (Forum des droits sur l'internet, 2003). However, the use of remote i-voting was proposed for all French nationals abroad participating in CSFE elections, as well as for use in professional elections in the private and public sectors (Forum des droits sur l'internet, 2003). The first argument concerns the preservation of traditional electoral rituals and public trust. Voting in France is "(...) a symbolic act, a ritual which lays the foundations for belonging to a social and political community" (The Internet Rights Forum, 2003a, p. 7), is "(...) very firmly fixed in citizens'

minds (...)" (The Internet Rights Forum, 2003a, p. 27), and is "(...) a privileged moment in community and social life and in life as a citizen (...)" (The Internet Rights Forum, 2003a, p. 15), or rather "(...) a ritual that is deeply engrained in the republican tradition" (The Internet Rights Forum, 2003a, p. 15). While in some other countries postal voting already represents a form of remote voting, in France the idea of "not going to the polls" is much less accepted (The Internet Rights Forum, 2003a, p. 27). The second group of arguments relates to the security and sincerity of voting, given the risks inherent in remote voting in high-stakes political elections. Voting in a polling station provides the protection of the voting booth and prevents coercion, from which it is much more challenging to provide protection in the conditions of remote voting. Related to this is the issue of identification, which is carried out by polling station members during in-person voting, whereas with remote voting it is more complicated and less secure. A further issues concerns the inequality between voters, because "(...) not all voters have access to the technologies used and are not sufficiently skilled in the use of these tools" (The Internet Rights Forum, 2003a, p. 15). This is, in fact, about the digital divide, which in 2003 was a far more significant argument that has, to a large extent, faded as an argument over the next twenty years.[41] Furthermore, the FDI considered it unrealistic, given the state of technology and perceptions at the time, to recommend remote i-voting, and the cost aspect was not entirely clear at that point, specifically whether i-voting would lead to a reduction or even an increase in costs. On the other hand, the FDI adopted a rather pragmatic stance when proposing to enable i-voting for French expatriates, which it substantiated as follows:

> "There is no reason why provision should not be made for the possibility of electronic distance voting from home or from the workplace where provision has been made for the routine alternative of postal voting. In fact, electronic distance voting, in principle, does not appear to be any less secure than postal voting" (The Internet Rights Forum, 2003a, p. 25).

Given that postal voting was already used for French expatriates and in many professional and ordinal elections, the transition to i-voting was seen as a natural technological evolution that brings certain advantages, both for voters and for the electoral administration, without introducing entirely new security paradigms into the equation when compared to the vulnerabilities of postal voting. However, the very fact that postal voting was already adopted

[41] However, as will be presented later, the argument about inequality between voters was later used to oppose the extension of i-voting for expatriates to other elections where it is not yet used, but not because of the digital divide. Instead, the reason was that one cohort of voters (the diaspora) would use i-voting, while another (in mainland France) would not, having only paper voting and proxy voting at their disposal (Anziani & Lefèvre, 2014a).

for these elections indicates that they are lower-stakes elections, and some of them are not even political. A distinction should therefore be made based on "(...) what is at stake, the sensitive nature of the issues being voted on, their symbolic weight, or the abstention rate" (The Internet Rights Forum, 2003a, p. 24). In any case, the FDI's proposal regarding i-voting as a general suggestion for higher-stakes elections was limited to the use of voting kiosks in any polling station, where a voter could choose to come to the polling place and vote via a device connected to a private network. This was never implemented. The future showed that on-site i-voting via so-called kiosks was a dead-end street and that, if i-voting was to be adopted, it only made sense if it was remote.

The first i-voting trial took place in May 2003 for the partial renewal of the CSFE, involved approximately 61,000 voters in the USA, and saw around 60% of voters choose to vote via the internet, with turnout more than two percentage points higher than in the previous elections (Assemblée nationale, 2005a, 2005b). The following year, 2004, i-voting trials for non-political elections were conducted for five Chambers of Commerce and Industry, which included 440,000 voters, and approximately 30% of all votes were cast via the internet, while participation increased by six percentage points compared to the previous elections (Assemblée nationale, 2005a, 2005b). In June 2006, i-voting was used for the partial renewal of the AFE in the Europe-Asia-Levant zone, in which 10,201 voters used i-voting, representing about 13.6% of all votes (Assemblée nationale, 2005a, 2006, 2007; Centre d'analyse stratégique, 2006).

The constitutional reform of 23 July 2008 introduced the election of eleven deputies by French citizens abroad and, to operationalise this for the election of members of parliament by French citizens living abroad, Article L. 330-13 of the Electoral Code was introduced in 2011, ahead of the first use of i-voting in the legislative elections in June 2012 (Assemblée nationale, 2014a, 2014b). In July 2013, Act No. 2013-659 was passed, adopting i-voting for consular councils while abolishing postal voting, which made these the first exclusively i-voting elections in France, and i-voting was first used in May 2014 (Anziani & Lefèvre, 2014a; Assemblée nationale, 2014a). The 2012 legislative elections and the 2014 consular elections offered i-voting, but the subsequent legislative elections did not offer this option. In March 2017, the government made a decision that i-voting would not be used for the legislative elections of that same year. The decision was not related to a specific or identified threat but to "a more global geopolitical context" and "the principle of precaution" regarding cyber threats and risks (Deromédi & Détraigne, 2018). The 2017 suspension of i-voting, justified by reasons of cyber

risk, can also be interpreted through the political reasoning of President Hollande and his progressive government:

> "In 2017, there was this mix between the pressure from the administration on one side, and the political calculation that avoiding too many conservative voters from voting would be a good thing at the end of the day. They never said that, but we know it. It was a political strategy to weaken the other side, and the administration was happy to say: 'Okay, so we have the perfect answer. There are many risks from hackers, so that is the issue we are going to use.' And that is what they did. (...) No one was surprised. No one. Everybody knew, because everybody could read between the lines what really was at stake. So, that is what happened in 2017. That majority was beaten, a new president came, Emmanuel Macron, and he said: 'I want the internet voting system to be re-engaged.' And that is what he did" (Interviewee-FR-4, 2023).

It is precisely the administration, which Jamin refers to as the "technocracy", that is "very tough to internet voting", and in fact "(...) is a big obstacle for democracy in general" (Interviewee-FR-5, 2023). This is supported by the statements of Interviewee-FR-4 (2023), who notes that the administration was "massively against" i-voting from the very beginning of its use for the 2012 legislative elections. There was reluctance and obstructionism within the French administration, driven by an aversion to increased "pressure and more responsibilities", which in turn then leads to what the administration "hates": a situation where "if something gets wrong, it is their fault" (Interviewee-FR-4, 2023).

Support for the re-adoption of i-voting came in October 2017 from the newly elected President Emmanuel Macron, who stated at the AFE assembly:

"If we are not able, for the next elections, to organise ourselves so as to have an internet voting system that is watertight against any attack, then it is no longer France, our country! […] We will give ourselves the means to do so, because it is, first and foremost, a democratic interest, but it is also a question of our credibility and sovereignty" (Deromédi & Détraigne, 2018, p. 41).

The readoption of i-voting can be attributed to the fact that such a decision came from the highest level, from President Macron, which overcame other potential obstacles that might otherwise have been presented (Interviewee-FR-4, 2023). The importance of i-voting and its return by Macron can be understood as a measure for the affirmation of the citizenship rights of French people abroad, an affirmation that "reinforces" their sense of belonging to France regardless of their current residence (Interviewee-FR-4, 2023). However, President Macron's

advocacy for the readoption of i-voting after its suspension in 2017, and his promise that it would be extended to presidential and European Parliament elections by 2022 (which did not happen), can be also understood in light of the diaspora having "a profile which is more aligned with the globalist attitudes of President Macron" or, more bluntly and without pulling punches, that "Macron wanted the French abroad to vote because he knew that an overwhelming majority of the French abroad would vote for him" (Interviewee-FR-3, 2023). At present, Macron's party holds nine of the eleven seats representing the French abroad in the National Assembly (Le Grand Continent, 2024).

The Ministry of Foreign Affairs then launched an 18-month design phase in 2018 for a new and more secure i-voting system, which was tested during 2019 and obtained homologation in January 2020 (Debré, 2020). It was used for the first time in the 2021 consular elections, when 86.16% of voters cast their ballot via the internet (although overall turnout was only 15.06%) (Guéraiche, 2023). I-voting was re-adopted for the 2022 legislative elections and has since been used in all regular elections, as well as in early and by-elections.

A spillover effect of voters to i-voting is visible, with almost 80% of all voters abroad choosing it for legislative elections, while other competing voting methods, such as postal voting, are being pushed aside and squeezed out, and it is likely that postal voting will no longer be offered in future elections (Assemblée nationale, 2025). While, in the first decade or so, there was no clear basis for comparing i-voting's effect on turnout, it can be said with some confidence that i-voting increased turnout among expatriates, as shown by turnout in the second round of the legislative elections: 16% in 2017 (without i-voting), 24% in 2022 (with i-voting), and 37.69% in 2024 (with i-voting) (Assemblée nationale, 2025). Two circumstances affect the achievement of even greater turnout and the use of i-voting: the disarray of the voter register and the authentication system during voting (Interviewee-FR-1, 2023; Interviewee-FR-4, 2023). The former is reflected in outdated data in the consular electoral roll, which is not kept up to date because French citizens fail to update their personal details, primarily their addresses abroad, email addresses, and mobile phone numbers. To that end, a Single Electoral Register (REU) was introduced in 2019. The problem is addressed through the introduction of a Single Electoral Register (REU) in 2019 (Buffet, 2020). It is a central register from which voter data are retrieved, and it is linked to the consular register. On the other hand, the authentication system currently in use relies on two channels for sending access credentials: SMS and e-mail. Experience from previous elections shows that, in some countries, preventive measures are in

place to stop the sending of large numbers of SMS messages in response to suspected spam or a potential cyber-attack (Interviewee-FR-4, 2023), which was not accounted for during its adoption. Thus, during the elections, some voters were unable to receive their password via SMS, and they saw the authentication method of the current system as the main obstacle. In January 2023, the Constitutional Council annulled the results of the legislative elections held in June 2022 in the 2nd and 9th constituencies, where only 11% of SMS messages and 38% of messages, respectively, were correctly delivered and contained the codes, and it ordered the elections to be rerun (Conseil constitutionnel, 2023a). The Ministry of Foreign Affairs' future plans are to remove SMS authentication entirely, given its reliance on local operators, and to introduce a digital identity that would serve as a replacement (Assemblée nationale, 2025).

6.5 **I-voting for residents?**

In 2014, a member of the National Assembly, Thierry Mariani, submitted a bill to extend i-voting to European Parliament and presidential elections in France (Assemblée nationale, 2014a). The bill was not adopted, but the parliamentary debate provides insight into the reasoning of the government at the time regarding i-voting (Assemblée nationale, 2014a). Matthias Fekl[42], presented the government's unfavourable opinion on extending i-voting to presidential and European Parliament elections for the diaspora. He stated that for legislative elections there were separate constituencies, whereas for EP and presidential elections there was only one single constituency for the whole of France, both metropolitan and for the diaspora. Distinguishing in the voting options available to voters from abroad compared to those from France would lead to a situation where "the Constitutional Council, which would be automatically referred to since it is an organic bill, could consider these provisions to be unconstitutional due to the breach of equality they would introduce between the voters of the same electoral constituency" (Assemblée nationale, 2014a, p. 4). Furthermore, Fekl cited two more reasons why the government did not want to support Mariani's bill. First, he stated that the claim in the law's explanatory memorandum that i-voting increases electoral participation was incorrect. Instead, it leads to a substitution effect whereby voters who would normally vote by another method switch to i-voting. Second, he referred to a report compiled by senators Alain Anziani (Socialist) and Antoine Lefèvre (UMP) and their findings on the difficulties associated with i-voting (Anziani & Lefèvre, 2014a). In addition, it is clear from the debate

[42] He served at the time as Minister of State for Foreign Trade, the Promotion of Tourism and French Nationals Abroad.

that the socialist representatives in the National Assembly had an unfavourable view of the legislative proposal for expansion. Their members Pascal Popelin and Arnaud Leroy, in addition to the reasons already mentioned, listed a whole plethora of reasons, among which stand out the security risks associated on the one hand with France's position and importance as a nuclear power and a permanent member of the UN Security Council, and on the other hand due to the risks inherent to i-voting such as cyber-attacks on high-stakes elections, the questioning of the republican ritual of voting, vote secrecy, and the absence of budget or impact studies related to the law. This bill introduced by MP Mariani offers an insight into the arguments for why i-voting in France is constrained to remain partial, both in terms of the group of voters it covers and the elections in which it is used. However, the bill was doomed to fail in any case. During the COVID-19 pandemic, regional elections were held in November 2020. At the time, a new i-voting system for the French diaspora existed, but a report recommended against its use due to limited prior experience and security risks (Debré, 2020). Extending i-voting beyond its current form of adoption would have opened a range of new questions for the French legislature, and, all things considered, this partial adoption appears to be its final scope. However, there is no serious political debate about extending i-voting to voters in metropolitan France whatsoever.

6.6 **Discussion**

The discussion concerns legislative elections, which are first-level political elections because they determine the composition of the national parliament. In contrast, consular elections concern a body that, in the first place, has consultative powers. The way France defined the problem for which it adopted i-voting as a solution was expatriate enfranchisement, whereas the question of i-voting in metropolitan France was never the subject of serious political debate. Although historically relations between France and the diaspora did not flourish, in the post-World War II period, owing to the diaspora's contribution to France's liberation, it became incorporated into political processes. The French diaspora is dispersed around the world and faces a wide range of problems when voting from abroad, including long distances, the need to travel to diplomatic missions, inefficient postal services, and host-country hostility to the organisation of French elections on their territory. In DOI terms, i-voting's relative advantage is asymmetric across electorates: voters in France have a dense network of 70,000 polling stations, while expatriates must travel long distances for in-person voting or rely on postal delivery. Proxy voting can partly help, but it was not considered an adequate solution to the diaspora's problem.

I-voting found its application when the diaspora was granted 11 seats in the National Assembly in 2008, while this voting method was not extended to presidential and European Parliament elections, in which expatriates also participate. At the moment when the diaspora received reserved seats, France had a stronger incentive to ensure that its participation in elections would be meaningful and real, rather than merely symbolic. The problem stream (difficulties of voting from abroad) existed before. However, with the new system of representation for the French diaspora, low participation became more visible (in legislative elections, each constituency is a separate election, so a low number of voters in overseas constituencies would be much more visible than in presidential elections, where the whole of France is a single constituency).

France thus introduced i-voting, but in a niche or partial form, for expatriates in legislative and consular elections. Voting in presidential elections, European Parliament elections, and referendums is not possible via i-voting for expatriates. Such an outcome can be explained by the political stream, which supports i-voting and also defines its boundaries for adoption.

Support for i-voting came from Presidents Chirac, Sarkozy, and Macron, who also weighed their own political gains, given that the French diaspora is more inclined towards their options. Thus, the policy choice, namely i-voting, was not linked exclusively to a genuinely existing problem of the possibility to exercise the right to vote from abroad, but also to an anticipation of how the French abroad would vote in the future. When support from high-level policy-makers is absent, as in the French case, i-voting is susceptible to discontinuation. This is shown by the 2017 case when, a few months before the elections, it was announced that i-voting would not be used for legislative elections due to cyber risks and the geopolitical context. From the interview materials, it is possible to discern that political calculation was also at play, namely, the reduction in participation by conservative-leaning voters abroad. It does not appear that the then government found it difficult to discontinue i-voting, nor is it visible that efforts were made to keep i-voting. It was shown that niche adoption is susceptible to discontinuation, that is, that bureaucratic reluctance met political calculation, and the absence of high-level political protection of i-voting allowed ready-made frames on cyber risks and integrity to come to the fore. In SoE terms, cyber risk is a strong fear repertoire that can be used, when political incentives no longer support i-voting, to discontinue it. This is not to say that cyber risks did not exist, but rather that, in the absence of top policy-maker support, institutional resistance and defensive framing easily dominate. The readoption of i-voting in the 2020s is again a display of high-level political sponsorship of i-voting, in this case by Macron, who had already promised in 2017 that i-voting for expatriates would be reinstated. Thus, in MSF terms, the

political stream (presidential commitment and agenda force) aligned with the policy stream (a new, redesigned i-voting system) and the never-disappearing problem stream (difficulties of voting for expatriates), which opened a policy window for i-voting and ultimately led to its readoption. At the same time, the politics stream makes i-voting boundary-constrained. This is shown by Macron's example: he promised to extend i-voting for expatriates to presidential and European Parliament elections by 2022, but this did not happen, and it does not seem likely to happen in the near future. The non-expansion of i-voting is not an adoption failure. It is that different political and legal risks are present in high-salience elections, where an error even in the part that concerns i-voting for expatriates spills over to the entire election (because the state is one constituency), and a situation of inequality among voters emerges in which the Constitutional Council could intervene.

Except in 2017, when i-voting was discontinued due to cyber risks (general risks, not a specific risk or a security problem with the i-voting system), technical and technological questions were not important for i-voting in France. Perhaps this is because the adoption is niche, so greater interest from academia and experts would be triggered by attempts to extend its use to other elections and voters. However, although the i-voting debate was not linked to security aspects, the practice of use showed that it is fragile in terms of authentication, which then has legal repercussions in the form of annulments and reruns of elections in certain overseas constituencies. Precisely for that reason, what DOI would call reinvention is currently underway: the Ministry is seeking to change the authentication method by introducing a digital identity to prevent situations like those in 2022 mentioned in the previous sentence in the future.

The French case shows how, once i-voting is available to expatriates, it tends to become the most used voting method. Although in the first period it was considered that i-voting did not affect turnout among expatriates, election results in the COVID and post-COVID contexts (2022 and 2024) suggest that i-voting may nevertheless increase turnout, but this remains for further detailed study. What is important is that i-voting creates a form of path dependence: even if niche adoption of i-voting is reversible, that is, prone to discontinuation, with longer-term and numerically higher use of i-voting, any eventual future discontinuation will be much harder to justify and will be more politically costly than the one in 2017. This creates an internal stabilising mechanism that ensures i-voting's future use, and, at the same time, for expatriates, i-voting becomes the expected default through habit of use.

We can ask whether niche adoption of i-voting is an outcome or tends towards full adoption. France is a stabilised niche adopter rather than a delayed full adopter. The current form of i-voting adoption has a stabilising tendency that derives from a scaling threshold that intensifies scrutiny, a constitutional and symbolic boundary around high-salience elections, and a cost-benefit asymmetry for residents. France can manage i-voting as long as it is adopted in a niche way, that is, as long as it remains bounded in scope and in the number of affected voters. If plans were to include adoption for presidential and European Parliament elections, scrutiny would increase significantly, and all the reasons from the 2014 parliamentary debate (France's geopolitical importance, France as a nuclear power, secrecy of voting, republican ritual, and so forth) would come to the fore.

Furthermore, even expanding to other elections with the same voters (expatriates) raises questions about voter equality and may trigger intervention by the Constitutional Council. Legislative elections are compartmentalised so that each MP election is an election in itself, which, in the case of difficulties, can be repeated, whereas this is not the case with presidential and European Parliament elections. Finally, while expatriates have a real need and tangible benefits from i-voting, the situation is different for resident voters. France has an extensive network of polling stations, and in-person voting is culturally legitimised, experienced as a democratic or republican liturgy. For these voters, there is no opening of a policy window because the problem stream is not compelling enough, and the risk frame is too salient.

6.7 **Conclusion**

France is the largest European democracy to have adopted i-voting, although this is a niche or partial adoption limited to the diaspora and only for two types of elections: legislative and consular. In the other two types of elections, presidential and European Parliament, the diaspora still votes in the traditional way, at diplomatic missions, by post, or by proxy, while mainland voters have no access to i-voting in any election. France has a large diaspora of over 2.5 million people worldwide, yet it faces numerous practical obstacles to voting, dominantly geographical distance from French diplomatic missions and inefficient postal services, as well as the reluctance of some countries to allow French elections to be held on their territory. Although France historically had a less positive stance towards the diaspora, this changed after the Second World War, and the diaspora began to play an increasingly important role in French political life. Not least, the first trials, the provision of representation for the diaspora in the National Assembly, and the adoption of i-voting coincided with right-of-centre presidencies

seeking to strengthen the diaspora's role, given its greater tendency to vote for the right compared with the rest of France.

The story of i-voting in France began in the early 2000s under President Chirac, with the first trials for the CSFE/AFE, the body representing French citizens abroad. A turning point came with the 2008 constitutional revision under President Sarkozy, which granted the diaspora 11 seats in the National Assembly, the lower house of parliament, and was followed by legislation enabling the use of i-voting. In legislative elections, i-voting quickly became the dominant voting method for the diaspora. The 2017 legislative elections did not offer i-voting because of alleged cyber risks and the need to protect electoral integrity, but with the arrival of Emmanuel Macron, i-voting was readopted. A new i-voting system was introduced in 2020, and since then it has been used in all consular and legislative elections. It should be noted that i-voting has become the dominant voting method in both elections. With regard to legislative elections, the 2022 and 2024 elections suggest that i-voting has not only a substitution effect, but also a mobilisation effect. President Macron signalled an extension of i-voting for the diaspora to the presidential and European Parliament elections, which has not been implemented to date. By contrast, there is no political debate on adopting i-voting for mainland voters, and it will, by all indications, remain a niche adoption for the diaspora.

Chapter 7: Estonia

"Historically, the state as an institution, both as Soviet legacy and over the centuries if not millennia, was always suspect – in Estonian history, the state was evil, the nation was good; the nation was us, the state was them" (Drechsler, 2018, p. 12).

7.1 Introduction

The last of the five case studies is Estonia, a small Baltic country of 1.6 million inhabitants, which often appears as an exceptional, even radical, example of the digitalisation of public services. Estonia has become "e-Estonia". Indeed, it is the first, and so far, the only country in the world to have adopted i-voting at all levels of elections (local, parliamentary, and European parliamentary), starting from the local elections in 2005 and continuing to this day. Although i-voting was and remains conceived as an additional voting method alongside existing paper voting at polling stations in Estonia, or alongside postal voting and voting in diplomatic missions abroad, it has over time become an extremely popular voting method. In the last two election cycles, it was used by 51.1% of voters in the 2023 parliamentary elections and 41.7% in the 2024 European parliamentary elections (Valimised.ee, 2025).

The case study follows a chronological structure, tracing Estonia's path over more than 30 years. It covers the period from the restoration of independence and the difficult post-Soviet transition, through the digitalisation of public services and the adoption of i-voting, to the normalisation or routinisation of this innovation. It also examines the predominance of i-voting over other voting methods in the 20 years since its adoption, as well as its position as a subject of political polarisation. Although the structure is chronological, the case study does not present a simple recitation of historical events related to i-voting. On the contrary, the main effort is to produce a theoretically informed analysis of the Estonian case. In this respect, Kingdon's MSP will be used to present the macro-level policy environment and to explain how the window of opportunity for the comprehensive digitalisation of public services in Estonia opened, and in that context, the adoption of i-voting. The problem stream is illustrated by the stark reality of post-Soviet Estonia in the 1990s: namely, the challenge of establishing state institutions and delivering public services in a small, sparsely populated, and then-impoverished nation. The aforementioned problem was addressed by embracing the digitalisation of services as a form of rationalisation. This was further leveraged to build a distinctive image for Estonia, which was then just one of many post-Soviet countries that did not particularly stand out. The

“Estonian way of doing things” in terms of digitalisation was chosen as a form of promotion. This represents the policy stream, the chosen solution from a plethora of possible solutions, which was digitalisation as a way of building institutions and providing public services. The third stream that, by converging with the previous two, led to the opening of the window of opportunity, is the politics stream. We will see how a new, anti and post-communist generation of politicians decided to make a clean break with the Soviet legacy and was very receptive to all novelties. Admittedly, it was not just a matter of ideals, but also of necessity by which they had to be guided. Rogers’ DOI will be applied through the stages of organisation adoption and the innovation attributes that i-voting possesses in Estonia. The first will show how Estonia accelerated and compressed the stages of the innovation process, which, incidentally, may also explain why Estonia succeeded in (quickly) adopting i-voting, as it was not constrained by lengthy considerations. The second will show how these attributes played a catalytic role in transforming i-voting from a politically desirable innovation into a routinised and sustainable innovation. Finally, Krimmer’s EVM provides dimensions within which the adoption of i-voting occurs. This serves as a thematic microstructure to dissect the implementation process and identifies stakeholder groups whose actions and interactions shaped the adoption process.

Although the preceding description might give the impression that the emphasis is placed on the digitalisation of public services in Estonia, rather than on i-voting whose adoption is the subject of the case study, it should be said in pre-emptive defence that the i-voting story is a story of digitalisation in miniature and, at the same time, part of the broader story of “e-Estonia”. As such, they are contextually inseparable from the broader context. The story of i-voting and everything that contributed to its initial adoption and then its sustainable use can only be correctly understood through the interweaving of the broader story of public service digitalisation. The predominant part of the case study will be dedicated to the adoption of i-voting in 2005, that is, to the analysis of what led to its adoption, grounding i-voting in the wider context of e-Estonia. A part will also be dedicated to how i-voting took root and became a sustained adopted innovation, which was not the case in other countries, not even in France which, as we have seen, offers i-voting for its diaspora for some elections but where it experienced a brief discontinuation. It is precisely this sustained adoption that makes the Estonian case different from the other cases observed.

7.2 **Setting the scene: Legacy of the Soviet period**

To understand i-voting in Estonia, it is necessary to understand the historical background that shaped and influenced its approach to digitalisation. Estonia declared its independence from the Soviet Union in 1991.[43] The period from 1940 to 1991 was seen as an occupation and a discontinuity in the independence that Estonia had gained in 1919, after the end of the First World War. The renewed freedom, won through the non-violent Singing Revolution (1987-1991), and the euphoria of restored independence were soon met with the grim reality of the post-Soviet transitional period. The 1990s in Estonia were marked by austerity, the dismantling of existing institutions and the building of new ones, the transition from a planned to a market economy, and the challenge of integrating a large Russian-speaking minority.

Like all the countries that emerged from behind the eastern side of the Iron Curtain, Estonia was a very poor country. However, this was not perceived fatalistically as an insurmountable obstacle, but as an opportunity for innovation, which is, as a rule, a product of necessity, if not emergency as was the case here. At the same time, there was an openness to novelties because "all old things were considered bad" (Interviewee-EE-13, 2023). The collapse of the Soviet Union was seen as a chance to "reinvent the country" (Interviewee-EE-10, 2023). Estonians "had nothing to lose and everything to develop" (Interviewee-FR-5, 2023). This would not have been possible without personnel changes at the level of policy-makers and the administration, and the change in mindset that they brought. Estonia did not carry out lustration, since former communist leaders (e.g., Arnold Rüütel, Vaino Väljas) had largely supported Estonian independence, while pro-Soviet parties were eventually prohibited (Interviewee-EE-6, 2023). The arrival of the 32-year-old historian Mart Laar to the position of prime minister in October 1992 brought a breath of fresh air and change.[44]

It was a reformist government which, according to the testimony of Interviewee-EE-8 (2023) and Interviewee-EE-11 (2023), was not guided by its own political gains and calculations about staying in power, but primarily by making what they believed were the right, though often unpopular, decisions that were meant to direct Estonia towards progress. The government was guided by the slogan "let's clean the scene", which led to a restructuring of ministries and

[43] A recurring theme in interviews was that this was a case of regaining "reindependence" (unlike, perhaps, other states that had not previously been independent).

[44] This was Laar's first term as prime minister, which lasted until November 1994. He would serve a second term from March 1999 to January 2002.

inviting new people into administration, diminishing former Soviet structures and nomenclature (Interviewee-EE-11, 2023). A clean start and fresh blood influenced the way of thinking and the approach taken. The new people in the administration brought with them experience and the habit of working on computers, for instance in scientific institutes, and they introduced the same into the administration (Interviewee-EE-11, 2023). At the same time, Prime Minister Laar received a letter from a professor at a Tallinn university informing him of the coming internet revolution, which greatly intrigued him and prompted him to support various "e-" initiatives (Interviewee-EE-8, 2023). The action-oriented and future-oriented approach that Laar fostered can be explained by his personal characteristics, which were an openness to new ideas and decisiveness, but also a certain perception of him as "crazy" or at the very least "erratic", while his professional background as a historian provided him with a perspective beyond the present (Interviewee-EE-8, 2023).

Estonia was "too poor to build a regular paper-based bureaucracy" (Interviewee-EE-10, 2023). It could also be said that it was too small in terms of its population or taxpayer base, and at the same time sparsely inhabited, making the maintenance of numerous institutions (military, education, healthcare) inefficient from a purely pragmatic and business point of view, which then represented a strong incentive for efficiency (Interviewee-EE-10, 2023).[45] Small-scale pragmatism led to seeking ways to overcome this problem, which was found in digitalisation, but it also provided the motivation for being "bigger in e-things" (Interviewee-EE-13, 2023). Digitalisation, besides increasing efficiency, also represented a means for rooting out corruption as "you cannot bribe a computer" (Interviewee-EE-3, 2023). It was precisely this early digitalisation that enabled Estonia to transcend its size, to rid itself of the Soviet legacy of corruption and inefficiency, to stand out from other post-communist countries, and, through a kind of (digital) exceptionalism, to build a narrative about itself for the rest of Europe (and the world) into which it sought to integrate. In addition, it was also an opportunity for rebranding the country. The geographical proximity of the Scandinavian countries served as a source of inspiration and a benchmark, and their corporate culture (many Estonian companies were privatised by Scandinavian ones) aided in reforming the ethical standards of the private and government sectors (Interviewee-EE-3, 2023).

[45] The Estonian pragmatism can be explained by their historical roots as a rural people, meaning that, when faced with political problems, they tend to use a "clear farmer's mind" (Interviewee-EE-6, 2023). This pragmatism stems from life in the countryside, where a farmer understands that, despite having ideas about vegetarianism or saving forests, he must realistically "eat his pigs (...) and manage his forest" (Interviewee-EE-6, 2023).

The final part of Estonia's historical background, and a defining feature of its post-Soviet period, is the large Russian-speaking population and the challenge of their integration. This is an issue which had an impact on i-voting, as the subsequent section will show. According to data from 2025, Estonia has a population of 1,369,995, of which 285,819 or 20.86% identify ethnically as Russians (Statistics Estonia, 2025). Additionally, 162,969 non-EU citizens and 60,169 individuals listed as 'not specified' live in Estonia (Statistics Estonia, 2025). Russians living in Estonia include Estonian citizens, Russian citizens, and "grey passport holders" (people without citizenship), and only those who hold Estonian citizenship can vote in national elections (Interviewee-EE-6, 2023). At the same time, the law prohibits dual citizenship with Russia, and acquiring Estonian citizenship presupposes the renunciation of Russian citizenship. However, there is no communication or data exchange with the Russian authorities, so it is highly likely that cases of dual citizenship exist (Interviewee-EE-6, 2023). Moreover, since the beginning of the Ukrainian-Russian war, there has been an increased interest from citizens of Russian nationality in acquiring Estonian citizenship, but Russia refuses to release them from their citizenship (Interviewee-EE-6, 2023). To understand the reason for this number of the Russian population in Estonia, and then why it is important politically and for i-voting, it is necessary to look into the not-so-distant past. The Russian-speaking population moved to Estonia during the Soviet Union over a period of about half a century, which led to a change in the demographic composition of the population (Interviewee-EE-3, 2023). Russification was considered one of the main threats to Estonia (Interviewee-EE-11, 2023), and the Russian population was behind the counter-independence movement, for example, the Interfront and the Union of Working Collectives (Interviewee-EE-6, 2023). The reasons for this can be found in the following vivid description:

> "One morning they woke up in a foreign country. They had always known the Soviet Union, where you could be understood with the Russian language. They also followed Russian TV channels and all those attitudes" (Interviewee-EE-6, 2023).

Even after more than three decades of independence, Estonia has not succeeded in integrating this part of the population, primarily in the use of Estonian at the everyday service level (Interviewee-EE-3, 2023). The genesis of the problem lies in the school system, which is divided between Estonian and Russian-speaking schools (Interviewee-EE-6, 2023). The declaration of Estonia's independence meant that they "lost their privilege" (Interviewee-EE-6, 2023). Estonian became the official language. Although Russian is no longer an official language, the state portal and public services are translated into Russian and English to increase

accessibility for those who are not proficient in Estonian (Interviewee-EE-3, 2023). Besides the language barrier, the Russian population has been less technologically savvy, and students from Russian-speaking schools also achieve lower scores on national exams, which creates barriers to higher education and the labour market (Interviewee-EE-3, 2023).

To understand Estonia's policies, including its digital ones, one must understand the broader geopolitical environment, a context shaped by its historical ties to Russia and the Russian minority within its borders. The link to digital policy might not be obvious at first glance. Russia is arguably the single most important factor driving Estonia's aggressive digital transformation and its willingness to take risks other countries would not consider (Drechsler, 2018). This is a consequence of the historical trauma caused by the foreign occupations that Estonia endured for centuries. On the one hand, digital exceptionalism provides international visibility, making it harder for a small nation like Estonia to be wiped off the world map (Drechsler, 2018). On the other hand, it requires constant vigilance and preparedness for scenarios involving cyber and physical attacks, so that Estonia could continue to function as a virtual country even in the event of a physical occupation (Drechsler, 2018).

The situation in Russia during the 1990s, up until Putin's regime consolidated power in the mid-to-late 2000s, was advantageous for Estonia. It provided the space to lay the groundwork for e-Estonia and introduce i-voting:

> "When I am thinking about that period, that window of opportunity was open then because Russia was not so aggressive. Putin had a different face back then. It was a weak country" (Interviewee-EE-13, 2023). At the same time, the early 2000s were years of optimism in Estonian society, with annual improvements in life quality, growing wealth, increased housing, and the achievement of joining the European Union and NATO, all of which made people hold strong beliefs in positive future perspectives (Interviewee-EE-6, 2023).

This period of relative calm was not to last. The turning point came a few years later in 2007 when Vladimir Putin, in February of that year, delivered his now-famous speech at the 43rd Munich Security Conference. From then on, Russia "became more confident and they believed that aggression could be a good method for solving problems" (Interviewee-EE-13, 2023). This was followed by a cyberattack on Estonia that same year (Interviewee-EE-3, 2023; Interviewee-EE-2, 2023; Interviewee-EE-8, 2023), and the 2008 war in Georgia, where physical bombing was synchronised with a cyberattack (Interviewee-EE-8, 2023). A new moment arrived in 2014 with the Russian occupation of Crimea, which prompted Taavi Kotka,

an important figure in e-Estonia, to conceptualise Estonia as a virtual country in case a similar scenario were to unfold there (Drechsler, 2018). Russia's 2022 invasion of Ukraine has complicated the situation further, and cyberattacks against the Estonian e-state infrastructure "have gone up and stayed at a high level" (Interviewee-EE-1, 2023). In today's geopolitical environment, with an aggressive Russia and a war previously thought unimaginable in the 21st century, adopting i-voting would be a much harder task (Interviewee-EE-2, 2023). Ironically, it is Russia that has been working on and has adopted i-voting since the outbreak of the COVID pandemic, which represents "a bad advertisement" for the technology (Interviewee-EE-13, 2023). This leaves Estonia isolated in its adoption, as i-voting is becoming a tool of authoritarian regimes, and it necessitates its adoption by non-authoritarian countries to create a balanced mix (Interviewee-EE-12, 2023). With similar irony, Drechsler (2018) notes that an atmosphere has emerged in Estonia where it has become politically perilous to challenge i-voting, since "the accusation of being a Putinite just for wanting to vote on paper always hangs in the air" (p. 6), despite Vladimir Putin himself having been an advocate for i-voting in Europe.

7.3 **Towards e-Estonia**

One of the first concrete step towards digitalisation was certainly the Tiger Leap programme, launched in 1996 under President Lennart Meri (Interviewee-EE-11, 2023), which sought to accelerate the technological and digital development of the country (Interviewee-EE-11, 2023, Interviewee-EE-13, 2023). Tiger Leap had two components: technological infrastructure and skills education (Interviewee-EE-10, 2023). The first component aimed at introducing the internet into schools, libraries, and other public buildings to ensure availability, while the second component aimed to retrain teachers to give the entire society the capacity to use technology. The programme was successful and generated enthusiasm among the younger generations, who then spread it to their families, encouraging households to prioritize buying a computer (sometimes instead of buying a new washing machine) (Interviewee-EE-11, 2023). The expansion of internet availability and the building of a set of computer skills among the population increased receptiveness towards later digital public services. The private sector had an important role in the digitalisation of Estonia, both through financing skills acquisition for the citizenry and through the development of new services. For example, Hansa Bank financed the acquisition of basic computer skills for approximately 20% of the least fortunate parts of the population through the "Look at the world" programme (Interviewee-EE-10, 2023; Interviewee-EE-7, 2023). Internet banking was introduced in 1996, and Estonian banks were

noted for being better digitalised than the Swedish banks that eventually purchased them (Interviewee-EE-7, 2023). Later, the banking sector played a role in providing public services by enabling login to them via bank user credentials.

As the government was guided by pro-market principles[46], it was undisputed from the beginning that the development of digital solutions should be outsourced, and Estonia's path to digitalisation involved collaboration with the private sector and academia from its early beginnings (Interviewee-EE-3, 2023). Estonia had existing expertise from the start that served as a solid base for the development of digital public services. Specifically, back in the time of the Soviet Union, in 1960, the Institute of Cybernetics of the Academy of Sciences of Estonia was founded in Tallinn, where "nerds were making high-end systems for the Soviet space program" (Interviewee-EE-10, 2023). The modern company, Cybernetica, grew directly out of the Institute and because of this background, it is still regarded as a scientifically driven, distinguished company (Interviewee-EE-12, 2023). Estonia was penniless, yet this was perceived as a blessing rather than a curse. Estonian solutions, particularly in the early years, were developed relatively cheaply by small domestic firms, thereby avoiding costly contracts with large international corporations such as IBM or Microsoft (Interviewee-EE-7, 2023). This proved beneficial in several ways. It enabled the development of indigenous solutions and the accumulation of local expertise. It positioned Estonia at the forefront of an entirely new segment of information technology, namely e-government services. It also contributed to the country's resilience, as Estonia was not dependent on foreign multinational companies but rather on its own technical competence. Finally, it allowed room for experimentation with even radical ideas, such as internet voting, though the initial focus was on those life events and services where the usefulness and public impact would be most visible. Over the years, the Estonian IT sector became known for its start-ups, later unicorns, Skype, Bolt, and Wise, which did not aim to develop customised, but rather global solutions (Interviewee-EE-7, 2023).

The country's openness towards the private sector can also be seen in the organisation of a special roundtable every few months for discussion, which would be convened by a special council for IT (Interviewee-EE-7, 2023). One person embodied this approach: Linar Viik, one of the most important figures behind e-Estonia. As an advisor to Prime Minister Laar, he had a free hand, and no IT decision was passed without his authorisation within the government

[46] In this regard, Interviewee-EE-10 (2023) shares an anecdote about how Prime Minister Laar had read only one book on economics, by Milton Friedman, and decided to be guided by what he read. Velmet (2025) notes the book is "Free to Choose".

(Interviewee-EE-8, 2023). Viik is considered a digital visionary and an innovator who made a great contribution to advancing the digitalisation of Estonia (Interviewee-EE-10, 2023; Interviewee-EE-6, 2023). An important role was played by "an epistemic community of IT people", which was extremely influential and included experts from both the public and private sectors (Interviewee-EE-7, 2023). It was precisely this community that made it possible to bring together all of Estonia's experts and achieve a technical consensus regarding the i-voting system concept (Interviewee-EE-2, 2023). Moreover, this community helped Estonia survive the 2007 cyberattack (Interviewee-EE-2, 2023).

In Laar's second term, at the turn of the 21st century, e-Estonia began to take its first concrete forms:

> "I couldn't say I am an expert in IT in any way. I only had ideas, quite largely coming from my laziness. The e-government idea came from the fact that until then, the Prime Minister had to carry all the materials of the cabinet session by hand to the press conference. There was an enormous amount of paper, and I asked, "Isn't it possible that we no longer produce this paper? The internet can do everything." Then we rethought, and e-government came. Margaret Thatcher said to me often: "When you do something, you don't know exactly what will come out of it." With a lot of this IT stuff, we started something, and what came out, we didn't even have the smallest idea about in the beginning. But it happened" (Interviewee-EE-8, 2023).

There are two important infrastructural components of e-Estonia: X-Road and the electronic identity card (eID). X-Road is the middle data exchange layer (a distributed system) for different government and private entity databases, and it enables the secure and automated exchange of data between databases across the open internet (Interviewee-EE-3, 2023; Interviewee-EE-10, 2023). The decision to use the open internet to exchange data (rather than a separate government network like Singapore uses) necessitated the implementation of high-end encryption and the integrity mechanisms provided by X-Road (Interviewee-EE-10, 2023). X-Road enforces the "once-only" principle, meaning that a citizen should only have to give their data to the government once, and the government is then responsible for exchanging that data within its systems, while at the same time, the creation of duplicated datasets of already-existing data is prohibited (Interviewee-EE-3, 2023). It was established in 2001.

Just a year later, in 2002, the rollout of the eID began. It is a two-in-one component, serving as both a physical document and an electronic key (Interviewee-EE-3, 2023). It allows for secure authentication and serves as the log-in key to the entire digital ecosystem (Interviewee-EE-3,

2023). On top of that, the eID card allows the use of a qualified electronic signature for signing documents and conducting transactions (Interviewee-EE-3, 2023). Development began in 1997 with plans for completion in 14 months, but in the end, it stretched to 5 years (Interviewee-EE-9, 2023). The idea for the eID was not originally Estonian - the model was found in Finland. However, the eID was not mandatory there, citizens did not voluntarily request eIDs because there were no services connected to it (Interviewee-EE-3, 2023), and their price of about 40 euros was not a small expense (Interviewee-EE-9, 2023). The Estonians learned from Finland's mistake, and it was decided that the Estonian eID should be mandatory (though non-punitively) for everyone, but also affordable, with a price of about 10 euros, which was 4 times cheaper than in Finland (Interviewee-EE-9, 2023). This seemingly simple innovation was not adopted as easily as one might expect. Pushing through the eID card was the last decision Mart Laar made as Prime Minister in his second term. He had to fight hard for the eID card, as many viewed it as merely an "empty thing for the future" or the Prime Minister's "toy" due to its cost (not the cost of issuing an individual card, but the infrastructure cost) and lack of immediate applications (Interviewee-EE-8, 2023). Initially, the eID cards were "only good for picking mushrooms" because there were so few services connected to it (Interviewee-EE-2, 2023). However, with a mandatory eID, the incentive to build services based on this identity was seen by the private sector (Interviewee-EE-10, 2023), and the eID became the default login for banks, telecom, and e-commerce (Interviewee-EE-3, 2023). On the other hand, an increasing number of public services became available that could be accessed with the eID, and it was possible to use the qualified electronic signature (Interviewee-EE-2, 2023). Over time, in addition to the physical eID card and reader, mobile-ID, a SIM card-based verification using SMS two-factor authentication, and smart-ID, a pre-verified smartphone application that acts as a login method, were introduced (Interviewee-EE-3, 2023).

7.4 **I-voting**

Estonia is, to this day, the first and only country that has adopted i-voting for all elections and offers it to all citizens. This fact is well known, but the genesis of the idea itself is less clear than one might expect. Through interviews with 14 individuals in Estonia, it is not easy to point to a specific person who originated the idea of i-voting. Some state that the idea came from academic circles (Interviewee-EE-14, 2023), while others claim it was first presented in 2001 by Märt Rask (Interviewee-EE-9, 2023; Interviewee-EE-11, 2023), the then Minister of Justice from the Reform Party, with possible influence from his party colleague Taavi Rõivas

(Interviewee-EE-11, 2023). However, (Drechsler & Madise, 2004), who were contemporaries and insiders to the events surrounding the beginnings of i-voting in Estonia, note: "One can safely conclude that the e-voting initiative came from a political elite, and that it was and is largely detached from 'the people' whose participation it is supposed to increase" (p. 104).

At the time when Estonia was starting with i-voting, there were "no serious projects in the world" (Interviewee-EE-5, 2023). However, in the year 2000, i-voting was used in the Democratic primaries in Arizona. Its vendor was the company Election.com, whose then senior vice president, Regis Jamin, was contacted by Minister Rask. Jamin testifies to this:

> "One little country in Europe, Estonia, called me. It was the then Minister of Justice, Märt Rask. He laid out the program, saying, 'We have a democratic issue in our country. First, we don't have an electoral list, so we don't know who is Estonian, who is Russian, or who is participating in our elections. For democratic elections, we first need to have a voter list. Second, we need technologies that can resist Russian hackers trying to penetrate our system.' The main issue was that if they started then, not all of their people were internet-equipped, so they would need to keep the classical polling places. At those places, they knew they would have pressure from their "Russian friends" to influence the result of the election. So, the question was what the solution could be, because they needed a secret vote, but one that could not be violated. If people vote from home, it's impossible to be sure if they have voted freely and not under pressure. I proposed a simple solution: allow people to vote as many times as they want, but only the last vote counts" (Interviewee-FR-5, 2023).[47]

The idea of i-voting was first publicly announced by Minister Rask about two months before the previously described meeting, in January 2001 (Drechsler & Madise, 2004). The motivation behind the adoption of i-voting can seem very broad. There was a hope that i-voting would increase public participation in decision-making and widen electoral possibilities for participation, that it would encourage young people to participate in elections, addressing the concern that their interests were often underrepresented due to lower turnout compared to older demographics (Interviewee-EE-8, 2023), and also generally address "voter alienation" (Interviewee-EE-12, 2023). However, the motivation was also broader and included moving away from Soviet-era systems of "order and control" (Interviewee-EE-8, 2023). Finally, i-

[47] The meeting between Minister Rask and the representative of Election.com was held on 16 March 2001 (Just.ee, 2001).

voting was “a cool idea” from the Reform Party, which was in power at the time, and, no less importantly, “a wonderful application of the ID card” (Interviewee-EE-9, 2023). However, besides the anticipated benefits that i-voting was supposed to bring, one can sense that its adoption did not follow the usual innovation or policy process. For instance, the frameworks used in this research (Kingdon’s MSF and Rogers’ DOI) presuppose a real-world problem which is then tackled with a thoughtfully designed innovation or policy. In this light, some interpretations suggest that i-voting was actually a solution in search of a problem, and that it was in fact itself a solution to the problem of the e-ID’s initially low usage rate. Thus, Velmet (2025) argues that i-voting in Estonia emerged as an unintended consequence of developing the e-ID infrastructure in the late 1990s and early 2000s. Rather than being “the culminating step in a grand vision of democratic renewal”, it resulted from “the particular confluence of public and private interests, mediated by the network of cyberneticians and unhampered by legacy systems” (Velmet, 2025, pp. 4, 17). The adoption was enabled by a fragile coalition of civil servants facing budgetary constraints, computer engineers with an ethos of experimentation developed at the Soviet-era Institute of Cybernetics, and banks seeking to externalise their R&D costs onto the state (Velmet, 2025). This coalition lacked a unified objective, and the project was pursued as a public-private infrastructure one rather than a political one, allowing it to develop before political controversy could emerge (Velmet, 2025). I-voting became a means of revitalising the initially underutilised e-ID card. This post-Soviet alignment represented conditions that “only came around once a century” (Velmet, 2025, p. 17). Interviewee-EE-8 (2023) states something similar:

> “We were using internet voting to sell the ID card, because for the ID card, nobody understood why we needed it at all. It cost quite a lot of money in the budget, and it was just seen as an empty thing for the future, like the Prime Minister’s toy or something like this. But through voting, as we presented it, it was possible to say, ‘Here is at least one practical application’” (Interviewee-EE-8, 2023).

It is common practice to conduct or commission a study by experts before launching an i-voting project, a fact demonstrated by the cases of other countries, as well as by Estonia’s case. The Ministry of Justice commissioned a feasibility report on i-voting from Helger Lipmaa and Oleg Mürk, which was dated 9 April 2001 (Lipmaa & Oleg, 2001). The report was negative, concluding that the organisation of national i-elections in 2002 was utopian given the state of technology, that lesser elections might be feasible in 4-8 years, and that i-voting is probably inevitable in about 20 years (Lipmaa & Oleg, 2001). However, this negative report did not

deter Estonia. The Ministry of Roads and Communications commissioned a new report from Tanel Tammet and Hannu Krosing, which was published on 24 October 2001 (Tammet & Krosing, 2001). Their conclusion was that it is "practically possible and advisable to conduct e-elections both in the 2002 local government elections and in several subsequent elections" (Tammet & Krosing, 2001, p. 3). This came with the note, however, that it was important to initially do so in the form of "a limited-scope trial with limited technological complexity and limited significance", whose main goal was "to learn from mistakes for subsequent e-elections, rather than as a fundamental, immediate and reliably functioning alternative to classical elections" (p. 3). I-voting should be a continuous, long-term process that involves organising experiments with continuously increasing volume and real-life significance, rather than viewing it as a one-time event (Tammet & Krosing, 2001).

The legal framework that made i-voting possible can be broken down into indirect and direct legislation. The indirect ones are related to infrastructure, and these are the Identity Documents Act of 1999, the Digital Signature Act of 2000, the Population Register Act of 2000, and the Personal Data Protection Act of 1996, which was replaced by a new law in 2003 (Centre for Intellectual Property and Information Law, n.d.; Ehin et al., 2022; The World Bank, 2015). During 2002, the Ministry of Justice proceeded with the passage of four laws governing electoral matters in order to enable the adoption of i-voting. These were the Local Communities Election Act (also referred to as the Local Government Council Election Act), the Riigikogu Election Act, the European Parliamentary Election Act, and the Referendum Act (Drechsler & Madise, 2004). Instead of a general debate about i-voting as a new method being adopted to the electoral system, the discussion was fragmented across these four distinct legislative processes (Drechsler & Madise, 2004).

The testing of the i-voting system before its use in politically binding elections in Estonia was not nearly as comprehensive or lengthy as in other countries. During 2004, several tests were conducted "at lower levels" (Goos & Korthagen, 2020, p. 279). Then, in January 2005, a popular consultation (a non-binding referendum) was held in Tallinn regarding the location of a monument (Breuer & Trechsel, 2006). Turnout was extremely low, with only 703 voters participating and 693 counted votes (Madise & Vinkel, 2014), which represents 1.5% of Tallinn's inhabitants. 14% of the votes were cast via the internet (Breuer & Trechsel, 2006). It was a "kind of unimportant question" that served primarily as "a tryout" for the i-voting system before its premiere in the local elections in October 2005 (Interviewee-EE-12, 2023).

While the technological basis of i-voting was ready for the 2005 local elections, the legal and political issues had not yet been fully resolved. With the beginning of spring 2005, friction sparked during the amendment of the Local Government Council Election Act between the parliamentary majority and the president of the country, concerning the possibility of revoting for those who vote via the internet. As mentioned, the idea for revoting came from Regis Jamin (Interviewee-FR-5, 2023). However, the legal enactment of this idea proved to be the main point of contention during the adoption of i-voting. In traditional elections at polling stations, the principle of secrecy implies the right and obligation to cast one's vote alone in a polling booth. In the case of i-voting, a form of remote voting, it was recognised that the state cannot ensure the privacy of voting because the act is undertaken in an uncontrolled environment, which requires a re-thinking of the principle (Madise & Martens, 2006; Madise & Vinkel, 2014). This led to a teleological interpretation of the principle of the secrecy of voting. The position was taken that secrecy and privacy are not objectives in themselves, but rather a means for guaranteeing the freedom of choice and protecting the individual from any form of coercion or influence against their free expression of political preference (Madise & Martens, 2006).

To overcome the challenge of voting from uncontrolled environments, the revoting mechanism (reversible or multiple voting) was introduced. According to the first version of the Local Government Council Election Act Amendment Act passed on 12 May 2005, this provided for two elements (Alvarez et al., 2009b; Breuer & Trechsel, 2006; Maaten, 2004; Maaten & Hall, 2008). The first was an electronic re-vote during the advance voting period, which allowed an i-vote to be electronically cast multiple times, with only the last i-vote counting. The second was the priority of a paper ballot, whereby an i-vote could be replaced with a paper ballot cast at a polling station, even on Election Day until 16:00. If a paper ballot was cast, the e-vote would be overridden. The then-president Arnold Rüütel refused to promulgate the amendment to the law, considering that revoting constituted a violation of the principles of equality and uniformity of suffrage, because the ability to change one's vote gave i-voters unequal voting opportunities (Mendez, 2010; Supreme Court of Estonia, 2005). On 15 June 2005, Parliament re-adopted the act with amendments that included a provision that an i-vote could be changed from the sixth to the fourth day before election day, thereby attempting to address the President's objections while at the same time retaining the re-vote option(Supreme Court of Estonia, 2005).

However, the President again refused promulgation, whereupon Parliament passed the same text of the law on 28 June 2005.[48] The President then turned to the Supreme Court on 12 July 2005, requesting a declaration that the act is unconstitutional (Supreme Court of Estonia, 2005). In its judgement of 1 September 2005, the Supreme Court dismissed the President's petition, holding that although the right of i-voters to change their votes could be seen as a formal inequality, it was not unconstitutional because it served the substantive democratic principles of free and secret elections (Supreme Court of Estonia, 2005). The judgement was centred on a teleological interpretation of electoral principles, ruling that the possibility for i-voters to change their vote repeatedly provided an "an essential supplementary guarantee to the observance of the principle of free elections and secret voting when voting by electronic means" (Madise & Vinkel, 2015, p. 116). The resulting infringement of uniformity was deemed "not sufficiently intensive" to outweigh these higher constitutional values (Supreme Court of Estonia, 2005, p. 7).

The Estonian political system, at least as it was at the time i-voting was adopted, cannot be understood from a European perspective of what political parties are. It was much more akin to "functionally vague associations of friends that represent certain interests (and funding sources) but hardly any ideological direction" (Drechsler & Madise, 2004, p. 105). The absence of a typical political career model facilitates continuous turnover between the public and private sectors, which allows technology-savvy individuals to infuse the administration with technical competence and open-mindedness (Interviewee-EE-3, 2023; Interviewee-EE-7, 2023). The system is marked by low polarisation, which allows that even if a party loses an election, it can still be part of a governing coalition, a situation different from other countries where winning or losing carries far greater weight (Alvarez et al., 2009b; Weill, 2017). Political structures are flexible, they have "the rather low level of institutionalization of democratic processes" (Reiners, 2017, p. 42), and are less intertwined, which greatly simplifies institutional change (Reiners, 2017). The processes, particularly in the field of digitalisation, can be described as top-down or even a form of digital ideology (Hartleb, 2020, drawing on Vaarik, 2015). Decision-making happens within the executive, not from party competition, civic movements or societal pressure (Hartleb, 2020). Such rapid, top-down decision-making fostered a "high level of support for overcoming any initial hurdles" (Alvarez et al., 2009b, p. 500) and allowed

[48] Ultimately, the option to vote on paper on election day and thereby cancel previous i-votes was introduced only later, in 2021 (Ehin et al., 2022).

policy-makers to “push through the e-voting agenda with haste” (Mendez, 2010, p. 467). The post-communist “generational cut”, which brought forth a new generation of young politicians, many of whom had studied abroad, can explain the Estonian political system and its decision-making as pragmatic, technocratic, and consensus-oriented, rather than pluralist or ideologically divided on digital issues (Hartleb, 2020). Informal coordination networks, which overlapped and consisted of a small number of people from the public and private sectors, played a major role in creating the e-Estonia story (Cepilovs & Dueñas-Cid, 2020). Estonian democracy can therefore be described as technocratically mediated and founded on technological proceduralism, that is, on trust in systems and experts rather than through participatory pluralism or contestatory politics (Hartleb, 2020).

During the adoption of i-voting, political parties held different positions on the matter, but these were primarily concerned with legal and political questions, and to a much lesser extent with technical ones. The anticipated political gains or losses associated with i-voting shaped the parties’ positions. Of the six most significant parties represented in parliament, three were proponents of i-voting (the Reform Party, the Fatherland Party (formed by the merger of the Res Publica and Pro Patria Union parties), and the Social Democrats), while the other three were opponents (the Centre Party, the People’s Union of Estonia, and its successor, the Conservative People’s Party of Estonia (EKRE)) (Ehin & Solvak, 2021). The government’s coalition agreement of 2003 between Res Publica, the Estonian Reform Party, and the Estonian People’s Union contained an unambiguous provision: “The coalition shall aim to create the necessary conditions so that it would be possible to implement e-voting at the 2005 local government council elections” (Breuer & Trechsel, 2006, p. 7).

The main proponent and initiator of i-voting’s adoption was the Reform Party, a neoliberal and market-radical party that can be said to have been a winner of the post-Soviet transition (Drechsler, 2003). Its Minister of Justice, Märt Rask, was the first to come out with the idea in January 2001 (Drechsler, 2003). He presented i-voting as a means to increase turnout and retain digital leadership, but also as a side-product of the eID card project (Ehin & Solvak, 2021; Velmet, 2025). Support also came from the Pro Patria Union, led by Mart Laar, a market-oriented right-wing party (Drechsler, 2003), who was prime minister when the idea of i-voting was made public.

Among the opponents, the first was the Estonian People’s Union, a socially conservative party with its electoral base in the rural parts of the country (Ehin & Solvak, 2021). The party was

against innovations like i-voting on principle. Their aversion to and mistrust can be summed up by the sentiment: “Something with the internet, something with IT, who knows what that means” (Interviewee-EE-2, 2023). The publicly declared reasons for their scepticism towards i-voting were related to claims about its unobservability and the impossibility of identifying voters in remote voting (Ehin & Solvak, 2021). In fact, the party “(…) feared that such a feature would increase the vote of its competitor parties, and which therefore would have very rightly and properly fought against it in Parliament (…)” (Drechsler & Madise, 2004, p. 105). Their fight yielded results when the 2002 package of electoral laws postponed the adoption of i-voting to 2005. Then, in 2005 itself, a few months before the local elections and the adoption of i-voting, they attempted to stop it through their former chairman, then-President Rüütel, first by refusing promulgation and then by submitting a petition to the constitutional court, which ultimately did not succeed.

The other opponent was the Centre Party, a populist party that was the main loser of the transition, which held the mayorship of Tallinn at the time (Drechsler, 2003). It is worth noting that they were part of a coalition government with the Reform Party, led by Prime Minister Siim Kallas (January 2002 – April 2003), and that it was precisely during this period that the legal framework enabling the use of i-voting was adopted (Drechsler, 2003). This is explained by the fact that the laws passed in 2002 merely established the possibility for i-voting without making it operational, which in turn enabled the financing of i-voting’s development for its first application in 2005 (Madise & Vinkel, 2014). It was the most prominent antagonist of i-voting, especially after its adoption, and relied on the part of Estonian society that was “more conservative and not as open to new technology as Estonian-speaking citizens” (Interviewee-EE-13, 2023), and on the “computer-illiterate and Russian-speaking” electorate (Interviewee-EE-9, 2023). Even at the time of i-voting’s adoption, it was intuited that parties with younger voters, who are more tech-savvy, could benefit (Interviewee-EE-11, 2023), while the Centre Party operated on the assumption was that Russian grandmas “will never even bother with i-voting” (Interviewee-EE-3, 2023). The party undertook numerous actions in its campaign against i-voting. It was extremely inventive and creative in this, and only some examples are listed here to illustrate the importance and dedication of the party to this issue. It financed the arrival of foreign experts in 2011 and 2014 who produced critical reports on the i-voting system used in Estonia (Ehin & Solvak, 2021). In 2013, the NGO Fair Elections, affiliated with the Centre Party, held a street campaign in Tallinn with anti-i-voting signs, while the Centre Party-led city government of Tallinn organised a forum titled “The Devil Elects Over the Internet”

(Ehin et al., 2022). In 2014, the party appealed to top Estonian and EU officials, demanding the discontinuation of i-voting (Ehin & Solvak, 2021).[49] The long-time leader Edgar Savisaar opposed i-voting with the argument that the party would never win elections as long as i-voting existed (Interviewee-EE-11, 2023). The criticism of i-voting lasted for about a decade[50] until the election of their leader Jüri Ratas as prime minister in 2016, when, although in power, they "didn't really make any decisions to get rid of it" (Interviewee-EE-7, 2023). Although it still proposed shortening the i-voting window in 2017, that same year Prime Minister Ratas expressed his endorsement for i-voting, and since then the Centre Party has ceased its criticism (Ehin & Solvak, 2021).

The Conservative People's Party of Estonia (EKRE) then took up the mantle of criticism, emerging as the main opponent of i-voting. Martin Helme, chairman of EKRE, confirms this, stating: "I have had issues with electronic voting at least over the past three or four electoral cycles, so from 2015 or 2017. Before that, I didn't get involved in any of the processes" (Interviewee-EE-14, 2023). Until then, EKRE voters used i-voting and polling station voting in equal proportions (Interviewee-EE-13, 2023) and did not differ in trust from other voters (Interviewee-EE-1, 2023). When EKRE started criticising i-voting, this was reflected in the trust of their voters, which became extremely low (Interviewee-EE-1, 2023), and consequently in their behaviour, that is, their preference for voting on paper at polling stations (Interviewee-EE-13, 2023). Evidence of this can be seen in the levels of voters' trust in i-voting after the 2019 parliamentary elections, where EKRE and Centre Party supporters expressed between 40 and 50 per cent trust, while voters of other parties expressed over 80 per cent trust in i-voting (Johan, 2019, as cited in Ehin et al. (2022).[51]

EKRE has two fundamental objections to i-voting: first, that it is not observable and recountable, and second, that it is not in accordance with the Estonian constitution (Interviewee-EE-14, 2023). They argue that the process is centralised in such a way that the

[49] A further overview of the steps taken against i-voting by the Centre Party and EKRE, which is more for information and review here as needed for the purpose of the case study, can be found in Ehin & Solvak (2021) and Ehin et al. (2022).

[50] Parliamentary elections were held in March 2015, but Jüri Ratas became Prime Minister only in November 2016 after Taavi Rõivas's government, a coalition of the Reform Party, the Social Democratic Party, and Isamaa, lost a vote of no confidence. Ratas subsequently formed a new coalition government comprising the Centre Party, the Social Democratic Party, and Isamaa.

[51] Ehin and Solvak (2021) show that voter trust in i-voting in Estonia, due to its technical complexity, is highly dependent on cues provided by their preferred political party, and that party affiliation is an independent factor that influences the formation of trust, which cannot be explained by differences in the socio-demographic characteristics of voters.

National Electoral Committee hands over control of the process to the State Information System Authority (RIA) and it is largely outsourced to the private sector (primarily Cybernetica) without the necessary oversight, which calls electoral integrity into question (Interviewee-EE-14, 2023). Therefore, "you have to believe what you're being told" (Interviewee-EE-14, 2023). Regarding constitutional inconsistencies, they cite what President Rüütel also cited, which is that revoting violates the equality of suffrage. In addition, they argue that the system "can't guarantee that an electronically given vote is a free vote" due to possible coercion, and also that the constitution speaks of an election day, so the seven-day period for voting is not in accordance with the constitution (Interviewee-EE-14, 2023). On top of that, they also claim that the RIA can see who voted for whom and cite instances where civil servants were allegedly told their vote for EKRE was known and were instructed to change it (Interviewee-EE-14, 2023). Therefore, EKRE's goal could not be more explicit: "We are working towards achieving the abolition of internet voting" (Interviewee-EE-14, 2023). Like the Centre Party, EKRE sought to make the topic of i-voting visible to the public and began taking steps in that direction from 2017. Thus, they called for an international audit of the i-voting system in the spring of that year, and half a year later filed a complaint with the Electoral Committee, demanding that i-voting be disabled for the upcoming local elections due to the e-ID card crisis (Ehin & Solvak, 2021). While part of the ruling coalition (April 2019 – January 2021), EKRE continued its attempts to problematise i-voting, but with limited success. An expert working group was launched under their minister at the Ministry of Foreign Trade and IT, Kert Kingo, to assess the verifiability, security and transparency of the system. However, its final report in December 2019, while containing 25 recommendations for improvement, concluded that there were no grounds for the discontinuation or limitation of i-voting (Ehin et al., 2022; Ehin & Solvak, 2021). Having since returned to the opposition, EKRE continues its fight to discontinue i-voting.

Interestingly, one of the features of Estonia's adoption of i-voting was the absence of organised opposition from civil society. At the time, there was no bottom-up mobilisation nor any "Pirate-style" digital-rights movement at the time i-voting was adopted (Hartleb, 2020). The first critical voices emerged from local hackers Paavo Pihelgas and Märt Põder, from 2011 onwards (Velmet, 2025). Põder remains arguably the most high-profile civil society opponent of i-voting today. He is a board member of the NGO Fair Elections (Estonian: Ausad Valimised) and uses

his blog and social media to actively monitor and critique developments related to i-voting in Estonia.[52]

In comparative terms, the time Estonia took to adopt i-voting was extremely short, just under five years from its announcement to implementation (January 2001 – October 2005). However, the initial plan was to adopt i-voting as early as the local elections in October 2002 (Drechsler, 2003) or the parliamentary elections in March 2003 (Velmet, 2025). Although the relevant electoral laws were passed in the spring of 2002, ahead of those elections, The Local Communities Election Act ultimately specified that i-voting "shall not be applied before 2005 so that enough time would be left for preparatory activities and for all stakeholders to be involved" (Kalvet, 2009, p. 513). This was the result of a political compromise and open technological questions and worries related to the i-voting system itself. The government of Siim Kallas, which was implementing the electoral law changes in 2002, did not have a majority in parliament (the Riigikogu), holding 47 of the 101 seats. This required it to rely on the votes of the Estonian People's Union to pass legislation, so their opposition to i-voting was taken into account, thereby postponing the adoption of i-voting to 2005 at the earliest (Drechsler, 2003). At the same time, individual members of the parties that supported i-voting had their own doubts, and there was concern that all the necessary technical preconditions for i-voting could not be secured in such a short period of a few months before the October 2002 local elections (Drechsler, 2003).

7.5 **Effects and consequences of i-voting**

I-voting saw its first use in the local elections of October 2005 and has since been offered as a voting method in all subsequent elections: local, parliamentary, and European parliamentary. Given that Estonia is the only country in the world with such extensive and rich experience in this area, it is possible to draw certain conclusions about the consequences of i-voting based on two decades of its use.

One of the possibly counter-intuitive consequences relates to electoral administration. There has been no reduction in the administrative burden of local election officials (LEOs) (Krivonosova, 2021; Spycher-Krivonosova, 2022). Adopting i-voting meant adding another voting channel and creating a process to reconcile votes from two different sources to uphold

[52] Põder's activist work can be followed on the social network X (https://x.com/trtram) and his blog Üks Tartu krants (https://gafgaf.infoaed.ee/).

the principle of equal suffrage (Krivonosova, 2021). It also expanded the number of stakeholders involved in election delivery to include new public bodies (like the State Electoral Office, the Estonian Information System Authority, and the Electronic Voting Committee) and various private entities (such as AS Cybernetica as a vendor, auditors, and other technology providers) (Heiberg et al., 2017; Krivonosova, 2021; Spycher-Krivonosova, 2022).

Although Krimmer et al. (2020), using the example of the 2017 local elections, empirically show that i-voting is the most cost-efficient method when evaluated by administrative cost per vote cast an i-vote costs roughly half as much as a vote cast on Election Day), the multi-channel nature of the elections actually makes them more expensive when i-voting is offered as an additional option. It is because the necessity of paper voting serves as a safeguard against coercion and as a backup in case i-voting does not function.

At the voter level, the adoption of i-voting was somewhat gradual. It started modestly at 1.9% in the 2005 local elections, rising to 5.5% in the 2007 parliamentary elections. The 10 per cent threshold was crossed in the 2009 European parliamentary elections (14.7%), followed by the 20 per cent mark in the 2011 parliamentary elections (24.3%) (Valimised.ee, 2025). It surpassed 30 per cent in the 2014 European elections (31.3%) and 40 per cent in the 2019 parliamentary elections (43.8%), before reaching its current peak of 51.1% in the 2023 parliamentary elections (Valimised.ee, 2025).

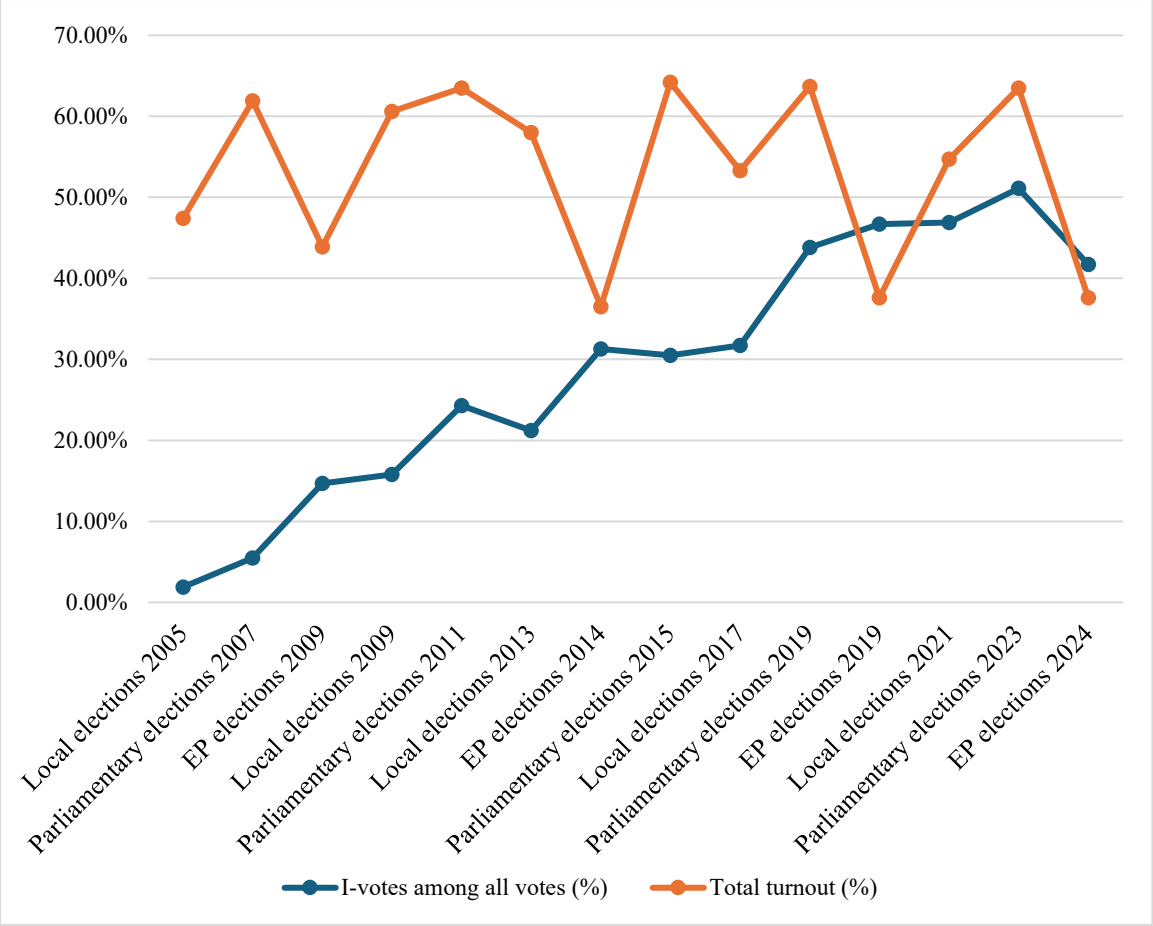

Figure 7.1 Share of i-votes and total turnout in Estonian elections, 2005-2024 (Valimised.ee, 2025).

Probably the most common belief related to i-voting is that it contributes to an increase in turnout, based on the idea that if access to voting is easier and the cost of voting is lower, turnout will be higher. This has not been the case in Estonia. No increase in turnout has been observed, and it can generally be said that i-voting hasn't changed Estonian democracy, or if it has, the change has been very minimal (Interviewee-EE-8, 2023; Interviewee-EE-7, 2023; Interviewee-EE-1, 2023; Interviewee-EE-12, 2023; Interviewee-EE-9, 2023; Interviewee-EE-13, 2023; Interviewee-EE-6, 2023; Interviewee-EE-10, 2023). Although some innovations have occurred at the local level in the form of participating budgeting or e-councils (allowing public viewing of sessions and remote participation by members), the change is more in perception than in outcome (Interviewee-EE-12, 2023). Also, there has been no increased demand for direct democracy in the form of referendums (Interviewee-EE-7, 2023). But what i-voting has become is "just another means of voting" (Interviewee-EE-10, 2023), and people

who were already participating in voting simply switched to i-voting[53] (Interviewee-EE-3, 2023; Interviewee-EE-1, 2023), primarily because it saves time and resources, in other words, it is more convenient (Interviewee-EE-7, 2023; Interviewee-EE-1, 2023).

However, i-voting "hasn't mobilised new voters" (Interviewee-EE-1, 2023). The traditional socio-demographic profile of a voter is the same, and this lack of an increase in turnout can be attributed to a lack of political interest. Making voting easier does not solve the problem for those who simply have no interest in participating (Interviewee-EE-1, 2023). However, i-voting has become a "line of division between political parties" (Interviewee-EE-13, 2023). Some attribute this to an echo of Trumpism that spread to Estonia with EKRE, where "losers try to find reasons to explain why they are not winners" (Interviewee-EE-11, 2023). The political opposition created a two-peaked trust distribution that is atypical, with a majority cluster at the high-trust end, a very small number in the middle, and a notable minority (10-15%) with very low or complete distrust (Interviewee-EE-1, 2023). Indeed, voter trust in i-voting has been the single most consistent and powerful predictor of its usage (Ehin et al., 2022; Madise & Vinkel, 2014). Although the use of i-voting in the 2023 elections passed the magic number of 50%, the polarisation in trust in i-voting leads to concerns about electoral integrity.

The aforementioned differences in the level of trust in i-voting are evident in the distribution of votes by voting method. Some parties do indeed have a larger share of i-votes than paper votes. Märt Põder, an activist in the field of i-voting, in his analysis of the 2023 parliamentary elections notes: "Despite near equal usage of e-voting and paper ballots in 2023, the results for different voting methods were as from different worlds" (Põder, 2023).

[53] Admittedly, i-voting was initially used by younger, wealthier, more urban individuals, but this profile began to converge with that of the average Estonian voter and, after three election cycles, matched the average voter in Estonia (Interviewee-EE-1, 2023).

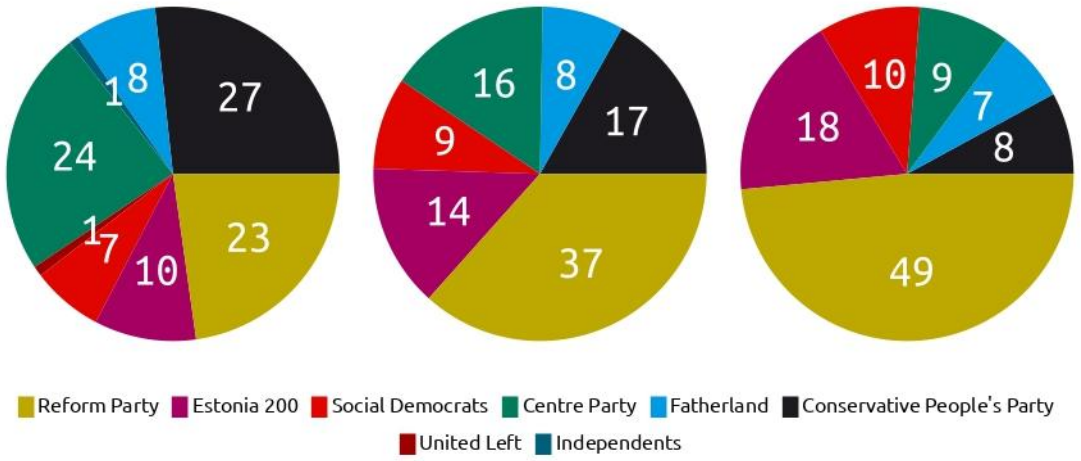

Figure 7.2 Distribution of votes and seats in the 2023 Estonian parliamentary elections by voting method. The figure illustrates the distribution of votes and parliamentary seats across Estonian political parties in the 2023 elections, comparing outcomes from paper ballots, the overall final results, and electronic votes (i-votes) (Põder, 2023).

Over the past 20 years, among European democratic countries, only France has adopted i-voting for its diaspora for legislative and consular elections, while others have either rejected it (the Netherlands, Norway)[54] or remain in a state of prolonged experimentation without a final decision (Switzerland). Therefore, it can be argued that i-voting is the most controversial part of the entire e-Estonia project (Interviewee-EE-7, 2023). At the same time, it has proven to be the most difficult to export, due to its dependence on the preceding ecosystem of trust and infrastructure (Interviewee-EE-10, 2023). In addition, the mainstreaming of digital rights concerns is a more recent phenomenon that was not prominent at the time i-voting was adopted in Estonia, and today it carries much greater significance in debates about i-voting (Interviewee-EE-10, 2023).

Although i-voting has not changed Estonian democracy in the way it was thought it would (e.g., increasing turnout or fostering more direct democracy), it certainly has not been without any impact on other areas. In terms of electoral administration, there has been a reconfiguration of back-office election operations, whereby a decentralised, paper-based system has transitioned to a much more complex, hybrid system (paper voting and i-voting) that requires centralised technical expertise and logistical management. On the technological front, it

[54] Here, the examples of countries that have abandoned or are still experimenting with i-voting are those included in the case studies. Of course, there have been others that have considered or even experimented with it, and these examples can be found in the chapter on the history of i-voting.

represents the most complex and perhaps (in the world) the most visible digitalised service within e-Estonia. It serves as an indicator of Estonia's technological capability and exceptionalism, which then contributes to its international reputation. On the political front, i-voting has led to a polarisation in trust, which is manifested in the patterns of i-voting usage and the share of votes by voting method. Throughout all 20 years, there has been at least one political party at the time that was strongly against i-voting. They believe that i-voting undermines trust in electoral integrity and that some political parties benefit from it disproportionately. Finally, i-voting also has a symbolic importance as a flagship project of e-Estonia, which has contributed to the normalisation and legitimisation of citizen-state interactions through digital means, and thereby reinforced a national identity that has, for the last 30-plus years, been built in no small part on technological innovation.

7.6 **Discussion**

How is it that Estonia, in contrast to and indeed unlike all other European democracies, succeeded in the adoption and sustaining of countrywide i-voting over the past twenty years? A careful reader will notice that much of the discussion refers to the concept of e-Estonia and digitalisation in general rather than the specific innovation under study, i-voting. This is because understanding i-voting is impossible without the wider context, and that wider context also contains an explanation of why i-voting was chosen and how it took root successfully in Estonia as compared with other countries.

It can be stated that Estonia in the 1990s was a nation in search of a state. The post-Soviet legacy and the challenges of transition it faced were acute and existential. A confluence of different indicators, focusing events, and feedback created immense pressure for what elsewhere would be considered unconventional solutions. As a small, sparsely populated, and impoverished nation, Estonia faced the need to rationalise and increase efficiency while building state institutions from scratch. The Soviet legacy, marked by corruption and crippling inefficiency, certainly did not help. A generation of young post-communist politicians decided to make a clean break with this legacy. The regaining of independence, the handling of the Soviet inheritance, and state- and institution-building created the need to construct a distinct national identity and to rebrand Estonia so as to stand out from the cohort of other post-communist countries. The path to that construction was found in digitalisation and digital exceptionalism, which enabled Estonia to be different and to punch above its weight, and thereby to secure its place on the international stage.

The literature often attempts to treat Estonia as a kind of unencumbered country, a "tabula rasa", or, pardon my French, a "lobotomised" country that was receptive to novelties, especially digital ones, which those with an allegedly long state tradition were not ready to accept so quickly. This is a distorted and simplified understanding of Estonia, which had independence in the interwar period between the First and Second World Wars, only for it to be abruptly interrupted by Soviet occupation. During interviews, some interviewees even corrected me when I asked questions about gaining independence, saying that they had regained independence (re-independence). It would be more accurate to understand that through openness to digital innovations in the public sector Estonia sought to catch up with and move closer to the West, to detach itself from the remnants of the Soviet legacy, especially the burdens and dysfunctions it carried, while at the same time differentiating itself from other post-communist countries as a shining example of successful transition, and building its image as a digital-by-default state. The elasticity of the legal framework (e.g., the teleological interpretation of the principle of secrecy for the purposes of introducing revoting mechanisms) should therefore be viewed in the light of the instrumentalisation of the legal framework so that it is receptive and serves the broader vision of Estonia's transition and transformation through digitalisation. On the other hand, the need to build new institutions that moved away from Soviet settings served as a signpost of what Estonia did not want to be and from which it wished to depart. Although a negative example, it was nonetheless a burden it wanted to get rid of.

Estonia's small size, in both global and European terms, is part of the solution to the puzzle. Having all the institutions that much larger countries have and providing all public services for a very sparsely populated and, at that time, poor country with a small number of people is simply inefficient, which creates a need for small-state pragmatism that then represents an incentive for efficiency. Alongside doing things more efficiently, there also emerged a motivation to be larger than its size in the field of digitalisation. Small countries are more flexible and adaptable (Sarapuu, 2010, as cited in Cepilovs & Dueñas-Cid, 2020). Moreover, in Estonia almost everyone knows everyone, and access to decision-makers is easier and less layered, which means that policy entrepreneurs can easily present and lobby for their ideas. The small number of relevant experts who knew each other facilitated their inclusion in discussions on e-Estonia and i-voting, allowing everyone to be heard, while also helping to prevent the emergence of separate and loud expert groups that would oppose i-voting. The government itself facilitated tighter connections with the IT community, which enabled radical novelties and consensus-building to be achieved more easily than in larger, more heterogeneous

countries. No less importantly, the clear distinction between the public and private sectors in terms of personnel almost faded, because the rate of turnover between these two sectors was high due to the absence of a standard career model for politicians. The nascent political system of a young Estonian democracy, together with fluid public–private boundaries, facilitated a speed of adoption that is not possible in rigid, strong institutional environments. Such a technocratic insular system enabled decision-making to occur within the executive rather than through pluralist competition, which allowed the creation of and the bypassing of veto points and accelerated the adoption of a disruptive innovation.

Digitalisation quickly emerged from the policy primeval soup as the pre-eminent solution for addressing the aforementioned challenges of post-Soviet transition. It was not a solution conceived to solve a specific pre-defined problem, but rather an idea or principle that gained momentum and later became a guiding thread in the construction of the young Estonian state. It was the primary method for institution and service-building and over time became part of the brand and a synonym for the „Estonian way of doing things". This was possible thanks to the existing human capital in the field of IT from the Soviet-era Institute of Cybernetics. I-voting was essentially a solution in search of a problem, and numerous needs it was supposed to satisfy were only incidentally or even retrospectively attributed to it. This was a policy that did not arise as a demand from the electorate, but rather an exemplary top-down innovation pushed by policy-makers. Although Velmet (2025) notes that i-voting was actually a solution to the problem of underutilised eID, and in an interview with former Prime Minister Laar (Interviewee-EE-8, 2023) it is confirmed that i-voting was a way to legitimise eID, this is factually correct but an insufficient part of the explanation of how i-voting became a sustained adoption and remained in place over the following twenty years. Even if the original idea was to save or provide a concrete use case for eID, it cannot be said that this was a successful mission, because voting is quite a rare and exceptional, not an everyday, occurrence that would enable habit-forming regular use without the existence of other services, which were introduced in the meantime. This is also confirmed by data on adoption at the individual level. Only in the third electoral cycle after the adoption of i-voting, namely 2009, did usage reach 10 per cent, then 20 per cent in 2011, 30 per cent in 2014, 40 per cent in 2019, and by 2023 it exceeded 50 per cent (Valimised.ee, 2025). The initial adoption of i-voting was fairly slow and gradual, which suggests that such a tactic was not an appropriate way to save the eID project. In this regard, Drechsler (2018) argues that i-voting can be viewed as a response to the problem of the loss of innovative momentum in the development of the broader Estonian e-government

system, thereby providing an explanation that captures the wider institutional and symbolic context, in contrast to Velmet's (2025) focus on saving eID. What can be concluded is that i-voting cannot be understood without the context of e-Estonia and that it is one of the public services that simply needed to be digitalised, just as all other public services were digitalised sooner or later. The difference is that i-voting was recognised as an opportunity for additional international visibility and has to this day remained the most controversial digital public service.

The political climate of the 1990s and early 2000s was extremely receptive to new policies that were intended to transform Estonia into a modern, well-ordered European country that delivers public services efficiently, one that decided to break with its Soviet legacy and embrace Euro-Atlantic integration. A new post-communist generation of young, reform-oriented politicians certainly contributed to this. Although one might gain the impression that early digitalisation in Estonia was implemented strategically, which was later "sold" through the marketing narrative of e-Estonia that retrospectively sought to rationalise the whole story and present those first undertakings as strategic, thoughtful, and planned, the reality is that it relied much more on the personal agency of policy-makers and other policy entrepreneurs from the IT community. However, the marketing and hype around "e-Estonia" is a great piece of marketing, and although there are genuinely interesting innovations, the impression one might have just by looking at the marketing story is that Estonia is by far, undisputedly, the most digitalised country in the world, but that does not hold ground (see more in Drechsler, 2018). That those first steps in digitalisation were more based on personal ingenuity and convenience (paperless government), as well as pure chance (Laar happened to be interested in a report that landed on his desk, even though he generally did not read everything he received), rather than strategic thinking, can be inferred from the above. This might be framed by saying that Estonia in the early stages was not guided by some comprehensive overarching strategy, but primarily by pragmatism and the principle that greater efficiency was needed, to which digitalisation was the answer.

Geopolitical circumstances help to discern the period in which the policy stream was ready to converge with the other two streams and why this was so. The weakness caused by the dissolution of the Soviet Union and Russia's inward focus enabled Estonia to consider seriously, and then to adopt i-voting. It did so towards the end of that favourable period, which can be delineated as 1991 to 2007. While Russia dealt with its own internal concerns, Estonia addressed its own, relying among other things on digitalisation as a means of increasing state

efficiency. At the same time, Estonia was moving towards Euro-Atlantic integration, and the early 2000s are generally remembered as prosperous and promising years. If we think counterfactually, postponing adoption from 2005 to a few years later would have been more difficult as Russia began to behave much more aggressively towards its neighbours. It may even have been impossible, but certainly slower, coupled with more deliberation and a greater focus on security aspects. In other words, this very same innovation, i-voting, would have faced very different prospects for adoption under an altered geopolitical situation. This temporal contingency has, it may be said, been neglected in the existing literature when attempting to explain the Estonian adoption of i-voting. Yet this window was different for Estonia compared with other case study countries that were not confronted with an imminent threat from Russia. In Norway, that window could be shifted to the mid or late 2010s. International events, including the election of Donald J. Trump to his first term and the Brexit referendum, shifted attention towards electoral integrity. As a result, what the author terms "electoral inclusivity", which seeks to increase accessibility and convenience through new voting methods, including i-voting, receded into the background.

Policy entrepreneurs, in Kingdon's sense, in the Estonian case were a form of network entrepreneurship spanning and blurring public–private sector boundaries that were fluid, rather than a single person. Of course, there were individuals who were more or less prominent, but there was a large number of people who were involved in different ways in the adoption of i-voting. Indeed, policy-makers themselves could be presented as policy entrepreneurs, or at least as extremely receptive to all proposals by policy entrepreneurs that carried the "e-" prefix, in this case "i-". This was possible because policy-makers were primarily guided by pragmatic reasons (for example laziness as an innovation driver), and where there were traces of ideology, it was a pro-market ideology whose principles included increasing efficiency. Consensus-building is simpler in a small country, and it is possible to seat everyone at one table. Neuralgic points that could become veto points can be more easily removed at the outset. In short, political positions on i-voting correlated with perceived electoral advantages or disadvantages rather than principled and ideology-based positions.

Explaining how the three streams converged and how this led to the opening of a policy window, and then to the adoption of i-voting, requires distinguishing between factors that were necessary and those that were sufficient only in combination with other factors. Indispensable were the existence of an electronic identification infrastructure (eID), a modernised and innovation-enabling legal framework, sustained political will irrespective of personal or party

changes, and domestic technological expertise. In the absence of any of these factors, the adoption of i-voting would not have been possible. However, the existence of these factors alone was not sufficient for the adoption of i-voting. Decisive was the combination of contextual factors: the small size of the state, the post-Soviet administrative transformation characterised by the speed of policy adoption, a technocratic political culture, and a favourable geopolitical moment for adopting what is, from the standpoint of state sovereignty, probably the most sensitive digital public service. This is a very specific combination of circumstances that allowed that window to open and which Estonia exploited, while other countries, each with their own specificities and with factors that in their cases are necessary and sufficient, did not do so.

With a strong wind from policy-makers and with the support of the IT expert community, i-voting was able to accelerate the initiation stages (agenda-setting and matching) of Rogers' innovation process, which can explain the rapid final adoption because the emphasis was on the implementation stages (redefining/restructuring, clarifying, and routinising). It can be asserted that the initiation process for i-voting deviates from the standard Rogers model in which agenda-setting serves to detect a problem that requires a solution, and matching fits the problem with an innovation. This is because i-voting was already conceived in advance as something that would need to be adopted, and its various legitimations (e.g., increasing turnout and raising the share of young people in political processes) were neither realised later nor decisive in the decision to adopt i-voting. This can be termed solution-driven problem search, as opposed to problem-driven solution search. The episode with the first negative report on the feasibility of i-voting, after which a second, this time positive, report was soon commissioned, shows that there had been a prior decision to adopt i-voting that only needed to be legitimised.

In the redefining/restructuring stage, i-voting was adopted as a supplementary voting method to the existing paper voting. By not replacing it but only complementing it, the possible disruption that would have arisen had it been the other way round was reduced. The most important redefinition in the legal system was related to the revoting mechanism as a form of coercion prevention in this form of remote voting. Revoting represents innovation re-invention to fit Estonian constitutional electoral principles. The speed of adoption of i-voting, bearing in mind that the original plan was for adoption to occur in just one or two years from the initial idea presented in 2001, prevented the emergence of meaningful, organised opposition that could at least have slowed down or even halted i-voting. It was a very new technology, and all those later objections and reasons that led to it being an endemic policy, or innovation if

preferred, cannot be applied retrospectively to the Estonian case. It must be understood that many of those objections were not yet prominent in that period. This necessarily directed policy-makers to think primarily about the effects i-voting would have on them, to think narrowly and in a self-interest-centric way, and much less about the bigger picture and the technical, legal, and other issues that later emerged with the development of i-voting worldwide. At that time there were no other international examples of civil society organisation (the famous Dutch case dates to 2006) that could have served for learning and knowledge exchange on how to organise something similar in Estonia.

I-voting achieved a routine status after several electoral cycles through the gradual increase in the number of i-voters and, at the same time, the convergence of the socio-demographic profile of i-voters towards that of the average Estonian voter. Over two decades, numerous new generations have grown up with i-voting, which has become routinised and the default method of voting for many Estonians. One could therefore ask what would happen if i-voting were discontinued, permanently or temporarily, due to certain difficulties. In a sense, such a high rate of adoption of i-voting creates a no step back situation in which disabling i-voting would likely lead to a decrease in turnout. Yet while for a significant part of Estonians i-voting is a routinised innovation, political opponents of i-voting deliberately resist routinisation and thus maintain the controversy of this innovation in order to preserve political differentiation. This creates a form of self-fulfilling prophecy and a feedback loop that reinforces polarisation, whereby parties opposing i-voting send political messages that foster distrust among their own supporters, which is reflected in significantly lower i-voting usage rates within their electorates and subsequently cited by those same parties as evidence of systemic bias.

I-voting in Estonia proved to be identity- and brand-building for Estonia rather than a tangible democratic gain, which it was neither in a quantitative nor a qualitative sense. Different stakeholders perceived different advantages in relation to i-voting, with the government (administrative efficiency, international visibility, justification for the existing technological infrastructure of eID), whereas voters (convenience, time-saving). For the nation as a whole, it expressed technological sovereignism and an escape from post-Soviet peripherality. Retrospectively, the motivation was increasing turnout and inclusion. Compatibility can be viewed through technological, legal, and cultural dimensions. I-voting required prior digital infrastructure and skills in order to be technologically compatible. Previous investments in these two areas enabled a path-creating dynamic, that is, the conditions for the subsequent adoption of i-voting. Although a literal reading of the constitution and electoral principles

would not have favoured i-voting, a teleological reinterpretation of the principle of secrecy allowed i-voting to reshape that principle, rather than adapting to fit the interpretation that had existed up to that point. During adoption and during the first electoral cycles, i-voting reinforced existing societal cleavages and was at the same time compatible and incompatible with parts of the population, on the one hand with the tech-savvy, younger, urban population, and on the other with the Russian-speaking, older, and rural population. However, through routinisation and increased adoption rates, that initial effect was normalised and converged towards a levelling of the socio-demographic profiles of voters.
The multi-channel nature of Estonian elections created a perception of voluntary adoption and voter choice, which obscured the non-negotiable decision to adopt i-voting as a policy. It signalled that those who might not trust i-voting could always resort to paper voting, creating an illusory veil suggesting that electoral integrity and trust in the results could be disentangled by design. In this way the question of compatibility, both at the institutional and individual level, was resolved by allowing everyone to choose that which one trusts, and not necessarily to participate in i-voting.

Unlike Rogers' assumption that complexity reduces through familiarisation, the technical complexity of i-voting increased over time, because the adoption of i-voting is not a one-off but requires continuous improvement and upgrading due to technological progress. Adoption, and especially sustained use, therefore occurred despite rather than through complexity reduction. At the level of voters as end-users of i-voting, a distinction can be drawn between the approach to complexity at the time of adoption and after adoption. During the adoption, technical consensus was achieved within a closed group of politicians and IT experts, which pre-empted public debates on complexity and thus avoided democratic deliberation through that closure. It was also assumed that citizens already had positive experiences of using digital services, private (e-banking) and public (tax filing), whose architecture and exact operation they might not understand, yet they use them and feel their benefits. Trust was transferred from familiar digital interactions rather than built from scratch. What enabled sustained use was trust, which served as a complexity mediator. The reduction of complexity was achieved through outsourcing to trusted intermediaries (in the Estonian case this is party affiliation), which bridged the need for individual-level comprehension. In addition, Estonia continued with the digitalisation of other public services and became a fully digital state. Positive experiences of using those services and the use of i-voting across numerous electoral cycles from 2005 onwards led to routinisation and to i-voting not being viewed as necessarily a

different or non-belonging part of the broader digital service ecosystem, at least not for the majority of the electorate. Estonia had only a few technical tests of i-voting, of which the one at the beginning of 2005, related to a consultative referendum in Tallinn. Although voters had certain opportunities to try voting at the individual level, at the organisational level it can be stated that the 2005 local elections, when i-voting was first used in binding elections as an equal rather than a test voting method, were effectively treated as a trial. This hastening of adoption reduced the scope for trialability of i-voting before its binding application, while at the same time reducing the possibility of certain unforeseen findings and circumstances that would have delayed its adoption.

Rogers defines observability as the degree to which the results of an innovation are visible to others. At the individual level, adoption itself was slow before reaching over or around 50 per cent today. The visible benefits firstly take the form of the convenience of voting, through the possibility of voting without being tied to a location and at any time within the advance voting period. On the other hand, if we observe at the organisational or state level, one may ask whether European counterparts do not see the benefits of i-voting or, if they do see them, whether they are not attractive enough to outweigh the possible negative sides of i-voting. Since i-voting is usually presented as a remedy for increasing turnout, the Estonian experience clearly shows that this is not the case and that i-voting has a distributive effect rather than a mobilising effect. If one adds to this the additional burden of responsibility for electoral authorities, primarily due to the increase in the number of existing voting methods that must be used in parallel, as well as foreign criticism by certain experts and the polarisation of trust and the weaponisation of i-voting for political purposes, i-voting no longer appears as attractive to others as it might at first glance. It is a somewhat paradoxical situation in which i-voting is highly visible as a national achievement in the field of digitalisation, for which there is no counterpart in the democratic world, and yet it is so particular and without substantial effect on the problems it was assumed to address that no other countries even attempt to adopt i-voting. This leaves Estonia one-of-a-kind, exceptional in its digital avant-garde. It is a somewhat quixotic endeavour that is seemingly magnificent in its vision yet remains lonely and without company. Company that Estonia would gladly have, because i-voting was embraced by authoritarian Russia before other European countries, which may complicate its legitimisation in the foreseeable future.

7.7 **Conclusion**

This case study asked why and how Estonia adopted and then sustained i-voting. The existing technological infrastructure, the e-ID, created the preconditions for the adoption of new digital public services, of which i-voting was one of the earlier, but not the earliest, applications. The instrumental use of the law, through a flexible teleological interpretation of existing electoral principles enshrined in the constitution, made it possible to redefine the principle of secrecy to some extent, viewing it as a means to secure freedom of choice in remote voting, which i-voting is. A technocratic decision-making culture, limited veto points confined to political parties focused on their own potential losses rather than the broader picture, and the close collaboration and blurred lines between policy-makers and a small expert community together compressed the adoption stages. This carried the policy or innovation process from consideration to adoption in politically binding elections before organised and meaningful opposition could crystallise. I-voting became a flagship project of e-Estonia, which provided Estonia with an image of technological competence and a form of technological sovereignty that supports the narrative of rapid post-Soviet state-building.

I-voting was adopted and to this day remains a supplementary voting method to the existing paper voting, not a substitute. This reduced the political cost of innovation because it ensured that the familiar paper voting method remained. Over time, but already after a few election cycles, trust split along partisan lines and the usage of i-voting followed those cues. Average trust remained high alongside a stable minority of those who distrust it partially or completely. There was a gradual adoption of i-voting across election cycles, the profile of i-voters converged on that of an average voter, and i-voting became a default voting method for a large share of voters, even over half. I-voting had a substitution effect, but not a mobilising one, nor did it qualitatively improve Estonian democracy. Thus, it was a case of routinisation, not mobilisation. The main advantages of i-voting are therefore seen in convenience and time saving. Through multi-channel voting methods, voters are enabled to choose the voting method that corresponds to their trust position, which adds to the preventative de-escalation of conflict over compatibility by allowing those who are distrustful to continue voting by paper.

Sustained adoption of i-voting required the co-presence of infrastructural, legal, political, and expertise factors, as well as a favourable configuration of timing in a specific geopolitical moment. A simple transplantation of the Estonian case into one's own backyard is doomed to failure because the broader context, which rarely travels with the technology itself, is important. Repeated use throughout twenty years has created habits and expectations that are

costly to reverse. As i-voting gained traction over time among a large part of the electorate, discontinuing it would likely have a negative impact on turnout among regular i-voters who expect the state to offer this voting method. This has created a practical irreversibility of this innovation and policy, and at the same time contributes to its sustained adoption. I-voting has become too big to fail.

Chapter 8: Discussion

"You define the question: you deliver the answer. The unique features of this situation are often hard to appreciate" (Dunleavy, 2003, p. 20).

8.1 Introduction

In the previous five chapters, we have presented five European countries (the Netherlands, Norway, Switzerland, France and Estonia) and their experiences with i-voting. Our five case studies show divergence in adoption outcomes: Estonia is the only example of sustained, full adoption worldwide; France is an example of niche adoption that shows signs of reversibility and has not yet become routinised; Switzerland is a case of prolonged experimentation without a final decision on whether to adopt or not; Norway conducted two trials for all groups of voters before deciding to reject i-voting; and, after two trials in the Netherlands, the outcome was the same as in Norway, with the difference that the Dutch trials concerned only expatriates.

Each of these chapters has sought to provide a rich and thick description of all the circumstances relevant to the adoption of i-voting in those five countries. In addition to the i-voting projects themselves, a broader picture has been offered of each society, its political and legal institutions and its traditions, all of which affect how i-voting has been perceived, imagined, and ultimately whether it has become an adopted policy or not. Only occasionally were parallels drawn with other countries, and then merely in passing and for illustrative purposes. It is now time, in this chapter, to compare the five case studies together through the integrated theoretical framework from Chapter 2, and to draw conclusions as answers to the first research question:

What are the reasons behind the divergent outcomes in

the adoption of i-voting among selected European democracies?

Providing an answer to this question is a process that unfolds throughout the chapter. The answer is composed of several parts, but the intention is to avoid a mere cataloguing of individual case studies or an indiscriminate listing and piling up of different factors. Some factors are important, others are not, and this chapter is in a sense an exercise in weighing what is relevant against what is not, and in composing what is relevant into a coherent and compelling answer that offers one possible interpretation of the answer to the central research question, as stated throughout the dissertation.

8.2 **Configurational adoption**

The answer is presented in the form of "the dials on the lock": (1) problem frame, (2) path dependency, (3) actor agency, (4) narrative, and (5) policy window. Dials that may align so as to "unlock" the correct combination for adoption, that may be only partly aligned so that some dials are not fully in place, or that may form a combination that does not allow unlocking at all. It is the configuration of the dials that explains the adoption outcomes, rather than any single factor, or a loose collection of factors without any account of how they interact.

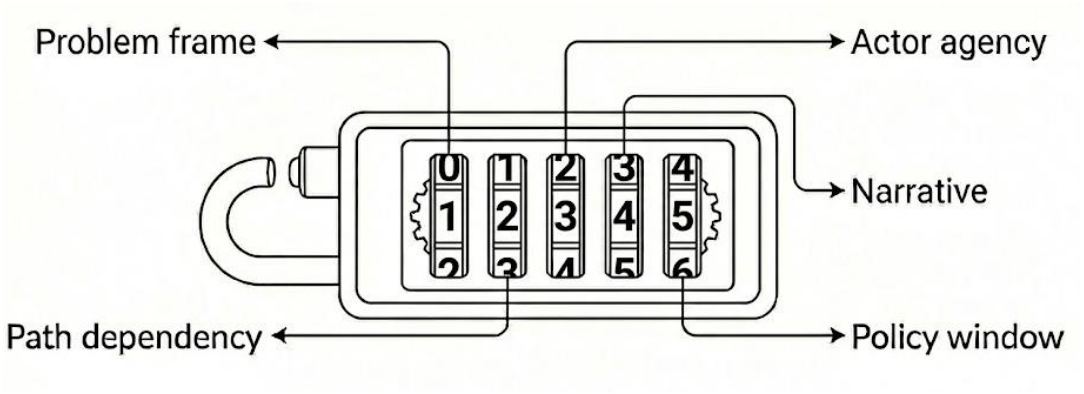

Figure 8.1 The key to i-voting adoption consists of "five dials" (problem frame, actor agency, narrative, policy window, and path dependency) that must align simultaneously for "the lock of adoption" to open.

The dials are presented through four different configurations: (1) full and sustained adoption (Estonia), (2) partial and unsustained adoption (France), (3) prolonged experimentation (Switzerland), and (4) rejection (the Netherlands and Norway). All the presented dials are considered collectively and situated within the dimensions of i-voting and its adoption outcomes, which provides the basis for an integrated answer we refer to as "configurational adoption"[55].

The construction of the answer rests on two premises that need to be stated clearly:

(1) Each country has its own lock with its own combination of dials, and the correct combination in one country is not necessarily the same in another. It follows that policy transplantation or replication of i-voting is unlikely without reconfiguration. It is necessary to identify one's own combination, which is conditioned by the mutual interaction of each of the dials.

(2) The alignment of all five "correct" dials in a given country is the exception rather than the rule. In other words, the "normal" outcome for these five European democracies is non-

[55] In the conjunctural sense, i.e. adoption outcomes arise from combinations.

adoption, and for an outcome that tends towards adoption (which also includes prolonged experimentation without a definitive conclusion) it is necessary that at least several of the five dials line up. The nuances in adoption, whether full, or partial or niche, stem from the problem frame, path dependency, and the narrative.

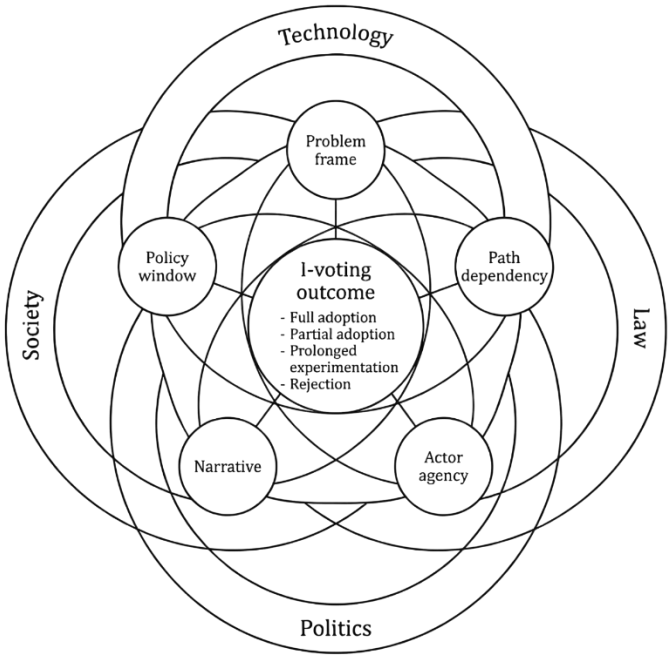

Figure 8.2 The "five dials" are situated within four dimensions of i-voting, and through their interaction and mutual configuration they generate different i-voting adoption outcomes.

One well-worn cliché nonetheless merits mention: there is no "one-size-fits-all" model of i-voting for all European countries. Each country has its own particularities. Yet, while acknowledging contextual differences, it is still possible, on the basis of what links the case studies, namely the case selection criteria from the Chapter 1 (European democracies with free and fair election, highly developed e-government, and prior experience with i-voting), to work towards a satisfactory answer that goes beyond this cliché. That cliché can serve as an excuse not to engage with the research question at all, or it may form one part of the answer, but it cannot constitute the answer in its entirety. That being said, what follows traces each of the necessary dials on the lock's dial face which, through their various interactions and configurations, shape i-voting adoption.

8.2.1 **Problem frame**

The first dial is the problem frame, which explains how societal, political and technical conditions (tolerable issues) are identified, categorised and framed as a problem that needs to

be resolved precisely through the adoption of i-voting. This dial rests on the logic that the political system will be prepared to absorb the risks and costs associated with i-voting if a compelling and broadly accepted deficiency in existing policies has been prioritised for action. Its role is not purely descriptive but also diagnostic, and it answers the question: "What is wrong now that we need to fix?" By doing so, this dial determines the scope of policy intervention, whether it is for the general electorate, or for a specific group of voters (expatriates, persons with disabilities), and whether it applies to all elections, or only a subset, which then manifests in full (Estonia) or partial (France) adoption.

It is oriented towards the current reality, and this distinguishes it from dial number four, the narrative, which is future-oriented and is generated after the problem for which i-voting is proposed as a solution has been identified. The narrative answers the question: "What story are we telling about how i-voting will shape and change our future?" While the problem frame looks backward or inward to define the necessity of change, the narrative looks forward to articulate the meaning and legitimacy of the solution chosen (that is, i-voting) to bring about that change. However, these two are often co-produced, as actors narrativise the problem while defining it. This understanding of the two dials is grounded in a view of the policy process as non-linear and recursive, in which future-oriented expectations are regarded as performative and shape present reality. The strength and clarity of the problem condition the level of political investment, the willingness to confront the challenges that arise during adoption, and the robustness and durability of the commitment to pursue i-voting despite anti-i-voting forces.

As noted, the problem frame is both descriptive and diagnostic, and it shapes i-voting adoption. Where the problem frame is deemed urgent, general and high stakes, the policy system is willing to confront the challenges of adoption (e.g., technological requirements and costs), which are understood as a necessary part of the process because the importance of solving the problem outweighs those challenges. By contrast, where the problem frame is regarded as non-urgent, niche or low stakes, the availability of alternative solutions (e.g., proxy voting, postal voting or other forms advance voting, or assistance for voters with disabilities) makes it difficult to justify the adoption of i-voting. Trust in existing simple and well-understood voting methods, or in other electoral innovations (e.g., voting at any polling station within a municipality), means that policy-makers lack sufficient motivation to overcome the associated challenges of i-voting. In situations where i-voting fails to address the very problem for which it was initially proposed (e.g., trials show no increase in turnout but only a substitution effect),

the problem frame collapses and i-voting is not going to be adopted, regardless of voters' satisfaction with it.

At times, the problems that actors seek to solve through the adoption of i-voting are multiple, in order, figuratively speaking, to kill several birds with one stone. Even in such cases, however, it has been necessary to distinguish what genuinely drove adoption from wishes that were merely attached *ex post*. If one were to record, with due care, all the proclaimed problems mentioned by different actors and at different stages of adoption, the result would be a long list resembling a brainstorming exercise, and it would probably overlap to a large extent across each of the case study countries. Precisely for that reason, it is necessary to distil those problems that actually carried, and gave momentum to, the effort to adopt i-voting. In broad terms, the problems invoked in the five case study countries can be grouped into three categories:

(1) Enfranchisement and equal access (e.g., geographical distance for expatriates, together with the unreliability of postal voting, and for voters in remote or sparsely populated areas, as well as difficulties in voting for voters with disabilities),
(2) Participation and convenience (e.g., low turnout that undermines the legitimacy of elected bodies, weak participation of younger voters in elections, and the need to adapt to the new technological habits of contemporary society), and
(3) Administrative modernisation and infrastructure justification (e.g., rationalisation and efficiency in the provision of public services, but also a kind of reverse-engineering to justify previous technological investments, as in the case of the underutilisation of e-IDs in Estonia).

It is apparent that there was no single common problem shared by these countries. Rather, each country faced different problems that it sought to address through i-voting. Some of these problems were, on the surface, similar yet at the same time different. The problem of unreliable postal voting, especially for votes cast from outside Europe, existed or still exists for Dutch, French and Swiss expatriates alike. However, while the issue of the diaspora is ephemeral and politically marginal in the Netherlands, in France the adoption of i-voting for the diaspora forms part of a broader constitutional reform. This reform aimed to politically connect its diaspora with metropolitan France and thereby extend France's influence in the world, and potentially to attract investment and talent from its expatriates. In Switzerland, expatriates have become a niche group whose problems, articulated by their lobbying organisation, largely legitimise the continuation of i-voting experiments. They were not the "first pick in the draft"

but came to occupy that role once it became clear that voters within the country were broadly satisfied with postal voting. Another group of voters, those with disabilities, is often mentioned as facing challenges that i-voting could help to solve, but their voice was heard much less than in Norway, where their organisations advocated for the continuation of the i-voting project. In addition, Norway sought to act in an anticipatory way, in order to be prepared for the future development of technology and of society's use of the internet in everyday life.

Estonia, meanwhile, integrated the adopting i-voting into the broader e-Estonia project of increasing the efficiency of the country in providing public services through digitalisation. Yet this was more than efficiency alone. It was also a project of state-building and state-branding for a young country that had regained its independence after the collapse of the USSR. I-voting can be labelled as the "cherry on the cake" of e-Estonia. Although a variety of benefits that i-voting was expected to deliver were initially cited in the Estonian case (higher turnout, more young voters, a more efficient electoral administration and so on), these did not materialise over time, yet this did not lead to the discontinuation of i-voting. The very fact that voters, the same ones who had previously voted on paper, make use of i-voting is already a strong indication that the innovation has found resonance among the electorate, and Estonia is recognised worldwide as the only country to have fully adopted i-voting. In describing the Estonian case, we are in fact already approaching, and entering, the territory of the narrative dial, and it is precisely in the Estonian case that the boundary between the two is thinnest and most blurred.

8.2.2 **Path dependency**

The second dial is path dependency, which explains how the adoption of i-voting is conditioned, either in an enabling or constraining way, by past choices, decisions, rituals, and standards rooted in a country's heritage. Path dependency is a double-edged sword that, in some cases, is enabling and, in others, constraining. These may include the existence of an e-ID infrastructure, a widely accepted practice of postal voting or other forms of remote voting (e.g., proxy voting), or alternative voting arrangements (e.g., early voting), as well as the burden of recent policy failures in previous technological policy projects, such as the Dutch voting machine scandal. The adoption of i-voting is never neutral, isolated or detached from these realities, which more or less visibly shape the process. It always has to be viewed against this backdrop. Path dependency shows that i-voting is never assessed purely on technological grounds, but is always seen through the lens of a country's historical experiences. A country's legacy may therefore open up, or close down, the path towards i-voting adoption.

The existence of established voting methods that voters already use and trust creates a baseline that i-voting has to surpass to justify its adoption. In countries where existing voting methods already provide sufficient accessibility or convenience, the impetus to adopt a new, technologically complex voting method is significantly diminished. Where such methods are entrenched in a country's democratic culture, as postal voting is in Switzerland, even if they come with acknowledged problems, as in the case of proxy voting in the Netherlands and France, they make i-voting a solution to a "non-problem" for the majority of the electorate. In this respect, the existence of a remote voting method is generally regarded as a positive form of path dependency for i-voting, on the assumption that the adoption and use of that other remote method have already resolved many of the issues that arise from the nature of remote voting, such as voter authentication, various forms of coercion (primarily family voting) and vote buying and selling. In this respect, the existence of a remote voting method is generally regarded as a positive form of path dependency for i-voting, on the assumption that the adoption and use of that other remote method have already resolved many of the issues that arise from the nature of remote voting (e.g., voter authentication, various forms of coercion (primarily family voting), and vote buying and selling). By the same token, the absence of any tradition of remote voting is considered an obstacle to the adoption of i-voting, since it raises an entire set of new questions that need to be addressed during the adoption process. In Norway, the tradition of voting in supervised environments proved to be a negative path dependency. In Switzerland, postal voting turned out to have a similar effect. Its widespread use, and the familiarity and convenience it offers, results in i-voting providing no meaningful additional convenience, which makes the problem essentially non-existent, at least for domestic voters. This is why the emphasis shifted primarily to expatriates in the later phases of the Swiss i-voting project. A similar pattern can be observed in Norway, where advance voting largely reduced the urgency of the problem and the justification for i-voting. The strength of postal voting as a path dependency in Switzerland is also evident in the way i-voting was conceived as a digitalisation of the return channel of postal voting. Voters first receive the necessary voting materials by post, including authentication and verification data, which they then use when casting their vote. In the same way, the Norwegian i-voting system was designed to rely on the postal delivery of authentication data for i-voting.

Voting as a social ritual is also part of path dependency. In countries where voting is invested with ritual significance, as in France, i-voting can be perceived as a form of desacralisation of the act of voting. This circumstance, among others, contributed to the decision not to adopt i-

voting nationwide in France. At the same time, it did not prevent i-voting from finding a niche application among expatriates. The ambition to integrate them politically into French society outweighed the understanding of voting as a republican ritual. Moreover, although France had negative historical experiences with postal voting and abolished it within the country, this did not prevent the use, for expatraites, of postal voting, and subsequently i-voting as another form of remote voting.

Technology behind i-voting, and existing technological infrastructure, are cited important preconditions for the adoption of i-voting. The existence of supporting authentication technological infrastructure, such as e-ID, is usually seen as a positive form of path dependency. It can also work the other way round, where costly investments demand justification and thereby further facilitate the adoption of i-voting as a practical use of that infrastructure, as in Estonia. The absence of a reliable channel for voter authentication makes i-voting adoption more difficult because such a channel needs to be established during the process. It does not, however, have to take the form of an e-ID. In Norway and Switzerland, authentication was carried out by sending voting materials by post. It can be even argued that i-voting in Switzerland is intrinsically tied to paper, in the sense that it is perceived as a digitalisation of postal voting, and that this feature will almost certainly remain. In France, delivery operates through a two-component system of SMS and email. These alternative channels have their own weaknesses and complications. They may prevent i-voting from reaching its full potential and can even lead to the annulment of elections. Voters not infrequently fail to receive the SMS or email, and, in some overseas constituencies in the French 2022 legislative elections this led to annulments and reruns.

The technology of i-voting is highly complex and there is no dispute about that. Reliable technology is a necessary precondition for adoption. Yet it is not sufficient. Even if the technology were flawless (and most computer scientists agree that i-voting is currently not in that position), this would still not guarantee the adoption of i-voting. The experience of the case study countries shows that i-voting is, in first place, a societal challenge. Hence, one cannot reduce the explanation of divergent adoption outcomes to the caricature that “some wrote good code and others did not”. The adoption of i-voting is not a matter of superior technology. Each of the case study countries could have gained access to broadly similar, if not identical, technological solutions and thus to a similar level of technology for i-voting. Some private vendors worked with several of them. Scytl, for instance, was involved in Norway, in Switzerland up to 2019, and in the early years of adoption in France. Nevertheless, partial

adoption has taken place in France, Norway decided to reject i-voting, and trials are still being conducted in Switzerland. Therefore, even if i-voting were, from the perspective of the current technological state of the art, fully secure and feasible, the diversity of adoption outcomes could not be explained by that fact alone. Technology clearly has an impact on adoption, but it does not override the political will to adopt i-voting where such will exists among the highest-level policy-makers. Moreover, technological limitations and technology-related risks are often handled instrumentally and through political calculation. In France, i-voting was abruptly discontinued in early 2017 under President Hollande, on the grounds of alleged cyber risks, only for Macron to announce during his campaign that, once in office, he would re-adopt i-voting for expatriates. In fact, his initial statements pointed towards extending i-voting to presidential and European Parliament elections. The perception of technology and technological challenges is not taken entirely literally or treated as determinative. Through the policy process, they can be rendered subordinate and prevented from dictating the outcome of innovation or policy adoption. In any case, the real world does not operate as if all scientific knowledge and technological constraints were fully taken into account and faithfully translated into policy. Hence, when technological reasons are cited as the justification for abandoning further adoption of i-voting, on the grounds that the technology has not yet matured and that one must wait until it advances, this might be read as an indication of something else. It signals either the absence of a sufficiently compelling problem, the lack of an appealing narrative within which i-voting serves as an instrument for achieving a better future, or simply the absence of sufficiently strong policy-makers who favour the idea, or of policy entrepreneurs capable of promoting it to those policy-makers. The adoption of i-voting is, in the end, less about the technology itself and much more about a country's capacity to manage such a complex and disruptive socio-political innovation.

Negative experiences with similar technological or electoral policies can make a country entirely unwilling to embark on an i-voting project. In the Netherlands, the adoption of i-voting was heavily overshadowed by the voting machine scandal that unfolded at the same time. The consequences of that scandal spilled over onto i-voting. The Netherlands became highly risk-averse towards technology-based voting methods and found alternative ways of addressing the problems faced by domestic voters, while expatriates continue to encounter difficulties when voting in elections. Unlike in Switzerland, however, they constitute a less prominent and less organised group and are therefore unable to exert sufficient influence on policy-makers to bring i-voting back onto the agenda.

Path dependency is also visible in the domain of human capital. Its presence allows the accumulation of local expertise and strengthens a country's technological competence and digital sovereignty. It reduces over-reliance on (foreign) private vendors, which can have negative consequences for voters' trust, and helps to pre-empt objections from the political opposition. In Estonia, the domestic company Cybernetica, which has a long-standing tradition and strong reputation in Estonia, has been the i-voting vendor from the very outset, and remains so. In the first period, Switzerland relied on cooperation between cantons and various private companies. Later, with Swiss Post's entry, the vendor was initially Scytl, but it was subsequently decided to move towards the full in-house development of an i-voting system. One reason was the issue of perception and trust: that an i-voting system used for elections ought to be developed in Switzerland, without the involvement of foreign companies.

The final, but not less important, dimension of path dependency is the level of institutionalisation and centralisation of the country. Countries that are in a nascent phase of institution-building, such as Estonia, have a lower level of institutionalisation and more flexible political structures, which facilitate rapid, top-down policy-making. This accelerates the adoption of i-voting, compresses the stages of innovation adoption and pre-empts the emergence of organised opposition. The size of the country also matters. In Estonia, all relevant experts could literally be seated around the same table and involved in discussions on i-voting, which is much more difficult and slower elsewhere. Countries with a decentralised governance structure, in which a larger or smaller share of electoral management is devolved to lower levels, as in Switzerland, are characterised by a slower, more iterative path of adoption. In such systems, there are multiple veto points, and mainstreaming a policy requires long-term consensus across all constituent entities.

8.2.3 **Actor agency**

The third dial, actor agency, shows that the (non-)adoption of i-voting is the consequence of the purposeful actions, motivations, competences and positioning of i-voting stakeholders, primarily those who hold decision-making power or have access to those who do. Agency therefore encompasses policy-makers, academia, i-voting experts, opposition groups, and influential representatives of the administration. The outcome of an i-voting project is less the result of abstract forces and more the consequence of the deliberate actions taken by these actors, their capacity to define the terms of the i-voting debate, to mobilise resources, and to couple or decouple the political, problem and policy streams (in MSF terms). In other words, actor agency determines who drives i-voting, who obstructs it, whose interests prevail, and how

i-voting is translated into a politically viable or non-viable policy. As a general observation, in the case study countries the adoption of i-voting occurred through decisive, top-down agency supported by expert networks (Estonia and France), whereas prolonged experimentation (Switzerland), and rejection (the Netherlands and Norway), resulted from a political culture of compromise and caution, combined with the absence of high-level policy entrepreneurs, or the strong agency of opponents. It is also difficult to argue that any of the i-voting projects was a direct response to popular demand for i-voting. Rather, they were initiated by policy-makers, or by policy entrepreneurs with sufficient access to reach them.

High-level government officials (presidents, prime ministers, ministers) possess the positional authority to set the agenda and to grant i-voting a top-down political mandate strong enough to override administrative inertia, (minor) political resistance and other challenges during the adoption stages. They also contribute to the acceleration of i-voting adoption. Their role can be described as one of executive entrepreneurship. In addition, they act as discursive entrepreneurs whose power lies in constructing and projecting a compelling narrative about the future. By convincing other stakeholders to share their narrative, they mobilise political will and public trust. It is not necessary, however, for the narrative to originate with high-level government officials. The role of discursive entrepreneurship may be shared with a stakeholder who has access to them, and who is sufficiently persuasive to bring policy-makers to adopt their narrative as their own. This was precisely the case in France, as evidenced by Interviewee-FR-5 (2023), who, through personal advocacy, persuaded President Chirac to pursue the adoption of i-voting.

Other important agents, who confer technical legitimacy on i-voting, are IT experts, academics and career bureaucrats who possess the technical knowledge required for the adoption of i-voting. Projects of i-voting adoption are frequently driven by small but influential epistemic communities formed by these actors, and because politicians lack the technical knowledge to refute expert assessments, their authority matters. Yet even when that community points to the difficulties or impossibility of adopting i-voting, this does not always deter policy-makers from a previously taken decision to proceed with adoption. The Estonian case is instructive. The first report by two experts offered a negative opinion on the feasibility of i-voting, after which a second report was commissioned, this time from two other experts, which provided the technical authority for adopting i-voting. Career bureaucrats also play an important role. They are less visible, but crucial during the adoption of i-voting, as the burden of implementation falls on them. They can have both positive and negative effects on i-voting adoption. In

Norway, it was in fact the bureaucracy, that is, the ministry, that carried and kept the i-voting project alive, even once it had become clear that political parties, including the governing coalition, were internally divided on the issue. In France, by contrast, bureaucratic inertia forms part of the explanation for the absence of i-voting in the 2017 legislative elections, due to resistance to the imposition of new tasks and responsibilities on top of existing ones.

Interest groups that for advocate i-voting are primarily representatives of clearly defined groups of voters who share problems for which they see i-voting as a solution (e.g., organisations of expatriates or persons with disabilities). They sustain momentum by providing ongoing justification and support for i-voting, ensuring that, even in cases of political turnover or technical challenges, the problem frame remains salient, and that i-voting, in turn, remains on the policy agenda. This can be seen in Switzerland, where expatriates have become the main pro-i-voting interest group that gives momentum to the project. In the Netherlands, the lack of lobbying pressure from expatriates, combined with the fact that this target group is small and politically modest, meant that i-voting could easily be sidelined as a non-pressing issue.

An integral part of agency is i-voting anti-entrepreneurs, who, in the context of i-voting, consist of various interest groups, primarily IT experts, organised to varying degrees of formality (some constituted as NGOs), as well as (opposition) political parties. Their objective is to preserve the *status quo* by blocking or rejecting the adoption of i-voting. Anti-entrepreneurs' activities range from weaponising focusing events, and leveraging institutional veto points, to engaging in discursive contestation. They become more potent when they leverage a focusing event (e.g., an i-voting related scandal or a geopolitical crisis) to expose vulnerabilities and to cultivate, at a minimum, mistrust and often outright distrust. Because they possess technical expertise within their ranks, they can deploy various tools, such as conducting their own security audits of i-voting systems or participating in bug bounty programmes, which allow them to intervene in technical discussions. They are also adept at using media outreach through creative campaigns (as in the Netherlands in relation to voting machines, which is equally relevant to i-voting), inviting foreign experts to audit i-voting systems or organising protests (as in Estonia), and employing instruments of direct democracy (as in Switzerland, by collecting signatures to trigger a referendum on i-voting). All these are pressure tools designed to raise the political cost of adopting i-voting, and to compel policy-makers to slow down, or to retreat.

The strength of the political push depends, in mathematical terms, on which (political) actors stand behind the idea of adopting i-voting, how strongly they support it, and existence and strength of anti-policy forces. The closer the supportive actors are to the apex of political decision-making (e.g., the president, prime minister, ministers, and prominent members of parliament), the easier it is to push through the adoption of i-voting. When the idea comes, for instance, from a junior coalition partner or from lower levels within ministries and the wider administration, adoption is unlikely, because unavoidable challenges arise in the course of adoption and their political power is not sufficient to overcome them. In the face of such challenges, adoption is slowed down, and the design is modified, which prolongs the adoption process. Owing to changes within the governing coalition, or the arrival in office of political parties that oppose adoption, this reduces the likelihood of adoption, and may prevent it altogether. By contrast, once adoption has taken place, it is unlikely that policy-makers will turn back the wheel of policy or innovation, and simply discontinue it, particularly if i-voting has been used on several occasions and its use has become routinised and expected by voters. The political capital of the actors who sponsor i-voting is necessary, although not in itself sufficient, element in the overall adoption equation. Acting in the opposite direction are anti-policy forces. Although i-voting may be supported by high-level policy-makers, a sufficiently early and sufficiently strong campaign against adoption can neutralise their support and, in doing so, hinder or prevent adoption altogether. When these veto points do not react to adoption in time (e.g., they react only once adoption has already occurred), or are not well organised and thus fail to communicate their concerns effectively in public, the pro-adoption push outweighs the anti-adoption push.

8.2.4 **Narrative**

The narrative helps to explain how different outcomes in i-voting adoption are shaped by pervasive, future-oriented discourses. This dial moves beyond the problem definition provided by the problem frame (dial 1) and focuses on the political and societal construction of the meaning of i-voting, placing i-voting within a broader vision of the future. The narrative affects how the risks and benefits of i-voting are perceived, and functions as the field of contestation in which the political and social viability of i-voting is fought over. The problem frame (dial 1) asks “What is wrong now that we need to fix?”, whereas the narrative (dial 4) defines the meaning and anticipated outcome of i-voting, that is, what the solution will achieve or put at risk. The question posed is: “What story are we telling about how i-voting will shape and change our future?” Drawing on SoE, the narrative foregrounds the role of promises, visions,

hopes and fears about the future of which i-voting forms a part. The backbone of this dial is the concept of performativity. As already noted under actor agency (dial 3), discursive entrepreneurs construct and project a narrative about what i-voting can or will accomplish. The fruits of the i-voting tree tend to cluster around claims that i-voting will increase voter participation or widen voting possibilities for traditionally underrepresented groups. The narrative is not necessarily tied to a particular group or to the attainment of a measurable indicator. It can also be linked to a vision built around national prestige and exceptionalism, as in Estonia.

However, i-voting is also highly susceptible to negative narratives rooted in fears, which may be further amplified when they are aligned with political or cultural anxieties connected with technological innovation, remote voting, or the need for broad political compromise. In this sense, i-voting is presented as incompatible with a country's traditions or democratic principles at an abstract level. At a more practical level, this is expressed through fears that remote voting compromises the secret ballot by creating an unsupervised environment that is vulnerable to various forms of coercion and vote buying and selling, or that election results can be influenced through manipulation of the i-voting system by dishonest insiders or hostile outsiders. When the narrative shifts towards safeguarding public trust and electoral integrity, arguments based on accessibility and convenience often recede. The nature of the narrative, whether positive or negative, has a direct impact on i-voting adoption outcomes. A narrative that fuses i-voting with state-building and state-branding, and thus with national identity, makes it possible to mediate the technological challenges of i-voting. Sustained use then appears to depend on trust that is transferred from positive experience with other digitised public services and from institutional trust, reducing the need for individual comprehension. If the narrative rests on fragile or exaggerated promises, failure to fulfil the proclaimed promise makes i-voting prone to rejection.

I-voting is not adopted in a vacuum, detached from a country's social reality and societal expectations. The narrative surrounding i-voting, and the framing through which it is linked to broader objectives to which it contributes, are a necessary part of adoption. Pursuing i-voting for its own sake, or relying on very general promises (e.g., higher turnout, faster counting, greater convenience), is not sufficient. I-voting serves an instrumental purpose in achieving political and social goals, which need to be wrapped in persuasive narrative packaging. Expectations must be made concrete and be part of a broader policy agenda. In Estonia, this takes the form of e-Estonia, in which everything is digital. In France, it forms part of the

preceding constitutional reform, which seeks to incorporate the diaspora into the political life of France. This also helps explain Switzerland's continuation of experimentation after the events of 2019, because i-voting is seen as a voting method that addresses the problems of a very significant group of Swiss expatriates, who are represented by a strong lobby organisation. The Dutch use of i-voting for the diaspora did not, in this respect, constitute a sufficiently strong rationale to allow i-voting to survive the tsunami triggered by the voting machine scandal, since the Dutch diaspora does not represent a sufficiently significant, and organised, group of voters. In Norway, by contrast, the group for whom i-voting would have held the greatest promise, and around whom a narrative of tangible benefits could most readily have been built, are visually impaired persons. Through the advocacy of their organisations, they did indeed crystallise as a group that would have benefited from i-voting, and this was framed as a way of securing their equality with other voters. However, alternative, non-technological options were found that delivered this outcome, which rendered i-voting superfluous.

8.2.5 **Policy window**

The fifth and final dial is the policy window, a concept borrowed from the MSF, which explains the timing and conditions under which i-voting can move from being a mere idea to an item on the governmental decision agenda, and ultimately be adopted. The probability that i-voting will become part of the governmental decision agenda is higher where there is a clearly defined problem for which i-voting is proposed as the solution, and where an appropriate i-voting system exists, or can be developed. It is also higher where there is a receptive political climate, that is, where the national mood and the balance of organised forces (agency from dial 3) are favourable, and make the adoption of i-voting politically viable. Certain focusing events can open the policy window, whereas others can temporarily or permanently close it. The policy window is open only temporarily. If policy-makers do not act decisively during the period in which it is open, a rare favourable opportunity created by the constellation of the other dials for the adoption of i-voting may be missed. There are several reasons why the window may close. These include failure to act, the expiry of interim legislation for i-voting trials, changes in office, shifts in priorities (e.g., for example a move away from accessibility and convenience towards electoral integrity), the exhaustion of the problem frame either through the achievement of partial remedies (e.g., the introduction of alternative voting methods or arrangements), and post-trial evaluations showing that i-voting does not address the intended problem (e.g., a spillover rather than mobilisation effect). Negative focusing events, such as the voting machine scandal in the Netherlands in 2006 or the vulnerabilities identified in the i-

voting source code in Switzerland in 2019, introduce risks that require an immediate response from policy-makers and can irrevocably alter the policy landscape by placing electoral integrity above other considerations. Electoral controversies in other countries, particularly in the world's largest democracies, such as the Brexit referendum and the United States presidential elections from 2016 onwards, can also make European countries reluctant to invite into their own political arenas the kinds of contentious debates that threaten electoral integrity and social trust. The Estonian case shows how the policy window was opened by a high-level political mandate that enabled i-voting to be adopted quickly, even pre-emptively, before opposition could emerge and consolidate and while Russia, its historical antagonist, could not obstruct adoption. In Switzerland, the policy window appears to have been half open for more than twenty years, while slow, iterative policy-making has at the same time prevented it from opening wide enough for full adoption or closing definitively.

The i-voting rush is over. In today's Europe, there is a climate of saturation and scepticism towards democratic innovations akin to i-voting. It was a different Europe in the early 2000s, open and on the rise, looking at the future and the world around it through somewhat rose-tinted glasses. The earlier drive to facilitate voter access and convenience has been replaced by an emphasis on preserving electoral integrity. Some twenty years ago, i-voting projects were springing up like mushrooms after rain. Some progressed, while others never moved beyond initial consideration. Yet there are very few, if any, examples of new i-voting projects starting from scratch. At the beginning of 2026, Europe's present is anything but rosy, more greyish, a leaden grey. Any new i-voting project now requires a much stronger justification than it did a quarter of a century ago. On the one hand, this is because of a shift in focus towards electoral integrity. On the other hand, it is due to the comparative experiences of other countries, which have shown that i-voting generally does not produce the benefits that many believed it could deliver (higher turnout, a greater number of young people voting, and more efficient electoral administration). In the absence of a clearly formulated higher-order goal (which brings us back to the problem frame and the narrative), there is little interest in even beginning to explore the possibility of adopting i-voting in a given country.

8.3 **Conclusion**

The chapter, following five individual case studies (the Netherlands, Norway, Switzerland, France, and Estonia), provided an answer to the central research question: *What are the reasons behind the divergent outcomes in the adoption of i-voting among selected European democracies?*

The answer was presented immediately at the outset in the form of "the dials on the lock", a mechanism comprising five dials: (1) problem frame, (2) path dependency, (3) actor agency, (4) narrative, and (5) policy window. I-voting (non-)adoption is configurational, meaning that individual outcomes (full or partial/niche adoption, prolonged experimentation, or rejection) do not stem from any single factor, nor from "technology" in a narrow sense, but are the result of the interaction, that is, the (mis)alignment of five "dials", each of which is individually a necessary condition, yet insufficient without the simultaneous alignment of all five for adoption to occur.

The "dials on the lock" mechanism was elaborated in greater detail throughout the chapter, dial by dial. All dials played an important role in the final outcome of i-voting projects in the five case study countries, yet each country had its own unique combination, which most often did not coincide and did not lead to "unlocking" adoption. Only the simultaneous alignment of all five dials can lead to i-voting adoption. As some dials may be aligned with others at a given time while other dials remain misaligned during that period, i-voting adoption occurs very rarely. The reason lies in the disruptiveness of i-voting, which is a complex socio-technical system, not only in terms of its effects on those states, but also in terms of the demands it places on managing the adoption of this innovation. A further nuance is that our cases demonstrate both full and partial or niche adoption, with the difference primarily residing in the problem frame, which determines the initial scope of policy intervention (all or some voters, all or some elections) and consequently affects the final outcome of adoption, should it occur. Partial adoption is more susceptible to discontinuation than full adoption, in which discontinuation would be politically far more costly than when a smaller group of voters is involved.

Rejection is likewise not a uniform outcome. There are multiple ways in which dials can misalign to produce the same outcome but for different reasons. It is possible for a single negative focusing event to trigger a narrative shift, thereby closing the policy window and resulting in negative path dependency, which renders renewed consideration of i-voting more difficult, as a stronger justification must be found for why a second attempt would succeed when the first did not. Aside from this *deus ex machina* scenario, a far more mundane and principled scenario is also possible. I-voting may fail the test of societal acceptance of a practice that i-voting calls into question. Actors may clearly articulate their positions unfavourable to i-voting from the very beginning of the i-voting project and await the moment at which they acquire the power to halt it on principled grounds. The absence of a clear and tangible problem frame is perhaps the strongest signal that the remaining "dials" will not align with that first one.

Some outcomes may also lie beyond binary 0 and 1 outcomes (adopted or rejected/discontinued). Thus, the alignment of several dials may support the continuation of an i-voting project, with trials being provided, while a final decision on adoption is nonetheless not taken because all dials have not been simultaneously aligned. As long as the problem frame remains present and actors perceive it as salient (or see some benefit for themselves therein), an i-voting project has the opportunity to remain in a stable equilibrium of perpetual trialling without a final outcome.

Chapter 9: Policy guidelines

"The social science researchers have gone into the forest of knowledge, felled a good and sturdy tree, and displayed the fruits of their good work to one another. A few enterprising, application-minded lumberjacks have dragged some logs to the river and shoved them off downstream ('diffusion' they call it). Somewhere down the river the practitioners are manning the construction companies. They manage somehow to piece together a few make-shift buildings with what they can find that has drifted down the stream, but on the whole they are sorely lacking lumber in the various sizes and forms they need to do their work properly. The problem is that someone has forgotten to build the mill to turn the logs into lumber in all its usable forms. The logs continue to pile up at one end of the system while the construction companies continue to make due [sic] at the other end. . . . There has been governmental and foundation support for the logging operation. There has also been some support for the construction companies. There has been almost nothing, however, for the planning and running of the mill." (Rothman, 1980 as cited in Dunn, 2018, p. 392)

9.1 Introduction

This chapter presents a set of issues that policy-makers should consider before adopting i-voting. It is a methodical tool to ensure that i-voting is a proper policy answer to a clearly defined problem, a guide to avoiding common pitfalls and building on the experiences of comparable countries, and a means to gain a sense of what might be overlooked, including collateral policy implications. It is not an analysis of pros and cons of i-voting, nor a set of recommendations for adopting it. It treats i-voting agnostically and neutrally, and proceeds in a Socratic manner by posing questions that enable policy-makers to reach conclusions and obtain answers on their own. The intention is to serve as an eye-opener, enabling readers:

- to provide a comprehensive first-person overview of what awaits them down the adoption road,
- to indicate how i-voting acts transformatively, interacts with and influences other policies and policy areas,
- to pinpoint second-order or side effects or collateral policy implications, both anticipated and not, particularly those that are negative.

The approach is agnostic and neutral about i-voting as an end state, yet it advances a clear argumentative stance about method: problems first, solutions second. The material draws on background knowledge from case studies that is generalisable rather than loaded with countless specificities and particularities, and on sources from the previous chapters, and interviews.

Two assumptions are placed up front:

(1) I-voting is a complex, disruptive or radical innovation or policy that goes beyond what might be considered a mere digitalisation of voting.
(2) I-voting is a complex socio-technological system, as noted by Spycher-Krivonosova (2022). The social and technological go hand in hand, should be synchronised and kept in view when thinking about i-voting.

This chapter is written for policy-makers, adopting their perspective throughout. As they are already faced with uncertainties, there is no need to complicate matters further. The argument is broken down into digestible, jargon-free so that readers do not lose sight of the wood for the trees. Furthermore, given that a policy-maker's attention is not constant, the chapter tries to capture their interest immediately. The goal is to ensure that reading this is a worthy investment of time. Policy-makers should view these guidelines through the lens of their own country's political and legal culture. While European nations share many similarities, they differ in the tones, colours, and nuances of their electoral systems. Readers are therefore encouraged to discern what is most relevant and applicable to them and their countries.

This is not the end of consideration, but the start. It should help save resources by enabling an assessment of whether proceeding is needed or not. Readers seeking a definitive answer to whether to adopt i-voting, and how, will not find it here. What they will find is a disciplined pathway to judge whether proceeding is needed or not.

9.2 **Finding a problem for a solution, or a solution to a problem?**

There are many potential reasons policy-makers may use to explain the need for introducing i-voting. A problem arises when these are presented as a jumbled list of more or less connected justifications. Some reasons appear to be attached to i-voting retrospectively, even if they were not the primary motivation for adoption in the first place. It is for some reason appealing for policy-makers to search for a problem that could legitimise i-voting as the solution, even though the problem had not previously been identified in a manner where i-voting might crystallise as the optimal policy solution through a consideration of alternatives. One must be certain and have a good justification for why i-voting is the required policy, rather than postal voting, advance voting at polling stations, or proxy voting. Even when policy-makers identify a problem based on hard data (e.g., high levels of electoral abstention or a high percentage of invalid ballots), they often do not take the further step of shedding light on the causal

relationships behind the identified problem. Instead, they proceed from their own intuitive and scientifically unconfirmed assumptions. What follows presents the most common and widely held assumptions about the types of problems that i-voting may resolve and the benefits it may bring.

For instance, policy-makers might assume that if voters had the possibility of i-voting, turnout would increase, thereby concluding that difficulties in reaching the polling station are the main reason for low turnout. Experience from Estonia indicates that i-voting within a country is largely used by voters who would in any case vote, whereas, in the case of out-of-country voting, there is evidence from Switzerland that i-voting increases turnout. However, the question behind this is whether a policy-maker wants diaspora influence on election results and to what extent (e.g., designated constituencies). If policy-makers are not in favour of diaspora voting, that is a barrier to i-voting adoption, despite its probable positive influence on diaspora turnout. Understanding this distinction is necessary for a policy-maker to grasp what i-voting can and cannot do. It forces the consideration of whether it is worth embarking on adoption at all if, by analogy with other European countries, domestic turnout is unlikely to increase. Political alienation resulting from low trust in politics may be the actual cause of low turnout.

Policy-makers might assume that a high percentage of invalid ballots is caused by complicated voting rules (e.g., voting for several lists or preferential votes) leading to overvoting or sometimes even to undervoting. Consequently, they might decide that some kind of e-voting, i-voting in this case, is necessary to provide voters with feedback on ballot validity. A high number of invalid ballots might be an expression of voter protest or, in compulsory voting systems, simply the performance of a duty to avoid sanctions by an uninformed voter. Furthermore, the assumption that i-voting speeds up the processing and announcement of election results is not necessarily true in reality. This would be the case if an election were exclusively i-voting based. However, since i-voting is one among other voting methods in a multi-channel election, every voting method adds complexity and time. The tabulation and announcement of results are subject to the convoy effect: the process is only as fast as the slowest method to count. With revoting, it is first necessary to cross-check the list of voters who cast paper ballots at polling stations to filter out any prior i-votes by the same individuals. Only then can i-votes be counted.

Even the convenience that i-voting is assumed to provide in an unparalleled way can turn out to be counterintuitive. The classic assumption is the following: the voting window is fairly long

(a few days, 24/7), voters can cast their ballot whenever they choose during that window from any location, and the system can help prevent inadvertent invalid votes. However, it is possible to view this from another perspective. In some countries, voters have to opt-in for i-voting in advance and go through a required procedure. Not every country uses an eID, so i-voting credentials are also delivered via physical post or digital channels (e.g., email and SMS). These must be stored (it is not uncommon for voters to lose them or for them never to arrive) and entered to vote. This necessitates orderly maintenance of electoral rolls (physical address, email, mobile number) for both in-country voters and, especially, expatriate voters. Expatriates live in other countries, and their home country relies heavily on their cooperation in reporting personal data changes. France's experience shows that disordered electoral rolls can diminish the positive effect i-voting can have on diaspora turnout, precisely due to problems with delivering authentication data. Logging in or authenticating on the designated i-voting application or portal may require skills that some older voters may not have. Modern i-voting systems have a verifiability option through checking against a numerical code or scanning a QR code with a mobile device, thus making the voter a partner of an EMB in revealing potential irregularities. While not mandatory, voters are encouraged to do this. If assistance is needed, the voter must call a helpline, whereas at a polling station, they can request it directly from poll workers.

Although policy-makers tend to assume that i-voting attracts young voters and increases their electoral participation, and cite this as one of the motivations for adopting i-voting, the experiences of Estonia and Norway suggest otherwise. In Estonia the youngest voters, particularly first-time voters, wish to experience what it is like to vote on good old paper, and i-voting has not increased their share of the electorate. It is middle-aged voters who make up the majority of the i-voters. In Norway, young people indicated that, when choosing between voting at 16 and i-voting, having the right to vote at 16 mattered more to them than the method, and although they tried i-voting during the trials, they often eventually chose to vote at polling stations in what they regard as the “real” way. These cases cannot be strictly generalised, but they are indicative and highlight the need for prior research to identify which groups are truly interested in i-voting and what doubts and concerns need to be addressed during the adoption process.

I-voting may appear to be a suitable policy solution without verifying whether something is indeed the root cause or whether it can genuinely be a benefit, and, if so, to what extent. The policy process has to be thought out sequentially. Identifying a problem, determining its causes

and finding the best policy alternative must precede any decision on solutions, and within such a process i-voting can be considered only if it addresses a concrete and genuinely existing problem. The cases of the Netherlands and Norway show that i-voting functioned as a solution in search of a problem and, consequently, failed to generate lasting political support. It became clear that i-voting brought new problems rather than solutions, so in the absence of tangible benefits and in the presence of legal and cultural challenges, they opted for non-adoption. Due attention must be given to competing policy alternatives (e.g., a longer voting window through advance voting, simplification of the ballot, using ballot scanners) without privileging i-voting and while avoiding techno-solutionism. The fact that i-voting appears technologically feasible does not mean it ought to be adopted. I-voting is not a technological magic wand which, in a context of apathy reflected in low turnout, motivates the demotivated to participate in elections simply by virtue of its availability. An i-voting project driven by motivation grounded in evidence from their own research and comparable countries prevents the trajectory from starting on the wrong track of excessive expectations and subsequent (even greater) disappointment.

9.3 **Looking across into others' yards**

Thinking about adopting i-voting in the early 2000s is distinct from doing so in the second half of the 2020s. This difference needs to be recognised because, while reflection is now easier due to available data, adoption has become more demanding. Some twenty years ago, during the period of the first i-voting projects, there were almost no comparative experiences from other countries to provide support and guidance. Unable to learn from the mistakes and successes of others, countries had to rely on their own experiences. European pioneering countries looked across the Atlantic to the first US i-voting experiments, the ones we can call successful (the 2000 Arizona democratic primaries) and the unsuccessful ones (the SERVE project, cancelled in 2004). Over time, several parallel i-voting projects were launched in Europe, and first meetings were organised, under the auspices of the Council of Europe, to exchange good practice. Over the course of those twenty to twenty-five years, a substantial body of i-voting experience has accumulated, involving very different forms of application and different European countries, and therefore different political and legal milieux. It is now easier for policy-makers to look back at their forerunners and gain insight into the challenges they faced, how they were addressed, what was perhaps overlooked, and the effects of i-voting (e.g., turnout, voter demographics, and accessibility).

The other side of the coin is that the legal and technological requirements that an i-voting system must meet today are stricter and more demanding than they were during the pioneering period of i-voting projects. This primarily concerns individual and universal verifiability, but there are also good practices aimed at increasing transparency (e.g., source code publication, public intrusion tests, bug bounty programmes, i-vote counting ceremonies). I-voting projects are subject to scrutiny by international organisations (e.g., OSCE/ODIHR reports), the international scientific community, and activist organisations. Although national in scope, i-voting projects almost invariably become internationalised, both through the interest of these stakeholders and through cooperation with international stakeholders in the development, testing and implementation of the i-voting system. This is due to its niche character and the very specific expertise required. Some of the challenges that were relevant for those pioneering projects are less pertinent today, if they are relevant at all. The clearest example is the digital divide which comprises access and skills. It is far less of a barrier now than it was two decades ago.

9.4 **Political culture and legal framework**

The contemporary accelerated way of life has changed how we perform even formal and ceremonial activities. In many countries, the communication between citizens and public authorities via various e-portals and services has become standard. Submitting tax returns, enrolling in school or university, initiating judicial and administrative proceedings, and booking medical appointments have long since moved online. In December 2024, Estonia digitised its last outstanding service and became 100 per cent digital (Kriisa, 2025). That service was divorce.

Maintaining an alternative in the form of well-established paper polling station voting is connected to the existence of entrenched voting rituals that are more or less woven into the political culture of a given country. Voting can be understood as a ceremonial act in which voters go to a designated place, preferably dressed in a way that suits the occasion, and perform this act in the presence of others, who see the act of voting itself but are not aware of its content. When a voter enters a polling station, they are entering a supervised environment. The question for the policy-maker is whether they consider it acceptable to relinquish this type of oversight over the voter, which is achieved through monitoring the act of voting (though not its content) and serves to safeguard the principles of universality and equality of suffrage. Some voters, and in turn political parties, are dismayed by what they see as the pure transactionalisation and

trivialisation of voting associated, in their view, with the adoption of i-voting. The question they pose, presented here in slightly caricatured form to underline the argument, is whether it is really acceptable to cast a vote while browsing social media, paying bills, waiting at a traffic light, watching a football match on TV, or sitting on the toilet?

European countries have very diverse practices and electoral cultures in relation to voting methods. In some, voting is possible only in supervised environments (polling stations), while others allow voting outside official oversight (postal voting). Some allow proxy voting, whereas others mandate voting in person. Voting is often organised in the diplomatic and consular missions abroad and in military bases, although there are also cases where voting takes place only within the country's borders. Voting windows also differ, ranging from a single election day to days, weeks or even months of advance voting. The prevailing common wisdom is that countries, which already allow postal voting, have an advantage when adopting i-voting, as legal and cultural questions regarding remote voting (secrecy, coercion, vote buying) have already been socially settled. Hence, i-voting does not have to reopen these questions. This is not always the case, as seen in Switzerland, where the existence of very convenient and widely used postal voting for in-country voters largely reduced the relevance and demand for i-voting.[56] The same applies to advance voting. I-voting generally takes place before election day, and countries that already have advance voting in whatever form are at an advantage.[57] It affects the political campaign, renders election silence meaningless, and can even create information asymmetries. Some voters cast their ballot early without all the information available at the end of the campaign. This is particularly important if a scandal breaks or an important debate between candidates is held immediately before election day. Voters in the same election, depending on whether they vote days, weeks, or even months earlier (as is possible in Norway), act on different information regarding the same candidates.

To what extent should i-voting replicate paper voting? Is regulation by analogy possible? For i-voting to be legally and politically acceptable, must it satisfy all the criteria of paper voting, or even exceed them? Is it even possible to reconcile all existing electoral principles that have been developed and reflected in paper voting? These are all questions that a policy-maker must

[56] It is worth noting that the use of i-voting has displaced postal voting in France, and due to low usage, postal voting will likely be removed from the list of voting methods.

[57] Technically, every remote voting method is a form of advance voting, as postal votes are usually cast before election day (often needing to arrive by then to be valid). There is also non-remote advance voting, as in Norway, where early voting is carried out in official premises, so it is not remote voting.

be aware of and not avoid answering. One should not take elections and voting methods lightly, but rather have a deep understanding of why something is regulated the way it is. It is an awkward situation where IT experts have to explain to politicians what democracy is, or what quality a certain voting method needs to have to be acceptable for democratic elections, which is exactly what happened in the Netherlands.

Although instruments of international law provide principles for democratic elections, countries have a certain latitude for interpretation and implementation. For instance, the secrecy of the vote is approached differently across European countries. In Switzerland, with its already predominant postal voting, the system operates on the assumption that coercion is not a (real) problem. In Norway, the remote nature of i-voting, which removes the voter from the oversight of polling staff, proved to be an insurmountable challenge and was the principal reason for halting further i-voting trials. The teleological interpretation of the principle of secrecy in Estonia might not be acceptable in another countries, and the German Federal Constitutional Court's requirements for comprehensibility and the public nature of elections could be viewed as excessively restrictive elsewhere. A policy-maker needs to understand the political and legal culture of their own country and anticipate the positions of the bodies responsible constitutional review. What is more, an understanding of the history of electoral innovations, and an avoidance of taking them for granted as old-fashioned solutions that do not suit the contemporary age, is needed. Each of these innovations has a deeper meaning and represents a path of progress towards ensuring electoral principles through different procedures. Voting screens, transparent ballot boxes, and the design of the ballot paper are thoughtful products of historical election experiences, not accidental or purposeless designs of a polling station and election procedure.

Beyond the general issues of compliance with electoral principles, the question arises whether a legal mandate for experimentation exists. Some legal systems provide a certain degree of freedom for experimentation, while others require legislative amendments to explicitly list permitted voting methods. Existing challenges can become more complex in countries where responsibility for electoral matters is decentralised and divided among a larger number of different bodies at lower levels of government. A bottom-up approach, where several different units (e.g., federal states, cantons, and regions) develop parallel i-voting systems is time-consuming and financially unsustainable for the units lacking in-house expertise. In some countries it is politically expedient to opt for such an approach because of strong but mutually different units. But, without strong support from the central level of government (finance and

expertise), these projects hit a dead end. In the first phase of its i-voting project, Switzerland chose a decentralised, bottom-up approach with three parallel cantonal projects under the supervision of the federal authorities. This enabled drawing lessons and avoiding failures, since any failure remained at canton level. In the end, however, Switzerland decided to move to a centralised, top-down approach and to build a single i-voting system which cantons can use at their discretion. Hence, it is more advisable to centralise the development of the i-voting system, given that, as already noted, it is impossible to find all the necessary expertise within a single country. At the same time, this approach allows local stakeholders to be involved and trained to use that i-voting system once, and if, it comes into use.

Election dispute resolution is more demanding than with traditional elections. The issue revolves around the burden of proof and the realistic ability of a layperson to demonstrate that an i-voting-related violation occurred which impacted, or could have impacted, the election results. In other words, abstract or preventative control of the i-voting system is not common. Generally, trust is placed in the state institutions having implemented the i-voting system correctly and without flaws (with the burden of proof on the claimant). The scope for challenge exists in concrete cases after the election, where it is determined whether certain omissions affected the results. National courts have proven quite restrained in annulling election results. Opportunities for challenge arise in concrete cases post-election, determining if certain failures affected the outcome. National courts have proven quite restrained in annulling election results. However, the 2022 French legislative elections show that malfunctions in the delivery of voting credentials, which result in the unavailability of i-voting at short notice for expatriates, constitute grounds for annulling and repeating elections in the affected constituencies (Conseil constitutionnel, 2023b). Nota bene: the repeated elections attracted significantly fewer voters.

There are two more important legal questions. The first is the possibility of revoting. Used in Estonia and adopted by Norway from the Estonian model, revoting allows a voter to cast a ballot as many times as they please, with only the last one counting, whether it is an i-vote or a paper ballot cast on election day. In principle, revoting is considered a safeguard against coercion and the way to ensure the principle of free and secret suffrage. However, one could argue that if a person is already under coercion, it is unrealistic to assume they will simply be able to free themselves at some point and vote. Coercion is a more structural phenomenon than i-voting system designers often realise. It is not a single moment in time after which a voter becomes free. A coercer will strive to maintain control throughout the voting window, and could always withhold a personal document (e.g., eID) or some other authentication document

or device until voting closes, thus preventing the coerced person from voting according to their own will. In this sense, revoting might even enhance coercion if the voter has already voted and the coercer subsequently influences the vote. In Switzerland and France, where voting is considered a one-off act that is exhausted in a single vote, with no option to re-vote for any reason. The second concerns the right to deliberately cast an invalid ballot. For example, Estonia does not provide this option. To cast a valid vote via the internet, a voter must select one of the candidates. This is not merely a technical matter. It is a legal issue regarding whether a voter possesses the right to political expression by intentionally invalidating their vote. If a voter holds the right to abstain and chooses to participate in the voting process, why should they not also possess the right to express their refusal to choose in this manner?

9.5 **Building political consensus**

A precondition for embarking on an i-voting project is to reach or already have a sustained, broad cross-party consensus. The adoption of i-voting should be understood as a policy reform, not merely an ICT project. Framing it as an "IT upgrade" can prompt opponents to accuse policy-makers of underestimating its disruptive nature or introducing it for partisan gain. If an i-voting project is supported only by the bureaucracy (ministries, election management bodies (EMBs)) or the current governing majority, there is a high probability the project will be halted when power changes hands. If it hinges on a few political parties, or even on particular individuals within parties or institutions, the first serious bout of turbulence can push it off course or even bring it to an end. This is illustrated vividly by the Norwegian case, where the proponents of the i-voting trials (and of potential adoption) came from two smaller coalition parties. Once a new government took office, the i-voting project was abruptly halted and never resumed. Estonia presents the opposite pattern. There, political consensus was constructed around the broader narrative and political strategy of "e-Estonia". Dissenting voices, which first came from the Centre Party (which, while in government, did not discontinue i-voting) and later from EKRE, did not overturn i-voting. Nonetheless, opposition to i-voting in Estonia became vocal after its adoption, rather than during the earlier phases. It is worth noting that the episode involving the Estonian President's veto and the subsequent referral to the Supreme Court did not concern i-voting as such. Instead, it focused on the option of revoting, which was a distinctive feature of the way Estonia (and later Norway) addressed the challenges of remote voting. Revoting is not an inherent component of an i-voting system, so this episode should be viewed in that light rather than as opposition to i-voting as a voting method.

An i-voting project should be approached with the expectation that the next government will inherit it, and consensus should therefore be built in such a way that all the efforts invested in the i-voting project do not come to nothing. It must be shielded from day-to-day political turbulence and institutionalised beyond the preferences of the current majority. Initial momentum often weakens during the adoption process, and it is more likely that those who are unsupportive of the project at the outset will maintain their position rather than change their minds along the way. Expectations start to fade either as a result of difficulties encountered during the adoption of i-voting or as a result of the passage of time without tangible delivery that would begin to justify the investment. It should be expected that the honeymoon period will not last long and that enthusiasm will decline once the novelty wears off. It is beyond doubt that throughout the process of i-voting adoption, whose duration, it bears repeating, exceeds a single parliamentary term or government mandate, expectations fluctuate. New, more attractive digital or electoral policies may emerge, that are easier to adopt and that bring more significant and tangible benefits in the daily lives of citizens (voting is in any case a rather rare event, sometimes only every few years). It is therefore quite logical to ask: why not direct attention and resources to that other policy or innovation instead of to i-voting, which has unclear prospects of being adopted and delivering on its original expectations?

A political opposition excluded from the consensus is very likely to weaponise the issue of i-voting and place obstacles in its path, doing everything possible to prevent the governing parties from delivering on their promises. Moreover, the governing parties may find themselves supporting the continuation of the project even though they no longer believe in it, simply in order not to allow the opposition to claim victory. These political motives of flexing muscles vis-à-vis the opposition can result in a stubborn continuation of a project that has no real future, but which no one has openly acknowledged. When a new majority comes to power, or when there is a change of parties within the existing governing majority, especially if the incoming party opposes i-voting, the project is likely to come to a formal end. This makes it all the more important to secure a rock-solid consensus across as broad a political spectrum as possible before starting the adoption process. Of course, it is impossible to win everyone over, but it would at least be desirable for the main opposition parties to express their support and, when difficulties arise along the path to adoption, to maintain a broader and longer-term vision that is resilient to obstacles.

9.6 **I-voting project: actors and some advice**

I-voting is not a replacement but a supplement to existing voting methods. From the outset, it should be framed as a supplementary and voluntary voting method, and there should always be at least one alternative in-person voting method available alongside it. Even so, i-voting is often subjected to particularly stringent scrutiny when adoption is being considered, with some requirements extending beyond what paper voting is able to meet. Policy-makers have to decide on whether i-voting will be a standalone policy, part of a broader project addressing a particular issue (e.g., the KOA project in the Netherlands, which simultaneously experimented with voting at a polling station of the voter's choice, kiosk voting, and internet and telephone voting, of which only the first modality was permanently retained, or in Norway, where i-voting formed part of a broader project of modernising electoral management and where the EVA electronic election administration system remained a lasting outcome), or part of a broader strategy implemented over a longer period that includes different applications of the internet by government (e.g., e-Estonia). Furthermore, ad-hoc suspension of an i-voting project can lead to a loss of trust. Scenarios for halting or suspending i-voting must be defined in advance so policy-makers remain in control rather than being driven by events.

Several groups of stakeholders are involved in the i-voting adoption process and need to have their share in it. Excluding certain stakeholder groups or not involving them sufficiently is unwise. First are voters. The question of voters' trust in i-voting needs to be addressed from the outset. Trust should not be treated as a by-product but a prerequisite for i-voting. It is a very catchy and broadly used term, both among academics and practitioners, and deserves distinguishing trust in i-voting (the system) as a technology from trust in the institutions that stand behind i-voting. The assumption that trust follows simply from the technical characteristics of the i-voting system is incorrect, so even if the system is technically sound, other determinants of trust will prevail in the sense that stakeholders, above all voters, the media and other political parties, will not have trust in it. The most recent research shows that voters base their trust in i-voting primarily on their trust in institutions, as they do not possess sufficient technological knowledge to be able to meaningfully assess the system (Romanov et al., 2025). Even if they possessed that knowledge, it is doubtful whether they would have enough time, which is why this kind of trust heuristic emerges. Hence, from the very beginning, a culture of openness needs to be established, and work on an i-voting project needs to proceed on the understanding that at some point, above all technical elements such as the source code, will be made public. Communication with stakeholders needs to be timely, proactive, and

transparent, and there should be no hesitation in clearly and fully communicating problems, mistakes, and failures. In addition to acknowledging them, it is also necessary to explain what will be done to remove them and to prevent them from recurring.[58] If voters distrust institutions, i-voting can be perceived as an instrument that does not serve the stated purposes, but is instead used to control and influence elections in favour of those in power.

After discovering serious technological weaknesses in its i-voting system in 2019, Switzerland realised that it had not adequately involved the academic community, and, after the relaunch of the project, academia was brought in to a much greater extent. Another important group are NGOs that bring together computer-literate activists for whom i-voting is a highly interesting target. Although they are critical of the project for principled or very specific reasons, it is important not to shut them out, but to be inclusive and transparent. By doing so, a relationship of trust is created, along with the impression that there is a genuine wish for i-voting to be properly adopted. At the same time, an opportunity arises to obtain high-quality feedback from them. It is better to resolve challenges at the table than via media headlines, through a cycle of claims and counter-reactions. Because of the highly technical character of the debate, such public spats prevent the public from forming any empirically based conviction about the i-voting system in question. Instead, opinions are formed on the basis of impressions and depending on existing trust or distrust in state institutions.

One of the more important decisions concerns how the i-voting system is to be developed: whether through a certain level of cooperation with private vendors or through the development of an in-house system. For the development of i-voting, it is not possible, or at least not sufficient, to hire IT experts who have so far been responsible for other digital public services, such as paying for parking, registering or deregistering residence, or filing tax returns. From a technological and social perspective, i-voting is the most demanding public service that a country can undertake. It requires narrow specialist knowledge, which countries, particularly smaller ones, often do not possess. In Norway, which is regarded as one of the most affluent countries in Europe, it was therefore decided to entrust part of the development of the i-voting system to foreign private vendors and to involve international experts, simply because there was not enough expertise within the country. For most of its i-voting trajectory, Switzerland likewise relied on different private vendors for different versions of the i-voting system, who provided the necessary expertise. After 2019, it decided to develop the system independently

[58] For more on trust repair in i-voting, consult Fel (2025).

within Swiss Post, in response to political pressure for i-voting to be developed in Switzerland and preferably by a public company.

Excessive vendor dependence undercuts sovereignty and public trust. The act of voting is a sensitive and fundamental democratic manifestation which, in technological terms, constitutes critical infrastructure. The sovereignty expressed through this process is not lost simply by involving foreign private vendors. Rather, it is lost through the absence of the necessary expertise within the body responsible for conducting an i-voting project. Without this expertise, the body is unable to keep pace with the vendors, to detect errors, or to provide feedback on their work, leading to blind faith in vendors and complete dependence on them. The boundaries between the private and the public then become blurred, the accountability of policy makers serves to shield private vendors, and this produces the Dutch scenario (importantly, in the case of e-voting machines) which (A.-M. Oostveen, 2010) calls "outsourcing democracy". This is not to argue that any form of collaboration with foreign private vendors should be avoided, but rather that it is necessary to have sufficient capacity and expertise to oversee those parts of the system whose development is entrusted to them. Moreover, the Swiss example of fully autonomous development of i-voting by Swiss Post is an exception rather than the rule. Ownership needs to be retained over core components and operations, and independent audits and certification procedures need to be guaranteed that are separate from vendors.

Procurement of services related to the development of i-voting impacts the transparency of the entire project. Norway offers a good example of public procurement through competitive dialogue rather than the usual tendering procedure for other state-organised contracts (Gjøsteen, 2017; Stenerud & Nore, n.d.). The aim is to leverage vendor expertise through their input and to shape the final i-voting system specifications through multiple iterative rounds. This involves evaluation phases, subjecting bids to independent security analysis and providing feedback to vendors in order to refine their proposals. The procurement process then ends with the award of a contract to one of the bidders or to a consortium only after a detailed, stipulated solution that meets the i-voting system requirements has been produced through those rounds. The idea behind this approach is to make use of the expertise of the vendors who have come forward in order jointly to define and refine the final i-voting system specifications.

Sometimes, it is hard to discern what is reality and what is heavily hyped marketing. It can be difficult to work out what is accurate and what is merely packaged as marketing so as to appear attractive when i-voting is at issue. When one visits the websites of vendors behind particular

i-voting solutions, one cannot help wondering how it is that i-voting has not already taken root in all countries when, according to the claims on those sites, it is "secure" and "100 per cent" verifiable. Private companies aim to sell their product, and countries may find themselves in an awkward position, lacking capacity within the administration to verify vendors' claims and to exercise genuine, meaningful oversight. Bringing in the academic community provides additional expertise and acts as a filter, a form of oversight, and a safeguard against unfounded or overstated vendors' claims. Nor should efforts be confined to domestic capacities alone. As the Swiss example shows, it is possible, through incentivisation, i.e., bug bounty programmes, to encourage experts worldwide to contribute to the development of an i-voting system that is as secure as possible.

I-voting can create headaches for EMBs by increasing the complexity of electoral operations. Instead of one or two voting methods, there is an additional method that runs in parallel. At least three further issues arise. First, there is the cost dimension, since operating more voting channels entails higher expenditure, and even if i-voting comes to predominate over polling-station paper voting, there must be a backup plan in case of i-voting failure that involves maintaining polling stations. Second, there is the issue of how the two channels interact in the production of final results, which is not only a technical but also an organisational question. A decision has to be taken whether to publish i-voting results first (since they are a single button press away once the polls close) or to wait for paper voting results and subsequently integrate the two. This undercuts the argument that i-voting speeds up the publication of results. Counting is faster, but as long as there is an additional channel, a kind of convoy effect is created in which final and complete results are released at the pace of the slower voting method. Third, there can be divergence between results by voting method. A scenario of "two worlds" might occur, as in Estonia, where the Reform Party receives substantially more votes via i-voting than via paper voting, whereas for EKRE the reverse is true. That situation can prompt doubts about the fairness of i-voting. It provides considerable fuel for politicisation by those who do not benefit from i-voting and, by raising such questions and claims, for encouraging their electorate to stay away from i-voting, thereby creating a self-fulfilling prophecy that the world has already seen with Donald Trump, albeit with the difference that the method under scrutiny and criticism in that case was postal voting.

9.7 **On the numbers: costs and time**

The question of cost is the elephant in the room. One of the first considerations is the cost side of adopting an i-voting system with all the features it ought to have. In all European countries, i-voting has been conceived as a supplementary voting method rather than a replacement for any of the existing methods. The administrative load of multi-channel elections is therefore greater than when i-voting is not offered, and this also translates into higher cumulative costs (even though i-voting per ballot is cheaper than other voting methods) and into a need for additional staff and training.

The level of costs is determined by their structure and by the political and technical decisions that need to be taken before the i-voting project starts. Costs can be divided into those that arise during adoption, namely the costs of developing the i-voting system and ancillary costs, and the costs of maintenance and upgrading of the i-voting system that go beyond the adoption phase and exist throughout the entire period of its use as a voting method. The cost structure consists of direct or visible costs and indirect or invisible costs. The visible costs certainly include the costs of staff who work directly on the i-voting project, who may be employed in a ministry, a state agency or in an EMB. There are also the costs of developing or procuring the software and hardware that form the technological backbone of the i-voting system. Indirect costs are those which as a rule are not immediately visible but are nevertheless necessary. These include conducting public opinion research, auditing the i-voting system by independent external experts, and evaluating the trials, which do not only contain an assessment of the technology but also of the effects shown by the use of i-voting (e.g., who the voters are, what the impact on turnout is, how satisfied voters are, what proposals for improvement exist). Training of staff within EMBs and other staff members, as well as observers for observing i-voting, can also be placed here. The involvement of legal experts who take part in drafting the legal framework for i-voting should not be forgotten either. In addition, a country may decide to organise a bug bounty programme through which financial rewards are paid to those who find a weakness in the i-voting system. Public campaigns to inform and to build trust among stakeholders, primarily among voters, also represent a cost. The list of costs is long, and it is difficult to think of all possible costs, but it is in any case necessary to acknowledge that the cost list is longer than might at first appear.

It is quite demanding to reconstruct all costs and to provide precise information on the costs that individual European countries incurred at adoption or that they have during the use of i-voting. Certain categories and amounts of costs are not published publicly for security or

commercial reasons, which makes it more difficult to provide an estimate on which a policy-maker can rely. Existing research mostly compares the costs (expressed as cost per cast ballot) of different voting methods within a single country, rather than the costs of i-voting across several countries.[59] For example, Swiss Post, which is currently developing its i-voting system, does not publish its costs publicly. The majority of i-voting projects have not ended in adoption and therefore perhaps did not incur all the costs that i-voting would have had if it had been adopted, and at the same time technological requirements today are stricter than in the period when everyone was pulling in their own direction and there were no agreed standards for i-voting. Individual and universal verifiability are today regarded as mandatory features that an i-voting system should incorporate, whereas this was not the case some twenty years ago. Inflation has its effect and mechanical copy-paste use of cost figures from earlier i-voting projects can misinform more than inform, if inflation rates are not first aligned and costs compared in, for example, the IT sector. No less importantly, i-voting is often part of broader electoral modernisation projects, so it is sometimes not entirely clear which part of the overall project budget relates to i-voting.

Therefore, the amounts that follow are only rough estimates that serve for general orientation. The cost of developing the first i-voting system in Estonia was about half a million euros (Wolf et al., 2011), while the cost of i-voting per cast ballot in the 2017 local elections was between 2.17 and 2.32 EUR (Krimmer et al., 2018, 2020)[60], that is, somewhat more than 400 thousand euros at the level of the election as a whole when the amount per ballot is multiplied by the number of voters, 186 034. Although Swiss Post does not publicly publish data on the costs of developing i-voting, it is interesting that more than 170 000 EUR has been paid out within the bug bounty for findings (Grellmann, 2023). In Norway, for two i-voting trials, approximately 3.99 million euros was spent when all publicly available amounts from 1 January 2008 to 31 December 2012 are added up (Stortinget, 2012, 2013). In France, for the 2012 elections, the costs were 3 128 852 EUR, and for the 2014 consular elections 2.8 million euros (Anziani & Lefèvre, 2014b). In the period 2016–2020, the total cost of developing the i-voting system and accompanying services amounted to 6 720 314 EUR (Deromédi & Détraigne, 2018).

The complexity of i-voting makes its adoption a protracted process. There is no general timeline, but in most cases, at least 3 to 4 years are needed from the first idea to adoption, and

[59] For more, consult Krimmer et al. (2020).

[60] Data from two sources provide slightly different figures.

that is in the most optimistic scenario. This was the case in Estonia, which did not have more serious previous trials aligned with regular elections, and several electoral cycles are usually required for those trials, their evaluation, and the final decision. For most states, a more realistic time horizon would be 5 to 7 years. I-voting is a continuous, never-ending investment. There is always something that needs to be fixed, updated, or replaced, on both the software (code) and the hardware side.

9.8 **Conclusion**

As the reader approaches the end of this chapter, they might think that its hidden title is "One hundred reasons not to contemplate i-voting". That is not the intention. Rather, it is to set out all those expected, and especially unexpected, tasks and obstacles that stand in the way of the adoption of i-voting. There are many of them, because otherwise i-voting would have put down deeper roots in Europe and, even after a quarter of a century, it remains an endemic plant. An endeavour has been made to demonstrate that some assumptions, namely that i-voting is the most convenient voting method, that it makes result processing faster and more effective, or that it is an excellent tool for attracting young voters, are not as straightforward as they might appear at first glance. The chapter has also sought to show that policy problems should be approached in a structured way and that the solution should be the outcome, not the starting point, of the process, to which numerous practically unfounded reasons for introducing i-voting are then attached. It is the most demanding voting method and digital service[61] that a country can adopt.

As a policy, i-voting certainly has its market and can contribute to addressing certain policy problems, which will depend on each country individually. A policy-maker should approach the topic of i-voting in a sober and prudent way and undertake a very careful analysis of whether it is the appropriate policy solution. They should pay attention to what is happening in other European countries but also consult academia as there is often noise that distorts the picture and produces partially accurate information without context. Finally, political elections are not the only context in which i-voting can be used. There are also numerous other elections over which the country has a certain degree of control (e.g., school boards, student councils, works councils, and trade unions). Many of the lessons from this chapter can be used for the

[61] Using the vocabulary of e-government. The idea that elections are a service should be treated with some caution.

adoption of i-voting for these purposes, which are less sensitive and where the pros most often outweigh the cons.

Chapter 10: Conclusion

"I have wished to understand the hearts of men. I have wished to know why the stars shine. And I have tried to apprehend the Pythagorean power by which number holds sway above the flux. A little of this, but not much, I have achieved" (Russell, 2010, p. 3).

10.1 **Closing the loop**

The dissertation began with a puzzle: why did outcomes diverge across European democracies when it came to adopting i-voting, spanning the full spectrum from rejection to (full) adoption. The focus was on five European democracies, which either rejected i-voting (the Netherlands and Norway), remain in protracted experimentation (Switzerland), adopted i-voting in a niche manner (France), or adopted it fully and sustainedly (Estonia). Part I framed this puzzle by providing contextual (and historical) background, and by defining i-voting as a distinct concept within the broader family of e-voting concepts. I-voting was approached and understood as a radical or disruptive democratic innovation or policy, and as a complex socio-technological system. The literature review justified the need for this research, since existing studies have not resolved this puzzle comprehensively, or in a satisfactory way, and, as an aid to answering it, the integrated theoretical framework was constructed, borrowing its building blocks from four different theories (MSF, DOI, EVM, and SoE). Part II provided a fairly thick description of the five case study countries (the Netherlands, Norway, Switzerland, France, and Estonia) and sought to reconstruct key moments in the i-voting projects of the respective countries, and, through each country's discussion, to examine each of them individually through the lenses of the integrated theoretical framework. Part III translated this dense and detail-rich empirical material, emerging from the case studies, into answers to the first research question through the "dials on the lock", five in total (problem frame, path dependency, actor agency, narrative, and policy window), whose mutual configurations and interactions produce divergent adoption outcomes, and into answers to the second research question through policy guidelines intended for policy-makers who might consider i-voting, as a way of helping them navigate the maze of decisions that awaits them and the obstacles they will almost certainly encounter during the adoption process.

The intention of the dissertation was not to add additional drivers and barriers on top of those already identified (although it is possible that the research noticed some new ones). Rather, it was to explain how and why similar factors, in different national contexts, when viewed

through nationally coloured kaleidoscopes, filtered through different political and institutional environments, actors and their constellations within those environments, path dependencies that are largely passive and given but can also be actively shaped, the expectations about the future a country holds, and, no less importantly, sequences of events, shape the outcome of an i-voting project.

This chapter does not reopen the argumentation, which was already set out in considerable depth in the relevant parts of the dissertation, but restates what has been learnt and what follows from it. First, it presents a summary of within-case and cross-case findings, and then offers concise, distilled, almost pocket-sized answers to the two research questions. The dissertation makes a threefold contribution (empirical, theoretical, and practical), and each is briefly set out. This research, like any other, has its limitations and boundaries within which the findings and the conclusions derived from them hold, and these are stated transparently. Finally, the closing statement offers a reflection and my personal view on what we can anticipate about the future of i-voting in European democracies, grounded in this research, not in terms of whether adoption will occur (the research sought to avoid pro-innovation bias and to approach the topic agnostically), but in terms of the configurations under which the idea of i-voting might be revisited by European countries.

10.2 **Findings summary**

10.2.1 **Within-case findings**

The Netherlands. The Dutch case shows how a pioneering country, with a willingness to experiment, can arrive at an outcome in which i-voting is rejected, not because i-voting itself failed, or because "technology failed" in a narrow sense, but because the overall approach to voting technology and electoral integrity changed profoundly and became far more sceptical of novelties in the wake of the voting machine scandal. This focusing event redefined the problem frame, which had previously centred on accessibility and convenience, and shifted it towards electoral integrity, while the narrative came to be dominated by themes of cyber threats and tampering. The absence of actors willing to stand firmly behind i-voting, alongside the presence of strong anti-policy forces in civil society, as well as other computer experts, meant that the costs and risks of proceeding with the adoption of i-voting became disproportionate to the limited and marginal gains it could deliver. This was all the more so because the diaspora, for whom i-voting offered the greatest benefits, was not politically salient, and, at the time, was

not organised in a way that could counter the anti-policy forces. Beyond expatriates, i-voting was also intended to help the water boards address turnout problems, which were later resolved by holding those elections alongside provincial elections. The Dutch case is therefore best understood as a recalibration of priorities, from accessibility and convenience to integrity and trust, in response to the uncertainties generated by the voting machine scandal and the reputational risks for policy-makers. They found themselves in a bind, and the voting machine scandal made them markedly more risk-averse, leading them to cut the Gordian knot, which meant discontinuing the i-voting project and rejecting i-voting.

Norway. Although this case also ended in rejection, it was not scandal-driven, but rather principled and driven by a political culture that does not support remote voting, reinforced by the absence of a concrete need for i-voting. Support for i-voting (trials) came from two smaller coalition partners, while the opposition consistently expressed opposition, which resulted in halting further trials after they came to power in late 2013. The problem that i-voting was meant to address was, on the one hand, very general, namely preparing Norwegian democracy for a future in which i-voting would be part of citizens' lives like any other digital service, and, on the other hand, extremely narrow, concerning the dignity of voting for visually impaired persons. However, for most voters the electoral system already worked sufficiently well, which is also visible in the absence of increased turnout in the municipalities where the trials were conducted. Although turnout itself was not the officially proclaimed problem that motivated the i-voting project, reading between the lines suggests that it was not irrelevant. The Norwegian case shows that rejection can occur even when the i-voting system performs relatively well and when there is positive feedback from voters who used i-voting. At the same time, there was a weak problem frame (voting is already easy for residents, the diaspora is very small and politically insignificant, and an alternative solution was found for the visually impaired), political and legal debates dominated the public debate and narrative, and political support rested on small political parties that did not survive their time in power. In other words, i-voting in Norway was rendered unnecessary and democratically illegitimate at the same time.

Switzerland. I-voting trials have lasted for almost twenty-five years, without a final decision on adoption. The problem that i-voting was meant to address shifted from the general population to expatriates and persons with disabilities, especially the former, because the trials did not affect the turnout of residents. The federal, decentralised institutional architecture created multiple veto points and required a slow and lengthy process of consensus-building. After all, other electoral innovations (e.g., postal voting over some thirty years) were

introduced in Switzerland gradually, from the level of cantons upwards. For any potential adoption, a broader coalition of pro-i-voting actors across multiple levels of government was required, whereas in more centralised countries this could have been achieved within a narrower circle of actors. Particularly important was, and remained, the lobbying of expatriates and the support of cantons, which contributed to the continuation of the i-voting project after what in 2019 looked like, if not the end, then at least a long interruption. A political culture of slow uptake of new innovations helped enable a relatively rapid relaunch of the i-voting project, because the challenges were not viewed fatalistically, but rather as an opportunity to learn and correct mistakes through a new approach. A tradition of direct democracy, expressed through frequent votes (on average three to four per year), to some extent legitimised i-voting as a new convenient voting method, but at the same time postal voting, as a very familiar and widely used voting method for Swiss voters, reduced the urgency for its adoption. However, direct democracy was at the same time a sword of Damocles over i-voting, because opponents could activate that channel against i-voting, raising the price of adoption and slowing it down. The approach to i-voting was guided by the principle of "security before speed", which contributed to incrementalism and, together with the factors above, resulted in a stable equilibrium of protracted experimentation.

France. I-voting has been adopted in a niche way for one group of voters, expatriates, and for some of the elections in which they can participate, legislative and consular. The adoption of i-voting is part of a broader French effort to connect with its diaspora by expanding opportunities for political participation. This was enabled by the 2008 constitutional reform, which granted expatriates 11 reserved seats in the National Assembly. Of particular importance were top policy-makers, namely French presidents, first Chirac and Sarkozy, and later Macron, as well as policy entrepreneurs who had access and could persuade, above all, President Chirac to move in the direction of introducing i-voting. However, beyond the benevolent intention of connecting the diaspora with metropolitan France, there were also personal calculations about the electoral benefits that i-voting could deliver, because the French diaspora, as is well known, has an inclination towards more right-leaning political options. Although President Hollande discontinued i-voting for the 2017 National Assembly elections due to alleged cyber risks, that decision was also shaped by an assessment that it would be opportune for the diaspora not to have a large influence over those elections, given that it was not inclined towards the President's political option. With Macron's arrival, i-voting was re-adopted and has since been used regularly. Although he announced its extension to presidential and European

Parliamentary elections, this has not materialised to date. The French case also shows that niche adoption is more exposed to discontinuation than full adoption, and that it is possible for i-voting to be introduced in a niche and partial way without thereby increasing demand to extend its use to other groups of voters, or to other, politically much more salient elections.

Estonia. Estonia is the only country in the world that has adopted i-voting for all elections and for all voters, and has sustained that adoption over the past 20 years. The post-Soviet period for the young Estonian state was marked by austerity, and it was receptive to bold and unconventional solutions in order to catch up with the rest of Europe. The vision of e-Estonia, which, on the back of digitalisation, transforms itself and draws closer to the West, also contained i-voting. Digitalisation was one way to achieve that, but it also became part of state-building and national identity (or branding) through which Estonia distinguished itself. The e-Estonia vision included i-voting, which was adopted under historically unique and i-voting-conducive conditions, namely the co-presence of political supportiveness, domestic expertise, digital infrastructure (eID), openness to legal flexibility (redefinition of secrecy), and a calm geopolitical moment. Compressed adoption stages and very rapid adoption prevented the emergence of meaningful anti-policy forces at the moment of adoption. Over time, it became clear that i-voting did not transform Estonian democracy (i.e., it did not lead to demands for more direct democracy), nor did it increase turnout, but it did provide convenience to voters and gave Estonia a very strong reputation and visibility internationally. The simplified perception of Estonia as a frictionless "digital success story", as seen by outsiders, is not accurate, and i-voting has been contested by certain political parties and activists and has been politically polarising. Likewise, i-voting has to some extent become a petrified voting method, through routinised use over 20 years, which created habits of use and an expectation that i-voting will be offered by voters. Discontinuation therefore becomes politically costly, and i-voting is "too big to reverse".

10.2.2 **Cross-case findings**

First, i-voting adoption is configurational, and non-adoption is the default outcome. I-voting adoption depends on the relationship between five distinct elements, which I termed in Chapter 8 the "dials on the lock". The need for all five dials to be aligned simultaneously suggests that achieving i-voting adoption is less common than not, which helps to explain why, in the third decade of the twenty-first century, i-voting remains very rarely adopted in European democracies. Different adoption outcomes are not points on a linear scale that simply tend

towards one end or the other. Rather, they can be stable end outcomes produced by their own national dial configurations (e.g., protracted experimentation in Switzerland, or niche adoption in France).

Second, technology is necessary, but not sufficient, for i-voting adoption. In other words, adoption does not depend on who has better software or hardware, but on the broader national ecosystem, including all actors affected by, and participating in, the adoption of i-voting.

Third, the politics of i-voting is, above all, the politics of problem framing. Where the problem is framed as acute and higher ordered, it is easier to justify i-voting than when the problem is framed as marginal, or as already largely addressed by existing methods, meaning that i-voting is perceived as mere convenience.

Fourth, individual negative focusing events have substantial power to set an i-voting project back, or even to stop it altogether. They can reweight the criteria by which i-voting, and voting technology more broadly, is judged, and they can produce a long tail of scepticism that persists and requires trust to be rebuilt, even when the i-voting system improves.

Fifth, political sponsorship is necessary, but not sufficient. The absence of clear "owners" of i-voting as a policy is a highly reliable predictor of its (non-)adoption. However, even where influential policy-makers stand behind i-voting, adoption still depends on the alignment of the other four dials.

Sixth, multi-channel elections reduce the benefits of i-voting relative to a scenario in which i-voting is the sole voting method, thereby reducing the appeal of adoption. When a new voting method is added on top of other methods (postal or proxy voting) or arrangements (advance voting), the benefits tend to be marginal, which also narrows the space for framing a sufficiently compelling problem.

Seventh, while the previous finding holds for resident voters, one group, the diaspora, faces geographical and logistical barriers that make i-voting preferable and its benefits more visible. Across cases, the diaspora is also the only group for which it can be said that i-voting increases turnout (notably in Switzerland and France).

10.3 **Research questions and answers**

The first and central research question was:

What are the reasons behind the divergent outcomes in the adoption of i-voting among selected European democracies?

The answer was presented in Chapter 8 in the form of the "dials on the lock" (problem frame, path dependency, actor agency, narrative, and policy window), from which it followed that adoption is a rare outcome because it requires the simultaneous alignment of five different dials. This contains part of the answer that distinguishes the cases of adoption (Estonia and France) from the cases of (non-)adoption (the Netherlands, Norway, and Switzerland). For a complete answer to the research question, it is necessary to further differentiate the cases into full (Estonia) and niche (France) adoption, then into prolonged experimentation (Switzerland), and finally into the two cases of rejection (the Netherlands and Norway). Here, the dials again help, but this time through an insight into each of them individually, and into the way they interact, even when they are not all aligned.

In cases of adoption, the difference in its scope (full or partial) lies in the problem frame dial, which defines the scope of the policy intervention, both in terms of the groups to whom i-voting applies and the elections for which it is intended. Hence, full and partial adoption are not different levels of "success in adoption". They are different scope outcomes that follow from different problem frames. Partial, or niche, adoption is a scope-limited policy intervention that treats i-voting as an instrument of inclusion, rather than as a universal voting method, and it is precisely for that reason more prone to (occasional) discontinuation (France). Full adoption, on the other hand, is a scope-wide policy intervention that treats i-voting as a regular voting method for the general electorate across (all) elections, and which, over time, through the formation of habits of use and the expectation that it will be offered, becomes increasingly difficult to discontinue (Estonia).

Prolonged experimentation is a type of equilibrium that results from the interaction between dials, some of which are favourable, and some unfavourable, to the adoption of i-voting (Switzerland). The partial and recurring alignment of several dials is sufficient to continue i-voting trials, but at the same time insufficient for a final decision on the adoption of i-voting. Therefore, because of only partial alignment, the outcome is not a final decision to adopt or to reject i-voting, but rather the cyclical repetition of trials.

Finally, because the dials can be misaligned in different ways, cases of i-voting rejection are not uniform either. In one case, a focusing event reoriented the problem frame from convenience and accessibility towards integrity and trust, and led to the abrupt closing of the

policy window, while also reinforcing negative path dependency for future i-voting projects (the Netherlands). In the other case, the problem frame was never sufficiently compelling, at least not enough to outweigh the negative path dependency rooted in the social unacceptability of remote voting, and the policy window was not closed by a visible focusing event that created a crisis and a need for rapid reaction, but rather through ordinary political cycling (Norway).

The second research question was:

What lessons can European policy-makers draw from i-voting experiences when deciding whether to pursue i-voting?

The answer presented in Chapter 9 is deliberately agnostic and does not address the question of "how to adopt i-voting" at all. Rather, the intention was to familiarise policy-makers who might consider i-voting with what lies ahead during the adoption process, and, through the policy recommendations, to enable them to assess whether i-voting is a suitable policy solution to the problem they face, as well as to understand which questions and obstacles emerged across the five case study countries. In other words, a disciplined way of thinking about i-voting was proposed, in relation to other possible policy solutions, guided by the principle "problems first, solutions second". The aim was to clarify which goals i-voting can plausibly serve, which questions or challenges it will unavoidably have to address, and which national characteristics matter for i-voting adoption, and to what extent. It is worth reiterating that i-voting cannot simply be transplanted from one state to another, but it is possible to learn from others and to adopt practices carefully where they are compatible with one's own national context.

10.4 **What this dissertation contributes**

10.4.1 **Empirical contribution**

The dissertation contributed through a structured, historically grounded, and thick description of five European countries that experienced different outcomes in relation to the adoption of i-voting, spanning the full spectrum of adoption outcomes: rejection (the Netherlands and Norway), prolonged experimentation (Switzerland), niche adoption (France), and full adoption (Estonia). Beyond the available literature and documents, the dissertation drew on more than 50 interviews that I conducted with individuals relevant to i-voting in these countries, and it contributed to the literature by adding some new details related to these i-voting projects that had been absent from the literature. Finally, the dissertation addressed the pro-innovation bias

present in the i-voting literature. This bias manifests in the privileging of studies of adoption cases, while (non-)adoption outcomes, particularly rejection, are less represented. This dissertation countered that imbalance by deliberately including i-voting projects that exhibit different adoption outcomes.

10.4.2 **Theoretical contribution**

The integrated theoretical framework developed and presented in Chapter 2, and the "dials of the lock" mechanism from Chapter 8 are two theoretical contributions of this dissertation. The integrated theoretical framework comprised four different theories (Multiple Streams Framework, Diffusion of Innovation, E-voting Mirabilis, and Sociology of Expectations) that stem from different fields of research. Relevant elements of each theory were incorporated into the integrated theoretical framework, which thus provided a multi-theoretical and multi-dimensional lens for studying the five case studies. The "dials on the lock" mechanism (problem frame, path dependency, actor agency, narrative, and policy window) is a single explanatory mechanism that accounts for the divergence of adoption outcomes across the five case study countries and thus serves as an instrument for answering the central research question. In this way, the dissertation contributed to the i-voting literature by conceptualising i-voting adoption as configurational, such that different combinations of the five main "dials" yield different adoption outcomes, and by showing that no single factor can provide a satisfactory explanation for the divergence of adoption outcomes in the selected European democracies.

10.4.3 **Practical contribution**

The dissertation contributed to policy-making by providing policy guidelines in Chapter 9. The approach was agnostic and proceeded in a rather Socratic manner (and, to some extent, as an *advocatus diaboli*), avoiding the clichéd, oft-repeated "good practice" approach. The policy guidelines aimed to give policy-makers a broader and deeper understanding of the i-voting adoption process, including the mundane but salient issues encountered by the five countries examined in this dissertation. In this way, I sought to present i-voting adoption as a governance marathon, rather than an engineering sprint.

10.5 **Research limitations and boundaries**

First, the research design was qualitative, comparative, and small-n (five cases). The dissertation could therefore offer explanation through depth and theory-guided comparison, but

it could not support the kinds of inferences that follow from a quantitative research design. In this sense, the configurational mechanism of the "dials on the lock" should be interpreted *cum grano salis*: it did not claim that the same dials, and their configuration, would mechanically lead to, or reproduce, the same outcomes in all settings.

Second, the dissertation focused exclusively on i-voting as a narrower concept within the broader family of e-voting and related terms, and on politically binding first-level (national) and second-level (regional and local) elections. The findings should therefore not be extended indiscriminately to other forms of e-voting, to other voting methods, or to lower-level, politically non-binding elections.

Third, substantial effort was invested in building a rich evidence base, through conducting interviews with relevant individuals, and through collecting literature and documents. However, this base was constrained by features inherent to qualitative research. On the one hand, interviews reflected perceptions, recollections (which may be inaccurate), and retrospective rationalisations, which called for interpretive caution. To address this, I sought to triangulate interviewee accounts against official documents and the literature. Even so, it was not possible to fully eliminate limitations of access (both to interviewees, as I did not always secure interviews with everyone I contacted, and to documents, as some were no longer obtainable), recall, and the possibility of informal policy-making and events that could not be reconstructed, despite extensive effort.

Fourth, the cases were exclusively European democracies, which may limit the extension of the dissertation's conclusions to non-European contexts and to non-democratic regimes, where adoption may not be governed by the same drivers as in democratic counterparts.

Fifth, the dissertation was time-bounded, as the cyber and geopolitical environment continues to evolve. I sought to identify elements in the "dials on the lock" mechanism that remain relevant across time, but future attempts at i-voting adoption will occur in different geopolitical and technological environments, with new hopes and expectations attached to i-voting, and with new questions that will need to be addressed, and challenges that will need to be confronted, before a decision to adopt i-voting can be made.

10.6 **Closing statement**

I will close the dissertation with a reflection on the future of i-voting in Europe. This reflection is shaped by what was discussed and by the positions I took in the dissertation. In brief, i-voting

is neither an “inevitable” innovation that will one day become a normal part of electoral life, nor has it failed to be more widely adopted simply because the technology is “not ready”. The intention, hence, is not to pose or answer the question “will i-voting happen”, but rather to consider under what configurations of the five dials it might be revisited and perhaps adopted by European democracies. Because simultaneous alignment of the five dials is uncommon (it requires both skill and luck for all five to fall into place at the same time), I argue that, in most European countries, the likely future will remain non-adoption.

I do, however, see a stronger prospect for i-voting in politically non-binding forms of participation at the local level (e.g., consultative referendums and participatory budgeting), where it could help to democratise local governance. When it comes to politically binding elections, I suggest that the period in which i-voting was being considered as a general voting method for the whole electorate has largely passed. If new i-voting projects do emerge, they are likely to be experiments targeted at predefined, narrower groups of voters for whom there is a clear need, and for whom i-voting can, with a reasonable degree of confidence, be regarded as an appropriate solution.

Given that many European states have numerically, and therefore politically, significant diasporas living elsewhere in Europe and beyond, the diaspora is the most plausible driver of any renewed consideration of i-voting at scale in Europe. Of course, this does not guarantee that renewed efforts would lead to i-voting adoption. Diasporas often have strong and uneven political affinities within the domestic political spectrum, which means that proposals to adopt i-voting are likely to intersect with policy-makers’ electoral calculations and to reopen questions about the role and influence of the diaspora in domestic political processes. Whether the dials will align, and whether my expectation will hold, only time will tell.

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Interviews

1. Interviewee-NL-1. (2023, April 12). Interview with professor of Software and Security Correctness at Radboud University, involved in election security and privacy, and member of various national committees and foundations.
2. Interviewee-NL-2. (2023, April 12). Interview with professor of Work, Organisations and Digital Technology at Radboud University, focusing on cybersecure behaviour and cybersecurity communication.
3. Interviewee-NL-3. (2023, April 12). Interview with senior researcher at the Dutch Electoral Council (Kiesraad).
4. Interviewee-NL-4. (2023, April 18). Interview with technology journalist at BNR Nieuwsradio and author of Just Trust Us: The Rise and Fall of the Voting Computers.
5. Interviewee-NL-5. (2023, April 13). Interview with former member of the Dutch Electoral Council (2013–2021) and lecturer at Vrije Universiteit Amsterdam and Leiden University.
6. Interviewee-NL-6. (2023, August 24). Interview with founder of the NGO “We don’t trust voting computers”, hacker and computer expert.
7. Interviewee-NL-7. (2023, September 8). Interview with chairman of the Foundation Against Hackable Elections, freelance IT security consultant, and ethical hacker.
8. Interviewee-NL-8. (2023, November 24). Interview with former Policy Advisor at the Ministry of the Interior and Kingdom Relations and independent electoral consultant.

9. Interviewee-NL-9. (2023, December 3). Interview with founder and chair of the Foundation for the Dutch Abroad (SNBN).
10. Interviewee-NL-10. (2023, December 3). Interview with co-founder and secretary of the Foundation for the Dutch Abroad (SNBN).
11. Interviewee-NOR-1. (2023, July 3). Interview with former senior adviser and security/technical manager of the i-voting project at the Ministry of Local Government and Regional Affairs (2009–2014).
12. Interviewee-NOR-2. (2023, November 17). Interview with member of the Conservative Party, former MP, and co-initiator of the proposal to stop i-voting trials [Personal communication].
13. Interviewee-NOR-3. (2023, August 14). Interview with professor of mathematical sciences, former consultant on internet voting for the Norwegian government (2009–2013) [Personal communication].
14. Interviewee-NOR-4. (2023, June 30). Interview with researcher at the Institute for Social Research, evaluator of Norwegian i-voting pilots.
15. Interviewee-NOR-5. (2023, June 30 & June 28). Interview and follow-up notes from evaluator of Norwegian i-voting pilots at the Institute for Social Research.
16. Interviewee-NOR-6. (2024, April 22). Interview with representative of the Ministry of Local Government and Modernisation.
17. Interviewee-NOR-7. (2024, April 22). Interview with representative of the Ministry of Local Government and Modernisation.
18. Interviewee-NOR-8. (2024, April 22). Interview with representative of the Ministry of Local Government and Modernisation.
19. Interviewee-CH-1. (2023, October 30). Interview with former head of cabinet for the Geneva State Chancellor (2001–2009) and Deputy Secretary General in charge of strategic projects (2009–2013), involved in i-voting.
20. Interviewee-CH-2. (2023, November 8). Interview with representative of the Federal Chancellery of Switzerland.
21. Interviewee-CH-3. (2023, November 15). Interview with software engineer and historian, moderator of expert dialogues on i-voting in 2020.
22. Interviewee-CH-4. (2023, November 17). Interview with political commentator and blogger engaged in Swiss i-voting debates.
23. Interviewee-CH-5. (2023, December 1). Interview with associate professor of comparative politics, conducting research on i-voting.

24. Interviewee-CH-6. (2023, December 7). Interview with former Swiss Post employee with responsibilities including Head of Business Development eGovernment (2012–2013), Head of Products and Project eHealth (2014–2016), Head of E-Voting (2016–2018), Director of Digital Public Services (2018–2020), and Head of Business Unit eGovernment (2021).
25. Interviewee-CH-7. (2023, December 15). Interview with e-voting product manager at Swiss Post.
26. Interviewee-CH-8. (2024, January 29). Personal correspondence with the director of the Organisation of the Swiss Abroad (OSA).
27. Interviewee-FR-1. (2023, June 21). Interview and personal correspondence with former director of i-voting projects (2012 and 2014) at the Ministry of Europe and Foreign Affairs.
28. Interviewee-FR-2. (2023, May 29). Interview with French academic and politician, former MP representing the 3rd constituency for French residents overseas in the Assemblée Nationale (2014–2017), and professor of political science at the University of Stockholm.
29. Interviewee-FR-3. (2023, May 30). Interview with French academic, professor of international relations and geopolitics, and author on i-voting in France.
30. Interviewee-FR-4. (2023, August 29). Interview with member of the Assembly of the French Citizens Abroad (Assemblée des Français de l'Étranger).
31. Interviewee-FR-5. (2023, November 2). Interview with founder and director of Election.com (1999–2019).
32. Interviewee-FR-6. (2023, November 10). Interview with consultant and IT expert monitoring e-voting since 2004, author of a blog on the subject.
33. Interviewee-FR-7. (2023, November 28). Interview with computer scientist at Telecom Sud Paris, specialising in e- and i-voting.
34. Interviewee-FR-8. (2024, January 30). Interview with project manager at the Directorate for French Citizens Living Abroad and Consular Administration, Ministry of Europe and Foreign Affairs.
35. Interviewee-FR-9. (2024, January 30). Interview with project officer at the Directorate for French Citizens Living Abroad and Consular Administration, Ministry of Europe and Foreign Affairs.
36. Interviewee-FR-10. (2024, January 30). Interview with project officer at the Directorate for French Citizens Living Abroad and Consular Administration, Ministry of Europe and Foreign Affairs.

37. Interviewee-FR-11. (2024, January 30). Interview with representative of French Cybersecurity Agency (ANSSI)
38. Interviewee-FR-12. (2024, January 30). Interview with representative of French Cybersecurity Agency (ANSSI).
39. Interviewee-FR-13. (2024, April 18). Interview with researcher at the University of Lille.
40. Interviewee-EE-1. (2023, September 13). Interview with associate professor of technology research at the University of Tartu, focusing on i-elections and running the Estonian Internet Voter Study.
41. Interviewee-EE-2. (2023, September 13). Interview with CEO of the Estonian Internet Foundation, former Chairman of the Estonian National Electoral Committee and leader of the Estonian internet voting project (2003-2012).
42. Interviewee-EE-3. (2023, September 13). Interview with representative of the e-Estonia Briefing Centre.
43. Interviewee-EE-4. (2023, September 14). Interview with adviser at the State Electoral Office.
44. Interviewee-EE-5. (2023, September 14). Interview with legal adviser to Estonian election management bodies for 15 years and current Head of the State Electoral Office.
45. Interviewee-EE-6. (2023, September 15). Interview with sociologist who conducted a 2004 report on attitudes towards and consequences of i-voting.
46. Interviewee-EE-7. (2023, September 18). Interview with rector and professor of political economy at Estonian Business School, author of articles on i-voting.
47. Interviewee-EE-8. (2023, September 19). Interview with former prime minister, in office during initial discussions of i-voting in 2002.
48. Interviewee-EE-9. (2023, September 19). Interview with project manager for internet voting at the Estonian National Electoral Committee (2003-2012), Chairman of the Estonian Electronic Voting Committee (2012-2016), and Head of Internet Voting at the State Electoral Office of Estonia (2017-2019).
49. Interviewee-EE-10. (2023, September 20). Interview with former National Digital Adviser for Estonia, involved in digital and innovation sectors.
50. Interviewee-EE-11. (2023, September 21). Interview with organiser of e-voting conferences in Estonia (2005, 2006), former MP and minister, now part of the e-Governance Academy.
51. Interviewee-EE-12. (2023, September 21). Interview with Senior Expert of Smart Governance at the e-Governance Academy, involved in the development and implementation of i-voting in Estonia.
52. Interviewee-EE-13. (2023, September 25). Interview with head of market research at Kantar Emor.
53. Interviewee-EE-14. (2023, September 26). Interview with member of parliament and leader of the Conservative People's Party (EKRE).