



Study on E-Voting practices in the EU

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1. Introduction

In this report, we will assess electronic voting (e-voting) practices in elections in the European Union (EU). We will examine EU policy and legal frameworks (or the absence thereof), explore recent literature on e-voting practices and experiences, and pay special attention to citizens' experiences and the alignment of practices with Council of Europe standards. As a case study, the report will analyse e-voting practices in France, focusing on the latest elections where e-voting has been an option, such as the 2022 Legislative Elections. We will discuss the potential advantages and pitfalls of the use of e-voting practices based on existing research. Moreover, we will integrate relevant findings from the proprietary research of the Electoral Psychology Observatory (EPO), for example, the effect of e-voting on groups of interest, such as first-time voters. Finally, we will discuss possible policy solutions for EU Member States who desire to introduce or maintain e-voting. Overall, the report will inform the preparation of the European Commission's compendium of practices. The report will set out recommendations that can translate, for instance, into the adoption of good practice frameworks in the Member States or good practices addressed to national and EU bodies.

It is important to clarify the scope of this report. In principle, the use of electronic tools and information technologies can affect many aspects of electoral processes, ranging from identity checks to registration, electoral roll management, vote counting, internal communication between individual polling stations and central stations, and of course voter facing processes among others. This report solely aims to deal with the voter facing aspect of e-voting and in particular with two sub-components which will be considered throughout: 1) electronic voting machines in polling stations, 2) remote e-voting (notably internet voting). It should be acknowledged that for many electoral management bodies there may be an important relationship between the choices made with regards to voter facing e-voting (as of interest in this report) and other users of information technologies in electoral processes. A good example of this is the case of Estonia, where internet voting is used as part of a much broader system of digital identity administrative organisation. Whilst practitioners may therefore consider a relationship between the findings of this report and other aspects of the way they use information technologies in electoral and broader administrative processes, it was important to keep a clear and transparent scope for the purposes of this specific study.

The report will be based on an extensive literature review and mapping exercise on the current e-voting practices in EU Member States. This includes previous works already conducted by and on behalf of DG JUST including a report on the study on the benefits and drawbacks of remote voting¹ and the updated report on the study of remote voting². We will also perform an analysis exercise on various EU and national legal sources, such as the EU Treaties, EU secondary legislation, EU soft law measures and EU case law, national legislation, national jurisprudence, national administrative practices, and measures implementing EU acts. We will incorporate primary research from the Electoral Psychology Observatory with voters that have

¹ https://ec.europa.eu/info/policies/justice-and-fundamental-rights/eu-citizenship/democracy-and-electoral-rights/studies_en#studyonremotevoting

² https://ec.europa.eu/info/files/study-report-remote-voting-update_en.

used e-voting systems (including qualitative and quantitative data). Finally, the case study will allow for a detailed analysis of one EU Member State, France.

As stated in the previous section, the findings will inform the current efforts by the Commission to prepare a compendium of e-voting practices as announced in the European Democracy Action Plan. Best practices will be identified and classified by levels of priority, effectiveness, and complexity in terms of implementation.

Scope of report

- 1) **Scope:** E-voting as the use of electronic means for voting and counting purposes. This covers e-voting machines in polling stations, the use of optical scanners to register and/or count paper ballots as well as remote e-voting., i.e.:
 - a. Internet voting
 - b. Use of electronic voting machines
 - c. Use of IT in remote voting processes (e.g., proxy voting in France)
 - d. But NOT use of technology in registration processes, vote processing, results processing, id checking, etc

- 2) **Conceptual challenges:** As a result of the scope, the e-voting study needs to consider the use of e-voting and technology in vote-casting procedures:
 - a. In the context of remote voting (i.e., internet voting) [IV]
 - b. In the context of the dematerialisation of voting procedures (electronic voting machines) [VM]
 - c. Briefly, in miscellaneous vote-casting procedures (e.g., proxy voting in France) [OIT]

- 3) Key questions:
 - a. What e-voting procedures (including IV, VM, and OIT) are used in the EU and where?
 - b. What is the state of the art in the field?
 - c. What is the legal framework within which those practices operate (primarily EU law and French for the French case study)?
 - d. Are there key success stories and horror stories to note in the field?
 - e. How have those practices been organised and implemented in the case of France (including overseas voting, municipalities specific decisions on electronic voting machines, proxy voting support, etc)?
 - f. What do we know about the impact of those procedures on voters (e.g., effects on behaviour, satisfaction, turnout, electoral choice, etc)?
 - g. Can we highlight some key “do’s” (best practice) and “don’ts” (elements leading to particularly adverse effects) in the field?
 - h. Are practices in using information and communication technology (ICT) in elections amenable to be mapped onto e-voting practices?

2. Context

E-voting has been considered by several national governments as a solution to low turnout. Essentially, the theoretical underpinning of the policy is based on the rational choice conception of political action (or, more specifically, inaction). Turnout rates at elections are argued to be inversely proportional to the costs incurred by voters – i.e., the time and effort they must invest to go to a polling station to cast a ballot in an election. The argument continues that if these costs were perceived to be decreased, for example, by implementing alternative ways to vote such as allowing people to vote from home or at any polling station in the country, these measures then would in turn increase turnout. As a result, the implementation of e-voting often brings the hope of increased turnout in elections and improved efficiency to the process of counting and tallying ballots. In the current context of decreasing participation in many Western democracies, institutions and administrators of elections latch onto the promise of reengaged and participatory citizens. Therefore, e-voting is often regarded as a solution to the ails of the traditional models of Western democracy. It is important to note that as discussed in the introduction, in this study we are specifically interested in aspects of e-voting that are voter-facing. By that, we specifically mean two important components: 1) the use of remote e-voting which would allow voters to vote from home or some other convenient place rather than having to go to a polling station, and 2) the use of electronic voting machines within polling stations. This allows citizens to express their preferences from their own homes or indeed anywhere else in the world where the internet can be accessed. The advantages of such systems include the perception that allowing citizens to vote from home will make it so ‘easy’ to vote (as compared to having to go to a polling station) that most people will take a minute or two to do it at their convenience. Conversely, electronic voting machines simply replace paper-based ballots within polling stations by de-materialised electronic ballots, which voters cast using ‘Direct Recording Electronic’ voting machines.

In 2005, Estonia became the first country to hold a legally binding election using internet voting (Maaten, 2004). France has also experimented with allowing citizens abroad to vote using the internet, while the European Union established the CyberVote project as early as 2000 (Cybervote, 2003). Other experiments on e-voting have included the use of e-voting for nationwide student representatives’ elections in Austria.

It is important to note the difference with direct e-voting (or the use of ‘electronic voting machines’) which has been practised in many countries for a number of years.³ With this system, voters pull a lever or mark or punch a card, which is read by a machine. The main benefit of these direct voting systems is that they supposedly increase the speed of counting ballots thereby decreasing the associated costs of tallying votes. However, they have also led to certain controversy, because it is much harder to verify final figures than with paper ballots. Within the European Union, countries including Belgium, Germany and the Netherlands have

³ Whilst outside the area of focus of this report (EU member states), the example of the US is often referred to by Electoral Commissions as a case in practice. Electoral management bodies often share experiences and international benchmarking makes the omission of this obvious case study likely to be perceived as problematic.

made use of this method of voting or vote counting. Voting machines, however, do not fundamentally change the relationship between voters and the polling station.

One of the key concepts coined by the team at the Electoral Psychology Observatory is 'electoral ergonomics', which they define as the interface between electoral arrangements and the psychological needs of voters. This concept encompasses the way in which all small aspects of electoral design – such as the format of ballot papers, remote voting options (internet, postal, advance, etc.), or station design, which are typically assumed to be neutral in electoral effects interact with voters' psychological reactions to affect voters' experience, satisfaction, turnout, and electoral choice. This means that we focus on all aspects of electoral organisation which have an impact on voters' key attitudes (electoral satisfaction, efficacy, trust, etc), turnout, and/or electoral choice. Those range from the design of ballot paper, use of diverse forms of remote voting, choice of the day of election (weekday, Sunday, election day designed as public holiday), use and design of voting machines, organisation of polling stations, forms of id checks, etc to specific initiatives and regulations pertaining to individual voter categories (first time voters, disabled voters, illiterate voters, specific ethnic, linguistic, or cultural minorities, in some countries, female voters, etc).

Simply assuming that changes to the organisation of the vote, however small they might be, are neutral is potentially a mistake: our research shows that every small detail of how the election is organised influences how citizens experience the election and the way they vote. These seemingly 'minor' details include aspects of the electoral process such as the type of ballot paper used, and the way polling stations are designed. Drawing upon insights from the Electoral Psychology Observatory's research on youth participation, the concept of electoral ergonomics also extends to the consideration of whether people vote using a paper ballot, an electronic voting machine, or vote online.

In particular, the EPO research focuses on the specific situation of first-time voters. It highlights the importance of the first two elections in a person's life, noting that participating in one of those first two electoral opportunities may have critical consequences in terms of life-long participation (Bruter and Harrison, 2020). In that context, the research also notes that contrary to popular belief first-time voters are significantly less likely to use remote voting than older generations. Furthermore, it also finds that first-time voters who go to polling stations derive far more positive emotions from their voting experience than those who vote remotely and that in turn those positive emotions may increase the likelihood of future turnout.

There are many reasons why electoral organisers have considered the two aspects of e-voting of interest in this report: voting machines, and remote e-voting. With regards to electronic voting machines, the stated goals have often included a desire to modernise voting procedures, minimise the risk of human error, and simplify and accelerate vote counting and results aggregation.

Electoral authorities are increasingly under pressure to accommodate voters who might not be able to vote in person, in their designated polling station, on Election Day. There are several options that are available, and they differ in their implementation and under certain

circumstances. There are three main forms of remote voting: personal (someone else may cast the vote instead of the eligible voter), temporal (the vote can be cast before Election Day, and geographical (the vote can be cast somewhere else than the voter's designated polling station), or indeed a combination of the three options. In this report, we discuss the various forms of remote voting offered to citizens, with a focus on e-voting.

3. Definition

3.1 E-voting

The concept of e-voting is fundamentally diverse and heterogeneous. In different contexts, it notably encompasses two very different primary instruments: the use of remote e-voting (ability to vote from anywhere using internet technologies from a phone or computer), and the use of electronic voting machines and notably Direct Recording Voting machines (also known as “DRE”), which may either be located in polling stations or in other specific public places.

In that sense, from a voter-centric perspective, the complexities of understanding the potential pitfalls and best practice in the use of e-voting relate to two core components:

1. The dematerialisation per se and replacement of paper ballots by electronic ballots for either some or all voters, either optionally or compulsorily.
2. The possibility of making voting remote in either geographical and/or temporal manner, that is, the possibility for citizens to vote either outside of traditional polling stations, or earlier than the traditional voting days.

The first component is common to all forms of e-voting, whilst the second only affects some of them. Beyond the change to the citizen experience, both components of e-voting are generally associated with a third component which is invisible to citizens: the electronic transmission of voting data using either public or private networks when it comes to the internal organisation of the work of Election Management Bodies, such as matching between election roll and participants, vote counting, count transmission and aggregation, etc.

Remote voting – which is part of many e-voting practices – encompasses all the ways in which a voter may be able to vote outside of the classic trilogy of 1) a given voter casting a ballot 2) in their polling station, 3) on Election Day.

All three components of this historical tryptic can be relaxed, usually with the explicit goal of broadening the ability for all citizens to cast a vote if they wish to if they are not able to meet any or any combination of the three personal, geographical, and temporal requirements described above. This typology is summarised in Table 1, which also provides examples of some (not all) of the forms they may take in practice. We can therefore distinguish between:

1. Personal remote voting: which enables a voter to ask someone else to cast a vote in their place;
2. Geographical remote voting: which enables a voter to cast their vote without going to their polling station;
3. Temporal remote voting: which enables a voter a cast their vote ahead of the designated Election Day.

Table 1. Typology and examples of remote voting.

GEOGRAPHICAL	TEMPORAL	PERSONAL
--------------	----------	----------

Right to vote in any national polling station (Sweden)	Advance (Australia, New Zealand)	Proxy voting (France, Poland: only for persons with disabilities)
Same-day remote e-voting (several US counties)	2-stage early/advance (Georgia) Limited advance for specific locations only (Ireland)	
GEOGRAPHICAL + TEMPORAL		
Postal voting (UK, Austria, Germany)		
Early remote e-voting (Estonia, Switzerland)		
Advance voting in any national polling station (Sweden, Finland)		
Interstate voting in some polling stations nationwide (Australia)		

Those three components can in turn interact. As a few examples:

- Proxy voting is a form of purely personal remote voting.
- Allowing citizens to vote in any polling station in the country on Election Day is a form of purely geographical remote voting.
- Advance voting (opening polling stations for a number of days or weeks so that registered voters can attend them earlier than Election Day if they wish) is form of purely temporal remote voting.
- Postal voting is a combination of geographical and temporal remote voting.

When it comes to remote e-voting, the option is systematically a form of geographical remote voting, but in practice, it is also overwhelmingly used as a conjointly geographical and temporal remote voting option. In fact, in some cases, such as Estonia, remote e-voting can only be used as both geographical and temporal remote voting, in the sense that it is only available till before Election Day but not on Election Day itself.

3.2 ICT in elections that is ancillary to e-voting or a necessary precursor

Whilst the scope of this report is limited to voter-facing aspects of e-voting in the context of vote casting, specifically, the use of electronic voting machines and the use of remote e-voting (internet voting), it is important to remember that ICT are used widely in other aspects of electoral organisation and broader administrative organisation, including in countries which strictly ban both voting machines and remote e-voting.

Some countries such as Estonia have a wide-ranging form of digital identity including a digital identity card, which citizens can use for a vast range of civic and administrative acts. Many countries, including France, also allow citizens to use the internet to register on the election roll. In France, it is also possible for voters to use the internet to verify their electoral registration and the details of their polling station.

Almost all EU Member States with decentralised vote counting (e.g., Sweden) also use ICT to send and aggregate election tallies from polling stations or counting centres to central administrative authorities. Finally, some Member States use ICT for voter-facing but non-vote-casting situations, for instance France which recently introduced a new form of internet-based proxy request which citizens can use to allow someone else to vote in their name on Election Day, although the system still requires the citizens to finalise their request in person in a police station or an embassy or consulate.

Whilst those aspects of the use of ICT in other aspects of the vote is very distinct from the use of e-voting in vote casting, it is important to know that the electronic infrastructure may often overlap. For instance, Estonia uses the same electronic identity for all formalities. By contrast, France uses France Connect for citizens to request proxy voting but registration on consular lists for the remote e-voting of French citizens registered to vote abroad in the elections where such vote is allowed (see section on France).

Whilst there is no sufficient empirical research on the synergies between the use of ICT in vote casting and non-vote casting processes, it is conceivable that one of the reasons why Estonia has been at the forefront of the use of internet voting in the European Union, which it has used since 2005 already, is precisely because this has been part of a far broader range of administrative and civic services offered as part of Estonian digital identity. Whilst the system of internet voting remains criticised by some both within and outside of the country (the Estonian Centre party has notably long been critical of internet voting and the OSCE has also expressed worries), it seems quite clear that those citizens that have used internet voting will have done so all the more comfortably that they use their digital identity in a wide range of administrative and civic processes. This has largely participated in a significant proportion of the Estonian population making use of the facility to use internet voting in elections.

Whilst it is important to understand how e-voting relates to other aspects of the use of ICT in electoral and administrative processes as well as questions of technological literacy, there is no doubt that the use of e-voting in vote casting procedures, including the use of both electronic voting machines and remote e-voting is distinct and specific. Those two specific elements generate their own challenges and opportunities and are neither a natural

continuation of the use of ICT in other aspects of electoral management nor pre-requiring them.

4. Literature Review

In order to explore the context briefly presented above, we have conducted a systematic literature review of recent academic publications on e-voting in the European Union. We designed several search queries on the Web of Science (WoS) to retrieve the most recent and up-to-date literature on relevant topics covered by this report.

Starting with literature on e-voting in the European Union published in the last 5 years, we surprisingly found a very small body of literature (only 5 papers that matched the search criteria)⁴. Three out of five papers focused on evaluating specific e-voting tools (Alonso et al. 2021, Del Blanco et al. 2020) or blockchain technology (Cucurull et al. 2019) in relation to their compliance with the Council of Europe's e-voting recommendations. Another one (Del Blanco and Gasco 2019) provided a framework for comparing two specific e-voting systems. The fifth one by Roblek et al. (2020) provides a very general overview of the current state of e-democracy in four EU countries (Austria, Croatia, Italy and Slovenia) and concludes that the stage of development of e-democracy is very different in each country.

We then modified our search to include "internet voting" as an item and expanded the publication date range to the last 10 years, from 2012 to 2022. This change added only four publications to our set of academic literature, which primarily focus, again, on The Council of Europe (CoE). The prominent role of the CoE's guidelines in the academic literature, either as a benchmark to evaluate specific e-voting tools or mechanisms, or as a topic of study itself, is an interesting finding, as it confirms the central (and lonely) role of the CoE as an international organisation trying to set a framework to regulate e-voting. Indeed, both Driza Maurer (2017) and Stein and Wenda (2014) highlight that the CoE is the only international organisation that has published recommendations to regulate e-voting. It has done so since 2004, and the latest document, Recommendation CM/Rec(2017)5 of the Committee of Ministers to member States on standards for e-voting, includes a wider definition of e-voting and sets out 49 e-voting standards to guarantee universal, equal, free and secret suffrage, establish regulatory and organisational requirements, and ensure transparency, observation accountability, reliability and security of the processes and systems employed.

Another important regulation also features in our literature, although only one paper covers it: the General Data Protection Regulation (GDPR). Rodriguez-Perez (2020) explores the impact of the EU's GDPR on e-voting through case studies in Finland and France. He concludes that the lack of guidance on implementing GDPR in the context of e-voting remains a challenge that should be addressed by the relevant authorities (either national or at the EU level).

Finally, this second search also yielded another comparative study, this time focused only on e-voting and comparing Estonia and Central Europe (Germany, Switzerland and Austria). Reiners (2017) reflects on the conditions that allow for a successful implementation of e-voting and pays attention to the legal and judicial frameworks of the four countries, which certainly

⁴ Peer-reviewed papers that contained the key words "e-voting" and "EU" or "European Union" or "Europe" in their title, abstract or key words.

play a key role in the implementation of new electoral procedures; the territorial governance of the countries, which may add barriers to the adoption of electoral innovations at certain government levels; the population size and culture of public debate; and the use of digital technologies and the internet by the general public, which will shape in part issues around accessibility and favourability. The paper concludes that Estonia is small, organizationally simple and tech-savvy enough to have implemented e-voting more rapidly and successfully than the other three countries. According to the author, only Switzerland seems to be in a position to potentially follow Estonia's lead in the implementation of e-voting solutions.

We then performed a purposive literature search to cover concrete aspects of e-voting not captured by our WoS systematic search. Namely, there remain several concerns about online electronic voting: technical, and psychological. In technical terms, Lauer (2004) notes that mechanisms should be in place for voter authentication, ensure confidentiality, and allow the voting process to be re-audited after the event. Fulfilling these criteria with electronic voting systems is problematic, to the extent that even some e-voting advocates have seen the technologies as more useful for second tier elections, as opposed to national contests (Mohen and Glidden, 2001). In terms of the psychological limits of e-voting, the argument is that while voting over the internet may be 'easier' it is certainly not symbolically the same thing as going to a polling station and participating in the atmosphere of the election. In our previous research, we have found that young people who vote over the internet experience different emotions as opposed to casting a ballot in-person in a polling station.

It is also important to highlight the impact of e-voting on electoral behaviour including turnout and voting choice. Bruter and Harrison (2020) have shown that the polling station experience plays a major part in the way voters perceive elections. Overall, we found that citizens voting at the polling station report more positive emotions with the vote than e-voting. In particular, in the case of young people that cast a ballot at a polling station, it makes them feel happier, more excited, and more connected with their community compared to voting electronically.

Moreover, the issue of accessibility needs to be addressed when considering the implementation of e-voting, in the case of citizens that have specific access requirements such as those physical or sensory disabilities. Using WoS again, we retrieved a small body of literature (12 publications) on the matter.⁵ The fact that 10 out of the 12 publications are Conference Proceedings, rather than peer-reviewed papers, indicates that there is a lot of research to be done on this topic. A strong focus of the literature is testing the design of electronic voting machines and electronic ballots for people with disabilities, especially the visually impaired, people with low literacy and the elderly. Even though each paper is based on different machine models in different countries, they all reach similar conclusions. First, one size does not fit all. There are important differences in the way voters interact with electronic voting systems depending on their disability. For instance, when voting, a visually impaired person's needs and challenges differ from those of a person with cognitive limitations

⁵ The query was TS = (("e-voting" OR "electronic voting" OR "voting machines") AND ("disabilities" OR "disabled people")), which searched these words in the title, abstract and key words of all the publications in the WoS database between 1900 and 2022.

(Lazar, 2020; van Eijk et al., 2019), which makes them prefer different electronic voting systems (Lee et al., 2015). Second, in various countries (e.g., the USA and Japan), voting officials and politicians have expressed concerns about the implementations of voting adaptations or systems specifically for disabled persons, given the risk to anonymity and secrecy of the vote (Lazar, 2020; Miura, 2016). Finally, seldom papers (all of them more than 10 years old) focus on physical and hearing-related disabilities and suggest that persons who live with these conditions may benefit from remote forms of voting (Ayo et al., 2009; Caldelli et al., 2009; Cross et al., 2009). Overall, the literature points towards the need to take a nuanced approach that looks at each disability separately and at the same time preserves the essential principles of vote casting, namely non-coercion, secrecy and anonymity.

Bruter and Harrison use the concept of “effective access to the vote”, which aggregates all aspects of registration, vulnerable categories accessibility, and ability to vote for all citizens on Election Day or through remote voting into one measure which we promote as the key synthetic metric of the quality of electoral democracy across systems. Designing electoral procedures which meet the psychological needs of citizens – both for the general population and for the most vulnerable voter categories (such as first-time voters, disabled voters, voters with literacy problems, etc.) is crucial.

5. Context

5.1 Policy

As part of the European Democracy Action Plan, the Commission announced its intention to prepare a compendium of e-voting practices, together with Member States and in close cooperation with the Council of Europe. It is worth noting that, apart from these recent developments, European institutions have been looking at IT solutions in electoral processes and democratic participation more broadly for several years.

A European Parliament report from 2016 concluded that online political participation is an evolving practice that tends to be focused on a reduced number of Member States. The report indicates that there is a steep learning curve for those authorities that chose to introduce e-voting in the electoral process, but once that is overcome, the results are promising.⁶

E-voting is not an extended practice in the EU. Some Member States are further ahead than others in terms of trial and implementation of such technologies. Comparability across countries is also a challenge, given the differences in the types and levels of processes. Therefore, there is value in focusing on specific case studies, such as France (see relevant section).

The Council of Europe has established intergovernmental standards, via the Recommendation Rec(2004)11 on legal, operational and technical standards for e-voting, which was later updated and became the Recommendation CM/Rec(2017)5 of the Committee of Ministers to member States on standards for e-voting.⁷

This recommendation establishes 49 standards, which cover, among other aspects, the interface of e-voting, the reliability and security of the systems, the evaluability and testability of the systems, the transparency of the process, vote secrecy and authenticity, etc. The aim of these standards is to provide a legal benchmark for countries when introducing, operating, and evaluating e-voting systems, as well as to enhance trust and confidence of citizens in e-voting.⁸

5.2 Regulatory context

Beyond the psychological impact of internet voting and more broadly e-voting on citizens, there are several legal aspects to consider when devising systems of e-voting. To begin with, e-voting procedures could simplify the exercise of voting rights provided under the EU Treaties.

⁶ European Parliament, Potential and challenges of e-voting in the European Union, available [here](#).

⁷ Council of Europe, E-voting, available [here](#).

⁸ Council of Europe, Explanatory Memorandum to Recommendation CM/Rec(2017)5 of the Committee of Ministers to member States on standards for e-voting, available [here](#).

For instance, e-voting procedures, could broaden the democratic participation in elections across the EU and facilitate engagement for EU citizens residing abroad, who may not be able to physically join voting stations to express their vote. E-voting rules could contribute towards the fulfilment of the inclusiveness goal reflected, among others, in Article 10 TEU, which establishes that every citizen shall have the right to participate in the democratic life of the Union.

As a matter of fact, inclusiveness proves to be a challenge, and the introduction of e-voting could potentially help to address it. E-voting could help mobile EU citizens (those having exercised their EU free movement rights) to exercise their voting rights. Indeed, there is evidence that EU citizens living abroad have often encountered obstacles to the effective exercise of their right to vote.⁹ The Commission presented in November 2021 proposals to address these difficulties.¹⁰

EU instruments would be of relevance in shaping a EU framework on e-voting. Among those, we should mention the 1976 Electoral Act, instruments concerning the voting rights of mobile EU citizens in municipal and European elections,¹¹ EU data protection rules,¹² as well as relevant rules governing the accessibility of the websites and mobile applications of public sector bodies,¹³ cyber resilience rules,¹⁴ e-government.¹⁵ Member States are also bound by specific international standards. Of relevance are also the guidance documents issued by the Council of Europe on e-voting.¹⁶

In addition to EU law, national legal orders have specific rules and approaches to voting rights that constitute a limit to the introduction of internet or e-voting procedures at EU level.

⁹ See Alexandra Brzozowski and Benjamin Fox 'The Brief – Why can't we vote?', Euractiv, 1 September 2020 <https://www.euractiv.com/section/future-eu/opinion/the-brief-why-cant-we-vote/>; Lisa O' Carrol, 'Outdated law led to voting problems in EU elections – watchdog', The Guardian, 8 October 2019, https://www.theguardian.com/politics/2019/oct/08/outdated-law-led-to-voting-problems-in-eu-elections-watchdog?CMP=aff_1432&utm_content=The+Independent&awc=5795_1575729646_020d034956ccd53965676701520d4e4a.

¹⁰ See Proposal for a COUNCIL DIRECTIVE laying down detailed arrangements for the exercise of the right to vote and stand as a candidate in elections to the European Parliament for Union citizens residing in a Member State of which they are not nationals (recast) COM/2021/732 final.

¹¹ Council Directive 93/109/EC of 6 December 1993 lays down detailed arrangements for the exercise of the right to vote and stand as a candidate in elections to the European Parliament for citizens of the Union residing in a Member State of which they are not nationals; Council Directive 94/80/EC of 19 December 1994, lays down detailed arrangements for the exercise of the right to vote and to stand as a candidate in municipal elections by citizens of the Union residing in a Member State of which they are not nationals.

¹² Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC, OJ L 119, 4.5.2016, p. 1–88.

¹³ Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies OJ L 327, 2.12.2016, p. 1–15.

¹⁴ European Parliament, 'Cybersecurity: Parliament adopts new law to strengthen EU-wide resilience', 10 November 2022, <https://www.europarl.europa.eu/news/en/press-room/20221107IPR49608/cybersecurity-parliament-adopts-new-law-to-strengthen-eu-wide-resilience>

¹⁵ European Commission, 'E-government', https://ec.europa.eu/info/business-economy-euro/egovernment_en

¹⁶ Recommendation CM/Rec(2017)51 of the Committee of Ministers to member States on standards for e-voting, CM/Rec(2017)5.

Accordingly, the challenges in shaping measures in this field are multiple and boil down to complex constitutional and privacy-security issues.

Due to space constraints, this section will focus, first, on EU legislation, and, in particular, competence rules, fundamental rights, data protection and cyber resilience rules; second, it will briefly outline some of the practices and rules adopted in selected Member States, notably, Italy and Belgium, concerning e-voting. The latter offer interesting examples for the possible adoption of an EU framework on e-voting.

Due to space constraints, this section will focus, first, on EU legislation, and, in particular, competence rules, fundamental rights, data protection and cyber resilience rules; second, it will briefly outline the French framework on electronic voting procedures as a potential model for the EU.

5.2.1 Competences

According to the division of competences outlined in the EU Treaties, Member States remain competent to regulate the conditions and the procedures concerning national elections. Subject to the respect of basic principles, such as those laid down in Articles 2 and 14 TEU, it is the competence and the responsibility of the Member States to outline the conditions for the conduct of elections. In particular, Article 2 TEU provides that one of the EU founding values, to which Member states are committed, is that of democracy. Respecting democracy is crucial to achieve a society in which pluralism, non-discrimination, tolerance, justice, solidarity and equality between women and men prevail.¹⁷ It follows that rules on elections laid down by Member States should comply with these values.

Under Articles 20(2)(b) and 22 TFEU, nationals of the EU Member states enjoy (a) the right to vote and to stand as candidates in elections to the European Parliament and (b) to vote and stand as a candidate in municipal elections in their Member State of residence. These two rights are also granted under the EU Charter of fundamental rights, and therefore have acquired a *fundamental* rights nature.¹⁸

Articles 20 and 22 TFEU provide that EU citizens can exercise these rights under the same *conditions* as nationals of that State. As a result, national laws outlining the conditions to exercise the right to vote under a purely national dimension should also apply to EU citizens with reference to municipal and elections to the European Parliament. This rule seeks to avoid direct discriminations on the ground of nationality¹⁹ against EU citizens. For the purposes of this report, the principle of non-discrimination under Articles 20 and 22 TEU entails that rules

¹⁷ Article 2 TEU.

¹⁸ As a result, any limitation to their enjoyment should comply with Article 52 of the EU Charter, and, notably, should be provided for by law and respect the essence of those rights and freedoms. Additionally, limitations may be made only if they are necessary and genuinely meet objectives of general interest recognised by the Union or the need to protect the rights and freedoms of others, subject to the principle of proportionality.

¹⁹ Article 18 TFEU.

provided by Member States on the conditions to access e-voting should apply also to elections in which EU citizens exercise their EU-derived voting rights.

Under Article 223 TFEU, the EU could introduce a uniform procedure or principles common to *all* Member States concerning the election of the members of the European Parliament. While the first approach may prove more effective and uniform, it may also pose challenges for States with specific requirements on the right to vote and thus encounter resistance from those jurisdictions. By contrast, the second approach would certainly be more mindful of the current rules existing in the Member States. At the same time, it may be challenging to establish a common core of principles shared by all Member States, precisely because of the specificities of Member States concerning voting rights. In light of the centrality of the values of democracy and inclusiveness in the EU legal order, a uniform approach to rules on the election of the European Parliament would appear more appropriate.

In May 2022,²⁰ the European Parliament adopted a resolution proposing a set of principles for e-voting. The resolution stresses the importance of national traditions as well as the Council of Europe's recommendations in that area. The resolution also points to the importance of appropriate safeguards to ensure the reliability, the integrity, the secrecy of the vote, the accessibility for persons with disabilities, transparency in the design and deployment of electronic and internet systems, the possibility for manual or electronic recounts without compromising the secrecy of the vote, and the protection of personal data in accordance with applicable Union law.

5.2.2 *Fundamental rights*

E-voting rules should also respect EU fundamental rights, including EU general principles of EU law.²¹ As mentioned, Article 39 of the EU Charter of Fundamental Rights transforms the right of EU citizens to vote and stand as candidates for municipal and European elections in their host Member States into a fundamental right. According to Article 52(3) of the Charter, Article 39 of the EU Charter is to be interpreted in light of the corresponding rights included in the European Convention of Human Rights. As a result, the right to vote granted under the EU Charter is to be read in light of the Court of Strasbourg's case law interpreting Article of Protocol No. 1, which provides the right to free elections. The Article reads as follows:

'The High Contracting Parties undertake to hold free elections at reasonable intervals by secret ballot, under conditions which will ensure the free expression of the opinion of the people in the choice of the legislature.'

The Article imposes two crucial requirements on the signatory parties, which should be complied with also in a potential EU framework on e-voting.

First, the ballots should be secret. Hence, the establishment of e-voting procedures should achieve the secrecy of the votes. The attainment of secrecy may prove complex in this context.

²⁰ https://www.europarl.europa.eu/doceo/document/TA-9-2022-0129_EN.html.

²¹ Article 6 TEU.

To name but one potential issue, the secrecy requirement means that the online voting procedures and electronic voting machines should be secure from cyberattacks to avoid data leaks.

Second, while the European Convention does not demand States to introduce a system that ensures the exercise of the right to vote for their non-resident citizens,²² it imposes to signatory parties positive obligations to take appropriate measures to enable all citizens to express their vote, including those who are affected by locomotive diseases that impede access to polling stations.²³ This positive obligations could constitute the legal basis for the introduction of e-voting procedures, especially in favour of individuals who cannot join the polling stations because of physical and medical challenges.

5.2.3 Data protection

The General Data Protection Regulation (GDPR) is of relevance for designing e-voting rules at EU and national level. This is because these voting procedures would involve the processing of personal data²⁴ of voters and candidates through automated means. What is more, some of the personal data processed for e-voting could belong to so-called special categories of personal data,²⁵ in so far as they would include, for example, biometric data which is processed for the purpose of uniquely identifying a natural person. Article 9 GDPR prohibits the processing of these categories of personal data except in certain circumstances. Under the same provision, one of the grounds on which processing of special categories of personal data can be lawfully based is data subject's explicit consent. It follows that EU citizens engaging in e-voting should provide their explicit consent to have their personal data processed. The expression of consent should be a clear affirmative act establishing a freely given, specific, informed and unambiguous indication of such an intention by the data subject.²⁶ An additional ground would be the pursuit of 'substantial public interest' 'on the basis of Union or Member State law which shall be proportionate to the aim pursued, respect the essence of the right to data protection and provide for suitable and specific measures to safeguard the fundamental rights and the interests of the data subject'.²⁷

Furthermore, additional principles, rights and obligations stemming from the GDPR come to play. First, the personal data collected for the purposes of e-voting should be adequate, relevant and limited to what is necessary (data minimisation)²⁸ and should be processed only for specified, explicit and legitimate purposes related to the effective participation of EU

²² Application no. 42202/07, *Sitaropoulos and Giakoumopoulos v. Greece*.

²³ Applications nos. 34591/19 and 42545/19, *Toplak And Mrak v. Slovenia*.

²⁴ It shall be recalled that the definition of personal data is 'any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person' (Article 4 GDPR).

²⁵ Article 9 GDPR.

²⁶ Article 7 GDPR ; Recital 32 GDPR.

²⁷ Article 9(2)(g).

²⁸ Article 5(1)(c) GDPR.

citizens to elections (purpose limitation).²⁹ Second, personal data should be stored only as long as necessary for the purposes for which they have been collected (storage limitation)³⁰ and should be protected to ensure their integrity and confidentiality. Namely, appropriate measures should be adopted to ensure the security of the personal data, including protection against unauthorised or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organisational measures (integrity and confidentiality).³¹ Third, data subjects having their personal data processed for e-voting purposes should enjoy the rights included in chapter 3 of the GDPR, such as the right to be informed,³² the right to access³³ and the right to rectification.³⁴ The prohibition of automated profiling under Article 22 GDPR would also apply, as well as all the duties for controllers and processors envisaged in chapter 4 of the GDPR.

5.2.4 Cyber resilience and security

Other pieces of EU legislation to consider when devising EU rules on internet and e-voting are the NIS2 Directive,³⁵ and the upcoming Cyber Resilience Regulation.³⁶ These instruments aim to ensure that the digital platforms and machines used by private and public entities across the EU are cybersecure. These requirements are therefore essential for ensuring the security of systems used for the purposes of electronic and internet voting procedures.

The proposal for a Cyber Resilience Regulation was published on 15 September 2022, and, as the proposed text currently stands, it applies to products with digital elements whose intended, or reasonably foreseeable use includes a direct or indirect logical or physical data connection to a device or network.³⁷ These products can be placed on the market only where they met security requirements, including the verification of an appropriate level of cybersecurity.³⁸ Among the requirements to be complied with at the design, development and production stage are the confidentiality of the stored or otherwise processed data, the monitoring and recording of relevant internal activities.³⁹

The NIS2 Directive requires Member States to ensure that essential and important entities within the scope, such as public administration entities, take appropriate and proportionate technical, operational and organisational cybersecurity measures. This includes, among

²⁹ Article 5(1)(b) GDPR.

³⁰ Article 5(1)(e) GDPR.

³¹ Article 5(1)(f) GDPR.

³² Article 13 GDPR.

³³ Article 15 GDPR.

³⁴ Article 16 GDPR.

³⁵ Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (NIS 2 Directive) (Text with EEA relevance).

³⁶ Proposal for a EU Regulation on horizontal cybersecurity requirements for products with digital elements and amending Regulation (EU) 2019/1020, COM(2022) 454 final, 2022/0272 (COD) (Cyber Resilience Regulation).

³⁷ Proposal for a EU Regulation on horizontal cybersecurity requirements for products with digital elements and amending Regulation (EU) 2019/1020, COM(2022) 454 final, 2022/0272 (COD).

³⁸ See Section 1 of Annex 1.

³⁹ See Section 1 of Annex 1.

others, a requirement to ensure security in network and information systems acquisition, development and maintenance, including vulnerability handling and disclosure.

5.2.5 E-voting practices and rules from the Member States

As mentioned, practices and rules adopted in the Member States concerning e-voting may offer useful examples for an EU framework on e-voting. To begin with, Italy offers a relevant and advanced model on e-voting rules. Starting from 2023,⁴⁰ the Italian Government plans to adopt e-voting for European Union and national elections as well as referenda. The first trial for e-voting will concern voters who reside abroad or are temporarily abroad for work, study or healthcare reasons. The Italian Ministry of Interior has adopted guidelines on the implementation of e-voting, consisting of 6 principles.⁴¹ Among these, mention should be made of the duty of the administration to ensure the availability, security and operability of e-voting. Additionally, the guidelines indicate that there should be mechanisms and safeguards to ensure that, where voters express multiple votes via electronic means, those votes count as one. Moreover, to facilitate e-voting procedures, the voters should be able to express their vote via personal devices or by accessing an electoral bureau. The e-vote should be expressed via a web application compatible with digital devices and that operates via internet connection. Concerning the identification of the voters, they should be provided with a digital identity benefitting from at least a significant level of security. The guidelines explicitly mention that the e-voting system should facilitate access for peoples with disabilities. Finally, an independent body should oversee the functioning of the e-voting procedures.

Moving on to Belgium, e-voting via electronic voting machines has been adopted in more than 150 Flemish and 9 German-speaking cities, as well as in Bruxelles.⁴² E-voting via electronic machines is used for European Union elections as well as for national elections.⁴³ Voters are required to join electoral bureaux, where they are provided with a card that initiate the electronic voting machines. After casting their votes in ballot boxes, the voters receive a receipt as proof of their vote. They then have to return the card to the electoral officers and scan their vote receipt to ensure that their vote has been correctly registered at the electoral bureau. This procedure avoids multiple votes counting. To ensure that voters are able to effectively vote, a tutorial⁴⁴ created by the Belgian Government allows voters to practice how to engage with electronic voting machines.

Finally, France's rules and practices on e-voting are of relevance. The report will return to them in section 7.

⁴⁰ See <https://temi.camera.it/leg18/temi/voto-elettronico-e-digitalizzazione-del-procedimento-elettorale.html>

⁴¹ See https://www.interno.gov.it/sites/default/files/2021-07/linee_guida_voto_elettronico_decreto_9.7.2021.pdf.

⁴² See <https://elections.fgov.be/electeurs-comment-voter/le-vote-electronique>.

⁴³ See <https://elections.fgov.be/electeurs-comment-voter/le-vote-electronique>.

⁴⁴ <https://elections2019.belgium.be/simElecSM/index.php?ins=21004&elector=1&lang=FR-NL>

6. Electronic voting in EU Member States: facts and figures

The increasing pressure to implement technology to help with the electoral process is generating both interest and concern among voters, as well as practitioners across the globe. Several countries have turned to a variety of technological solutions to make elections more efficient, more cost-effective, and to strengthen trust in the democratic process. However, these efforts have borne mixed results, and have invariably been difficult to implement and have often been met with scepticism. In 2002, Ireland spent €54 million on electronic voting machines. Yet, concerns were voiced about the inadequate security and a lack of paper trail meant they were never used. Germany also introduced e-voting machines in a pilot scheme but had to withdraw them after the Constitutional Court ruled that they were insufficiently open and transparent. Norway meanwhile trialled internet voting in both 2011 and 2013 but decided against continuing because of public perception about the security of the vote. On the other hand, Estonia has led the way in embracing the technological assistance within the electoral process. With its population of 1.3 million, is the only country in the EU to offer its citizens the possibility of universal internet voting. As a result, Estonians have had the option to vote online for 10 years. The system was first introduced in trials at municipal elections and has expanded to national elections now to a point where about 32% of the population cast their vote online.

Table 2 illustrates some examples of the practices that have been proposed, trialled, implemented or abandoned due to concerns of security and transparency. Please note that this table is not exhaustive and is intended to provide a brief summary of selected cases, further information on all European Union Member States and their experiences of e-voting and more broadly the implementation of ICT practices in electoral processes can be found in the relevant sections throughout the report.

Table 2. Selected examples of implementation of voter-oriented technology in the electoral process in EU Member States

Country	Scope of use	Type of e-voting	Year of introduction	Notes
Belgium	Current (N+L)	IRE (partial)	1999	Electronic voting in Belgium has been based on two systems known as Jites and Digivote. Both have been characterized as "indirect recording electronic voting systems" because the voting machine does not directly record and tabulate the vote, but instead, serves as a ballot marking device.
Bulgaria	Current (N+L)	DRE (partial)	2021	Electronic voting is mandatory for sections with more than 300 registered voters. Paper ballots are still in use both in smaller sections and as backup in case of equipment malfunction or other unforeseen events.
Estonia	Current (N+L)	REV (optional)	2005	Electronic voting was first used in Estonia during the October 2005 local elections. Estonia became the first country to have legally binding general elections using internet voting. Each citizen possesses an electronic chip-enabled ID card, which allows the user to vote over the internet. After identity is verified (using the digital certificate on the electronic ID card), a vote can be cast via the internet. Voters can also vote in polling stations. Votes are not considered final until the end of election day, so citizens can regret and re-cast their votes in person in polling station.
Finland	Past (abandoned)	REV (abandoned)	2008	Internet voting was trialed in 2008. A review in 2016-17 concluded that the risks associated with internet voting outweighed the limited benefits that it brought.

France	Current (Citizens abroad only) + Limited in some towns	REV (abroad only) + DRE (partial and frozen)	2022 and 2002	<p>A review in 2017 concluded that internet voting should not be introduced. Citizens abroad can vote by internet in legislative and consular elections, but not for Presidential or European Union elections.</p> <p>Separately, voting machines are theoretically authorised since 1969 and some municipalities started experimenting with electronic voting machines since 2002. 82 of 36,000 municipalities used them at the peak of 2007. However, following complaints and petitions, a 2008 moratorium has prevented any municipality not yet equipped from using voting machines. That moratorium was reconfirmed by the Senate in 2014. In 2021, some members of the National Assembly sought an end to the moratorium, but it is so far still in place and reconfirmed by the 23 March 2022 instruction from the Home Ministry (ref INTA2206579C).</p>
Germany	Past (abandoned)	DRE (abandoned)	2005	There was a limited trial in 2005, but a Court found it unconstitutional in 2009 so the plans were abandoned.
Ireland	Past (abandoned)	DRE (abandoned)	2002	Voting machines were used on a 'pilot' basis in 3 constituencies for the 2002 Irish General Election and a referendum on the Treaty of Nice. However, the introduction of the system was delayed and then scrapped completely in 2010 at a huge cost (approximately €55 million) and public outcry.
Italy	Past (abandoned)	DRE (abandoned)	2006	On 9 and 10 April 2006, the Italian municipality of Cremona used voting machines in the national elections. The pilot involved 3000 electors and 4 polling stations, and it was deemed to be a success. Italy

				conducted a feasibility study in 2020 to introduce e-voting at the next elections in 2023, but it is still unclear if/when it will be implemented.
Lithuania	Planned (date unclear)	REV (considered)	Planned	Plans to introduce internet voting are being drafted but it is still unclear when it will be implemented
Netherlands	Past (abandoned)	DRE (abandoned)	1990s	From the late 1990s until 2007, voting machines were used extensively in elections (the first non-electronic machines were introduced in the 1970s). Most areas in the Netherlands used electronic voting in polling places. However, after separate issues with security in the 2006, two committees (Hermans-van Twist Committee and Korthals-Altes Committee) concluded that electronic voting was problematic and pen and paper voting should be preferred. Electronic voting machines were consequently banned in 2007. A new 2013 Committee (van Beek) proposed the reintroduction of electronic voting based on vote printers, but an expert group expressed caution about it though recommending the possible use of voting scanners to count votes. However, on 1 February 2017, the Dutch government announced that all ballots in the 2017 general election would be counted by hand.
Romania	Past (abandoned)	REV (abandoned) soldiers abroad	2003	Limited trial of electronic voting in 2003 to extend voting capabilities to soldiers and others serving in Iraq, and other theatres of war.

Note: DRE (direct-recording electronic voting machine), REV (remote electronic voting), IRE (in-direct electronic voting).

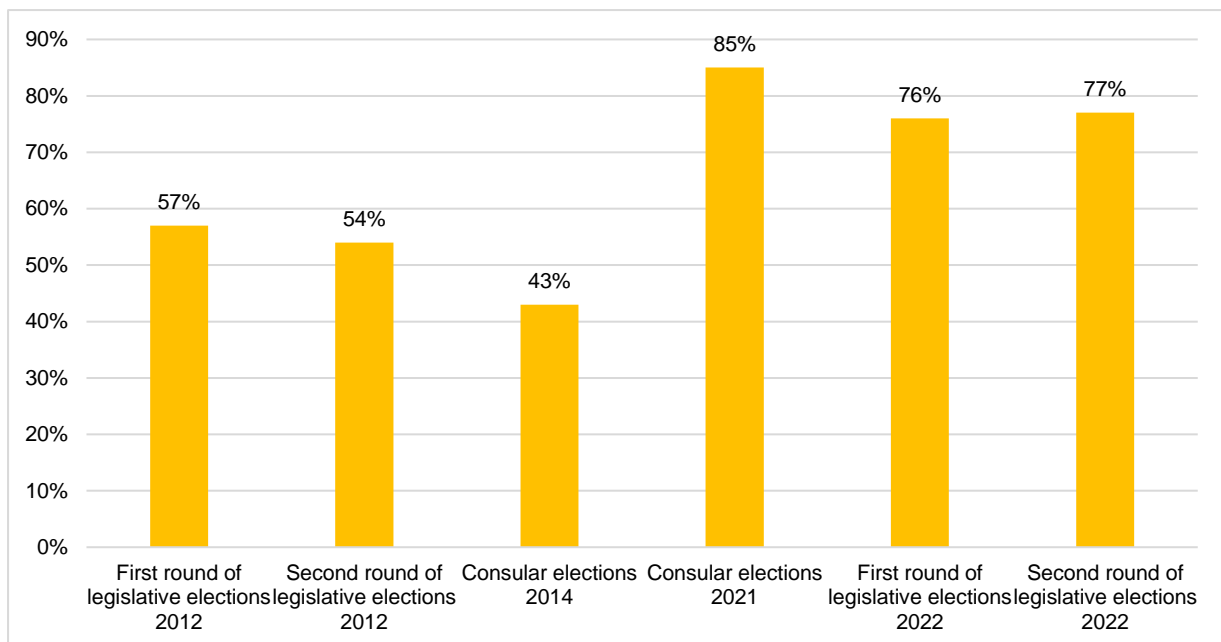
7. Case study of France

7.1 Short description of e-voting solution

France contemplates e-voting for two types of elections - the legislatives and the consular – and only for French citizens residing abroad and registered on a consular list.⁴⁵ The solution consists of a system of internet voting that is accessible through a computer, tablet or mobile phone with internet connection.

The first time this solution was implemented was 2012 and it was most recently available for the 2022 Legislative Elections that took place in June 2022. Participation in the elections using this system saw a sharp increase after 2014, as shown in the figure below:

Figure 1. Share of registered voters who used internet voting in each election.



Source: Secrétariat général des affaires européennes, *Pratique du vote par internet en France: une modalité de vote à disposition des Français de l'étranger lors des élections consulaires et législatives.*

Although analysing the causes of such an increase from 2021 is beyond the scope of this report, it may be due to different factors. First, the pandemic may have incentivised some people to prefer online voting over in-person voting due to health and safety reasons. And second, stakeholders have been slowly introducing the idea of e-voting in the public discourse

⁴⁵ France Diplomatie, Vote par internet, available [here](#).

as one of the tools to counter low electoral participation, reduce costs of elections and modernise the image of politics”.⁴⁶

In the last election (first and second rounds of the legislative elections 2022), e-voting was available during five consecutive days, from two Fridays before the election to the Wednesday before the election. In this case study, we will focus on the specific characteristics of the e-voting systems used during that election.

7.2 A note on voting machines

As showed in Table 2 (p. 21), some French municipalities can use voting machines under article L. 57-1 of the Electoral Code. The permission is conceded only to municipalities with over 3,500 inhabitants and that had received an approval from the regional department by 2008. In 2008, a moratorium on the use of voting machines was adopted, forbidding the expansion of the use of such equipment beyond the municipalities that were already using them. According to the last available information (from 2017), only 66 municipalities (out of the 35,000 existing in France) are currently equipped with voting machines.⁴⁷ Of these, 63 used voting machines in the last presidential election.⁴⁸

The Ministry of the Interior has approved the use of three models, based on the "*Règlement technique fixant les conditions d'agrément des machines à voter*" (Technical regulations setting the conditions for the approval of voting machines) from 2003.⁴⁹ The models are:

- 2.07, NEDAP-France election
- iVotronic, ES&S Datamatique
- Point & Vote, Indra Sistemas SA

As highlighted by a French Senator in June 2022, the moratorium poses an increasing risk for the municipalities allowed to use e-voting machines, because it prevents them from repairing and updating them with newer models. In fact, the three companies that produced the permitted models have ceased their production, making it even harder to repair old machines.⁵⁰

Despite this, the moratorium still stands. The French Government is said to be reflecting on the regulation and authorisation of e-voting machines, without a clear timeline in sight, which indicates that the focus of the governmental efforts seems to be on e-voting.

⁴⁶ <https://en-marche.fr/emmanuel-macron/le-programme/vie-politique-et-vie-publique>

⁴⁷ <https://www.tf1info.fr/politique/election-presidentielle-2022-pourquoi-certaines-communes-sont-equipees-de-machines-a-voter-2216179.html>

⁴⁸ https://www.liberation.fr/checknews/est-il-vrai-que-les-resultats-des-communes-equipees-de-machines-a-voter-sont-anormalement-favorables-a-emmanuel-macron-20220417_KBLXHC2X45C4FJMBETLEVHDQSA/

⁴⁹ <https://mobile.interieur.gouv.fr/Archives/Archives-elections/Comment-voter/Machines-a-voter>

⁵⁰ Question orale n° 2176S de M. Michel Savin (Isère - Les Républicains)
publiée dans le JO Sénat du 02/06/2022

7.3 Legal framework in France

France has pioneered the use of electronic voting procedures. It therefore offers an interesting model for conceptualising EU rules on electronic voting procedures. Article 3 of the French Constitution stipulates that all French citizens of either sex who have reached their majority and are in possession of their civil and political rights may vote as provided for by statute. According to Article R176-3 of the French Electoral Code,⁵¹ the French citizens residing abroad can vote remotely through electronic means. The framework of the procedure is highly influenced by data protection rules, and voters are explicitly granted data protection rights.⁵² An Office of Electoral Votes is established to supervise the correct functioning of the electronic voting system.⁵³ The identity of the voter is verified via a password that is not connected to the civil status of the citizen.⁵⁴ After being identified, the voter having express his or her vote will receive a code confirming that the vote was registered.⁵⁵

7.4 Description of software architecture/system and application configuration/technology used

France has changed its e-voting supplier several times since it started offering this possibility to voters. From 2012 to 2014, the consortium formed by ATOS/ScytI was responsible for the delivery of the service, with ScytI providing the voting software and ATOS hosting the voting platform. In 2016, ScytI won the procurement process and provided the voting software as well as a tool to manage the results for the 2021 consular elections, while the servers were based in France and hosted by NTT. Finally, in 2019, the French government published a new tender to find a provider for the 2022 legislative elections. The winner of the procurement process was the French company Voxaly-Docaposte and during the elections, it was hosted by the Ministry for Europe and Foreign Affairs (MEAE in French).⁵⁶

In France, it is not compulsory for providers to publicly disclose the characteristics of the system used.⁵⁷

7.5 Testing methodology

The testing stage of the e-voting mechanism for the legislative and consular elections in France was of utmost importance, given that in 2017 the system was not used due to cybersecurity concerns.⁵⁸

⁵¹ https://www.legifrance.gouv.fr/codes/section_lc/LEGITEXT000006070239/LEGISCTA000024372035/

⁵² Article R176-3 of the French Electoral Code.

⁵³ Article R176-3-1 of the French Electoral Code.

⁵⁴ Article R176-3-7 of the French Electoral Code.

⁵⁵ Article R176-3-9 of the French Electoral Code.

⁵⁶ Secrétariat général des affaires européennes, Pratique du vote par internet en France : une modalité de vote à disposition des Français de l'étranger lors des élections consulaires et législatives.

⁵⁷ https://www.francetvinfo.fr/elections/legislatives/legislatives-comment-fonctionne-le-vote-par-internet-accessible-aux-francais-de-l-etranger_5161495.html

⁵⁸ <https://monaco-hebdo.com/dossier/vote-electronique-legislatives-2022/>

The French government conducted two “tests grandeur nature (TGN)” or life-size tests, that is, a test of the e-voting system reproducing real-life conditions. In order to do so, volunteer voters were recruited from around the world, representing around 1% of the electorate. During the tests, the voting platform was open for 72h twice (imitating the two voting rounds of elections) and voters were requested to follow the procedure as they would in a real election. The first test took place in September 2021 and the second one in January 2022. The four-month gap was used by the e-voting supplier to improve the voting procedure. The tests were supervised by an independent expert and the Office for Electronic Voting (BVE in French).⁵⁹

At the end of the tests, the president of the State Council committee for electronic voting stated that the tests were concluding, and the results ensured that e-voting would comply with the requirements to ensure a secure and trustworthy election.⁶⁰

7.6 Functional and operational flow

The voting process consisted of several steps. Four days before the opening of the e-voting platform, registered voters received 2 codes: one via email with link containing a username and another one via SMS, containing a password.

The e-voting platform was open for 5 days every election round. During this period, the voters had to follow these steps:

1. First, they had to access the website of the French Diplomatic service and click on the “I vote via the internet” option.
2. They were then prompted to identify themselves using the username and password that they had previously received via email and SMS, respectively.
3. Once the identification process was successfully completed, they reached a page where they had to select the candidate they wanted to vote for or cast a blank vote. The order the candidates appeared in on the website was randomly allocated, according to French electoral law.
4. After clicking on “Next”, voters were asked to confirm their choice in a new screen.
5. When they clicked “Confirm”, they were directed to the voting page. To make their vote effective, they had to input a code that they would have received in their email within 10 minutes of confirming their choice and that was valid for 15 minutes.
6. Once the code was introduced, the “Vote” button was enabled. Voters had to press it to cast their vote.
7. Voters could then see a new screen where a message confirming their vote was correctly submitted was displayed. Simultaneously, voters received the same confirmation via email. At this last screen, voters were requested to download the voting receipt with the warning that it would not be available once they left the page.

⁵⁹ https://www.diplomatie.gouv.fr/fr/services-aux-francais/voter-a-l-etranger/modalites-de-vote/vote-par-internet/#sommaire_5

⁶⁰ <https://monaco-hebdo.com/dossier/vote-electronique-legislatives-2022/>



Figure 2. E-voting process. Source: <https://alliancesolidaire.org/2022/05/25/vote-electronique-pour-les-elections-legislatives-des-francais-de-letranger-suivez-le-guide/>

After an individual has voted, their vote is encrypted and sent to the server. Once the counting is automatically completed, the system delivers the result and a cryptographic proof that proves that the results correspond to the sum of encrypted votes. In the latest election, a group of three people from the National Centre of Scientific Research (CNRS) were charged with verifying that there were no problems with the cryptographic proof.⁶¹

7.7 Communication campaign/awareness raising, including building trust and confidence of voters

In line with the Council of Europe's standard number 32 of section VI. Transparency and observation, the website of the French Diplomatic Corps provides information on⁶²:

- The steps a voter needs to take in order to participate and vote.
- The correct use and functioning of the e-voting system.
- the e-voting timetable, including all stages.

In order to increase trust in the system, the page also provides detailed information about the homologation process of the e-voting system, as well as the tests that were run to ensure its proper functioning.⁶³ In addition, consular webpages also provided information about e-voting to French citizens living abroad.

7.8 Accessibility for persons with disabilities and older persons

As seen in the literature review section, there is little research on e-voting and persons with disabilities and older persons, and publications focus mostly on electronic voting machines and people with visual impairment. In the case of France, a paper from 2010 (Matyja et al., 2010) summarises several tests done on the use of voting machines by older voters and presents a new evaluation of the accessibility of the Point&Vote machine, designed by Indra. The authors find that elderly people had serious difficulties using this voting machine, while accessibility improved when they used a tablet with a voting system designed specifically with the needs of the elderly in mind, which included new features such as audio guidance that

⁶¹ https://www.francetvinfo.fr/elections/legislatives/legislatives-comment-fonctionne-le-vote-par-internet-accessible-aux-francais-de-l-etranger_5161495.html

⁶² <https://www.diplomatie.gouv.fr/fr/services-aux-francais/voter-a-l-etranger/modalites-de-vote/vote-par-internet>

⁶³ <https://www.diplomatie.gouv.fr/fr/services-aux-francais/voter-a-l-etranger/modalites-de-vote/vote-par-internet/>

detailed instructions to exercise the vote and reminded voters of the next step after 20 seconds of inactivity (Matyja et al., 2010). For the authors, these results show that the machine by Indra effectively excludes older voters, but with proper interface adaptations elderly people are as proficient as anyone else in the use of voting machines.

The debate around electronic voting accessibility of disabled and elderly voters has taken place beyond academia as well and reached the public sphere. In 2019, the French Senate held a discussion about the topic.⁶⁴ A senator claimed that online voting could improve voting accessibility for people with disabilities, specifically those with reduced mobility and visual impairments, compared to traditional, in-person, paper-based voting. He thus asked the Minister of the Interior what measures he would put in place to ensure that all people can exercise their right to vote autonomously and secretly. The Minister replied that expanding the modality of online voting the people with disabilities in the French territory would pose serious practical and ethical difficulties, as it would require keeping a record of disabled people and cross-reference it with the electoral registry, which would go against voting secrecy. He said that traditional polling stations and existing voting machine models already guarantee autonomous voting accessibility for all persons, regardless of age and disability, and thus the Government was not planning to modify the current legislative frameworks and regulations around voting.

Hence, for now the French state seems to be focused on offering equal accessibility in in-person settings. Two sets of measures are envisaged to that effect:⁶⁵ first, in polling stations, physical infrastructure should ensure accessibility for all, voting officials must guarantee that at least one voting booth is adapted and persons with disabilities who need physical assistance can nominate another elector to assist them in the voting booth. Second, voting delegation allows people who request it to nominate another elector to vote for them, although the voting delegation for people with mental disabilities is restricted by special, more restrictive regulations.⁶⁶ In line with the Minister's statement above, e-voting does not feature in the measures to enhance voting accessibility for disabled and elderly voters.

7.9 Analysis of consistency with CoE 2017 Recommendation and EU data protection requirements

Voxaly-Docaposte claims that it complies with the National Commission of Information and Freedoms⁶⁷ (CNIL in French) 2019 Recommendation⁶⁸, which is specific to France and

⁶⁴ <https://www.senat.fr/questions/base/2019/qSEQ190610758.html>

⁶⁵ <https://www.service-public.fr/particuliers/actualites/A14943>

⁶⁶ <https://mobile.interieur.gouv.fr/Archives/Archives-elections/Comment-voter/Le-vote-des-personnes-handicapees>

⁶⁷ The Commission Nationale de l'Informatique et des Libertés (CNIL) is an independent administrative body created in 1978 that is responsible for ensuring data protection regulations and digitalisation for the public good in France (<https://www.cnil.fr/fr/cnil-direct/question/la-cnil-cest-quoi>).

⁶⁸ Full title: Délibération n° 2019-053 du 25 avril 2019 portant adoption d'une recommandation relative à la sécurité des systèmes de vote par correspondance électronique, notamment via Internet.

focuses on the security of voting systems. It is currently the most comprehensive regulation specifically targeting online voting systems in France, and thus calls for a deeper analysis and comparison with EU and Council of Europe's regulations and recommendations around data protection and other aspects of e-voting.

This recommendation was published in April 2019 and it references convention 108 of the Council of Europe on the protection of individuals with regard to the processing of personal data, as well as the EU's GDPR. It does not refer, however, to the Council of Europe's Recommendation CM/Rec(2017)5 on standards on e-voting.

When assessed against the risk matrix of CNIL, the e-voting system by Voxaly complies with the security objectives of levels 1 and 2. This can be cross-referenced with the CoE's e-voting standards in order to see to what extent Voxaly's solution is also consistent with them.

CNIL Security Objectives ⁶⁹		CoE's e-voting standards ⁷⁰		Does Voxaly's system comply? ⁷¹
Security Objectives – Level 1	1. Implement a high-quality technical and organizational solution that does not present any major flaws	No corresponding standard.		YES
	2. define the vote of an elector as an atomic operation comprising the choice, the validation, the registration of the ballot in the ballot box, the signature and the delivery of a receipt.	No corresponding standard.		YES
	3. Authenticate voters by ensuring that major risks related to identity theft are significantly reduced.	Equal Suffrage	7. Unique identification of voters in a way that they can unmistakably be distinguished from other persons shall be ensured	YES
	4. ensure the strict confidentiality of the ballot from its creation on the voter's computer.	Secret Suffrage	19. E-voting shall be organised in such a way as to ensure that the secrecy of the vote is respected at all stages of the voting procedure.	YES
	5. ensure the strict confidentiality and integrity of the ballot during its transport.	Secret Suffrage	19. E-voting shall be organised in such a way as to ensure that the secrecy of the vote is respected at all stages of the voting procedure.	YES

⁶⁹ Délibération n° 2019-053 du 25 avril 2019 portant adoption d'une recommandation relative à la sécurité des systèmes de vote par correspondance électronique, notamment via Internet.

⁷⁰ Recommendation CM/Rec(2017)5 of the Committee of Ministers to member States on standards for e-voting.

⁷¹ <https://www.voxaly.com/blog/vote/eclairages-sur-la-nouvelle-recommandation-cnile-2019-applicable-en-2020/>

	6. Ensure, in an organizational and/or technical manner, the strict confidentiality and integrity of the ballot during its processing and its storage in the ballot box until the counting.	Secret Suffrage	19. E-voting shall be organised in such a way as to ensure that the secrecy of the vote is respected at all stages of the voting procedure.	YES
	7. Ensure total sealing between the identity of the voter and the expression of their vote throughout the duration of the processing.	No corresponding standard.		YES
	8. Reinforce the confidentiality and integrity of data by distributing the secrecy allowing the counting exclusively within the electoral office and guaranteeing the possibility of counting from a determined secrecy threshold.	Secret Suffrage	26. The e-voting process, in particular the counting stage, shall be organised in such a way that it is not possible to reconstruct a link between the unsealed vote and the voter. Votes are, and remain, anonymous.	YES
	9. define the counting as an atomic function usable only after the closing of the ballot.	Secret Suffrage	24. The e-voting system shall not allow the disclosure to anyone of the number of votes cast for any voting option until after the closure of the electronic ballot box. This information shall not be disclosed to the public until after the end of the voting period.	YES
		Reliability and security of the system	45. Votes and voter information shall be kept sealed until the counting process commences.	YES
	10. Ensure the integrity of the system, the ballot box and the attendance list.	Reliability and security of the system	48. The authenticity, availability and integrity of the voters' registers and lists of candidates shall be maintained. The source of the data shall be authenticated. Provisions	YES

			on data protection shall be respected.	
	11. Ensure that the counting of the ballot box can be verified a posteriori.	Free Suffrage	17. The e-voting system shall provide sound evidence that each authentic vote is accurately included in the respective election results. The evidence should be verifiable by means that are independent from the e-voting system.	YES
Security Objectives – Level 2	1. Ensure high availability of the solution.	Reliability and security of the system	48. The authenticity, availability and integrity of the voters' registers and lists of candidates shall be maintained. The source of the data shall be authenticated. Provisions on data protection shall be respected.	YES
	2. Ensure automatic control of the integrity of the system, the ballot box and the attendance list.	No corresponding standard.		YES
	3. Allow the automatic control by the electoral office of the integrity of the voting platform throughout the ballot.	No corresponding standard.		YES
	4. Authenticate voters by ensuring that major and minor risks associated with identity theft are significantly reduced.	Equal suffrage	7. Unique identification of voters in a way that they can unmistakably be distinguished from other persons shall be ensured	YES
	5. Ensure logical partitioning between each voting service so that it is possible to completely stop a	No corresponding standard.		YES

	poll without this having the slightest impact on the other polls in progress.			
	6. use an IT system implementing the security measures recommended by publishers and ANSSI.	No corresponding standard.	YES	
	7. Ensure the transparency of the ballot box for all voters.	No corresponding standard.	YES	
Security Objectives – Level 3	1. Study the risks according to a proven method in order to define the most appropriate measures in the context of implementation.	No corresponding standard.	Available upon request	
	2. Enable ballot box transparency for all voters using third-party tools.	No corresponding standard.	Available upon request	
	3. ensure very high availability of the voting solution by taking into account the risks of major damage.	Reliability and security of the system	48. The authenticity, availability and integrity of the voters' registers and lists of candidates shall be maintained. The source of the data shall be authenticated. Provisions on data protection shall be respected.	YES
	4. Allow the automatic and manual control by the electoral office of the integrity of the platform throughout the ballot.	No corresponding standard.		YES
	5. Ensure physical partitioning between each voting service so that it is possible to completely stop a poll without this having the slightest impact on the other polls in progress.	No corresponding standard.		Available upon request

No corresponding objective.	Universal suffrage	1. The voter interface of an e-voting system shall be easy to understand and use by all voters.	No information available
		2. The e-voting system shall be designed, as far as is practicable, to enable persons with disabilities and special needs to vote independently	No information available
		3. Unless channels of remote e-voting are universally accessible, they shall be only an additional and optional means of voting.	YES
		4. Before casting a vote using a remote e-voting system, voters' attention shall be explicitly drawn to the fact that the e-election in which they are submitting their decision by electronic means is a real election or referendum	NO (from the information available)
No corresponding objective.	Equal Suffrage	5. All official voting information shall be presented in an equal way, within and across voting channels.	YES
		6. Where electronic and non-electronic voting channels are used in the same election or referendum, there shall be a secure and reliable method to aggregate all votes and to calculate the result.	No information available

		8. The e-voting system shall only grant a user access after authenticating her/him as a person with the right to vote.	No information available
		9. The e-voting system shall ensure that only the appropriate number of votes per voter is cast, stored in the electronic ballot box and included in the election result.	No information available
No corresponding objective.	Free suffrage	10. The voter's intention shall not be affected by the voting system, or by any undue influence.	No information available
		11. It shall be ensured that the e-voting system presents an authentic ballot and authentic information to the voter.	No information available
		12. The way in which voters are guided through the e-voting process shall not lead them to vote precipitately or without confirmation.	No information available
		13. The e-voting system shall provide the voter with a means of participating in an election or referendum without the voter exercising a preference for any of the voting options.	YES

		14. The e-voting system shall advise the voter if he or she casts an invalid e-vote.	No information available
		15. The voter shall be able to verify that his or her intention is accurately represented in the vote and that the sealed vote has entered the electronic ballot box without being altered. Any undue influence that has modified the vote shall be detectable.	NO
		16. The voter shall receive confirmation by the system that the vote has been cast successfully and that the whole voting procedure has been completed.	YES
		18. The system shall provide sound evidence that only eligible voters' votes have been included in the respective final result. The evidence should be verifiable by means that are independent from the e-voting system.	YES
No corresponding objective	Secret Suffrage	20. The e-voting system shall process and store, as long as necessary, only the personal data needed for the conduct of the election.	No information available
		21. The e-voting system and any authorised party shall protect	NO

		authentication data so that unauthorised parties cannot misuse, intercept, modify, or otherwise gain knowledge of this data.	
		22. Voters' registers stored in or communicated by the e-voting system shall be accessible only to authorised parties.	No information available
		23. An e-voting system shall not provide the voter with proof of the content of the vote cast for use by third parties.	YES
		25. E-voting shall ensure that the secrecy of previous choices recorded and erased by the voter before issuing his or her final vote is respected.	No information available
No corresponding objective	Reliability and security of the system	44. If stored or communicated outside controlled environments, the votes shall be encrypted.	YES
		46. The electoral management body shall handle all cryptographic material securely.	YES
		47. Where incidents that could threaten the integrity of the system occur, those responsible for operating the equipment shall	No information available

		immediately inform the electoral management body.	
		49. The e-voting system shall identify votes that are affected by an irregularity.	NO (it is a group formed by 3 experts who would)

As it can be seen in the table above, CNIL’s regulation only focuses on technical aspects of the system used and does not cover aspects related to democratic principles of e-voting or the role of the state in organising such process, while the scope of the CoE’s standards are much broader. It is thus necessary to do a similar exercise focusing on how France complies with the CoE standards on e-voting.

CoE Standard		Does France comply?
Regulatory and organisational requirements	27. Member States that introduce e-voting shall do so in a gradual and progressive manner.	YES
	28. Before introducing e-voting, member States shall introduce the required changes to the relevant legislation.	YES
	29. The relevant legislation shall regulate the responsibilities for the functioning of e-voting systems and ensure that the electoral management body has control over them.	YES
	30. Any observer shall be able to observe the count of the votes. The electoral management body shall be responsible for the counting process.	Unsure (CNIL recommendations seem to imply that the supplier is responsible for the counting process, and only a team of 3 experts was tasked with overseeing the counting process)
Accountability	31. Member States shall be transparent in all aspects of e-voting.	NO (no obligation for the supplier to disclose characteristics of the IT system, for instance)
	32. The public, in particular voters, shall be informed, well in advance of the start of voting, in clear and simple language, about: <ul style="list-style-type: none"> - any steps a voter may have to take in order to participate and vote; - the correct use and functioning of an e-voting system; - the e-voting timetable, including all stages. 	YES
	33. The components of the e-voting system shall be disclosed for verification and certification purposes.	No information available
	34. Any observer, to the extent permitted by law, shall be enabled to observe and comment on the e-elections, including the compilation of the results.	Unsure (a team of 3 experts was tasked with overseeing the counting process)
	35. Open standards shall be used to enable various technical components or services,	No information available

	possibly derived from a variety of sources, to interoperate.	
	36. Member States shall develop technical, evaluation and certification requirements and shall ascertain that they fully reflect the relevant legal and democratic principles. Member States shall keep the requirements up to date.	YES (CNIL recommendation)
	37. Before an e-voting system is introduced and at appropriate intervals thereafter, and in particular after any significant changes are made to the system, an independent and competent body shall evaluate the compliance of the e-voting system and of any ICT component with the technical requirements. This may take the form of formal certification or other appropriate control.	YES
	38. The certificate, or any other appropriate document issued, shall clearly identify the subject of evaluation and shall include safeguards to prevent its being secretly or inadvertently modified.	No information available
	39. The e-voting system shall be auditable. The audit system shall be open and comprehensive, and actively report on potential issues and threats.	YES
Reliability and security of the system	40. The electoral management body shall be responsible for the respect for and compliance with all requirements even in the case of failures and attacks. The electoral management body shall be responsible for the availability, reliability, usability and security of the e-voting system.	Unsure (CNIL recommendations seem to imply that the supplier is responsible for this)
	41. Only persons authorised by the electoral management body shall have access to the central infrastructure, the servers and the election data. Appointments of persons authorised to deal with e-voting shall be clearly regulated.	Unsure (a team of 3 experts was nominated ad-hoc for the last election, it is not clear whether this was properly regulated)
	42. Before any e-election takes place, the electoral management body shall satisfy itself that the e-voting system is genuine and operates correctly.	YES

	43. A procedure shall be established for regularly installing updated versions and corrections of all relevant software.	No information available.
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7.10 Threats and vulnerabilities identified and measures for mitigation

The experience of many French citizens in the latest election exposes some of the challenges of e-voting. For instance, authorities struggle to find a balance between cybersecurity, including voter identity, and the simplicity of the process. As explained by many French citizens residing abroad that tried to vote online for the June 2022 election, a system error made it impossible for them to cast their vote, which generated frustration.⁷² Once of the main problems was that voters that had registered with a Yahoo email address never received the username needed to sign into the voting platform.⁷³

Beyond the last elections, some French citizens have persistent concerns about e-voting more generally. It is worth noting that in a post-election poll done by the People 2022 project (led by the ESPOL Lille), 60% of respondents were in favour of introducing e-voting in the presidential elections, while 30.7% were against it. These results coincide almost exactly with respondents who claim that they would use e-voting to cast their vote in a presidential election (60.4% would, while 30.9% would not).⁷⁴

Even though a majority of respondents declared they are in favour of and would use e-voting, amongst those who wouldn't the main reason is security (60.7%), followed at a very considerable distance by the lack of previous experience with the system (20.7%). For those who would, the most cited reason is that it would take less time than voting in a polling station, closely followed by their daily use of the internet (45.9%). France has tried to mitigate security concerns by increasing transparency around the testing methods used to validate and select e-voting systems. As mentioned above, the main webpage of the French Diplomatic Corps containing information about how to vote online, also includes a simple but comprehensive explanation of the homologations procedures and tests underwent before implementation.⁷⁵

The same study also sheds light to a potential issue that may arise when moving political participation online. Claiming to be more willing to use e-voting is associated with higher levels of education attainment. In the People 2022 poll, 72.4% of respondents with an education level equivalent to an undergraduate degree or above declared they would use e-voting, compared to 57.2% of respondents with lower qualifications. Similarly, people with a higher interest in politics would also be more likely to use e-voting than those with no interest.

This is in line with the literature on online participation and it should be considered by policymakers when introducing new voting methods. Citizens' experiences and participation

⁷² Le Monde, Législatives 2022 : les ratés du vote électronique des Français de l'étranger, available [here](#).

⁷³ <https://www.tf1info.fr/politique/elections-legislatives-2022-des-francais-de-l-etranger-privés-de-vote-en-ligne-a-cause-d-un-bug-de-leur-adresse-mail-yahoo-2221413.html>

⁷⁴ <https://theconversation.com/le-vote-par-internet-une-solution-pour-faire-face-a-labstention-en-france-190588>

⁷⁵ <https://www.diplomatie.gouv.fr/fr/services-aux-francais/voter-a-l-etranger/modalites-de-vote/vote-par-internet>

inequalities are as important as legal and policy frameworks to guarantee the success of e-voting.

Experts also expressed concerns regarding the particularities of the processes and systems used. One important criticism has to do with the reception of vital identifying information to vote (username, password and confirmation code) via email and SMS. It has been argued that emails could be intercepted by hackers, as they are not encrypted. SMS could also be threatened by failures in telephone network connection and the dependency on foreign operators. Finally, if a voter was using their smartphone to receive the SMS, and the email and their device was hacked with spy software, a hacker could access their voting credentials.⁷⁶ There are alternatives to the use of email and SMS, which would render the identification process less prone to hacking. For instance, in Estonia, all citizens have a state-issued digital identity card that is used for all e-Government purposes, including e-voting.⁷⁷ France is taking steps towards enabling digital identity for its citizens. Currently, an application to proof one's identity online ("France identite") is being tested to make online public services more easily accessible and secure.⁷⁸ If successful and approved, the new digital identity will allow citizens to, among other actions, make a request for vote delegation and register in the electoral registry.⁷⁹ There is currently no mention of online voting as one of the actions that will be available if France identite becomes a reality, but it could be explored following the example of Estonia.

Apart from the vulnerability to external threats, concerns have been also raised around the secrecy of the vote and the authenticity of the results,⁸⁰ given that the knowledge required to understand what happens between the moment a vote is cast and the moment the results are delivered is too technical by the majority of the people. To partially address this, the CNIL recommended creating a three-people expert team to track that the results are authentic and corresponded to the votes cast to address this very issue.⁸¹ Once the expert team confirmed that the system correctly reported the results, they sent a confirmation email to all voters, to (humanly) reassure them that their vote had been safely and correctly registered by the system.

⁷⁶

http://www.acbm.com/pirates/25897_Nous_avons_essaye_le_vote_en_ligne_a_la_francaise_nos_doutes_sur_la_securite_.html

⁷⁷ <https://e-estonia.com/solutions/e-identity/id-card/>

⁷⁸ <https://france-identite.gouv.fr/>

⁷⁹ <https://france-identite.gouv.fr/en-savoir-plus/a-quoi-sert-il/>

⁸⁰ <https://monaco-hebdo.com/dossier/vote-electronique-legislatives-2022/>

⁸¹ https://www.francetvinfo.fr/elections/legislatives/legislatives-comment-fonctionne-le-vote-par-internet-accessible-aux-francais-de-l-etranger_5161495.html

8. E-voting, security, and efficiency

It should be noted that beyond the effects of e-voting in principle on citizens' experience, it is also practice, incidents, and perceptions which determine how the introduction of any new voting environment will shape voters' experiences and attitudes. In other words, even when a system could be problematic in principle, it may not be adversely perceived when it works in practice, and conversely, even when a system is robust on the face of it, the emergence of coincidental or related incidents can quickly affect citizens' perceptions of its reliability, safety, and integrity.

We will quickly review some of the existing concerns affecting both electronic voting machines and online voting in the European context, which should be considered when implementing future e-voting practices and reviewing existing ones.

8.1 Concerns regarding security and efficiency in the use of electronic voting machines

Multiple European countries have used electronic voting machines. Some have done so continuously for many elections, but others – whether they decided to continue with the system or discontinue it – have experienced significant worries or incidents. In principle, electronic voting machines all use highly secure and high performing technologies and the risk of significant fraud or interference is low.

In 2002, the Irish Government invested in machines that would implement an e-voting system, which could then be then used for all subsequent elections. However, the project was abandoned after two years after the machines were considered to have failed to prove safe from tampering and did not facilitate a paper print for a double check of the results. In 2006, the Commission on Electronic Voting, authored a second report on the e-voting system that suggested additional work should be done to improve the system. The recommendations included the addition of a voter verified audit trail, the modification of the embedded software, and the rectification of the identified security vulnerabilities. As these conditions have never been met, the Irish Government was forced to abandon the plan.

In Belgium, polling stations have historically used either electronic voting machines or paper ballots essentially depending on the size of polling stations. In the 2014 elections, problems affected electronic voting machines used by many municipalities in the French-speaking part of the country since 2012, which resulted in a delay of over 10 days in the announcements of the results. This followed incidents in the previous 2012 elections which notably affected people who had changed their vote before recording it but whose vote receipt indicated their initial selection. Interestingly, the newer, more secure and more expensive machines seemed more affected by problems than the older outdated ones still used in many municipalities.

For example, in France, as part of the discussion surrounding the voting machine experience, institutional debates revealed that for the time being voting machines still represent a much higher cost than paper ballot (on average €4.50 per electronic ballot as opposed to €1.50 per paper ballot).⁸²

⁸² More information on the cost of the voting options can be accessed here: <https://www.poueva.be/spip.php?article897&lang=fr>

In France, whilst experiments with electronic voting machines started early on, a Senate Committee proved very critical of electronic voting machine technologies proposed. They concluded that no electronic voting machines achieved anywhere near the same reliability, transparency, and safety as paper ballots. Consequently, a 2008 moratorium was adopted preventing any new municipality from adopting electronic voting machines if they did not already use them.

8.2 Concerns regarding security and efficiency of remote e-voting (online voting)

The suspicions surrounding online voting have often been even stronger than in the case of electronic voting machines. The obvious part is that when voting occurs in polling station, in effect, ballots would commonly not be “hidden” from the public eye. In some countries, such transparency is almost extreme. For instance, in Malta, traditionally, public television films and shows ballot boxes as they are transported from polling stations to the counting places where they will be counted on the next day (voting takes place on the Saturday and counting on the Sunday). By contrast, when it comes to remote voting, there is an element of perceived “hidden” time, either in the form of postal transportation in the case of postal voting or of a potential “black box” in the case of online voting. Regardless of whether anything untoward happens during that hidden period, it is in any case propitious to some observers either genuinely worrying or seeding doubts when they wish to delegitimise the election process and result. This of course gets worse every time an actual incident is noted for any reason.

Additionally, there are less obvious but probably more important concerns. For example, when voting occurs in polling stations, it is possible for officials to verify that voters all cast their own vote without any undue pressure or intimidation. This is obviously not possible when people vote online using existing online voting options. Indeed, many countries including in the EU have strong legislations intended to ensure that voters cannot be influenced at the time they cast their vote, cannot share or prove their vote to someone else (be it to influence them or to prove that they fulfilled an illegal “contract”) but those legislative norms become essentially redundant or unenforceable in the context of remote voting where they could, in theory, occur without anyone noticing.⁸³

8.3 Understanding the psychological effects of potential security and efficiency limitations in e-voting on citizens’ perceptions

In practice, it is likely that cases of actual fraud in the context of both electronic voting machines and online voting remain rare. However, it is important to note that democracies operate in an environment in which conspiracy theories, distrust, and fear of manipulation are probably stronger and more powerful than at any time in the past.

From that point of view, the real problem is that whilst it may be very difficult for an ill-intended person to effectively attack a system in such a way as to successfully modify the result of an election, it is a lot easier to commit an attack which will be sufficient to create a bug and generate suspicion. In other words, the threshold for successful delegitimization is a lot lower than the threshold for successful fraud, and the damage that can be achieved in terms of

⁸³ This is an issue with all types of remote voting. Safeguards can be put in place to avoid such cases, such as the Estonian practice of giving voters the option to change their minds, which raises the cost of any type of fraud that could be envisaged.

public confidence in the system and perceived legitimacy of and compliance with electoral results can potentially be disastrous.

In the context of geographical remote voting, including online voting, worries about voter intimidation and manipulation are also very real considering the potential behaviour reported by some extreme political party activists worldwide in recent years.

Finally, one problem specifically related to e-voting is that whilst Election Management Bodies are conscious of those perceptions of risk and potential fraud, the solutions that they propose to enable voters to ensure the integrity of their vote and the match between their intended choice and the one recorded for them are often double-edged swords that can lead to new potential problems even as they are trying to fix others. For example, in Belgium, the “ticketing” process introduced in the 11 March 2003 vote with the express intention to foster public support in the electronic voting machine system was decried as illegal. Indeed, whilst it entitled a voter to get a ticket confirming their vote and allowed them to ask for a revote if they found a discrepancy between the ticket record and their intended choice, the revote could only be allowed after they asked the polling station officer to witness the discrepancy, that is, to view their vote, thereby blatantly betraying electoral secrecy. This of course is based on one specific examples and some other countries using electronic voting machines have not made the same choices to resolve that specific issue.

On balance, the genuine security risks of electronic voting machines are not particularly high, those relating to online voting can be more significant in terms of invisible voter intimidation and manipulation, but the psychological risks to perceived integrity and transparency are undoubtedly much higher than the risk of effective manipulation of the result itself, and particularly so if and when some electoral stakeholders decide that it is in their interest to cast suspicion over the electoral process, which is unfortunately an increasing reality within our society.

Those psychological effects interact and combine with the direct effects of e-voting on citizens’ experience, efficacy, emotions, and satisfaction reported earlier in this section in the contexts of both electronic voting machines and even more so online voting and remote e-voting.

It should be noted that populations affected by disabilities – and notably hidden disabilities and mental health issues – may also be differently affected by remote voting options compared to the rest of the population. On the positive side, remote voting alternatives may increase accessibility and opportunities to vote for disabled voters. However, in some countries, those options have been considered an adequate replacement to making traditional polling station voting more accessible to voters with disabilities, and this runs the risk of citizens with disabilities feeling that they are considered second class citizens by their democratic systems.

Voting and the polling station experience is a moment of integration and equality. This element of integration is simply not replicated in the context of geographical remote voting (as well as personal remote voting where it exists) and should in principle not be considered a substitute to ensuring full and equal access to the traditional voting experience.

9. Effects of e-voting on citizens; potential positive and negative consequences/electoral ergonomics of e-voting

9.1 Potential effects of dematerialisation on citizen experience in all e-voting solutions

All forms of e-voting introduce the dematerialisation of vote casting and the replacement any form of paper ballot (single ballot with writing or multi ballot with or without writing) by electronic ballots.

Traditionally, the political science literature has paid little attention to the potential effects of that phenomenon because it has often assumed that a given voter casting a vote would necessarily do so in exactly the same way regardless of the materiality of the ballot. However, recent research by the Electoral Psychology Observatory questions this narrative and suggests that dematerialisation can in and of itself modify the voter's experience.

Notably, in an experiment comparing the voting experience of citizens who used paper ballots or Direct Recording Electronic Voting machines, Bruter and Harrison (2020) show that in the first instance, dematerialisation drastically shortens the time participants tend to think about their vote before casting it. In their experiment (conducted initially in Germany), they find that given similar material, information, and choices, the average thinking time by participants using the DRE voting machine was approximately 20 seconds where that of those using a single paper ballot was 30 seconds, that is, 50% more. In the case of multi ballot paper ballots that thinking time was further doubled to almost 1 minute.

From the point of view of Election Management Bodies, that shorter thinking time may well have advantages in shortening polling station stay and therefore potentially polling station queues. However, from an efficacy perspective, that shorter thinking time may well be deemed negative and likely to lead citizens to feel significantly less ownership of their vote and of the democratic process,

Indeed, in the experiment, Bruter and Harrison (2020) also analysed the emotions displayed by citizens using both processes using kinesics analysis (Birdwhistell, 1970). They found that those using paper ballots were overwhelmingly displaying more positive emotions such as happiness and excitement compared to those voters asked to vote on the electronic voting machines. Conversely, those voters using the electronic voting machines displayed significantly more negative emotions such as worry and nervousness. Of course, this is based on experimental evidence tested in Germany before being replicated in the UK and as such reactions maybe different in some other contexts although there is no particular reason to think so. Of course, there may also be ways of mitigating those negative effects. There is no evidence that such resolutions have been identified to date, however, countries using e-voting could invest in research to identify and implement such mitigation mechanisms to try and uncover models of e-voting that would be more conducive to positive voter experiences.

In that sense, in terms of voting experience, dematerialisation is not a neutral experience but one that affects both subconscious voting process and quality of the electoral experience, whilst also shortening the deliberative component of electoral choice on the day.

Furthermore, those effects may well affect different types of voters in heterogeneous ways. For instance, the negative emotions associated with dematerialisation (stress, etc) may well be heightened for some categories of citizens who are less comfortable with the use of

technology in general such as older generations, or citizens with a number of disabilities including learning and cognitive disabilities, which may find voting machines more intimidating and anxiety-inducing than most other voters. This may in turn result in an even worse electoral experience for them. Those specific categories of voters may often be the primary target group for remote e-voting. However, it is important to note that from qualitative evidence many of them value the possibility to vote in polling stations rather than remotely. Indeed, when it comes to standards of inclusive elections, it should not be enough to ensure that citizens living with specific circumstances should have access to vote. Instead, the standard should be that their right to vote and electoral experience should be equal and as comparable as possible to that of citizens who live with circumstances different from theirs.

9.2 Potential specific effects of remote e-voting on citizen experience.

As noted, except for the specific and limited case of DRE voting machines, e-voting is frequently used as a form of remote voting, notably in the context of online voting. In such cases, two different types of effects on citizen experience need to be considered: the effects of geographical and of temporal remoteness.

Once again, the literature has been surprisingly shy in its evaluation of the “within voters” effects of the remote voting. In other words, much of the literature on remote voting has primarily focused on whether introducing remote e-voting could effectively broaden the range of citizens that would effectively participate in an election, with most of the literature finding that such effects on encouraging new voters were negligible (see for example, Norris, 2003; Vassil, and Weber, 2011).

In the context of this report however, what we are interested in is precisely the “within voter” effects, that is, how the experience of a given citizen will vary depending on whether they vote 1) in their polling station on Election Day, 2) away from any polling station on Election Day (geographical remote voting); 3) in a polling station before Election Day (temporal remote voting), or 4) away from any polling station before Election Day (combination of geographical and temporal remote voting).

9.3 Effects of geographical remote voting

The main form of purely geographical remote voting occurs when citizens are allowed to vote in any polling station in their country on Election Day. That option exists in a number of Scandinavian and Nordic democracies as well as in Australia. It is fully compatible with the use of electronic voting machines and is not known to have any specific effect on the voters’ experience or choice.

In theory, geographical remote voting could also be achieved by using same day internet voting, though in most of EU Member State experiments pair internet voting with the possibility to vote before Election Day.

The effects of geographical remote voting are analysed in greater detail in section 3 where they paired with temporal remoteness (postal and online voting).

9.4 Effects of temporal remote voting

There are few known things about temporal remote voting that is specifically electronic. However, some research exists on the effect of Advance voting in polling stations (whether electronic or not).

Here again, we can use data collected and analysed as part of the Electoral Psychology Observatory research and published in Bruter and Harrison (2020). Specifically, the authors looked at the US case study as a natural experiment as a number of states offer voters the options of voting either in Advance in a polling station (called early voting in the US) or by post (called absentee voting in the American context). The first option is only temporally remote, whilst postal ballots are both temporally and geographically remote.

On balance, the authors find that the experience of the citizens going to a polling station even when voting early is significantly more positive than when voting postally. As a caveat, in that nationally representative large sample, it was still not possible to further disaggregate between people using electronic voting machines vs traditional ballots, especially because in the US context, the choice of electoral equipment is so thoroughly disaggregated (not only by states, but often by counties) that internal differences are enormous, and their effects could effectively only be assessed experimentally or through in-depth case studies within specific counties.

However, whilst the polling station environment for temporal remote voting resulted in significantly better experience than geographically remote alternatives, the authors note reasons why temporal remoteness could be an issue. In particular, they note that in citizens' perceptions, the atmosphere of the election only fully settles in the final week of the election cycle. They notably find that routinely, between 20-30% of voters either make up or change their minds in the final week before Election Day, and half of them (so between 10-15%) on Election Day itself. This is true of first order votes where citizens hold strong preferences (including, for instance, the highly polarised 2016 Brexit referendum), whilst in some cases, those proportions can be a lot higher in second order and less salient elections and referenda (for instance, in the context of the 2012 Irish Referendum on Children's rights, the proportion of last week finalisation of the electoral decision reached as much as 80% of voters). From that point of view, it is worth noting that in the context of European Parliament elections, which are typically of low salience and suffering from insufficient campaigning in particular from larger parties, the proportion of final week decision makers is likely to be higher than the typical first order 20-30% measured by Bruter and Harrison.

In that sense, even when advance e-voting is conducted on voting machines within polling stations, there is a significant chance that voters may have second thoughts about their vote. This is all the truer that campaign investment will be lower (as is the case with European Parliament elections) and that key debates would be organised in the final week or any time after early voting starts to be available to voters, as often, those candidates' debates may weigh significantly in some voters' decisions.

It should be noted that as a result, a small number of countries allowing advance voting (or early remote e-voting by post or mail) specifically allow citizens to "regret their vote" on Election Day. This is notably the case in Sweden, where anyone voting early in any polling station across the country has the right to regret their vote in their polling station on Election Day. Their initial advance vote, kept in a double sealed envelope, is then destroyed and

replaced by their Election Day vote. Similarly, in Estonia, anyone choosing to use internet voting can do so until one day before Election Day, but they are then allowed to regret their vote in person, on Election Day, in their polling station itself.

Those mechanisms remain rare in the context of temporal remote voting, but where they exist, they provide an extremely important guarantee to voters that if they choose to vote early, they will not be penalised for doing so and that if, for instance, an important campaign event occurs which would make them reconsider their electoral preference (debate, scandal, new policy proposal, change of context, etc), they will be able to update their preference based on the same historical information as those people voting on Election Day itself, thereby ensuring greater transparency and greater equality in the vote.

9.5 Effects of combined geographical and temporal remote voting

The majority of remote voting options combine geographical and temporal remoteness. This is notably the case of postal voting as well as – in the specific context of e-voting practices – most occurrences of online voting.

In an experiment conducted with young people aged 15 to 17 in six European countries (France, Austria, Spain, Finland Hungary, and the UK), Cammaerts, Bruter, Banaji, Harrison, and Anstead (2016) compared the turnout and reported emotions of young people invited to participate in a mock election either in a polling station (group 1) or online (group 2)⁸⁴

The findings of the experiment were quite striking. First, contrary to popular belief, they showed that turnout was in fact significantly higher for young people invited to go to a polling station than those invited to vote online. One of the most remarkable observed effects was on turnout. In the experiment we conducted, a group of young people aged 16–18 was invited to vote in their first election in a polling station reported a turnout of 36.9%. When invited to do the cast their vote using e-voting, turnout plummeted to 17.4%. This is in fact entirely consistent with the work of Bruter and Harrison (2020) showing that for many young people, voting is first and foremost something which they wish to “experience” just like many other first times. These young citizens valued the ‘social’ aspect of the polling station and reported that they were curious about this ‘first time’ which they said was no different to other crucial first times or rites of passage that they experience in this evolutionary period of their life. This may of course be specific to young voters (who are indeed consistently less likely to vote remotely compared to older generations according to public figures) but is critical to the extent that young people are often named as a primary target when political systems decide to introduce online voting.

Furthermore, the same experiment showed that those young people voting online were reporting significantly more negative feelings about their voting experience compared to those voting in a polling station. 63% of the young voters reported that they feel happy when they are in the polling booth, 60% felt excited, 74% proud, and 79% stated that it was an important moment for them.

⁸⁴ This particular research was commissioned and funded by the European Commission’s Education, Audio-Visual and Culture Executive Agency (EACEA) to study the practices and experiences of democratic participation of young people in six EU countries (UK, France, Spain, Austria, Finland, Hungary).

We also noted a distinction between voters choosing to cast their ballot at a polling station and those voting electronically in terms of how they relate their vote to the wider community. Voters that visit the polling station to cast their ballot are more likely to vote according to what they think is best for their country rather than for themselves. In addition, voters who vote in a polling station as opposed to by post or electronically report feeling more efficacious and generally more positive about democracy. Level of efficacy drops by approximately 15% for first time e-voters as compared to first time in-station voters.

In the case of our experiment, the results of the e-voting experiment proved truly interesting. First – and maybe most importantly – of all it seems that young people asked to vote over the internet were over twice less likely to turn out than those invited to vote at polling stations. First of all, many (albeit not all) of the institutional bodies will offer it as an optional alternative to polling station voting and not instead of it. The second key element is that while internet voting comes across as a more individual decision, we observed that polling station voting reinforces group dynamics about political participation, which in itself is a critical finding. In other words, groups voting at polling stations are more likely to ‘monolithically’ become groups of voters or non-voters depending on whether groups ‘determine’ that participating in elections as ‘cool’ or ‘uncool’. Again, this might be quite specific to the age of the young people that were in our sample for this experiment. However, we chose 16–18-year-olds on purpose precisely because we wanted to measure reactions of people who had not had a chance to vote before, and in this context, this result is rather striking. Only Hungary proved an exception in which turnout for the e-voting group was higher than for traditional voters.

Overall, our research found that e-voting is not a ‘neutral’ substitute for voting at a polling station. Our findings exposed a paradox: although young people often ask politicians to make greater use of e-voting and social media campaigns, in practice their implementation increases negative views of politicians and heightens young people’s perceptions of a gap between themselves and the political elite. Furthermore, e-voting appeared to promote more individualised voting decisions than when compared to the experience of voting at a polling station, where being alongside others seems to emphasise group dynamics.

Apart from the age specific aspects of those findings, many will note that whilst the experimental setting effectively constrained each participant to vote in a specific way (either in a polling station or online), the introduction of remote e-voting is usually (although not always) adopted as a simple option in addition to the possibility to vote in a traditional polling station, as opposed to being the only form of voting available.

However, using data from real elections and nationally representative samples of the general population, Bruter and Harrison (2020) specifically looked at the differences between geographically remote voters and the rest of the population in the US and UK cases. Their results largely echo, and sometimes emphasise the experimental findings of Cammaerts, Bruter et al. (2016). Bruter and Harrison (2020) notably find that geographical remote voters derive a lower sense of efficacy from their electoral experience compared to those voting in a polling station, as well as a lower sense of sociotropism (sociotropism is when citizens vote according to what they believe is best for their country as opposed to what they believe is best for themselves personally and is usually credited with strengthening social fabric and democratic legitimacy).

Furthermore, and perhaps even more strikingly, the authors also find that in the context of another real British election, young people using geographically and temporal remote postal voting (online voting was not offered) were more likely to cast a vote for an extremist party than those casting their vote in a polling station. The effect was very strong amongst 18–24-year olds and remained true even when controlling for their earlier voting intention some weeks before the vote. The effect remained important for 25–39-year-olds and then disappeared for middle aged and older citizens.

In that sense, whilst further research is probably needed to confirm those results in a greater diversity of contexts, online voting in particular may have a significant and potentially negative impact on voters' experience and satisfaction, and even potentially impact turnout and actual electoral choice not least by removing the vote from the solemnity of the polling station environment, and the impact of that change of atmosphere on what Bruter and Harrison refer to as societal projection (thinking of others when you cast your vote) and projected efficacy (the sense that one's vote is part of a broader social movement and that if people like us mobilise, they can make a collective difference to their political system).

9.6 Risk of heterogeneous effects of remote voting on specific types of population

In the analysis that precedes, we have seen that not all categories of populations are equally affected by the potential risks of remote voting. In particular, in section 3, we saw that young and very young voters are likely to be significantly more affected by those effects than older, more experienced voters. This is particularly important to note to the extent that very frequently, an argument used to support remote voting options is that it is hoped to notably facilitate the electoral participation of young voters who are chronically under-represented in democratic processes in terms of turnout.

As we see, young people are instead more likely to find a remote voting experience very different from a traditional polling station voting experience, and in particular, they are likely to assess their experience more negatively and even potentially to express materially different electoral preferences in remote voting compared to in station voting. This is critical as a worse perception of electoral experience will likely lead to lower turnout in future elections (Bruter and Harrison, 2020) as well as a lesser sense of electoral resolution and legitimacy attached by voters to the election outcome.

It should be noted that populations affected by disabilities – and notably hidden disabilities and mental health issues – may also be differently affected by remote voting options compared to the rest of the population. On the positive side, remote voting alternatives may increase accessibility and opportunities to vote for disabled voters. However, in some countries, those options have been considered an adequate replacement to making traditional polling station voting more accessible to disabled voters, and this runs the risk of citizens living with disabilities feeling that they are considered second class citizens by their democratic systems.

It should be noted that for many citizens and vulnerable citizens in particular (disabled, elderly, etc), voting and the polling station experience is a key moment of integration and equality. This has for instance been well studied in very unequal societies (Banerjee, 2017). This element of integration is simply not replicated in the context of geographical remote voting (as well as personal remote voting where it exists) and should never be considered a substitute to ensuring full and equal access to the traditional voting experience.

Similarly, and consequently, existing experiences where geographical remote voting is the only option available to citizens (some Swiss canton elections, UK 2004 experiment, some US local elections and referenda, etc) notably as online voting deprives citizens of a critical opportunity to join in a highly meaningful shared experience.

9.7 From risk to opportunities – qualifying pessimistic outlooks

As we have seen, existing research has highlighted potential risks relating to both main components of e-voting: remote e-voting and electronic voting machines. Nevertheless, those pessimistic assessments need to be qualified in important ways for at least three reasons. The first is that it is important to understand the specific comparison basis of many studies raising issues about e-voting. The second is that electronic voting has arguably been subject to a lot more scrutiny and suspicion than many other forms of voting. The third is that some aspects of e-voting remain relatively new and consequently, identifying the issues that have been present with early versions of it could precisely equip researchers and Election Management Bodies alike to invent a new generation of e-voting which could potentially mitigate some of the issues that have been identified. In other words, problems are here to be solved, and need identifying before such resolution becomes a possibility.

First, it is important to understand what research pointing out to the potential limits of e-voting compare it to. In effect, in terms of both safety and ergonomics (the interface between electoral organisation and voters' psychology and behaviour), criticisms of e-voting tend to compare it to the most traditional form of voting – i.e., voting in polling stations, on Election Day, using paper ballots. This traditional version arguably represents the “gold standard” of voting but by no means the only form of voting used across the EU at the moment. Indeed, as societal habits and lifestyles have changed making increasing proportions of voters unable to vote traditionally, many EMBs across the EU have taken steps to increase the options available to voters in case they could not participate in elections traditionally, including postal voting and proxy voting. Whilst research suggests that there is a potential transparency and even more so ergonomic cost in current forms of e-voting mechanisms compared to “traditional” voting, it is far less clear that e-voting performs any worse than postal voting or proxy voting. Both options impose arguably worse safety trade-offs than e-voting, and Bruter and Harrison (2020) suggest that proxy voting tends to be severely criticised by voters whilst postal voting does not fare any better than e-voting in ergonomics term. Furthermore, whilst e-voting has the possibility to improve over time, perceptions amongst many EMBs is that postal voting is becoming an increasingly impractical option as, in many countries, traditional postal services tend to worsen in terms of cost, speed and efficiency. In other words, whilst there may be issues in using e-voting to replace traditional paper voting in polling stations on Election Day, voting, it is not necessarily performing poorly compared to other alternatives to such as traditional vote, and may well be a better secondary option than most existing alternatives.

Second, it is important to remember that e-voting arguably tends to be more heavily scrutinised than many other forms of voting. In terms of electoral ergonomics and voters' psychology, this may not make a big difference, but in terms of safety, integrity, and technological efficiency, it is arguably the case that despite the relatively frequent issues noted by Member States in 8.2, so far, the majority of integrity and technological issues noted have been minor or moderate – for instance delays in results computation, issues affecting a small number of polling stations, etc. Because, at this stage, many voters and stakeholders tend to be intuitively more

suspicious of electronic processes than material ones, this can lead to issues of trust, but so far at least, the practical consequences of the integrity problems raised have rarely been disproportionate compared to other routine issues with electoral processes. It is also the case that problems tend to be more important when electronic voting is conceived as an isolated effort, and the case of Estonia where it participates to a much wider concept of digital identity, there have been no disproportionate issues. Furthermore, whilst the Estonian case shows that electronic e-voting (specifically) does not result in a turnout boost (turnout rates remain lower than in the 1990s), turnout has certainly stabilised over time suggesting that in a system where digital behaviours are normalised, remote e-voting does not result in a long-term decline in turnout either.

Finally, whilst it is clear that both components of e-voting have been deemed by research and practice alike to raise some concerns, which have not been found a compelling answer just yet, the very identification of those potential issues means that EMBs are starting to get a clear sense of what new and future e-voting processes will need to address. In particular, we noted above that potential issues include the lower sense of societal engagement and connection in the case of remote e-voting, and potentially lower sense of efficacy and lack of trust in the both the cases of remote e-voting and electronic voting machines. Ultimately, effort will thus need to focus in particular on how to rectify those issues, for instance by trying to make remote e-voting less isolating and socially disconnected for citizens using it. Whilst those issues have not been addressed in ways that can be deemed as certainly successful just yet, it certainly does not mean that such ways do not exist, and teams of scholars are currently researching precisely what processes and designs could counterbalance such risks. Any proposed new e-voting technology or process can also be tested for those risks to understand whether they might have successfully addressed concerns or require further tweaks.

Overall, there is therefore some hope that by focusing on the specific advantages of electronic voting and creating new designs and procedures which would specifically aim to mitigate the issues and risks that have been identified to date, specific forms of implementation of electronic voting options may be useful in particular where they do not replace traditional modes of voting but come, instead, as an alternative to postal or proxy voting. The optimal procedures and implementation have arguably not been fully conceived yet, and will need to be systematically assessed and tested. They will also need to be adapted to the electoral psychological needs of citizens as well as to the settings, rules, and cultures of individual Member States, but it is clear that technological advances mean that the range of options available to those Member States intending to use e-voting is much larger today than it was even a few years ago, and will continue to expand.

10. Conclusions

This report has looked at the use of e-voting in voter-facing processes – notably the use of Electronic Voting Machines and internet voting – in electoral processes across EU Member States. The report is interested both in existing practice and the potential for future use in the context of European Parliament, national, and local elections. The scope of the report includes regulatory framework, current use, a focus on the specific case study of France, potential security issues, and impact on citizens' experience, ergonomics, and behaviour.

Critically, there are very diverging preferences regarding the desirability and use of electronic voting – both in the context of voting machines in polling stations and of internet voting as remote voting –.

First looking at the use of electronic voting machines, some Member States have long moved to using them in some (rarely all) of their polling stations a long time ago (e.g. Belgium, Bulgaria) and are unlikely to question that choice. Others have decided not to make use of that option (e.g., Greece, Portugal). Some have also experimented with electronic voting machines and either discontinued pilots (e.g. Italy, though a new feasibility study has recently been undertaken in that country), reversed the move to electronic voting machines (e.g. Ireland, Netherlands) or imposed a moratorium halting its extension (e.g. France). In all those cases, Member States are unlikely to reintroduce those machines.

When it comes to remote electronic voting and notably internet voting, use is a lot less spread (Estonia, and in the specific case of expatriate French voters in some specific elections) and a majority of Member States are not in favour of introducing internet voting.

Among the main arguments of supporters of electronic voting are speed, the fact that digitalisation seems to be a general trend in society which seems hard to avoid in elections, that the use of electronic voting can make vote counting less labour intensive and potentially faster and in the context of electronic voting for remote voting that it may be more generalisable and more effective than some other forms of combined geographical and temporal remote voting such as postal voting and less dependent on the use of increasingly limited postal services. A particular case needs to be made regarding the use of internet voting in Estonia which, whilst it is not unanimously supported (some voices have been critical both within the country – such as the Centre party – and outside – such as the OSCE), seems to be part of a much broader transition towards digital citizenship which includes a wide range of services from digital identity to administrative formalities that extend well beyond the realm of elections.

Among the main criticisms of opponents of electronic voting, there are many references to security risks, issues regarding citizens' trust and satisfaction, the fact that electronic voting fails to increase turnout, a significantly higher cost (particularly for electronic voting machines), risk of diluting the role of elections as a shared societal experience (in the case of remote e-voting), dependence on third party providers, the existence of multiple settings and alternatives which are hard to choose from (and where traditional tender models are ill fitting whilst providers themselves cannot provide impartial advice, whilst independent scientific advice and evaluation are rarely sought in practice). Furthermore, worries about error can typically only be mitigated by methods that raise risks with regards to the secrecy of the vote, and the continuous changes in electronic voting technologies which result in fast obsolescence. Finally, citizens are not equal when it comes with electronic voting methods

(notably when they live with disabilities), and whilst the use of electronic voting is frequently framed as an attempt to bring young people back to elections, young voters aged 18-24 (partially first-time voters) are in fact the least likely to make use of geographical remote voting including internet voting and likely to express lower satisfaction.

Regardless of whether one supports or criticises electronic, research suggests that both the use of electronic voting machines and remote e-voting have a potential impact on voters' experience, satisfaction, speed and depth of deliberation, and even electoral choice.

It is particularly noteworthy that whilst many voting practices have evolved at different point in time across countries but seem to constitute trends that are durable when initiated (e.g. lowering of voting franchise, extension of the use of remote voting options, be they geographical, temporal, or personal) so that they constitute "trends", this is not necessarily the case with electronic voting where a number of Member States have reversed or abandoned initial intentions to introduce electronic voting.

Due to those diverging preferences and to the legal context which means that the organisation of election remains largely a national competency, it is unlikely that anything approaching unanimity on the use of electronic voting would be emerge in the European Union.

Crucially, it should be emphasised that the potential risks that we highlight when it comes to the different e-voting systems that have been trialled or implemented do not imply that e-voting (either in terms of electronic voting machines or in terms of remote e-voting) are necessarily negative. When it comes to electoral processes, difficulties are here to be addressed, and identifying them is simply an indispensable first step towards doing so regardless of the electoral procedures that a system wishes to implement. In terms of safety – often one of the biggest worries of political systems when it comes to e-voting – it should be noted that the vast majority of elections that use either electronic voting machines or remote e-voting in recent history have in fact avoided major safety issues in practice. There is no doubt that attempts to disrupt electoral processes have increased over the years, however, aggressive disruptors may target any aspect of election campaigns (notably through social media) and electoral organisations (including internal processes) and not only voter-facing processes. Furthermore, whilst no answer provided so far to try and optimise voter experience when it comes to e-voting has been totally satisfactory, this does not in any way mean that there can be no way to mitigate potential issues. If anything, a key issue is probably that academics and practitioners alike have often failed to effectively understand and measure the extent to which voting procedures can in fact affect voters' experience, often (mistakenly) assuming that voter experience is "procedure neutral" because voters would go to a polling station with their mind made up already and that their vote casting is simply a neutral opportunity for them to express their preference. The reality is that in a typical major election, 20-30% of voters make up or change their minds within a week of the vote, half of them (so between 10 and 15%) on Election Day itself (Bruter and Harrison, 2020) and it is because of this that every detail of how the election is organised, be it in polling stations or remotely may have profound implications on the experience of each and every voter. Acknowledging this impact is the first step towards mitigating the potential negative effects of some e-voting procedures and ensuring that those potentially negative implications are pro-actively avoided.

Therefore, safeguards and best practices that can be used if and when Member States decide to use either Electronic Voting Machines or Remote Electronic Voting (Internet Voting), the following key elements can be highlighted:

For the use of electronic voting machines:

- Independent scientific advice should systematically be sought when it comes to the choice of options and settings that are fit for a specific polity (in particular, advice on the most desirable options should not come from the agents or companies which will be providing the technology to avoid conflict of interest);
- Ensure the existence of a protocol where a citizen suspect an error that fully protects the secrecy of the vote;
- Ensure that the use of electronic voting machines includes specific mitigation or separate paper alternatives for citizens living with disabilities, notably learning disabilities;
- Ensure that no state, region or municipality is in a situation of long term electoral dependency towards a specific private provider.

For the use of internet voting:

- Ensure that internet voting is never the sole compulsory mode of voting (i.e. that polling stations continue to be offered as an alternative for citizens who wish to vote in person);
- Ensure that internet voting is part of broader secure digital identity systems;
- Ensure that early internet voting is paired with a right to regret one's vote on election day;

In all cases, ensure that the use of any form of any form of remote voting in voter-facing elements of elections is accompanied by elements of monitoring including the assessment of accessibility for citizens living with disabilities and models ensuring equality between citizens using electronic voting and those who are not.

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