E-VOTING SYSTEMS

– SWEDISH CITIZENS PERCEPTION TOWARDS A FUTURE IMPLEMENTATION

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Abstract

Today's digitalized society sees constant change and development. Revolutionary and otherwise controversial inventions are now considered conventional. Sweden is one of the most technologically developed countries in the world, with the exception of our voting system. The biggest change seen during the decades is the inclusion of voters. The current voting system in Sweden is neither effective nor accurate. There have been talks about an electronic voting system but Sweden has seen no effect of this. Other countries have already implemented electronic voting with successful results. Projects in other countries have also been shut down with the reason being users that are not aware of how the system actually works, even though citizens were positive towards the systems. No investments have been made in making sure that users know how the system works. It is therefore important to include the end-user in the design and development of a system. This inclusion ensures satisfaction from both parties. If an ultimate solution is to occur, both from a developer and user perspective, involvement needs to happen.

Through this study, swedish citizens perspective regarding e-voting will be analyzed to enhance an e-voting system in case of a future implementation in Sweden.

Keywords: e-voting, e-governance, e-participation, security, Swedish citizens

Sammanfattning

Dagens digitaliserade samhälle ser konstant fortsatt utveckling. Revolutionära och annars kontroversiella inventioner är normaliserade idag. Sverige är en av de mest tekniskt utvecklade länderna med vårt röstningssystem som undantag. Förändring i röstning har setts i inkludering av människor men systemet har inte transformerats. Det nuvarande röstningssystemet är varken effektivt eller precist. Det har pratats om ett elektroniskt röstningssystem men Sverige har inte sett någon effekt av detta. Andra länder har redan implementerat elektronisk röstning med framgångsrika resultat. Projekt i andra länder har å andra sidan också lagts ner med anledningen att användare inte är medvetna om hur systemet egentligen funkar, fastän invånare uppskattade systemet. Inga resurser har investerats på att se till att användare vet hur systemet fungerar. Med detta som grund är det viktigt att inkludera slutanvändaren i utvecklingen av ett system. Denna inkludering kan leda till belåtenhet från båda sidor. Om en ultimat lösning ska kunna ske, både från ett utvecklar och användarperspektiv, måste medverkan hända.

Genom denna studie kommer svenska invånares perspektiv gällande e-röstning bli analyserade för att förbättra ett eventuellt framtida elektroniskt röstningssystem i Sverige.

Nyckelord: e-röstning, e-förvaltning, e-deltagande, säkerhet, svenska invånare

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1 Introduction

In the first chapter, the reader gets an introduction to the subject. A background and some previous research on the subject is included. Thereafter, the problem and purpose is introduced and discussed. Finally, the research question is presented.

1.1 Background

Previous elections in Sweden have been turbulent ensuing in inaccurate results and ineffective counting of votes. One of many issues that occurred during the previous election is results of 2018 being delayed by two days (The Local 2018). E-voting (electronic voting) may be a possible solution for this issue. E-voting refers to the use of electronics and/or internet stationary or remotely as a supplement to the traditional voting system.

Multiple services are progressively being electronized and improved whilst voting has remained traditional and undeveloped. Improvements like these can be seen in electronic identification in Sweden. Essential services such as banking, tax declaration and signing of transactions and documents have developed, mainly through BankID. The official website for BankID states that they have 7,5 million active users in Sweden (BankID 2018).

A study by IIS (Internetstiftelsen i Sverige) established that nearly everyone in Sweden has access to internet at home. IIS notes that almost everyone under the retirement age uses internet. 100% of citizens aged 16-25 and more than 50% citizens 76 or older use internet. The study also concludes that 98% over the age of six use internet and that 67% in this group use it daily (IIS 2017). It seems fair to conclude that the internet usage in Sweden is broad and widespread.

Melanie Volkamer, author of "Evaluation of Electronic Voting" (2009), argues that "*history shows that electronic voting cannot be stopped in our technically oriented society*". Volkamer also mentions that when voters become aware of the system, the attitudes are often positive. Voting is an important issue and is compared to other important matters, voting being the one lagging behind in development. All internet based inventions are fairly new concepts and this includes e-voting that evokes different reactions. Some swedes are negative and mean that e-voting is a threat to democracy while four out of ten swedes think that voting digitally should be an obvious accessibility (Visma/Sifo 2016). According to IIS (2018) 51% of all internet users in Sweden want to have the opportunity to vote through the internet instead of going to a polling station. The study written by IIS (2018) further verifies what Melanie states could occur in the future with implementation of e-voting in Sweden. The study by Visma (2016) also showed that the most positive age group in this sample were participants aged 35-55 with 48% positive responses. The younger generation aged between 18-34 were not as optimistic with only 29% agreeing whilst the voters aged 56-79 were 40% for e-voting.

Another research also mentions the problem of "the missing element: voters?" as there is a lack of recent cross-sectional data on the attitude of the voters towards internet voting. However there are several useful researches performed in some of the European countries where they had trials of electronic voting and others where they collected answers from

surveys. Another study gave different results and did not correspond with Visma's study. This study performed an online survey in Sweden with a non-representative sample of Swedish residents. The study concludes that the response was overall positive towards internet voting even though the respondents were cautious towards security questions. (European parliament 2016).

E-voting has been used in multiple countries around Europe. The most widely known countries that has had cases of e-voting is Norway, Estonia and Switzerland. These three are to date the countries with the longest running and most developed electronic voting system. There has also been trials in countries such as United Kingdom, France and Canada. (Pammett & Goodman 2013). In Estonia e-voting through mobile phones was implemented in 2005 and 2007, then further expanded to e-voting using internet for parliamentary elections (E-Estonia 2018). During the gap between the elections from 2004-2009 the voting turnout was raised from 27% to 44% after the implementation of e-voting. Estonia has had five nationwide e-voting elections since 2005 and is currently the only country using e-voting at the presidential and parliamentary elections. Seen as how e-voting has been implemented in other countries, e-voting could be a possibility for the future market in Sweden.

A committee named Statens Offentliga Utredningar (SOU), consisting of parliamentary parties and several experts in their respective area, was appointed in Sweden in 2011 to review the Swedish election system. After thorough research, the final report in 2013 proposed e-voting as a compliment to the existing manual system. The reason being that this system could be a benefit to disabled, elderly and out-of-country residents. This would possibly lead to a broader equality and democracy in Sweden.
The report also states that the number of countries implementing the system is low. Estonia being the only country implementing it for the general public, France having internet voting as an option for citizens abroad and Schweiz using e-voting in some regions. SOU states reasons being that the system is a relatively new form of application and that countries with high voting participation do not want to risk an already functioning system. Norway is presented as a country with a high voting participation that had trials in remote e-voting in 2011 and 2013. The arguments for remote e-voting was that it was cheaper and less of a security risk. One rigged computer in a polling station has greater consequences than one computer at home. (SOU 2013:24). A news coverage "Varför kan vi inte e-rösta?" by SVT (Ljungholm 2018) brings up arguments against e-voting. Main arguments being that citizens could easily be influenced when voting, higher hacking risk and lack of transparency. Thore Husfeldt, professor in computer science, expresses "*It is crucial that the legal process can be understood by everyone and not just by a professor*". Meaning that all citizens must be able to understand the electoral process and be convinced that it has been performed democratically.

Electronic voting systems are dependent on maximum security, yet there is no 100% secure system. The electronic voting system must instead achieve a certain level of security to perform an electronic election in a specific environment. The same way a controlled environment exists when voting at polling stations, where there are workers that ensure privacy when casting a vote. When voting appears in an uncontrolled environment i.e. remote e-voting, the voters must ensure their own privacy when casting their vote. Some concerns that occur when voting remotely through an electronic voting system are influence from surroundings, the risk of selling or buying votes and taking the liberty from the voter to vote for themselves (Volkamer 2009).

Sweden has already throughout the years implemented e-governance in the form of e-declaration, e-journals and e-health. E-governance refers to authorities using electronics for communication. Sweden has already throughout the years implemented e-governance in the forms of e-declaration, e-journals and e-health. E-participation (electronic participation) refers to using ICT (internet communication technologies) for political participation. The goal being actively involving citizens in policies and other processes for a cooperation in government initiatives (Davies 2015). Fountain (2001) points out that citizens are being seen as consumers and public authorities as production companies. Users are solely given the final product without being actively involved and aware of the development. To improve the legitimacy of the government citizens have to be involved in the process. Having citizens involved in the design process and including feedback during the development and after implementation potentially also leads to the ultimate solution for government systems (Bertot, Jaeger & McClure 2008). Another benefit might be improved quality in political decision and the trust in authorities rising. All these can be seen as possible advances towards a breakthrough into a new era. (Bekker & Homburg 2007).

1.2 Problem Statement

The traditional way of voting possess many issues that are not up to date with the present society. Technical revolution and inventions are rising fast but one of the most important factors in today's society, democracy, stays the same. Implementation of e-voting in Sweden has been suggested and discussed. Considering the digitalization in Sweden and seeing how e-voting has been implemented and developed into a certain degree in other countries, it is likely to assume that Sweden might follow in the future. For an ultimate solution, e-participation could help maintain a high standard and make the transition as smooth as possible. Involving Swedish citizens would therefore be of high importance. Previous studies are limited to the opinions of experts and professors. Existing studies on Swedish citizens attitudes towards e-voting are not detailed and only present conclusions. They also contradict each other.

Previous studies regarding e-voting seem to have similar main topics. These being security, accessibility and anonymity. In regards to these topics, we want to explore citizens view to help a future ultimate solution if e-voting systems were to be implemented in Sweden.

1.3 Purpose Of Study

We believe that a market for e-voting in Sweden is a possible progress and that citizens prospects are of importance for an ideal system, hence our choice in research.

The purpose of this study is to explore, analyse and describe Swedish citizens opinions towards a future implementation of e-voting in Sweden, focusing on security, accessibility and anonymity. We want to find out how e-voting is perceived and received by voters and if e-voting carries any barriers from citizens perspective. We hope to accumulate more details regarding citizens perspective on e-voting to guide a possible future implementation.

1.4 Research Question

From ordinary Swedish citizens perspective, we want to explore, analyse and describe:
What are Swedish citizens stance towards a future electronic voting systems in Sweden?

2 Theory

This part of the thesis will introduce what literature was used to deepen the understanding in the subject. Readers that are not familiar with the subject matter will be informed.

2.1 E-governance

The term is broad and defined in various ways but definitions usually have the following in common; "*e-governance consists of information technology as the tool used for communication and intermediation of services to other authorities, companies and citizens with the common goal of reaching improvements and to be able to strive businesses more effectively.“* (Eriksson 2014) The EU also explains e-governance as an effort to improve democratic participation by the use of ICT. (Davies 2015) Treasury Board sees the use of ICT as having the potential of connecting citizens and improving the definition of democracy and citizenship (Treasury Board 1999).

The crucial requirement is that public authorities need to sense an urge of working together and not seeing citizens as only consumers (Fountain 2001). However, some say resistance of authorities working together lead to e-participation technologies being unprioritized. Some going as far as calling digital democracy "the myths of e-government" (Bekker & Homburg 2007). A difference from the general definition of e-governance can be seen in Sweden. The inclusion of authority internal work is central, the use of ICT strives to develop new work processes and routines for authority employees which in turn also benefit the society (Eriksson 2014).

2.1.1 The use of e-governance

An effective use of e-governance, if implemented well, helps rebuild authorities and their processes and in turn enables all interests to "*carry out their business with government more easily, more quickly and at a lower cost"* (Archmann & Castillo Iglesias 2010). The Austrian tax authority is estimated to have saved 2 euro per transaction compared to conventional processing (Waldecker 2012). Despite the many advantages of e-governance service for citizens are still lagging behind compared to services to businesses (Davies 2015).

STORK (Security Identity Across Borders Linked) and SPOCS (Simple Procedures Online for Cross-border Services) are examples of e-government projects in the EU. STORK and STORK 2.0 received support in 2008 and ended in 2015. The goal of STORK was to create a single European identification and authentication platform. Hence enabling authorities to easily access public services for any EU-citizen from the participating EU countries. Key authorities such as e-banking and e-health were involved. The outcome of STORK was a success and now involves 19 EU countries, including Sweden (European Commission 2011 & 2015). SPOCS is an ongoing project with the goal of one contact point, to support cooperation and exchange of information between different authorities including police, customs and judicial authorities, All EU member countries are involved in this project (Council of Europe 2018).

2.1.2 E-governance benefits, drawback and barriers

Proposed arguments for e-governance include time-efficiency, “once-only”, “whole-of-government”, transparency, citizen participation and the reduction of carbon footprint. Having different authorities connecting and cooperating leads to registration of data only being necessary once, hence “once-only”. In turn contributing to faster work processes, for instance merely visiting one authority to open a business as all necessary actors would be connected in a “whole-of-government”. Transparency comes from having large quantities of data provided for anyone to analyze. Also opening up channels for citizens to cooperate and develop services together with authorities can encourage greater citizen participation (Davies 2015).

Victor Bekker & Vincent Homburg (2007) address that e-government policy documents talk about the integration issue as a technical problem despite technical solutions existing. Pointing out that the tools to reach this level of e-governance does exist and are not the problem. The “whole-of-government” and “once-only” barrier seems to be the resistance of authorities working together. The different public authorities lack a common vision and sense no urgency to work together preventing cooperation.

Exclusion of citizens is one argument against e-governance. Citizens might have no internet access, limited digital literacy or live in poverty. Providing alternative channels such as in person service and telephone service assist in social inclusion. In addition there is a risk of personal data leaking, a cooperating system carries the possibility of cross-referencing between authorities resulting in anonymized data being read. Furthermore, lack of trust in the government can act as a barrier from citizens (Davies 2015). Citizens also expressed that in the end the service would require them to a personal visit anyway (Davies 2015).

2.2 Electronic voting

E-voting stands for electronic voting and can be specified in multiple ways. Alvarez, Hall and Treschel (2009) mention that the term electronic voting means that a voter through the usage of a computer, mobile phone or anything electrical, can cast their vote using a ballot over the internet prior to the voting day without it being supervised by official authorities. The biggest difference in e-voting and the current traditional system in Sweden is that the voter is able to cast a vote with the use of internet.

As of now, there are three different types of e-voting systems classified. The goal for e-voting is *Remote Internet Voting* which means that voting is available wherever internet is, this being the most accessible way of e-voting. This would allow voters to cast their ballot from any electrical device that can connect to the internet whether they are at home, work or outside. When it comes to these type of systems, many studies have focused on the vulnerability of the systems while others have targeted how to develop the systems in hope that the development when it comes to the integrity, privacy and security of e-voting systems are high enough to withstand any breaches possible (Becker et.al 2013).

Another type is *Poll site internet voting* and is not very different from the existing system in Sweden. Voters can casts their votes in different polling stations in any location in the country by using internet. The difference from the current system lies in it not being restricted to their residential polling station.

Kiosk Voting is the voting type in between the two already mentioned above. This system suggests that voting should be possible in various places such as gas stations, libraries, shopping malls and kiosks. Kiosk Voting is intended to promote voting as part of a daily routine where the poll station would be close to the voter at all times. The voting would be carried out with ATM/computer-like machines (Becker et.al 2013).

E-voting has currently been implemented and are legally and politically binding in over 5 countries in the world. This meaning that it is bound by law and results comes with consequences, such as forming a government. Not many countries use e-voting completely using the internet, instead countries around the world do however use ballot scanners and electronic voting machines as a supplement for the traditional voting system. Norway and Germany, to name a few, that formerly had e-voting have currently completely cancelled their use of any voting technologies (E-voting 2015).

2.2.1 The current voting system in Sweden

Sweden is a democratic country, meaning that citizens have the opportunity to take part of how the country should be governed. Every fourth year there is an election to vote for political parties and politicians. All citizens aged 18 or over may participate. Sweden has great turnout, in the previous elections 87,2% of all Swedish citizens participated. Although the turnout is admittedly high, around 1 million citizens in Sweden did not proceed with voting this election (Valmyndigheten 2018).

There are different ways of voting, the voter could vote on the election day and there are possibilities to vote in advance and from abroad. When voting on the election day you can only vote on the distributed polling station, it is important to bring a valid identification document. Before entering the polling booths, the voter chooses the ballots of the parties you want to vote for. When voting in advance you are able to vote at any polling station around in the country. It is important to bring your voting card and a valid identification document. If the voter forgets the voting card you can get a doublet printed at the polling station and if the voter does not have a valid identification document someone else could confirm the voter's identification. To vote from abroad the voter must vote in advance from the nearest Swedish embassy the same way as you would in Sweden.
There are opportunities to get assistance, if the voter is disabled or unable for other reasons, a carrier could handle the vote. A carrier could be a relative, a caregiver or a rural carrier. The carrier must be 18 years old or older and be able to show identification. If the voter does not have anyone to cast their vote an itinerant could come to their home and collect the vote (Valmyndigheten 2018).

It has been observed that the secret ballot in Sweden is not as secret as it should be according to Elklit (2018). The meaning of the secret ballot is to cast a vote independently where no one else should know which party the voter support.
In Sweden the standard way of choosing ballots is collecting it from a shared stand in the public area outside of the polling booths. Having the ballots in the public area violates the secrecy of which party the voters choose, this has been noticed by foreigners who vote in Sweden for the European Parliament or in local and regional elections. The reaction is often that the elections is not as secret as it is in other countries. Another issue noticed by foreign voters is the pressure from outside the polling station. Foreigners say having political parties distribute their ballots is a problem (Elklit 2018).

2.2.2 E-voting in other countries

When it comes to e-voting, Estonia is the country that first used e-voting in all elections, including the politically binding level (Krimmer, Triessnig and Volkamer 2007). Estonia started with e-voting in 2005 and has since then developed the most comprehensive e-voting system yet. The elections started from local elections and two years later reached higher levels such as the national parliament and European parliament. Estonia has currently had 5 elections carried through with e-voting. During these 5 elections, the remote internet voting participation has grown largely from having 1.9% in 2005 to 24.3% during the parliamentary election in 2011. Estonia does not have electronic voting as the only option but is right now the major choice of voting with 56.4% participants. Estonia made the decision to implement an e-voting system 2003 but the implementation was not completed until the local government elections in 2005. The reason to why Estonia wanted to implement an electronic voting system was to increase the turnout, simplify the procedure while also making it attractive to the younger generations (Pammett & Goodman 2013).

Switzerland has only had few trials and is yet to fully implement electronic voting in the whole country. Most of the elections have been referendums and municipal elections. At the year of 2012, 28 elections had tried e-voting (Pammett & Goodman 2013). E-voting was already in talk early 2000s, but the country took some time to proceed with the implementation process. The country first tried three different pilot elections in different cantons. The first trials happened in 2003 and these has since then been developed and spread throughout the country with different cantons applying two of these three methods. The method that still has not been applied to other cantons is one with an e-governance portal where citizens must register at their municipality in order to be able to vote online. The other two required no registration to be able to vote. The goal now in Switzerland is to generalize e-voting in the country by 2020. Even in Switzerland, the reason for implementation of e-voting was in hope of increased voting turnout (Serdült *et al* 2015).

Norway was one of the latecomers to e-voting and took around 7 years of planning for it to be carried through. Norway's Institute of Social Research (NISR) researched and evaluated the trials with focus on the participants behavior and attitudes in "Internettvalg - Hva gjør og mener velgerne?". The survey showed that through normalization, people got used to the system and that the trust increased between the years 2011 to 2013. People were generally very positive towards e-voting in Norway. However, after a few voting trials, the e-voting proposition was shut down. The government stated that users lacked understanding of security issues and, with this as basis, felt it was inappropriate to spend time and money on further trials (NISR 2014).

2.2.3 Turnouts

The biggest focus Estonia had was to increase the voting turnout in the country, but the question remained, was this goal successful or not? In a study made by Trechsel, Hall and Vassil (2010), the first four elections in Estonia were studied and analyzed to find if the implementation of e-voting were the reason for an increased voting turnout. What resulted in their study was that 2.6% of the voters would not have voted if not for e-voting available as a selection. The study also mentions that e-voting is rapidly increasing and that this should not be put aside. They expect that more voters will vote during the process of future selections. They explain this through late adapters that take time to get used to new technology (Trechsel & Vassil, 2010). Another study mentions that e-voting might not necessarily increase the turnout as it is not fully possible to know if e-voting is a mandatory selection for voters. Meaning that they might have voted a traditional way if that was the only option available. Also voiced was that bigger minorities preferably chose to not vote electronically even though this is a cheaper solution (Kitsing 2014).

Switzerland started the implementation of e-voting in hope that it would increase the turnout in elections as well. Most of the countries that have implemented e-voting has done it in hope of it simplifying voting and increasing the turnout. A study however conducted about the voting in Switzerland argues that the use of e-voting did not specifically increase the voting turnout but that voters tended to go for the more accessible choice. They mean that there is no "pull" of the internet. The voters only favor e-voting but would still vote through a traditional way if this was the only option. While they mentioned that all studies including theirs have limitations. Their statement ends with the argument that Switzerland is a special case as the turnout was low already. They argue that if e-voting was to be implemented in countries with a higher turnout, the change would not be drastic (Germann & Serdült 2017).

2.3 Information system

Today, computers perform tasks that were previously done by hand making them faster with endless possibilities. Leading to information systems being a core element in organizations today. Information systems support the collection, storage, processing and distribution of information and support communication within and between organizations. It is important for an information system to be well adapted to its users. Information systems do not only include the computer components but also the processes and people around it (Flodén 2013).

Accessible information systems are often described as hardware and software that is designed for people with disabilities. Accessible software can easily be understood and used by a range of users. Addressing all users benefit with inclusion of citizens. It can be everything from having voice recognition available or having it accessible everywhere (W3 2016).

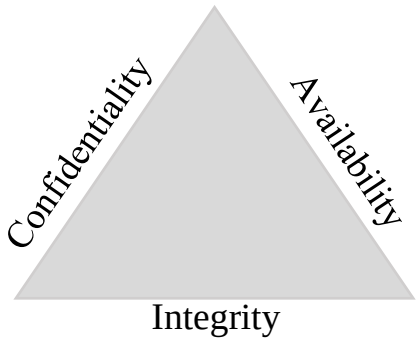
2.3.1 Security

All information systems possess general threats such as hacking, cyber terrorism and cyber espionage. These are constant threats as a system is never completely safe, regardless of if the system is new or established (Grawrock 2006). Common ways to target computers are by denying the rightful owner access to their resources, or hackers themselves getting access to

resources (Flodén 2013). Some ways to protect such threats are antivirus software, encryption, firewalls and improving the computer architecture (Grawrock 2006).

No system has absolute security, with enough skills, time and tools a hacker can break through any measure taken for security. It is therefore important to keep having security tests to be able to catch hackers and find vulnerabilities. NSA (National Security Agency) hired 35 hackers in 1997. They launched a simulated attack to reveal vulnerabilities in governmental IT-systems. Administrative access was obtained in 36 out of 40,000 systems (Merkow & Breithaupt 2014).

The CIA-triad explains the security goals for a general information system. CIA stands for confidentiality, integrity and availability.



CIA-triad

It is important to protect the *confidentiality* of data by making sure that no unauthorized access is permitted and that no sensitive information is leaked. The *availability* of data makes sure that it can be reached during natural disasters, denial-of-service attacks and equipment failures. Lastly, keeping the *integrity* helps keep the data trustworthy by making sure no intentional or accidental changes are made (Merkow & Breithaupt 2014).

One important principle to keep maximum security between the system and its users is to not give a false sense of security. Keeping users aware of vulnerabilities gives them the right and chance to protect themselves. Also, the principle of least privilege further aids in security control. Letting users only access parts needed to perform specific tasks leads no single person having full access to the system. This also leads to complementary checks, an error can be catched before the process is fully executed (Merkow & Breithaupt 2014).

25th May 2018 GDPR (the general data protection regulation) was put in to force in EU replacing the old data regulations. GDPR contains rules about how personal data is allowed to be handled and stored. It is important to inform the user about how, what and why their data is being used and that individuals should have the right to access it at any time. Even as far as having the right to correct, modify and delete their data. Also, the data integrity has to be high, users data needs to be accurate, current and only used for the stated purposes. Lastly, more personal data than necessary is not allowed to be collected and they must be deleted when they no longer are needed (Datainspektionen 2019).

USA has similar data regulations as the EU where the recent Facebook scandal with Cambridge Analytica turned away from above mentioned principles (ICLG 2018). It was revealed that millions of American users had their data sent to Cambridge Analytica for political purposes (Adage 2018).

2.3.2 Access control

The application of access control helps to meet the confidentiality and integrity goals from the CIA-triad. Using access control helps protecting the assets of an information system. This collection of mechanisms can help prove someone performed an activity at a specific point in time. Protecting data and the integrity can be through the use of firewalls, cryptography and intrusion detection tools. Having identification and authentication credentials keeps the confidentiality high. With identification the user is uniquely identified which leads to authentication that permits the system to verify the identification. Other ways to ensure confidentiality is through "Least Privilege" or "Need-to-Know". Users are given no more amount of access than needed for their task to be performed (Merkow & Breithaupt 2014).

A single factor authentication are passwords. All that is needed is that the user remembers the unique code. A two-factor authentication system also included a physical device. Tools such as smart cards or tokens are included. In a three-factor authentication system a third protection is included. Unique information such as a biometric identification (fingerprints or facial scanning) is added (Merkow & Breithaupt 2014). Which one is to be preferred depends on the system. A single factor allows user to access files quickly but the more factors the secure the system might be.

An electronic identification functions as a regular identification document and is used for identification on the internet can also be used for signing documents and agreements. An electronic ID can either be a hardware usually presented as a smart card with a chip where the data/information is stored, or as a software where the user downloads an electronic ID as a file to their computer (Andréasson 2011). An electronic ID is not always stored in a card or computer, it could also be provided by actors who handle the information and allocates it to public organizations or authorities if requested (Andréasson 2011).

In Sweden BankID is a popular electronic identification system, they provide electronic identification through a bank where the user can choose to use an application, a file installed in the computer or as a smart card. The BankID is provided through a bank that ensures to connect right person with right electronic ID. When identifying through BankID the user has to open the application, file or use smart card to verify their identity, in this process the identification gets verified through a certificate revocation list (CRL) and if the electronic ID is valid the user signs a document or gets admittance to information (BankID 2018). Certificate revocation list is a list of revoked certificates, there could be several reasons for revoking certificates, some reasons being if the key are compromised and others are revoked by administrative routine (Rhee 2013).

Telia is another actor in Sweden who provides electronic ID, they use smart card with the security method of PKI (Public Key Infrastructure) (Telia 2018). PKI is a system consisting advanced security technology and regulations adjusted for i.e. secure electronic transactions, identification of user, electronic signature for agreements and diverse types of secure

communication over public network. PKI is a solution of handling encryption keys, a special encryption technology builds up a system for identification, encryption and integrity control. The certification is established through a certificate authority (CA) these are usually from reliable actors with great trust from users, it could be a bank or an authority etc. (Rhee 2013).
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Another type of access control is biometric identification. It works by measuring unique human characteristics as a way to confirm identity. Some biometric identifications include fingerprint recognition, face recognition, iris scanning and voice prints (Merkow & Breithaupt 2014). One advantage of biometric identification over the others is that the security does not rely on the end user. There is no need to remember passwords, the security lies completely on the system. Human factors such as keeping codes on post-it notes no longer possess an issue (Li & Jain 2009). One type of biometric identification being used at several airports in Germany is EasyPASS. The electronic travel document is scanned, the traveler enters the e-Gate, and thereafter the camera runs through a facial recognition which is compared to the passport photo (EasyPass 2019).

2.3.4 Anonymity

Anonymity means that a person is non-identifiable. Anonymity in an electronic system depends on the security and the attacker model. If the anonymity sets are at larger size and more strictly defined, a stronger anonymity will be achieved (Bleumer 2011).

In the current voting system, anonymity is handled through identification at the polling station before casting a vote. The vote is not bound to the voter and is therefore anonymous. The secret ballot is used in the current system to ensure secrecy when voting. In voting and elections, anonymity can be connected to the secret ballot. The secret ballot is a voting method where the voter can cast their vote without anyone else knowing their choice. It is necessary to have the secret ballot to prevent corruption. This also gives the voters the liberty to vote without intimidations. Another prospect of the secret ballot is that voters are able to decide if they want to provide information of their vote and not feel obligated to do so (Lever 2015).

When taking voting to a possibly uncontrolled environment i.e. remote e-voting, the secrecy of the ballot could be violated. Authorities and voters should ensure that the votes are cast secretly. The authorities also have the responsibility to keep the ballot secret and ensure that voters have a right to a secret ballot (Saglie & Bock2016). When connecting this to remote e-voting, the secrecy of the ballot should be an alternative and authorities should trust that voters will be able to independently cast their vote without outsiders interfering.

Former experience from voters' states that the secret ballot in the current Swedish elections does not appear as secret as it should be. According to Elklit (2018), foreign voters and a German with resident in Stockholm experienced that the secrecy was not obtained through the voting process. The Swedish democracy and the HR support invited a group of election observers from Ukraine, Latvia and Belarus to observe the election in polling stations around Stockholm. They noticed the same as the German and the other foreigners. This was that the secrecy of which ballot was chosen was not as secret as it should be. Most voters only pick the ones they are going to vote for which results in a bare view of their votes. Another scene

observed was family voting where family members could go together inside the polling booth. This shows that the secret ballot was violated (Elklit 2018).

3 Methodology

The focus in the method chapter is to present what research strategy and methods will be used. Later on the data collection and analysis will be specified.

3.1 Method choice

This study's focus is as previously mentioned focused on voters perception of e-voting in Sweden to assist a future implementation. To better understand and fulfill the purpose of the study, a theoretical and empirical study was combined. A qualitative methodology fulfills the research purpose and answers our research question in an extensive way. To accomplish the theoretical study, thorough research was made with the help of theoretical collection data while the empirical study was made through interviews. A qualitative interview was chosen so that the answers given by the interviewees were as open as possible without them being led into a certain direction (Bryman & Bell 2011).

According to Jacobsen (2017) when you are interested in creating more clarity in terms of concepts or phenomena, a qualitative method is most appropriate, and a qualitative design usually aims at identifying how people interpret and understand a given situation.

This method will provide an opportunity to explore the area on a deeper level and as Bryman & Bell (2011) clarifies a qualitative research is a strategy that does not attempt to delimit the research areas and is made to ask fairly generally rather than specific interview questions.
A quantitative method was also an alternative to the research, however, that type of method would give less response options in a questionnaire and even if it would consist of a few open questions where the informant can answer in their own words, this method would not cover how the user experiences the problem in a more profound way.
The interview does not only consist of questions but also of an e-voting prototype. The prototype is of a smartphone e-voting application to let the participant get a firsthand experience with e-voting. The prototype has the purpose of exploring if the participants opinion towards e-voting differs before and after using the prototype. Having a prototype further helps with the e-participation view of the development of a e-governance system. Also, the perception of the easiness of an e-voting system can be considered.

The method approach used in this research is an inductive approach. An inductive approach is a method where you observe or experience something and then make a conclusion or theory about it (Jacobsen 2017). The opposite of inductive is deductive approach, a deductive approach usually deduces a hypothesis from previous theory to latter confirm the hypothesis from the findings from the research (Bryman & Bell 2015).

There is a third method approach called abductive reasoning, this kind of approach is a combination of deductive and inductive approach. The starting point of abductive reasoning is that all researches starts with observations that leads to a question and latter considers as a problem to solve. To solve the problem, new observations and speculations leads to a hypothesis. A scientific research using an abductive approach becomes a continuous problem-solving process (Jacobsen 2017).

This research will observe citizens perspective of a future implementation of an electronic voting system, the suitable approach will therefore be inductive (Bryman & Bell 2015).

3.2 Theory collection

In order to answer the research question and to build up the theoretical reference framework, search for literature and scientific articles has been made through the university of Borås library search and through the websites, Google Scholar, siencedirect.com and uxpajournal.org. The most common keyword for searching in these sources is: Electronic voting system, E-voting, E-governance, security.

3.3 Interview

A structure of the interview was needed. A semi-structured interview form was most complementary for the interviews to answer our research question. A semi-structured interview is flexible and lets the informant answer the researcher's questions openly and choose how to develop their answer, also providing the possibility to go deeper in the questions asked. A possibility for the researcher is to add questions or reform a question if the informant does not understand or does not answer a question. Going off the structure is encouraged in a qualitative interview as it explains what the informant sees as significant and meaningful (Bryman & Bell 2011). To deepen the meaning of the informants answers the interviews were conducted in their native language, Swedish.

3.4 Limitations

This research will not reach out to or consider the attitude of the government or experts towards the subject as the purpose of this study is solely focused on Swedish citizens.

Citizens participating in the study have all previously voted ergo citizen who were unable or who chose not to vote will not be included. An aspect of why some citizens chose not to vote could be associated to the current system but will not be included in this study. An e-voting system is said to benefit the disabled and their perspective is of great importance to this study. However, there were difficulties reaching out to these citizen, therefore this study will not be able to include their perspective.

Citizens participating in this study are limited to residents in Gothenburg, Sweden with the exception of two residents stationed abroad.

The interviewees are to be informed about all types of e-voting systems to express their opinion towards these. However only one prototype was developed, as a smartphone application, limiting the concept to one kind of e-voting. Participants can therefore only conceptualize and assume how the process might be conducted in the other systems.

A quantitative questionnaire could provide us with a greater response rate and additional view-points. By choosing qualitative interview the response rate will be reduced, instead the target is to dig deeper into citizens perspectives.

This research will not demonstrate how the system is going to get implemented, neither will it demonstrate how to create an electronic voting system. It will only give a viewpoint for a future implementation. The literature in this research explain the basics of the systems and how these have been implemented in other countries for a better understanding and comparison.

This study is to be seen as a starting point for opinions and the cooperation between citizens and experts for a future implementation. The importance of three main subjects can be found in this research. However, there are many more issues to be explored for a thorough e-participation development.

3.5 Ethical considerations

Bryman & Bell (2011) emphasize how important it is to be truthful to the research to not obtain any deception therefore this study was presented as it is. The option for the participants to confirm what was written in the final report was presented to decrease the risk of being dishonest. The participants had the option to confirm if they agree with the analysis of their answers and the way it is used.

All participants had the option of choosing whether they wanted to be anonymous or not. Participants might choose to be identifiable to maintain ownership of their stories (Bryman & Bell 2011). In our case all except one of the participants chose to not be anonymous. Prior to determining their anonymity, the study will be truthfully presented likewise information about how their answers will be used. Additionally, they will be informed that the answers will be recorded for the purpose of transcribing and the data will be stored on two computers.

3.6 Data collection analysis

The data analysis in this research is vital as the answers provided will be the biggest guidance to answering the main criteria for this study and help give a thorough research in this area. The answers in this research will come from the completed empirical study.

All interviews conducted were recorded and transcribed word-by-word. Written notes during the interview were also concluded. The interviews were recorded with one cellphone and one computer to lessen the risk of data loss. After conducting the interviews, keywords were picked out whilst also looking for a common line in the answers given.

The obtained data from the interviews was organized firstly by transcripts to make it ready for analysis. Qualitative methods lead to voluminous amount of data. To have a clear understanding of the data we read the transcripts iteratively before starting the coding. When applying a qualitative data analysis, coding is the starting point for most researches (Bryman

& Bell 2011). Writing notes or memos in transcripts simplifies breaking the interview into parts and obtaining a more detailed comprehension of the data. Our notes were split up into themes following our interview guide. Thereafter ideas, phrases and concepts were divided into the different themes. When other key words implied to other main themes, it was added in the coding process. With help of the former step, the data was reduced and helped pinpoint what could potentially be important to the research (Creswell 2013). The next step was to interpret the themes and turn data into valuable information. In all the conducted interviews common themes were found. The final step was to prepare the data for presentation where we analyzed and compared it to other researches. This way of analyzing collected data is a commonly used process described in literature when using a qualitative method (Creswell 2013).

4. Research

This chapter will describe our research to the reader in more detail. How and with whom the interviews were conducted are explained.

4.1 Interview guide

To make sure that the questions would cover all the important aspects, an interview guide was made. Through the literature of Bryman & Bell (2011), instructions of how an interview guide should be designed was followed. As a first step the question asked was "What do we have to know to be able to answer our research question?" from this an outcome of the overall view of what was important and relative to the research question was made. As we followed the steps of Bryman & Bell (2011), to create an interview guide, the interview questions had to be reviewed several times to make sure the questions would be essential and unambiguous.
The interview guide initiates with open questions to get the interviewees neutral initial thoughts without any influence from the interviewer's opinions on the said subject. To receive a greater overview of the opinions towards an electronic voting system the interview begins with a few open questions about the current system. The relevance of asking about the current system was to be able to compare it to a future system, what needs to be improved in a future system? Following the open questions are leading subjects related to previous research such as anonymity and security issues. These are to be compared to what previous research has presented. Last but not least the participants try out an e-voting prototype on a smartphone. With help of the prototype, a practical sense of how e-voting might possibly function is given. Lastly, previous questions were repeated to document if there were any changes from their initial thoughts after experiencing one type of electronic voting.
During the process of collecting data from interviews, the questions will be reviewed and updated based on the reflection of the interviewers and answers provided from the interviewees. The interviews will also add additional questions during an interview if needed depending on the answers given to get a more in-depth understanding of the answers. This will be a continuous iterative process performed during, between and after every interview executed for best knowledge and improvement in both interview questions and data. The process will also help improve our understanding in the area and minimize our workload. The interview guide is available in Swedish and English.

4.2 Selection

Our participants were chosen through a purposive sampling. The respondents all have the criteria of having voted before. The participants were not made on a random basis but were rather sampled in a strategic way (Bryman & Bell 2011). With the experience of voting we hope that the answers we get are more insightful. The chosen participants will be Swedish citizens born in Sweden and citizens born in another country, immigrants, to contribute to more of a variation. This selection will allow us to receive information from a wide variation of Swedish citizens when conducting this study. Two of our participants were out-of-country residents to get their experience of voting abroad. Participants were found through recommendations. The authors reached out to acquainted that introduced them to their

parents, friends or bosses. This to ensure that the chosen informants were not selected mainly through the authors of this thesis.

4.3 Prototype

Defining prototyping is difficult as it does not follow a given set of rules. A prototype can therefore be adopted to what is relevant to the developer. A prototype could refer to a product that is yet to be finished but tried out to provide first impressions. In software development one part of prototyping could be demonstrating concepts (Bähr 2017). Prototypes can help in discussing difficulties and clearing up problems (Budde 1992).

In the context of our study the prototype is used to test a concept. Trying the prototype hopefully helps the respondent imagine the concept of e-voting. As Sweden has not established any kind of e-voting system on a higher level many have yet to experience it for themselves. The outcome could be helping the respondent to easier discuss one type of electronic voting system and comfortably be able to compare it to a traditional voting system.

4.4 Interviewees

Mahasen - 58 year old, retired early. Was born outside of Sweden but has been a resident since 1991. Voted everytime she was allowed to since coming to Sweden.
Anonymous X - 39 year old informant that came to Sweden 1984. Has voted every election since he turned 18 years old. Works as an official for Gothenburg.
Melina - 22 years old, born in Sweden, working in London for almost a year. First time voter and experience from abroad voting.
Vanja - 23 year old student born in Sweden. Has lived in Korea for 3 years where she currently studies. Voted once in Sweden but did not vote while she was in Korea.
Huda - Is a 23 year old student currently attending university in Jönköping. Came to Sweden 2002 and has voted every election since she turned 18.
Ulf - 68 years old, retired. Born in Sweden, has voted since he reached the legal age for voting.

5. Result

In this chapter we will present what was said during the interviews in the respective themes. This chapter will present the interview and the results of the subjects in chronological order. This way of presenting the results are consciously made for the reader to greater understand how the analysis of this study was performed.

5.1 Current voting system

The informants have all voted every time they were allowed to since they were in legal age with the exception of one outside-residence, Vanja. Reason being difficulties to vote because of the time-period for voting abroad was too short. In contrast, Melina, the other out-of-country resident expressed easiness in voting. Melina's perception of easiness corresponds with the other informants. They experienced that it was not hard to vote but the process could be confusing. This regarding both ballots and voting cards. X said that after picking the ballots and entering the polling booth he realized he had picked the wrong one. The colours were not clear enough so there was a confusion between "personal-vote" and only voting for the political party. Also, the ballots were mixed up further increasing the risk of picking the wrong ballot.

One recurring issue with the current system was the secret ballot. In questions regarding anonymity the response was often connected to the ballots being outside the polling booth. *"[...]and the opportunity to be anonymous is affected by people that can see your ballots" "[...]when you are choosing ballots everyone can see after all"* Their perceived anonymity was inside the polling station and not after their vote being sent away.

Despite this issue almost all the informants expressed that they trust the current system. However almost all said they trust the system because they have to. Either because they have no other option or because Sweden is a rechtsstaat (society governed by the rule of law). *"I have to because I live in a functioning rechtsstaat and that is what one points out to be which means that there must exist a demanding responsibility […]for how would it look like if I wandered around and suspected the voting system. "I will find out!", it is not possible. "*(The informant expressed with strong words). Mahasen said she did not trust the current system at all because of the human factor. *"[...] I write on paper behind this thing and later put it in, but they are the ones that take it all out later."* Indicating that people can change her vote.

Other scenarios that appeared were impacts from others in various aspects. One being impact from your surroundings. Having a lack of knowledge was mentioned, you trust what other people tell you to vote for. Informants had experienced representatives of various parties pushing people into voting for them right outside the polling station. *"The previous election immigrants in this area were affected because they do not know a lot about systems and politics. There is a Somali woman that has been a teacher to almost all Somali people in this area and they listen to her. If she tells them to vote for someone, they all do. There was a Swedish man that talked to her and convinced her to choose them right outside the polling station. And they all voted for him because she said he was nice to her[...]There are many people that do not have knowledge that are taken advantage of. "This* informant was not the only one that highlighted this problem, others said that the knowledge of *why* you should vote

needs to be acknowledged. Saying that many people that come from other non-democratic societies do not understand the significance of voting.

Most informants said they do trust the way the system and votes are handled but that the current polling stations are not optimal. "*I think like this maybe if you're old or do not have the knowledge of the process. the accessibility, how good it is for everyone!"* Meaning that not everyone might be able to get to a polling station. Melina also says that voting abroad could be inaccessible for many citizens. She says that she was lucky to live in London *"Other that do not live close to London have to travel far to vote and then the probability is pretty big that people choose not to vote instead".*

5.2 Electronic voting system

Informants first reactions were overall positive towards an electronic voting system believing that it definitely will be implemented in Sweden only being a question of when. X adds that Sweden is already, if not the most, digitalized society in the whole world.
Some of the informants were not aware of the electronic voting system already existing in other countries expressing thoughts such as *"out of everybody I believe that Sweden would be first with it. (electronic voting system)"* The reaction towards the way it should be implemented was mixed. Some informants preferring only having the electronic option in the future while others would like to see a combination of both. None of the informants was completely against the implementation of an electronic system.

One of the reasons informants wanted the current system to still exist was the tradition, meaning and feeling behind going to a polling station. Huda says that voting does not only include sending in your vote but the whole process behind it such as looking up political parties and going to the polling station. She says it is a feeling of achieving greatness. Electronic voting systems could potentially take this feeling away *"through the phone could maybe feel like doing a quiz [...] not as serious, just choosing something and then not thinking more about it and what it represents."* X's statement corresponds to Hudas saying that there is a Swedish history behind the democracy and the elections. Mentioning that some take the election seriously, dressing up and having dinners together on the election day. Only having the electronic voting system would kill this tradition according to X.

One of the informants, X, put more importance on the process after the voting. He said that the tools used for counting the votes were not as important as the tools used after the election. To increase the inclusion and democracy you had to put more emphasis on direct democracy. One suggestion being applications after the election where the elected politicians communicated with the voters *"[...]not only by voting but also by being involved in the political decisions being made, it would be exciting to see if people could have a direct contact with the elected person under their process of voting through different things whether it be municipal, regional or national."*

5.2.1 Accessibility

All informants reacted positively to the accessibility aspect of electronic voting systems. Mentioned was that it would be more inclusive than the current system. Saying that citizens that cannot physically get to a polling station would be able to vote. Not only were citizens that are not able to vote mentioned, but also those that are able to but do not have time to or are too lazy. X states that the current voting process is bothersome and time-consuming while the electronic voting system seems like the opposite. He said *"It is an annoying process, waiting for the voting card and then going to the station. [...] First I went in and my wife had to wait for half an hour in the cold together with our dog and then we changed and I had to stand there with the dog."*

Melina says that the increase in accessibility is possible as long as the citizen has access to internet, through their own device or by going to a public place in possession of one. Informants liked the idea of being able to vote anywhere and not having to physically go there. Informants pointed out that more methods available result in higher accessibility. Younger informants mention that the older generation might be hard to include in an electronic voting system but that a younger generation *"cannot live without the digitized world".* However, Ulf says it would be in favour for the older generation as well, as long as they are taught to use the system. Ulf states that *"It is easier to sit at home in peace and quiet rather than going somewhere and you are also able to do it (vote) whenever you have the time [...] I think it would facilitate for many elderlies that have a hard time to get to the polling station."*

5.2.2 Security

In general informants were aware of different security issues but were still positive towards using an electronic voting system. Majority of the informants mentioned hackers as a security issue while also stating that security breaches could also occur in the traditional voting system as there are always risks. Other security issues mentioned were theft of identity and citizens selling their vote. Despite these issues Mahasen states that there is a higher possibility of votes being counted correctly compared to the current system. Vanja says that the risk of adding or taking away votes does exist, but the same goes for the current system.

Many informants imply that having biometric identifications such as fingerprints and/or eye scanning could increase their trust to the electronic system. They mention that biometric identification is already used in various ways, such as airports and police stations. Huda states that BankID also feels somewhat secure as she has not heard about hacking of BankID.

Lastly informants talked about being pressured by their surroundings. X states that not having the secure environment of a polling booth might ease the risk of citizens being forced to vote for a specific party or person. Melina however mentions that she does feel that there is a risk of pressure but appreciates the opportunity for families and friends to interact and discuss political parties without the pressure to vote for a specific one. Other informants remark that the pressure and influence from surroundings exist in the current system as well.

All in all, informants are suspicious towards the security issues but would like to see the electronic voting system being implemented provided that the security measurements are developed. Ulf declares that he trusts electronic voting as long as it is through BankID. That way he would trust that it operates correctly without security breaches. He could not come up with any security issues with electronic voting during the interview.

5.2.3 Anonymity (The secret ballot)

When asked about the perceived anonymity informants differed in answers. The common line was that they felt the same anonymity regardless of the type of system. One respondent that would not feel anonymous in any of the systems stated, *"there are probably already authorities that know what I vote."* Adding that she is okay with not being anonymous as long as the votes are counted correctly.
Other respondents think that an electronic voting system is not any different from the current stating "If *you go and vote, you have your passport with you so it's kind of the same thing."* .
Huda, that differs from the others as she feels different depending on the system, she would not feel anonymous because smartphones already snap up your conversations therefore not believing that you are really anonymous anyway.

Informants did mention concerns with the secret ballot. The secret ballot meaning that other voters cannot see what you are voting for during elections. Vanja mentions that she would feel more anonymous with an electronic voting system than the current one. The current system in Sweden has all the ballots posted outside the polling booth and because of this, voters can see which ballot you choose. She states that "*It is not anonymous at all, or you cannot be anonymous. [...] Everyone can see when choosing the ballots".* She mentions that a solution for this, if not an electronic voting system, could be to instead have the ballots inside of the polling booths.

5.2.4 Prototype

All respondents found the experience very positive when using the prototype. The informants think that an implementation of a similar system would be a very smooth quick and easy way to vote using an electronic system. Others also mentions that with a system like this, the voting process would be more effective and easier to complete at home for voters that are busy or have a hard time to get to the polling station. Ulf says "[...]*I think it would facilitate for many elderlies that have a hard time to get to the polling station, just as long as they get help learning this system."*
Informants indicated that with the right instructions and easy technology, an electronic voting system could be available for everyone. Melina states that considering people that are not well acquainted with technology it would be "[...]*difficult to press wrong*".

5.2.5 Turnout

When asked if they think the use of electronic voting system would increase the turnout, all informants believed that the system definitely would increase the turnout. A few mentioned that with the combination of both systems, the turnout would at least not decrease. Ulf states "[...]*with the alternatives of both electronic and non-electronic, I think it (the turnout) would increase"*.
Another factor stated by few was that this could increase the turnout as the disabled and

elderly would have a bigger opportunity to participate. Even people that normally would not like to spend any time or energy to get to polling stations would most probably participate through an electronic voting system. Melina says "[...]*more can do it (vote) at home, on weekends, you can do it basically anytime, anywhere which makes it easier for so many people".*

6. Analysis & Discussion

In this chapter, the found results are being analysed and compared to each other. The results are also compared to previous research. In addition to that, we discuss the results and a few subjects that we thought were mentionable.

The informant's opinion towards an electronic voting system were positive, believing in implementation of an electronic voting system in Sweden with the only question being, when. This corresponds to Volkamer (2009) who argued that when voters become aware of the electronic voting systems, the attitudes towards the system are positive leading to an eventual implementation.

This study gave a different conclusion contrasting to Visma (2016) that showed that the younger generation, between 18-34, had the least positive response. The informants in this study were however positive to implementation of e-voting regardless of age. SOU's study proposed e-voting as a compliment to the existing manual with the reason being an increased accessibility and inclusion. The thoughts of the informants did correspond with the expert's opinions in SOU's study (SOU 2013). The optimal goal for e-voting is a remote e-voting system as this is the most accessible system. The best solution in union with all informant's opinion, is the implementation of an electronic voting system as a compliment and not a replacement.

Informants said that a combination of systems would contribute to higher accessibility and that additional methods result in additional options. They stated that a greater inclusion would involve in a mixed system and that this is an important aspect of voting. One informant also mentioned that the current process was time consuming. Sweden does have a high turnout with 87,2% in the recent elections but there are still voters unable to get to the polling station. Citizens with disabilities and elderly. The out-of-country informants said that sometimes getting to a polling station could be difficult for voters stationed abroad living far from Swedish embassies. If kiosk or polling e-voting systems were to be implemented in the future it is important to consider placement. Otherwise, the accessibility for out-of-country residents would not change drastically. With a remote e-voting system and the traditional also intact, voters that preferably wants to vote from the comfort of their home and voters that are occupied and unable to make time to vote are easily able to vote.
Another argument, from the authors, is granting citizens the right to choose how they want to vote is one kind of democracy. Replacing the current system would take away one freedom of choice.

One out-of-country informant's reason for not voting in the previous election was the limitation of time. The advance voting period abroad was perceived as too short and is therefore of importance to consider out-of-country residents in a future system. The voting period should be equally long for all eligible voters regardless of place. The other out-of-country informant that did vote said the process was easy, but she was lucky to be placed near a polling station.

Another reason for a combination is the tradition and history of voting. The current system should be available for citizens that want to maintain the tradition. Some citizens take great pride in the voting process and would not be pleased with a major change. Informants said that remote e-voting might give the impression of a trivial matter. A future development of a

remote e-voting system should therefore make sure that it does not, as expressed by one informant, “feel like a quiz”.

Informants expressed that the positivity towards the prototype of mobile e-voting came in the finesse of the system. They liked the idea of how easy it was and that it seemed difficult to push the wrong buttons. The current system was not perceived as complicated, but the informants felt that errors were easily made regarding ballots. A future system needs to be clear and easy. Decreasing the risk of making a wrong choice and the feeling of confusion.

Almost all informants except one elderly were aware of security issues, especially on the issue of hacking. With the help of public security tests, the informants can put more trust in that the vulnerabilities are taken care of. An example of such a test is having hired hackers try to break into the system and find possible system issues (Merkow & Breithaupt 2014). Unawareness of security breaches can lead to a false sense of security and is therefore of importance to inform users about the potential threats. This gives them the right and chance to protect themselves (Merkow & Breithaupt 2014).

Informants stated that they would feel more secure with several identification and authentication tools. Combining passwords, mobile BankID and biometric identification could potentially increase their trust with focus on the system not being complicated.
The informants of this study did however not feel the need to understand the issues fully because they put trust in the authorities developing a well-thought-out electronic system before putting it on the market. The informant not aware of the security issues did not feel the need to seek knowledge in this area because of his trust in authorities. A Boston Consulting Group study showed that Sweden was frequently among the European Union Member States with the highest trust in public authorities (Davies 2015). Voters felt that they have to trust the authority because we live in a society based on the rule of law.

This is an interesting aspect, saying that informants feel the need to trust the authorities because they have to. We wonder if the thoughts would differ if e-participation was an obvious alternative. Citizens might feel that they are a part of the development thus trusting the system because they are aware of its processes rather than trusting in it because of no other choice. If the Norwegian experiment was conducted this way, it might not have shut down. The Norwegian government said that voter’s knowledge in security is of significant value thus not proceeding with the experiment (NISR 2014). They did however not seem to invest in making sure citizens were conscious about the mentioned issues.

In our study, the informants were also introduced to security scenarios and as in the study conducted by NISR (2014), the support towards electronic voting still remained the same. Norwegian internet voters said that they were not exposed to more pressure than those in the traditional voting system. This corresponds with our informants emphasizing that manipulation and pressure does not only have to exist in an electronic voting system, as most of them feel that it already exists in the current voting system as well. According to Elklit (2018), the scenery with party activists distributing their ballot papers outside the polling station is strange, at least to first-time non-Swedish voters.

Many of the informants put a lot of emphasis on the secret ballot when asking about anonymity, rather than how their votes are handled and stored after the voting was completed. This was also mentioned in the discussion of Elklit (2018) where he mentions foreigners voting in Sweden perceiving that elections are not secret. Some informants believed that

through an electronic voting system, other voters would not see which parties they choose. Informants were not satisfied with ballots being outside of the booths. It is importance to consider secret ballot in the future as it is a significant issue. The use of a kiosk or polling system could increase the secret ballot. A negative aspect stated by previous research, is that one rigged computer in a polling station possess more risk than one rigged computer at home. (SOU 2013). The use of remote e-voting systems does eliminate this issue while the secret ballot matter would still exist. Yet we believe that the secret ballot issue would decrease as you can vote from a private space as long as there is an internet connection.

The other aspect of anonymity is the leaking of sensitive data. This could be information about the voters and their votes. A few of the informants felt sceptical towards this subject but still preferred an electronic voting system. One informant expressed willingness to sacrifice anonymity as long as the votes were counted correctly. Meaning that anonymity could be sacrificed for a fast and correct presentation of result. A future implementation would need to present itself as accurate. Meaning that citizens involved in the development process (e-participation) need to trust that this is taken care of.

As mentioned above, voters found accessibility to be of great importance. One of the informants mentioned that one flaw in electronic voting is that you have to have a device of some sort connected to internet or a public space offering it. Seeing as 100% of Swedish citizens between 16-25 use smartphones and more than 50% that are 76 year or older use internet this might not be a barrier in Sweden (Svenskarna och Internet 2017). Another factor noticed by the informants was that the older generation might not prefer using the electronic voting system or not have enough knowledge. However, both of the elderly informants said that the prototype was easy and for non-technical citizens it would not be difficult to learn. This factor together with the strong tradition of elections led to many informants preferring implementing electronic voting while also keeping the current system.

All the informants believed that the turnout would increase either by the use of either an electronic system or the combination of both. 87.2% of the Swedish population voted in the recent elections which is a higher amount than many countries that have electronic voting system. Although the turnout is admittedly high, around 1 million citizens in Sweden did not proceed with voting this election (Valmyndigheten 2018). With this information, it's hard to assert that the votes would drastically increase with the help of an electronic voting system. Even if when implementing an electronic voting system turnout increases, it is hard to locate the reason of the increase as mentioned by Kitsing (2014).

One issue seen was the lack of knowledge in the current system. One informant experienced stress of losing her voting card before the election day. She was not aware of the fact that the voting card is only needed when voting in advance. Even if losing the voting card, there are solutions for this issue. Indicating that there are several misleads in the current system. Some sources conclude that if the turnout is already high, the difference will not be significant. Nevertheless, it is valuable to include these, even if few, citizens as well.

A topic mentioned in this study was direct democracy, the participant did not believe that the tools used was of most importance for a higher turnout. Instead said that the use of e-participation could further develop the democracy and increase the turnout. Following up after the election and having citizens involved in political processes might possibly be a push for both citizens and politicians. A suggestion could therefore be to develop the systems and

make it better with information being continuously updated. Bekker & Homburg (2007) said a benefit in e-participation might be improved quality in political decisions and the trust in authorities rising. Having applications where citizen communicate with their elected representative, instead of politicians only following their respective political party programme, might also increase the satisfaction level. The crucial requirement is that public authorities need to sense an urge of working together and not seeing citizens as only consumers (Fountain 2001). Seen as Sweden has evolved in digitalization they could be the first to set an example.

Education was also connected to *why* citizens should vote. Citizens with a background from non-democratic societies do not understand the significance of voting. The future system should to address this issue. “The authors” discussed a follow -up system that shows the impact of voting. Making sure information about changes happening as an outcome from the winning parties getting their policy through. This could be an attainable way of presenting the significance of voting. News informing about new laws is not enough, the information presented does not specify what political party initiated a change.

An important aspect that many mentioned for both the existing voting system and an electronic one was knowledge. They mentioned that voters are not aware of both the political part of the voting and how voting works. An important aspect in a future system is to have as much information out as possible to voters so that they have it accessible if they need it. This being both about the system, political parties and elections. One informant mentioned that a solution for this could be to in the systems have the information about the parties and the people they are voting for to get information about them even the day of voting. Another comment was that voters could be able to follow the proceedings of the government even after the elections. This could work with a remote e-voting system with an application with constant information for voters to be updated about and it could also be available in different languages to include all voters. As one informant also mentioned, politicians are visible even outside the polling stations the day of the election to push people to vote for them instead. Even here education is the key, with having information of what a democracy is, how it works and why it is existent.

It seems to be of importance to ensure citizens are informed of their options and their respective processes. Informants that do not have access to internet or have a disability should be reached out to. These citizens especially should be informed of their options of voting. Once again, informants talked about communication and education. Not technically oriented citizens should be offered help to learn the system.

Informants thoughts despite the explanation of the different kinds of systems, often shifted to remote electronic voting even before introducing the prototype. This despite other systems being introduced during the interviews. It seems that many of the security and anonymity scenarios were applied on remote electronic voting. This shows how much digitalisation have affected people without them having any real perception on how much it has affected the society. While only having computers in a polling station could increase difficulties in counting if one was to crash, this option is still the friendliest way to first try to implement a new way of voting. This goes to show that citizens by now have already started to forego desktop computing as it is not the first that comes in mind when thinking of electronics. Everything now is available through mobile phones and laptops with lesser needs of desktop computers. The citizens positive attitudes towards implementation of an electronic voting

system goes to show how digitized our society already is with the younger generation using internet 100% and a bigger part of the older generations too (Svenskarna och Internet 2017).

7. Conclusion

In this chapter a conclusion of our research is presented. Also suggestions for further research and our contribution to the subject are mentioned.

The purpose of this study was to explore, analyse and describe Swedish citizens opinions towards a future implementation of e-voting in Sweden, focusing on security accessibility and anonymity. This in perspective of e-participation that says that the ultimate solution in political systems is through citizens involvement.

What are Swedish citizens stance towards a future electronic voting systems in Sweden?

The overall attitude towards electronic voting in Sweden was positive, most of the informants preferred an electronic voting system over the one used today. The ultimate solution for *what* kind of system seems to be a combination of remote e-voting while keeping the current system. Informants appeared to prefer the remote electronic system over others. Especially a mobile one that can be used on any device with internet.

The future system needs to be fast, time-saving and give the impression of professionalism. Especially if it is a remote e-voting system. It should not feel improper. In a future system, taking accessibility in count is of high importance. Making sure citizens are involved in the process and informing how the system is going to help in that aspect. There should be no room for misunderstandings.

Education is key. Citizens need to have user-training and vulnerabilities need to be exposed. All citizens have the right to learn how to use the system and why one should vote. Also, security tests to show how secure or unsecure the system is. Citizens need to be able to question the system and the developers should have the expertise to provide answers.

The future system should provide several identification tools. Electronic and biometric identifications should be combined. Citizens feel that the system will be more secure through this procedure.

Citizens felt that both the current and a new system possess similar issues. However, prefer an electronic because of accessibility. A future e-voting system should therefore ensure that accessibility is provided as a main issue. The design should be easy for everyone to use and the system should be available for all citizens.

It would also be preferred for a future system to not only include elections. Having direct communication with the elected politicians and parties and being provided with information about changes.

7.2 Further research

This research is only to be seen as a starting point for the development of e-voting together with citizens. We suggest more in-depth research where more informants are included. Another point is to include those that do not have the time to vote and disabled citizens. Having their point of view is, in our opinion, important to develop democracy and the ultimate solution. Knowing what is hard for these citizens makes for a better system.
Also, including citizens that did not vote is of significance. Why did these citizens not vote and what would make them vote? To make sure they do, they should be researched.

Also, a quantitative study in this area could be compared to our results. The fact that our informants reside in Gothenburg might influence this study. Another factor could be the gender and age distribution in this qualitative study.

Another aspect that was brought up by an informant was a direct democracy system. It would be interesting to research what citizens opinions are regarding this. Also, what are developers and experts point-of-view concerning this subject? It would be interesting to research factors connected to this idea. This information could be a starting point for the development of this kind of system.

7.3 Contributions to the subject

We believe we have contributed with another point-of-view concerning e-voting systems in Sweden. The e-participation point of view could help with a future implementation. This study has therefore contributed with knowledge to the field of Informatics.
We also believe that we have raised the question of how a system should be developed. Systems nowadays, in our opinion, do not cooperate with the end-user extensively. This contributes to the maintenance part of the system development process being the most expensive one. To reduce this cost users should be included. Having this inclusion means that no extensive changes will have to be made from a user's point-of-view. We are therefore contributing with information towards a future e-voting system.
We believe that this knowledge will be valuable for future studies. Not only to receive some user-perspective but also to have researchers realize this is an area of importance.

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Appendix

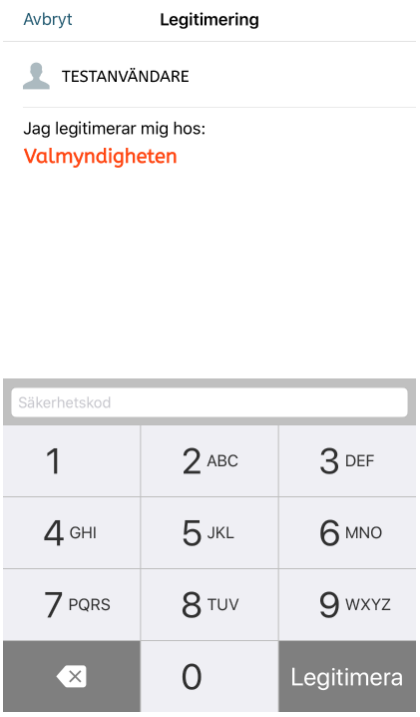
Appendix – Prototype

The following is a preview of the most important designs of our prototype. The full prototype can be found on this link: https://invis.io/D8PNA49SXZQ
The following prototype does not store any data but are pictures connected to work as an application would. To develop the prototype, we used the following sites; invisionapp.com & figma.com. The designing process was made in figma and the connection of designs for a prototype was made in invision. The prototype is not made to be a full scale voting application thus only contains the necessary means for an eVoting simulation. Not all options that would be available during a real voting period are included.
The chosen identification tool being Mobile BankID. Mobile BankID is also a simulation and no real login and authentication is made. Mobile BankID was chosen because of the many users in Sweden.
The design was made with inspiration from Swedbank, Skatteverket and other governmental applications. For maximum usability there are only a few buttons and common used colors were chosen. This prototype was made to fit an iPhone.

1. Frontpage for login.

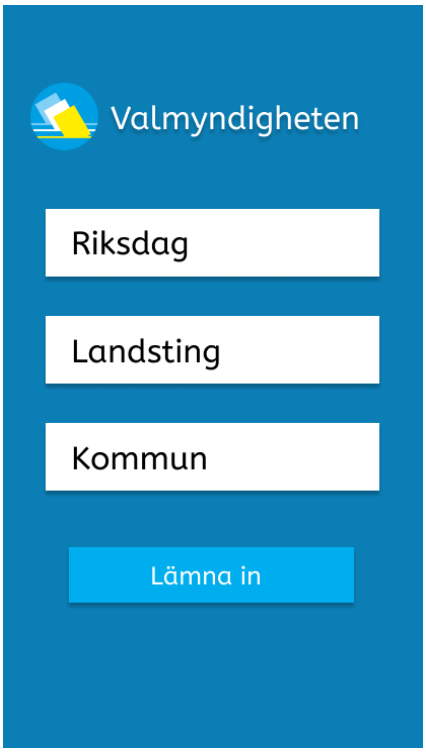
The user enters the application and comes to the frontpage. The front page contains the logo for the election authority. The user is encouraged to kindly login with their identification number through Mobile BankID. When pushing the login button, the user is being sent to the Mobile BankID authentication screen where you login with your password.

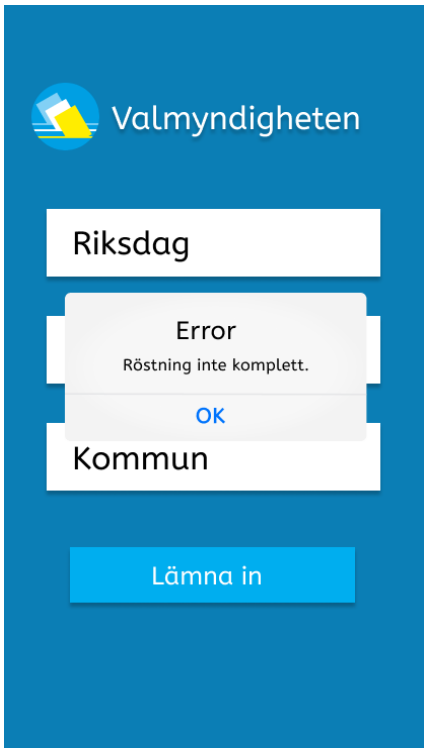
2. Simulation of login with Mobile BankID



1. Frontpage for the election process. **2. Errormessage**

The frontpage for the election process contains buttons that lead to three different election choices; parliament, county and municipality. If the user pushes the "submit" button before completing the election an error message appears stating that the election is not completed.





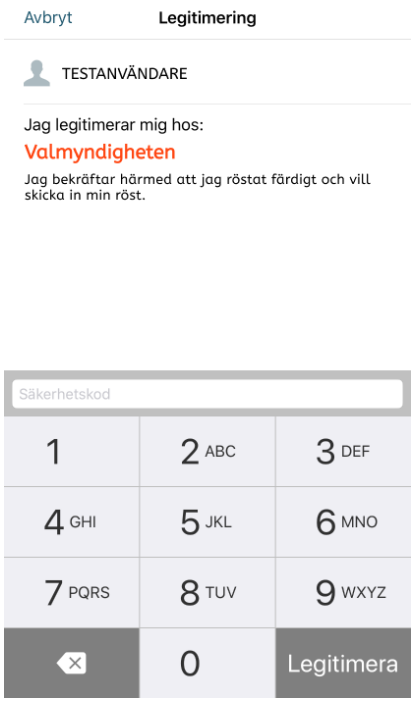
3. Frontpage for parliament selection. **4. When a political party button is pushed**

The front pages for the three choices are identical except for the text under the logo which clarifies the category. When pushing a political party button, it turns green for validation.

4. Front page after choices.

When the user has chosen a political party in all of the categories a check mark shows up beside the category. Here, all categories have been completed. The "submit" button can now be chosen and leads to the final Mobile BankID verification.

5. Final verification & authentication.



5. Final page

When all choices have been made and submitted a "Thank you for voting" screen appears.

Appendix – Interview guide

Date:

Location:

Interview Guide

General questions

Age: Ålder:
Years in Sweden: År i Sverige:
Occupation: Sysselsättning:

Self Introduction
Introduktion

Introduce us and our purpose with this study.
Introducera oss och berätta om vår studie.

We are Hanin Talal, Hjördis Harzdorf & Sumejja Duric. We are currently writing our bachelor's degree with the subject of elections. We want to start by asking some general questions about your past experience concerning voting. We will get into our subject more after the general questions. This interview will be recorded and written down for the purpose of our study. You can choose to be anonymous and if interested, you can examine the transcript for approval.
Vi heter Hanin Talal, Hjördis Harzdorf & Sumejja Duric. Vi skriver just nu vår kandidatuppsats som handlar om röstning. Vi hade tänkt ställa några generella frågor angående er tidigare erfarenhet med röstning. Vi kommer komma in mer på vårt ämne efter de generella frågorna. Denna intervju kommer att bli inspelad och nedskriven för vår studie. Du kan välja om du vill vara anonym och du kan även undersöka vår transkript för godkännande.

Traditional voting system:
Traditionella röstningssystemet:

How many times have you voted?
Hur många gånger har du röstat?

What do you think about the current voting system?
Vad tycker du om det nuvarande röstningssystemet?

Was the instructions clear/easy regarding voting?
Var det lätt att rösta?

Do you trust the current voting system?
Litar du på det nuvarande röstningssystemet?

Would you change anything from the current voting system?
Hade du velat ändra på något med det nuvarande systemet?

Explain electronic voting.
Förklara elektronisk röstning:

Electronic voting refers to voting through electronics such as a cellphone or a computer. Another kind of electronic voting are polling stations that could be located in for example a library or a traditional polling station that instead of paper voting has computers. Identification is often made through a type of electronic identification. One kind being an electronic identification that you connect to a computer with the help of a chip or card. A type of electronic identification in Sweden could be Mobile BankID.
Elektronisk röstning innebär att man gör sin röst genom elektronik, det kan vara via mobilen, datorn, det finns även röstnings stationer (t.ex. i en vallokal eller bibliotek) kopplade till någon typ av dator. I andra länder har man autentiserat sig genom någon typ av elektronisk identifiering. I vissa fall har man haft en elektronisk legitimation som går att koppla till datorn med hjälp av chip/kort. Ett exempel på det vi skulle kunna ha är BankID.

Electronic voting system:
Elektroniskt röstningssystem:

What is your opinion about an electronic voting system now that you have heard about it?
Vad tycker du om ett elektronisk röstningssystem nu när du har hört om den?

What do you think about the already existing voting system in comparison to an electronic voting system?
V*ad tycker du om det nuvarande systemet till skillnad från ett elektronisk röstningssystem?*

What do you think of these two systems? Would you prefer one over the other?
Vad tycker du om dessa två system? Hade du föredragit någon av de?

So far, would you want to see the system being implemented in Sweden? Why/Why not?
Hade du kunnat se detta systemet i sverige? Varför/Varför inte?

Now go into more specific questions related to our theory. (To see if the theory and other researchers conclusions match when the participants are given more specific questions)
Djupare frågor relaterat till vår teori. (För att se om teorin och annan undersökningsslutsats stämmer överens när deltagare får mer specifika frågor)

Security/Anonymity
Säkerhet/Anonymitet

How do you experience the security of using an electronic voting system?
Hur upplever du säkerheten kring användning av ett elektroniskt röstningssystem?

Does security issues comes in mind?

Kommer något säkerhetsproblem i tanke?

Would you feel anonymous through an electronic voting system?
Hade du känt dig anonym genom ett elektroniskt röstningssystem?

Accessibility

Do you think an electronic voting system would be easily accessible?
Tror du att ett elektroniskt röstningssystem hade varit lätt tillgängligt?

Do you think it would be easier to vote through an electronic voting system?
Tror du att det hade varit lättare att rösta genom ett elektroniskt röstningssystem?

Do you think an electronic voting system would affect the turnout?
Tror du att ett elektroniskt röstningssystem hade åverkat hur många det är som röstar?

Identification

What do you know about electronic identification?
Vad vet du om elektronisk identifikation?

What do you feel concerning anonymity when using electronic identification through code, i.e Mobile BankID?
Hur känner du kring anonymitet när du använder dig utav ett elektronisk identifikation genom kod, som exempelvis via ett mobilt bankID?

Trying out prototype
[Letting the interviewee try our prototype]

What you are about to try now is a prototype of an electronic voting system made for smartphones. The prototype does not save any data. Everything in this prototype is artificial and this includes the login through mobile BankID. You can select any number combination when logging in. We will not see your selection or what you voted on in the prototype. This prototype does not have a complete list of candidates or parties. The purpose of the prototype is to try it out and experience how it could feel to vote through a smartphone. The thought behind the application is to log in through your mobile BankID and the vote is supposed to be sent in anonymous.
Det du nu kommer att få testa är en prototyp av ett elektroniskt röstningssystem. Prototypen sparar ingen data. Allting i prototypen är konstgjort inkluderat inloggning av mobilt bankid. Du kan välja vilken sifferkombination som helst när du loggar in. Vi kommer inte att se vad du har valt eller vad du har röstat på i prototypen. Den här prototypen har inte en komplett lista av alla kandidater eller partier. Syftet med prototypen är att få testa och känna på hur det skulle kunna kännas att rösta genom en mobiltelefon. Tanken bakom applikationen är att

du loggar in genom ditt mobila bankID och att rösten sedan skickas in anonymt.

What were your first thoughts using this prototype?
Vad var dina första tankar när du använde prototypen?

What do you think about electronic voting through smartphones?
Vad är dina tankar kring elektronisk röstning genom mobiltelefoner?

Does it feel safe?
Känns det säkert?

Do you trust to be anonymous through this prototype system?
Hade du känt dig anonym genom detta system?

Do you experience it would be easier to vote through an electronic voting system?
Upplever du att det skulle underlätta att rösta genom ett elektroniskt röstningssystem?

Do you think there will be more or less participants in voting in an electronic voting system?
Upplever du att ett elektroniskt röstningssystem skulle öka eller minska deltagandet?

Do you think voters could feel any pressure to vote for a certain political party when using electronic voting systems ?
Tror du att röstare kan känna press till att rösta på ett specifikt politiskt parti när de använder sig av ett elektroniskt röstningssystem?

Does your opinion towards implementing an electronic voting system remain the same?
Har din åsikt kring införandet av en elektroniskt röstning ändrats?

Do you have any final thought on electronic voting in Sweden?
Har du några slutliga tankar kring elektronisk röstning i Sverige?

Appendix - Transcribations

Here the full transcripts from our interviews are to be found. If the link no longer works please contact the authors through University of Borås. The transcripts are only in Swedish as the interviews were conducted in the informants native language.

https://docs.google.com/document/d/1krPHYS0vbHg9GUFSget8AX3M7d-zS96fML3hXZbpkCU/edit?usp=sharing