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Tripped at the Finishing Line: The Åland Islands Internet Voting Project

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Abstract. The Åland Islands spent years preparing an internet voting system, to be implemented for the first time in October 2019 for Parliamentary Elections. Despite this, the project was canceled the evening before the expected release date. In this paper, we explore the causes of this failure using a two-pronged approach including Information System failure perspectives and the approach to e-voting Mirabilis, focusing on organizational elements which provoked the decision not to use the system.

Keywords: Åland Islands, Internet Voting, System Failure, Organizations, Convenience Voting

1 Introduction: Three contextual questions

The Åland Islands were expected to introduce an internet voting system (IVS) during their last Parliamentary elections (October 2019), for expatriate voters, with the expectation to extend use of the same system to Municipal elections too and to all possible voters on the next possible occasion. Unexpectedly, internet voting was cancelled the day before it should have started. This paper explores this case approaching it from an Information System (IS) failure framework [18, 20], describing how interactions between the different stakeholders involved are a central element for understanding the final decision, and the e-voting Mirabilis frame, focusing on the organizational elements which provoked the decision to not use the system.

1.1 What are the Åland Islands and how does their electoral system operate?

The Åland Islands are a Swedish speaking autonomous region of Finland comprising around sixty inhabitable islands and around six thousand small rocky islands not suitable for human habitation or settlement. The archipelago is situated in the opening to the Gulf of Bothnia, bordering south-western Finland and central-eastern Sweden and is inhabited by 29,789 citizens, 11,743 of them living in the capital, Mariehamn. The autonomy of the Åland Islands was affirmed in 1921 by the League of Nations, through which Finland would protect and guarantee the continuation of the culture, language and traditions of the archipelago, and the Ålandic Government would have a say in foreigners acquiring franchise and land in the isles [4]. Similarly, the autonomy of Åland was reaffirmed by the treaty for admitting Finland into the European Union. Amongst other elements of self-government, the Åland Islands have their own Parliament (Lagting) and Government (Landskapsregering), elected in their own independent elections.

The uniqueness of Åland's status translates to implementation of its elections, relating to both the archipelago and Finland. The Åland administration is in charge of organizing Parliamentary and Municipal elections, and uses the electoral system of proportional representation, in which voters cast votes for a particular candidate, instead of for a party. Votes are transferred into seats using the D'Hondt method. Participation in elections is determined by acquiring the Right of Domicile in Åland, or after having been an inhabitant of any Ålandic municipality for one year prior to Election Day (the latter only applies for municipal elections). Legislation regulating these elections is covered in the Election Act for Åland [1], adopted by their Parliament in January 2019, on the occasion of introducing internet voting.

1.2 Why were the Åland Islands attempting to use internet voting?[1]

As the head of election administration, Casper Wrede describes [21], the idea to implement this voting channel in the Åland Islands was following the general worldwide trend and popularity of internet voting in the late 1990's, but the initial debate and research which produced the recommendation not to introduce the system until voter integrity and identification issues had been resolved. The idea of postponing introduction of a remote voting system in the islands was reinforced by the Finnish failure in their attempt to use electronic voting machines in 2008 local elections. Using internet voting was again introduced to political debating chambers after discussions on the reform of the electoral system in 2014 where, amongst other proposals, the suggestion was voiced to start introducing internet voting as an additional advance voting channel, only applicable for people living outside the Åland Islands. The introduction of internet voting was expected to be facilitated in two steps: 1) in 2019, only for expatriate, overseas voters in Parliamentary Elections; and 2) in 2023, based on the results of the 2019 experience, internet voting would become available for all voters [21]. Three main elements are mentioned as key factors triggering implementation of internet voting: convenience, turnout, and international projection.

Given the geographic location of the Åland Islands, it has been a long term goal of electoral authorities [19] to make voting more convenient for remote voters, as well as a traditional element considered as a driver for internet voting. The logic is based on two assumptions that 1) a general demand for convenience voting channels exists among the population; and 2) trust has been established towards remote voting channels, implemented in an uncontrolled environment. The Åland Islands have a legacy of convenience and remote voting channels being available to the population, since even before 2019 they were already offering, a number of voting channels consisting of 1) early voting at general voting locations not linked to the voter's place of residence, meaning that a voter could vote at any early voting polling station across the Ålands during an 11-day period; 2) early voting at care institutions; 3) Election Day voting; and 4) Postal voting for those who "are out of the country or are ill/handicapped and unable to vote in any other way" [2].

Advance voting channels are quite popular for the population and currently are used by around 1/3 of all voters who cast a vote (35% in 2019 and 2014 EU Parliament Elections)[3]. Said differently, Postal voting was not able to gain popularity due to the cumbersome procedure. During 2015 elections to the Legislative Assembly, around 150 people voted by post, constituting only 0.7% of all eligible voters [3], with about 10% of postal ballots arriving too late to be counted for the elections. Besides Postal voting, no other voting channels are available to voters residing overseas, outside of the islands.

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1 For a more detailed development of this point, see our previous work on the preparation of Åland's internet voting project [5]

2 As described in the leaflet produced by the government of Åland to explain how Elections function to citizens: "Election on Åland, 18 October 2015".

3 Statistics and Research Åland, URL: https://www.asub.ax/sv/statistik/valet-europaparlamentet-2019

Åland does not have any embassies, representative agencies, or consulates and, as a result, voters do not have the option to vote in foreign missions. It is no coincidence that expatriates – 'absentee, overseas' voters - constituted a target group for initial use of internet voting.

The introduction of internet voting was also connected to projecting Åland to the outside world. In recent years, the Government of Åland provided IT-services for the public sector and contributed to overall digitization of the islands in various ways, through the public company ÅDA[4]. Both the development of internet voting and digitization of the islands are elements for creating a digital narrative of Ålandic identity and creating a positive image to promote the islands as a place where innovation thrives, and to highlight the positive impacts of their self-government.

In contrast, the reduced costs and time required are not amongst primary reasons for introducing internet voting. Cost savings were highlighted as a potential advantage for the long term [2, 3], under the assumption that a realistic assessment of cost-efficiency would only be possible once the system had been consolidated and the number of users increased. Regarding time savings, another dimension which is often highlighted as a potential positive outcome of using internet voting, the small size of the electorate would limit the potential impact of using the system in this regards.

1.3 Why are we writing this paper?

Discussions on the convenience of introducing internet voting to the Åland Islands were held for more than 20 years, intensifying during the last months of preparatory work. The first use of internet voting seemed to be ready for 'go live' on October 2019 but, at the very last minute and after the system had been set up, the use of internet voting was cancelled hours before elections opened. Our initial goal with this research was to approach the Ålandic case in order to observe their initial use of internet voting and conduct a cost-efficiency calculation of multichannel elections as we had already done for the case in Estonia [9, 10]. The fact that elections were cancelled when our team was already in-place and on site and we had already conducted extensive preparatory work (analysis of electoral law, preliminary interviews, initial study visit) made us direct our gaze towards analyzing the reasons for failure. We had the rare and unexpected opportunity to directly observe management of an electoral crisis and to interview the relevant actors. Our aim is to pinpoint the different elements which may have contributed to this final decision and try to extract lessons to be applied by other electoral managers and for implementing voting technologies. Failures help unveil processes which would remain hidden when assertions are made for systems that are successful [14], in this particular case, the complexity of electoral management and technological innovation and the interaction of different stakeholders.

To do this, we will propose and use a framework describing the Information System (IS) failure and interactions between the different stakeholders involved, relying on interviews conducted during our study visits to the islands.

[4] Åland Digital Agenda, see: www.ada.ax/

2 Stakeholders and Models of failure

Several studies targeted the issue of Information Systems (IS) failures [5, 6, 8, 12, 16, 22] over the last few years, and some proposed explanatory frameworks described the concept of IS failure and tackling the determinants for successful implementation [18, 20]. Definitions of an IS failure are generally in line with the two categories Ewusi-Mensah described [8]: either the system fails due to inability to perform to users' levels of expectations or due to the inability of producers to produce a fully-functional, working system for users. Sauer [18] considers the definition of an IS system failure as a system abandonment due to stakeholder dissatisfaction.

Sauer [18] developed an explanatory framework describing IS failure based on three key elements: 1) Supporters, 2) Project Organization and 3) IS. In it, he creates a triangle of dependencies between these three elements and there must be interaction between them to prevent eventual failure occurring. In his analysis, failure is presented as the outcome of the interplay between context, innovation process and support. Flaws occur if the context is inadequately addressed in the innovation process, and, if flaws should accumulate, the system loses support and faces risk of failure. Sauer also highlights the importance of system supporters and their perceptions regarding the system itself, rather than solely focusing on technological characteristics of the IS. In his interactive framework, the IS serves the supporters, while they in turn support the project's organization, and this last component innovates the system. According to Sauer's way of thinking, failure is seen as total abandonment of a system, which occurs when this triangle of dependencies breaks down. The role of Project Organization is seen as a middleman between stakeholders and the IS. What is more, the role of project organization is not limited to this: it also serves as "a mediator" between context, system and stakeholders.

Toots [20] iterated and adapted Sauer's model in order to develop an analytical framework for contextualizing and explaining factors which influence system failure for e-participation. The framework proposed by Toots consists of four key elements, focusing on: a) Innovation Process; b) Contextual Factors; c) Processes with contextual factors interacting with innovation process and stakeholders and; d) Project Organization, where they have the power to change influential contextual factors or if it can, to align the system to the context. The sub-elements of context include technology, organizational variables, and politics. In both frameworks mentioned above from Sauer and Toots, the elements complement one another, creating an interactive triangle of dependencies which allows us to understand the reasons for failure in exchanges occurring between different elements.

The Supporters in Sauer's model can be also viewed as stakeholders in Toots' model, but Toots includes a differentiation between "Project Organization" and "Stakeholders", based on the following logic: *stakeholders need the project organization to develop IS according to their interests* (p. 548). Therefore, Project Organization is viewed as a middleman between stakeholders and the IS, but the role is not limited solely to this, serving also as "a mediator" between context, system and stakeholders.

Even if Toots' efforts bring the causes for e-participation IS failure closer to the case we are analyzing, her model does not apply in full for understanding reasons for the Åland Islands' failure. Of the four key assumptions presented, only two of them are indicative for our case:

"1. Implementation of an e-participation system may be regarded as an innovation process characterized by uncertainty and susceptibility to changes in the context;

2. While contextual factors and changes are not the immediate cause of failure, context may constitute an important trigger for failure."

However, even these assumptions do not apply fully in our case, because Toots, following Macintosh's [13] definition of e-participation, explicitly distinguishes *e-participation from other e-democracy instruments such as e-voting* (p. 546). Ålands' IVS is a type of e-voting and thus could not fully benefit from applying a framework designed for e-participation, even if it is an excellent fulcrum for developing a new iteration of the model.

Some of the arrangements proposed for Toots' model relate to the role stakeholders play and the fact that the technology was never used. One of Toots' arguments is that if using an e-government system is not satisfactory for those who must use it, they will abandon its use and condemn the system to failure. In the case under analysis, the IVS was never used by stakeholders, so their impact is minor. On the contrary, the role of Project Organization and the Context in which the IVS is framed play a more relevant role, since the unequal discourses collected from Election Managers and Vendors highlight the existence of a difference in criteria towards the system. Also, some of the difficulties highlighted for developing IVS relate to adapting to the context, either legal or technological, of the Ålandic environment.

Taking one step forward, for iteration and for adapting Toots' framework to the case of the Åland Islands, we can detect different elements proposed in the framework mentioned: 1) Project Organization existed and managed creation, development and implementation of the system (here, also, a difference to Toots' model, since the role of Project Organization was not to innovate an IS which already existed, but to implement a brand new one); 2) the IS was in-place but never used; 3) the Supporters never accessed the system, but they could track developments through the media and further discard the system; 4) external contextual factors might have facilitated failure of implementation, such as the Data Protection Authority arriving late or integration of the IVS in the Finnish e-Government environment. Failure, in our case is transposed to being the decision to not proceed with internet voting, even with the system in-place, giving more relevance to the interaction between the different elements than to the IS itself.

Since some of the elements included in the frameworks proposed by Toots and by Sauer cannot be included in the same manner as has just been described, their models need to be iterated and adapted to the conditions of the case study. For this reason, we refer to the conceptual model analyzing e-voting implementation – the E-voting Mirabilis [11]. Including this allows enlarging the context in which the IVS is implemented. It focuses on four macro dimensions influencing application of ICT in elections:

- technological dimension;
- legal dimension;
- political dimension;
- social dimension.

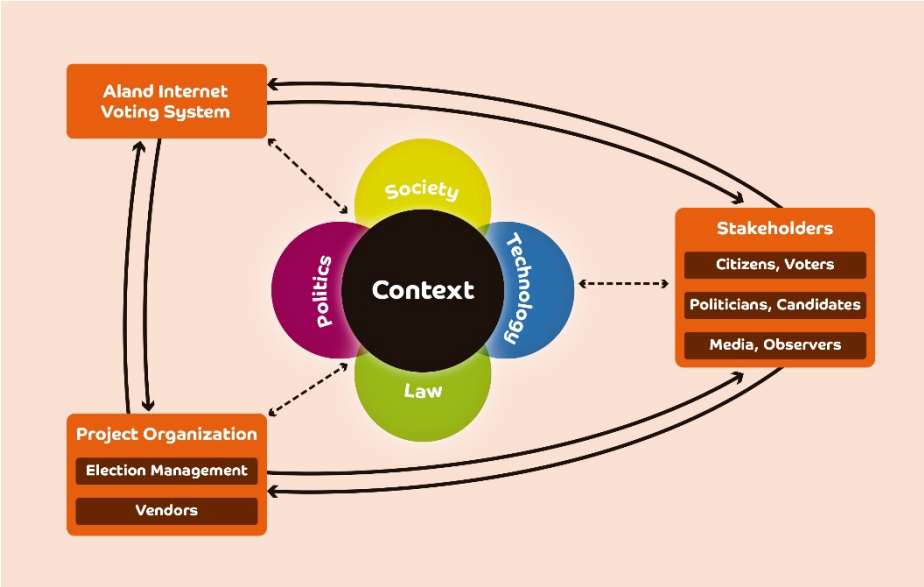
For the technological dimension, we consider what supporting infrastructure for internet voting was already in place (in particular, voter register and voter identification). For the legal dimension, we trace how the legal framework has been amended to adjust for internet voting, and whether it covers such aspects as secure processing of voters' personal data. For the political dimension, we analyze what groups of voters' internet voting was supposed to enfranchise, how the IVS was evaluated, and what was the overall political discussion on its introduction. The social dimension focuses on citizens' understanding and level of trust in IVS.

The E-voting Mirabilis is also helpful for stakeholder categorization, distinguishing between Voters, Politicians, Election managers, Vendors, and Media representatives and election monitors or observers. Combined with Toots' model, distinguishing between stakeholders and project organization, categorization should look like this:

- Stakeholders: Voters; Politicians; Media representatives and election observers;
- Project organization: Vendors; Election managers, Project managers.

Therefore, our theoretical framework builds on the conceptual model of the 'E-voting Mirabilis' [11] and an adaptation of the information system failure framework by Toots [20]. Based on these, we propose and use the "Mirabilis of internet voting System (IVS) failure". Toots' 'e-Participation System' was replaced by the IVS, and inside it we find Krimmer's e-voting components. All around, the 'contextual factors' (Toots) or 'four main macro dimensions' (Krimmer) *that explain the areas that influence e-voting deployment* [11]. Afterwards, Krimmer's five stakeholder groups which help to apply ICT to the electoral process, are grouped as either a 'Stakeholder' or 'Project Organization', according to Toots' framework and to their direct involvement in implementation of internet voting. Relationships between IVS, Project Organization and Stakeholders have remained similar (with some minor changes) to Toots' original diagram.

Fig. 1. Mirabilis of IVS failure.



In the context of the Åland Islands, project organization will be represented by the vendor (Scytl) and the organization responsible for the IVS procurement (ADA) and project management (Electoral Management Body). The rest of the actors will fit into the category Stakeholders: voters, government, election administration, parties, Data Protection Authority, and others. Stakeholders send requirements of IVS to project organization and provide them with the resources to fulfill those requirements. The IVS produced should satisfy stakeholders, otherwise, they will not use it. In other words, the IVS produced should meet the expectations of key stakeholders. In the context of the Åland Islands, this first and foremost concerns the stakeholders responsible for the decision on whether to start using internet voting. Already at the stage of modelling, we can observe that there is a possible mismatch between stakeholders' requirements formulated to project organization at the start of IVS development, and expectations which the final IVS should satisfy.

In this conceptual model, the context plays the key role: it shapes the demands of stakeholders, thus affecting the requirements they will send to project organization; it constrains or defines what is possible for project organization to fulfil the requirements; and the final IVS should serve the context.

3 Methodology

Data collection for developing this case study took place between March and December 2019. During this period, we conducted two visits to Mariehamn in teams of two researchers: 9-16 June and 14-22 October. Most of the interviews and observations included in this research were carried out during these visits to Åland, although we had

completed some preparatory interviews with the Ålandic Electoral Management Body (EMB) before the first visit, and arranged some digitally mediated interviews after the second visit. A total of 20 semi-structured interviews were conducted with EMB, ADA, Scytl, Central Committee for Elections, Data Protection Authority, local politicians, and voters. Many interviews had more than one respondent and some interviewees were contacted at different times. In all, a total of 20 people were finally interviewed, and the interviews were anonymized (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). Data was analyzed using NVIVO qualitative data analysis software following a multi-stage inductive approach consisting of identifying a set of core themes during transcription (including, amongst others, 1) the electoral process, 2) government, 3) introduction of internet voting, 4) cancellation of internet voting and 5) voting organization) and the further coding of interviews based on the above themes. This inductive method was aligned with re-focusing of the research plan described below, allowing us to include the information collected in a context of crisis and relate our conclusions to the literature on Information Systems failure.

Table 1. List of interviewees, anonymized.[5]

Occupation	Date
Head of election administration	March, 2019
Head of IT-unit at Ålands Landskapsregering	June, 2019
System administrator at Ålands Landskapsregering	June, 2019
Legal Director, Government Offices, Unit for Legal and International Affairs	June, 2019
CEO of Åda Ab	June, 2019
Project Manager at Åda Ab	June, 2019
Data Inspector	June, 2019
Minister	June, 2019
Minister	June, 2019
Head of election administration (II)	June, 2019
Voter	October, 2019
Voter	October, 2019
Head of election administration (III)	October, 2019
Data Inspector (II)	October, 2019
Head of IT-unit at Ålands landskapsregering (II)	October, 2019
CEO at Åda Ab (II)	November, 2019
Worker at Åda Ab	November, 2019
Worker at Scytl	November, 2019
Worker at Scytl	November, 2019
Worker at Scytl	November, 2019

[5] The numbers in brackets refer to the number of times the person was interviewed

The case of the Åland Islands was selected due to the fact that they intended to implement internet voting for the first time and it represented a good comparison to research already conducted by the research team. The size of the country and administration allowed swift, effective communication and privileged access to data. Also, it would have covered a relatively unexplored dimension of electoral analysis, the costs of initial implementation of voting channels and their evolution over time.

We must point out here that the methodological plan was reframed during the research, due to cancellation of the IVS. Whilst applying the methodology for calculating costs, the initial plan followed on from previous research [3, 4] and research mentioned in a previous publication on the same case [5]. Cancelling implementation of internet voting took place during the research team's second visit to the Åland Islands, at a time at which the analysis of electoral law and modelling of the electoral processes had already been completed, as well as several interviews for understanding and describing the electoral system, its management and the costs involved. The fact that the research team was on-site during the cancellation, allowed them to observe and conduct interviews about management of the crisis, which were followed by a second round of interviews with the key stakeholders. Hence, this publication is the result of refocusing our research goals, given the opportunity to gather information on a critical case study relating to management of an electoral crisis due to cancellation of a voting channel. As a result of this, the interview design was modified (*the contents of the questionnaire)* in the course of the data collection process, paying special attention to integrating the different steps of data collection in the final analysis of the data.

The value of the data collected is derived from the opportunity and the uniqueness of the situation but, at the same time, it may involve some limitations given that it was not possible to plan such a methodological reconfiguration in advance. Amongst the strengths of our data collection process: 1) we developed a deep analysis of the electoral system prior to cancellation, and so were able to rapidly identify the key stakeholders to interview and the key processes to direct our attention to; 2) the presence of our research team on the ground allowed us to gather first impressions and reflections after cancellation and to experience the moment of cancellation on-site: direct observation of events provides us some interpretative clues which it would not be possible to gather through other data collection methods [7]. Amongst the limitations: we could not access some information on grounds of secrecy and confidentiality; the sources which, according to some discourses, could shed light on legitimacy of their claims.

4 Data Analysis

The context surrounding the Åland IVS looked promising for implementation of the new voting channel. At a socio-political level, no objections were raised against the system, the media did not pay much attention to implementation of the voting channel and no political party openly opposed it. There were more concerns about lowering the age of voters to 16 years of age for example, a reform discussed simultaneously to introduction of internet voting.

The overall political discussion on internet voting was fairly positive. Stakeholder evaluation varies from feeling *fairly optimistic* (I-1) to endorsements: *I always thought that this is a good thing, this is something we need to do* (I-13). The Parliament also has not seen much of the debate on internet voting, besides *some discussion on the security issues* (but) *in general, all parties in Åland responded positively to this voting channel* (I-13). Media outlets in the Åland Islands were not interested in internet voting, until almost right before voting started: *here is not big interest because everybody's focused on the transformation of the municipalities* (I-13), *I think, as a journalist, the interest in the elections will awaken in the end of August, when the campaign starts* (I-13)

This smooth political development crystalized in the decision that, during the first binding trial during the 2019 Parliamentary elections only expatriates (*overseas, absentee voters*) were eligible to vote via the Internet, *most of [the expats] are young people, they are studying or have been studying and stay for some years after studying* (I-3). This decision was considered as a clear improvement of voting conditions for expat voters (*a very strong urge from the younger generation to have a simplified voting procedure, possibly electronic* – I-5*)* since they could avoid the problems associated with using postal ballots to cast their votes (*last election 10% of our postal votes came back too late to count* – I-5).

As a result of which, *the whole new electoral act passed unanimously* (I-3). The legal dimension, in accordance with Krimmer [11], regulates how the electoral code can be changed in order to permit votes cast by electronic means and to provide the level of accountability required to the voter and should further: 1) provide the voter with the ability to see how personal data are processed; 2) include the principle of proportionality when handling personal data; and 3) serve as a guiding indicator. The Election Act for Åland, issued on May 2019, consists of 15 chapters and 122 individual sections (or articles), and defines all voting channels including postal voting, advance voting, Election Day voting and contains *new provisions on internet voting* (I-5). The legal dimension was further bolstered by the 'Registerbeskrivning'[6] or Privacy Policy (2019) which describes processing of personal data in connection with implementation of the Parliamentary and Municipal elections in Åland, including a description of the personal data required, its use during various stages of the election process, and the entities responsible which may interact with it, either directly or indirectly.

In order to specifically implement internet voting, the government *decided quite early [for] the procurement process*, that they *should buy a service, not the system* and that they *need[ed] someone else to run* it (I-10). To this end, the law and the procurement requirements were written in "parallel". As confirmed by an interviewee, this was *not ideal, perhaps theoretically. But in practice, it was quite good because we could adjust the wording and the law, according to what we experience, what is possible and how things should be* (I-10). This procurement process was run by ADA, resulting in a bicephalous organizational structure from the side of the government: ADA for managing the contract and the Electoral Management Body for management of elections, both interacting with the vendor.

[6] Available at: https://www.val.ax/sites/default/files/attachments/subject/behandling-av-personuppgifter.pdf Last accessed 15 June 2020

The development of IVS was accompanied by audits and evaluations. The checks and balances are prescribed by law: *the government […] should check and to have a third party to check everything, all the processes. So, we will also have somebody to check when the election takes place that everything is [OK]* (I-4). However, in June 2019, the independent body which would check and review the i-voting system had not yet been defined. The notions of who this independent body could potentially be were still vague: *It could perhaps be some authority from the Finnish state government, but it must be independent from the vendor and from the government… (…) it could also be some representatives from the Finnish authorities. Could be representatives from Estonia, for example. I mean, experts on internet voting, would be possible. Or it could be some audit company like KPMG, or whatever* (I-9).

At some point during development of the IVS, the Data Protection Authority of Åland became interested in auditing the process [17], for the following reasons: *Well, the biggest reason is because this is a new project, that has not been done before. And also, since this is a democratically critical process, pertaining to a lot of sensitive personal information or other special categories of personal information as in political opinions… since that kind of data is being processed […] That is the kind of processes that the data protection authorities should be auditing to make sure that they're safe (I-17)*. The arrival of the Data Protection Authority brought a new along with it player to the table; since it was not possible to conduct the audit on their own, it was necessary to outsource this to an external consultant for *auditing the security documentation sent by [the vendor]. And to see if they fulfilled the safety requirements* (I-17). The main findings of the audit, were that the Data Protection Impact Analysis (DPIA) has not been completed[7].

From a technological perspective, the IVS used the digital infrastructure provided by Finnish government – e-ID systems (e-ID Cards and Mobile-ID) – and private institutions (e-Banking), and consisted of main elements such as an e-ballot box, a list of voters and candidates, voter identification and authentication as well as vote verification.

During the development process of the IVS, a number of deficiencies were detected with the e-Identification system: in relation to integration *during the first pilot we found errors in the Suomi.fi implementation. So when I cast a vote, I was not successfully logged out from the authentication* (…) *And then they have corrected one mistake in Suomi.fi identification but there was still one loop, one error more.* (I-19); *In June already. And then in July again and in August, again* (I-15). Discovery of these problems was motivation for outsourcing a penetration test to an external vendor who dealt directly with the vendor in charge of IVS. The interaction between both vendors presented some problems in relation to accessibility to the source code of the voting system, since the vendor in charge of the penetration test was allowed access to the code but in the premises of the IVS provider, in a different country, and this option was not accepted

[7] For further details on the General Data Protection Regulation in the Alandic elections, see the work of Rodríguez-Pérez [17].

and delayed the auditing process[8]: *The argument that they were unable to access the source code for me is not a valid argument (…) they were invited… but even if they decided to not to come, this particular issue has been tested* (I-20).

According to the vendor's position, the problems detected challenged the development of the system: *during such integration, [or] maybe during any sort of customization or development, when you test, you find things, with the objective to correct them, fix them (*I-20*); The main challenge here is that, since we are not (…) Finnish, we don't have Finnish ID, so we have few test credentials that we can use in our tests to automate them (…) the personnel both from ADA and the government (were) very helpful as well in providing (them) to us (*I-20*)*. Problems were resolved according to their position, and the system was in place and ready to run during the elections as expected: *this issue with the verification of the digital signature. It was corrected, and was said that was corrected (by the vendor).*

The report from the vendor in charge of the penetration test was finished very late on (*we got the report from the security company very late, so it was not so much time to evaluate that and also to have a meeting with them and to discuss about – I-19*) and, even if the problems might have been solved, *we have not run the pilot from start to end (…), never ran it from beginning to end in a test environment (...), it doesn't feel right to do it (run the elections)* (I-19). The result was, cancellation of using internet voting at the very last moment.

5 Discussion and Conclusions

In the complex environment of electoral management, many factors can tip the scales towards failure if these are not perfectly aligned. In the case analyzed, even if there was a long process of preparation, training and a well-documented Electoral Management Body with members and experienced vendors, their joint efforts did not match up to initial expectations and the IVSs could not be implemented. It is not our role (nor our aim) to blame anyone for this outcome, but to understand the process in order to gain some useful knowledge and experience for others who aim to implement similar systems.

As we described, the context in which the IVS was to be implemented appeared to be quite friendly, accommodating, and welcoming: positive political discussions, lack of external agents discussing the suitability of the decision taken. The law was approved on time, as was the procurement process too. The problem, then, relied on the process of adjusting the IVS and the interaction between the members of the project organization, particularly with relation to timing. The accumulation of delays in some deliveries, responses and interactions, combined with organizing pilots during the summer period (in June and in August) reduced the time available for resolving problems detected (problems of integrating IVS into the Finnish e-ID system). Developing two Penetration Tests in a relatively short period of time and the presumed problems of collecting

[8] In this regard, it is worth noting that it was not possible to interview the vendor in charge of the penetration test due to a disclosure agreement. The views collected in this research might be distorted due to this issue.

data for the audits delayed the responses until a time when they were already redundant and no longer required. The Data Protection Authority's appearance late in June, and creating a new parallel legal and document audit probably superimposed a new layer of complexity onto implementing the system. Even if problems could have been resolved, as the vendor in charge of the IVS states, the authorities 'confidence in reliability of the system had already been damaged and the decision to cancel the elections could seem reasonable for those who were legally qualified to make it. Paraphrasing the idea expressed by Oostven and Van den Besselaar [15], *a voting system is only as good as the Administration* ("public" in the original version) *believes it to be.*

The key takeaway we can extract from this case is the relevant role which organization of the overall process plays in successful implementation. In the case under analysis, time management appears to be the main limiting factor for effective resolution of problems identified. We believe that with better time-management, four critical factors could have been managed more effectively: 1) the vendor could have resolved the problems detected in a timely manner, 2) project organizers would have had time to make sure these issues were resolved, 3) the final version of the system could have been tested, and hence, 4) the system could have been operated securely in real time. In addition to this, other factors, that without time constrictions could have had an irrelevant impact, in the case analyzed played an important role. Firstly, the bicephalous structure followed for project management divided the knowledge available on the side of project organizers, that is the technical knowledge separate from contract management and adding to the complexity of the process. Due to this fact, the process was slowed down at critical moments when a more directed management structure could have forced the vendor to react more swiftly in order to solve problems encountered. Secondly, the unexpected problems encountered related to the integration of the Finnish e-Identity system and their late resolution, damaged the trustability of the IVS. A faster detection and a smooth resolution of these problems could have walked the process to a different ending.

In contrast to the case proposed by Toots[20] in which the e-participation system failed due to a lack of a meaningful connection with stakeholders, in the case of the Åland Islands, failure originated on the side of interaction between project organization and the IVS itself, showing, in the end, the relevance of the organizational factor for creating, developing and implementing technological innovations.

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