

Chapter 11

E-Voting System Usability: Lessons for Interface Design, User Studies, and Usability Criteria

M. Maina Olembo

Technische Universität Darmstadt, Germany

Melanie Volkamer

Technische Universität Darmstadt, Germany

ABSTRACT

The authors present a literature review, carried out by searching through conference proceedings, journal articles, and other secondary sources for papers focusing on the usability of electronic voting (e-voting) systems and related aspects such as ballot design and verifiability. They include both user studies and usability reviews carried out by HCI experts and/or researchers, and analyze the literature specifically for lessons on designing e-voting system interfaces, carrying out user studies in e-voting and applying usability criteria. From these lessons learned, the authors deduce recommendations addressing the same three aspects. In addition, they identify for future research open questions that are not answered in the literature. The recommendations hold for e-voting systems in general, but this chapter especially focuses on remote e-voting systems providing cryptographic verifiability, as the authors consider these forms as most promising for the future.

INTRODUCTION

Electronic Voting (e-voting) systems continue to be used in different countries and contexts around the globe, enabling governments to obtain information on citizens' preferences more quickly

and efficiently. Systems in use are both e-voting machines and remote e-voting systems. Four reasons can be stated why usability is important in e-voting systems. First, due to the election principle of universal suffrage, anyone who meets the voting age requirement¹ should be able to use these systems to cast his vote. This includes first time voters, elderly persons, and even those who

DOI: 10.4018/978-1-4666-3640-8.ch011

do not frequently interact with technology. Second, a voter should be able to easily express his wishes. The interface design should neither cause him to make mistakes nor influence his decision. Poor interface design can easily cause a voter not to cast a vote for his desired candidate. Third, voters remain novices due to a lack of training and irregular interaction with these systems, since elections are held infrequently in many countries and contexts. As such, the learning that occurs from continuous interaction with systems over a period of time is less likely to occur. Finally, if the usability of e-voting systems is not considered, frustration is likely to occur, reducing acceptance among voters, and thus decreasing voter turnout. Usability issues are especially important in e-voting systems that provide verifiability and in particular when using cryptographic verifiability.

Verifiable voting systems have been discussed since their proposal by Cohen and Fischer (1985). We mainly distinguish e-voting systems which implement voter verifiable paper audit trails (VVPAT) and those using cryptographic means for verifiability. The premise is that individual voters are able to verify that their vote is cast as they intended, and stored as they cast it. In addition, voters and any interested parties are able to verify that all votes are tallied as stored. Voters will then have to carry out certain steps to verify votes, and may encounter unfamiliar terminology, such as encryption. However, verifiable systems are only beneficial if any voter who wants to verify his vote can do so without being a specialist. The German Federal Court Decision (2009) backs this stance, requiring that the correctness of all essential steps in the election are publicly examinable without having specialist knowledge. Verifiable e-voting systems are thus even more challenging from a usability point of view; however, the future of e-voting lies in verifiable e-voting as black box systems (where one has to trust that technical and organizational processes are correct, yet no way of testing this is provided) continue to face criticism (Alvarez & Hall, 2008, p. 31).

There is a lot of literature available on usability studies of e-voting systems. Researchers and developers of future e-voting systems should take this into account, especially if they address the most complex systems, namely verifiable and cryptographically-verifiable remote e-voting systems.

In this book chapter, we review existing literature on usability of e-voting systems. Note that the literature is primarily from a western perspective, specifically from American and European contexts. The literature is available either as user studies or usability reviews carried out by HCI experts and/or researchers. We *summarize lessons learned* for e-voting system interface design, user studies, and usability criteria, from which we *extract relevant recommendations* for the same. We argue for extensions in these three areas to take into account verifiable and cryptographically-verifiable e-voting systems.

The content of this book chapter is especially relevant to designers of e-voting systems for whom the information provided will form basic input for designing future e-voting systems, in particular, verifiable e-voting systems, where user interaction for verifiability is required, and therefore understanding is critical. Researchers who are interested in replicating user studies or carrying out their own studies will obtain invaluable information, as will researchers and practitioners who are interested in the usability of e-voting systems, and the criteria used to determine usability. Further we identify future research beneficial to researchers seeking open questions in this field.

The reader is advised that accessibility issues in e-voting systems will not be discussed, and are left for future work. However the Voluntary Voting Systems Guidelines (VVSG), which we review, addresses the evaluation of accessibility aspects of e-voting systems.

In the next section we give background information for the reader to better understand the content presented. Following that, in the methodology section, we describe the approach used to

28 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

www.igi-global.com/chapter/voting-system-usability/74961

Related Content

Designing and Implementing E-Government Projects: Actors, Influences, and Fields of Play

Shefali Virkar (2013). *Human-Centered System Design for Electronic Governance* (pp. 88-110).

www.irma-international.org/chapter/designing-and-implementing-e-government-projects/74957

What Are the Determinants of the Attitude of Civil Servants Toward Using e-Public Procurement?: The Case of Belgium

Mohamad Amin Alomar (2023). *International Journal of Electronic Government Research* (pp. 1-22).

www.irma-international.org/article/what-are-the-determinants-of-the-attitude-of-civil-servants-toward-using-e-public-procurement/320500

E-Government Organizational Performance Framework: Case Study of Haryana State in India - A Log Linear Regression Analysis

Susheel Chhabra and Mahadeo Jaiswal (2008). *International Journal of Electronic Government Research* (pp. 57-80).

www.irma-international.org/article/government-organizational-performance-framework/2055

A Holistic Approach to E-Government: Ongoing Research in Oman

Angela Espinosa and Ahmed S. Al-Maimani (2010). *Systems Thinking and E-Participation: ICT in the Governance of Society* (pp. 109-134).

www.irma-international.org/chapter/holistic-approach-government/40458

Repeated Use of E-Gov Web Sites: A Satisfaction and Confidentiality Perspective

Sangmi Chai, T. C. Herath, I. Park and H. R. Rao (2006). *International Journal of Electronic Government Research* (pp. 1-22).

www.irma-international.org/article/repeated-use-gov-web-sites/2016