LOVE AT FIRST SIGHT? A USER EXPERIENCE STUDY OF SELF-SOVEREIGN IDENTITY WALLETS

This research delves into the realm of Self-Sovereign Identity (SSI) wallets, which offer users control over their digital identities, aiming to enhance security, efficiency, and privacy in digital identity management systems. The study evaluates four leading SSI wallets through a mixed-method user experience analysis, uncovering that while these wallets provide a satisfactory user experience, they fall short in communicating their unique advantages to users. This work contributes valuable insights for enhancing user experience in the realm of SSI, offering practical guidance for industry practitioners.

Introduction

The secure management of digital identities faces challenges highlighted by researchers and practitioners, especially magnified during the COVID-19 pandemic, as online activities surged. Users' struggle with managing numerous passwords despite tools like password managers or two-factor authentication underscores the usability challenges. Federated identity management and single sign-on services offered by companies and governments aim to ease this burden but raise concerns about data security and privacy.

- User challenges with password management lead to vulnerabilities like phishing attacks.
- Alternatives such as federated identity management and single sign-on services come with data aggregation risks and privacy compromises.
- Existing digital identity management paradigms lack convenient electronic equivalents of analog documents, hindering processes like account opening or vaccination verification.
- Governments like Germany and Canada are exploring digital identity management based on the SSI paradigm to enhance user experience.
- The research primarily focuses on technical aspects of SSI, emphasizing the importance of user experience for widespread adoption.
- Development of user-centric digital wallets necessitates direct involvement of end-users for successful adoption.

Key Points:

- Digital identity management faces usability challenges despite existing tools like password managers and two-factor authentication.
- Current paradigms fall short in providing electronic equivalents of analog documents for seamless digital processes.
- Governments are exploring SSI-based digital identity management for improved user experience.
- Emphasizing user-centric design is critical for the successful adoption of digital wallets.

Self-sovereign identity and digital wallets

In the digital realm, digital certificates ensure tamper-proof identification through public key cryptography and signatures, addressing the limitations of conventional identity management systems. Here are the key points regarding self-sovereign identity and digital wallets:

- Digital certificates, leveraging public key cryptography, offer robust identification for end-users, mitigating privacy concerns associated with unique identifiers.
- Anonymous credentials, a privacy-enhancing feature, enable secure, efficient, and privacy-focused digital identity management, surpassing current systems' challenges.
- Despite the advantages, widespread adoption of digital certificates for end-users is limited to specific applications like smart cards or mobile authentication in certain domains.
- Efforts are underway to establish domain-agnostic digital certificates managed through mobile wallets, enhancing user control by storing cryptographic keys and verifiable credentials.
- The use of digital wallets facilitates the management and sharing of Verifiable Credentials (VCs), enabling individuals to prove their identity attributes and authorizations while reducing reliance on major identity providers.
- This shift towards user-centric identity management has led to the emergence of Self-Sovereign Identity (SSI), empowering individuals and accelerating digital transformation.
- Various organizations are exploring SSI's potential for digital identity management, highlighting technical divergences and security concerns, including limited interoperability and security risks.
- The EU, recognizing the importance of setting standards for digital wallets handling sensitive data, aims to certify wallets to ensure proper information management and holder authentication.

Usability and User Experience Testing

The concept of usability can be viewed in terms of perceived usability, focusing on attributes like learnability, efficiency, memorability, errors, and satisfaction.

- Usability research involves various techniques:
    - Classifying techniques into field studies and laboratory experiments aids data collection.
    - Use of qualitative and quantitative methods in usability studies provides a comprehensive understanding.
    - Formative studies during design and summative tests for final product evaluation are common practices.
- Usability predominantly considers effectiveness, efficiency, and satisfaction, assessable through both objective and subjective measures.

- Notable methods in usability studies include the System Usability Scale (SUS) and the User Experience Questionnaire (UEQ).
- User experience (UX) analysis focuses on subjective perceptions like emotions, attitudes, and preferences throughout the interaction with a system or service.
- UX assessment extends beyond usability by evaluating brand, hedonic, and pragmatic aspects like aesthetics and user journey.
- While usability covers functional aspects of a product, UX assesses subjective responses, and their collaboration is crucial for successful user interactions.
- The UEQ, comprising 26 bipolar word pairs, evaluates both hedonic and pragmatic aspects of UX through scales like stimulation, efficiency, and dependability.
- The UEQ facilitates comparison studies and benchmarking to assess a product's UX quality.
- The UEQ benchmark database aids in determining a product's readiness for market release and areas needing improvement.
- Specific product aspects like icons or colors may require additional complementary investigations beyond the UEQ assessment.

Suggestions for Improvement

Participants provided qualitative feedback on the graphical representation of Verifiable Credentials (VCs) in Self-Sovereign Identity (SSI) wallets, highlighting the importance of managing VCs effectively, including receiving, storing, and presenting them.

The study revealed various aspects for enhancing SSI wallet usability:

- Provision of credential overviews with detailed information was favored by users.
- Participants desired one-page access displaying multiple credentials and detailed attributes.
- Lack of credential overview in some wallets led users to express a need for such a feature.
- Suggestions included defaulting to the credential view page and moving tabs to settings for better navigation.

Users also expressed improvement ideas related to search functions, backup options, clearer differentiation between services and credentials, and more intuitive terminology. Specific user feedback included requests for a demo case, improved accessibility from the lock screen, and the ability to add personal comments to credentials. Noteworthy suggestions encompassed exclusive focus on credentials, consistent semantic display of VCs, and alternative structuring options beyond historical or alphabetical ordering. Participants proposed additional features like quick access functions, folder systems, filters, and color-based classifications for VCs.

Conclusion

The researchers conducted a user experience study on Self-Sovereign Identity (SSI) wallets through moderated and remote interviews using the UEQ (User Experience Questionnaire). Key findings and implications include:

- Despite some SSI wallets receiving good ratings, there were suggestions for improvement and a general lack of user understanding regarding the unique benefits of SSI.
- The investigated SSI wallets were generally rated higher in pragmatic quality than hedonic quality.
- The Lissi Wallet and Connect.me were noted for user-friendly pre-select designs, but an overall lack of perceived novelty indicated a deeper misunderstanding of SSI.
- The study had limitations due to the sample size, leading to inconclusive outcomes regarding differences among the four wallets.
- Suggestions for future research included more targeted surveys, larger sample sizes, and continuous usability tests for SSI wallets.
- Symbol choice was highlighted as crucial for user understanding, suggesting the need for further analysis to improve SSI wallets.
- Research should focus on finding symbols and terms that enhance user comprehension of SSI to support wider adoption.
- Practical considerations such as costs, usability, and deployment challenges should also be addressed by SSI practitioners to ensure real-world viability and avoid previous failures in academic proposals.

References:

Condensed from Sartor, Sebastian, et al. "Love at First Sight? A User Experience Study of Self-Sovereign Identity Wallets." ECIS. 2022."