Socially Aware Information Systems: Delimitation and Characterization

Olga Levina

Brandenburg University of Applied Science
Brandenburg an der Havel, Germany
e-mail: levina@th-brandenburg.de

***Abstract*— Information systems increasingly surge not only in the topics areas of task automation in business and personal contexts, but also in the areas of the recommendation of content and information that can be consequentially used to support business or individual decisions. Thus, the design of these information systems needs to expand its considerations above the user and towards the effects the system implementation has on the users affected by the actions that result from the application of the system. The scope of the affected users can be as broad as a cultural circle or the society. This extended abstract introduces the term of socially aware information systems, hence those information systems that consider their impact from the design, requirements engineering and testing, into the focus of the design science and information system research.**

Keywords- socio-technical systems; systems engineering; software engineering, socially aware information systems.

I. INTRODUCTION

With information technologies striving to automate and to support many of the activities in business and private context, the effects of their application on the users as well as the society, where these technologies are engaged, are increasingly visible. Although, it is acknowledged among managers and system users that adopting a socio-technical approach to system development leads to systems that are more acceptable to end users and deliver better value to stakeholders [1], this socio-technical design approach is only slowly gaining recognition in the software engineering and software user community.

Given the public discussions on machine learning based systems (MLS), value-based software engineering has gained popularity in public discussion. As when digital products are being designed, their (negative) effects such as the effects on the environment or the society should be part of the public discussion and responsibility that are not (and maybe should not be) regulated, but can be supported by socially acceptable IT artefacts [2] and ethical frameworks. Recommendations, ethical frameworks and principles for MLS design merge in the business and legal environments, e.g., in [3]–[6]. Nevertheless, ethical aspects can also be interpreted during the software design differently [7].

Following the development of the value-sensitive design [8], [9], user-centered design [10], [11], design thinking and socio-technical systems design [1] over the years, the term "socially aware information systems" (SAIS) is proposed. The term describes an information system that considers users beyond the ones that are directly involved with the information system and includes affected users and system stakeholders into its requirements analysis and testing. The affected user is explicitly singled out of the composed term "stakeholder" [12] for a specific focus during the requirement analysis. SAIS are thus defined as IT artifacts that extend the design of socio-technical systems by comprising the consideration of the effects of their use and implementation on a scale that includes the directly involved process actors but also the individuals affected by the results of the system implementation and use. This scope can be as broad as the customers affected by the information system or the society that includes these information systems into its interaction and social exchange, e.g., in its administrative processes. This focus is especially important in domains where these systems build or use personal-specific data, e.g., decision automation and decision support in human resources domain.

Participation, Transparency, Human Autonomy, Human Rights and Auditability are suggested based on the ALTAI criteria for MLS introduced by the European Commission as main pillars of the design of an information system that is socially aware. SAIS thus follow the thought schools of value sensitive [8] and value-based [13] design, problem orientation in design science research [14] and ethical information systems design [15]. Evidently, Information Systems Research (ISR) should manifest its leading role in pursuing practices for the creation of IT artifacts that are not only technically innovative but also socially acceptable.

SAIS extends the characteristics of socio-technical systems by Baxter and Sommerville [1] with following additions:

- SAIS address a (business) problem with a resulting significant increase in efficiency of business operations or significant advantages for the process workers or affected users.
- SAIS does not use behavioral approaches to un-ethically draw on user's or affected user's data.
- SAIS considers users and affected users in the requirement analysis.
- SAIS has audit and testing mechanisms that consider the mid-term effects of its application on the user, the affected users and their environment.
- SAIS has a laboratory testing environment and is subject to regular audits concerning the stated values, but at least the values of Participation,

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Transparency and Human Autonomy and Human Rights.

- SAIS use includes a definition of the contextual, cultural and value-based scope of the environment it shall be implemented in and can lead to accordant modifications, e.g. in the context of data processing.
- SAIS has a feedback mechanism that allows a flow of information between the user and SAIS, as well as affected users and SAIS that enables necessary changes in the SAIS functionalities and architecture.

Following this reasoning, the requirements engineering for socially aware information systems should apply the analysis of ethical and legal issues that appear during the design of the system's features and its usage. As methods scenario analysis, surveys, workshops documented with use case analysis and user stories can be applied. As personas external actors need to be considered. Here, the actors "user" and the "affected user", i.e., an actor affected by the results of the information system application, need to be differentiated.

II. CONCLUSION

This extended abstract motivated and presented the term of socially aware information system that extends the context of design science research, user- centered and value-sensitive design as well as the term of socio-technical systems. The necessity of this extension was motivated with the upcoming prevalence of data-based systems that are increasingly used to provide recommendations, information and support decisions on individual and business scales. Involving this term in the research and practice will allow including a mid-term thinking in the design of information systems as well as robust testing plans that consider mid- and long term effects of the system use on its direct and affected users. Also the use of behavioral science for increased engagement of the system can be critically tested for the expected and actual added value within the SAIS design.

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