

Accountability Evaluation in Systems-of-Information Systems Based on Systems Thinking

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Abstract. *In Systems-of-Information Systems (SoIS), accountability encompasses strategies that encourage responsible behavior considering SoIS purposes. However, its implications remain unclear when it focuses on evaluation strategies in SoIS. In order to fulfill these promises, the AESoIS or “Accountability Evaluation in SoIS” is proposed. The AESoIS solution aims to support SoIS managers to understand SoIS organizational scenarios. Such an approach is composed of three AESoIS macro-processes: (i) prepare data collection; (ii) define accountability indicators database; and (iii) generate a visual presentation of an organizational problem from an investigated scenario. In addition, the AESoIS were evaluated with managers in educational organizations supported by SoIS based on a feasibility study. Therefore, the relevance of understanding and modeling SoIS scenarios is highlighted, as well as the AESoIS effectiveness.*

1. Introduction

Accountability is a non-functional requirement¹ [Pearson 2014] for holding responsible actions in organizations regarding obligations and sanctions [Feltus *et al.* 2009] and must encompass evaluation strategies [Bissland 1990; Pearson 2014]. An evaluation strategy associated with accountability aims to provide means for optimizing business processes according to a business scope and improving their results.

In this context, the evaluation focuses on evaluating complex information systems (IS) arrangements to contribute to people’s involvement and create better products and services considering the organizational context [Cordeiro 2021; NSF 2021]. An example of a complex IS arrangement that demands research is Systems-of-Information Systems or SoIS [Majd & Marie-Hélène, 2017; Li, 2021]. SoIS is formed by several constituents IS working together to accomplish an organizational goal by using individual functions of each one [Saleh & Abel, 2016].

¹ Non-functional requirements are those that specify criteria that can be used to judge the operation of a system, rather than specific behaviors (Pearson, 2014).

To investigate the intersection between accountability and SoIS, the Doctoral thesis was motivated by the lack of accountability evaluation in SoIS [Oliveira, 2021; Neto *et al.*, 2021]. Santos *et al.* (2021) argue that SoIS research lacks notations, tools, and has gaps, and several opportunities. In order to fulfill these promises, the AESoIS or “Accountability Evaluation in SoIS” is proposed. The AESoIS solution aims to support SoIS managers to understand organizational scenarios and propose solutions related to accountability evaluation based on three criteria: engagement, management, and regulation. In view of the context, motivation, and problems presented above and the relationship with the Grand Research Challenges in Information Systems in Brazil 2016-2026, this work is positioned in: “*Information Systems and the Open World Challenges*” combined with “*Smart Systems-of-Information Systems: Foundations and an Assessment Model for Research Development*”. Therefore, we explored the accountability evaluation for SoIS modeling scenarios and supported SoIS managers’ decision-making.

2. Research Methodology

The main objective of this work is to evaluate the following hypothesis: *Accountability evaluation affects SoIS context understanding, precisely SoIS arrangement*”. Our research methodology comprises some steps described next.

Exploratory Study in Educational SoIS – The investigation allowed revealing systemic aspects of SoIS scenarios involving daily school routines as an initial attempt for SoIS modeling for its understanding.

Systematic Mapping Study (SMS) on accountability and research challenges – SMS and research challenges complemented the theoretical accountability and exploratory studies provided directions for further investigations in IS/SoIS based on identified research challenges.

Accountability Evaluation Model (AEM) – We developed a UML representation for key concepts and their relationships.

AESoIS Framework and Tool – AESoIS framework establishes modeling and analysis of SoIS dynamics concerning a scenario. AESoIS tool focuses on representing actors, business tasks, and constituent IS interconnections, considering accountability criteria as suggestion indicators for investigating a problem.

AESoIS Tool Evaluation – It reported a feasibility study conducted with practitioners in real two educational organizations concerning to organizational problems. It investigated two SoIS scenarios to evaluate the AESoIS and contribute to SoIS analysis aligned with accountability evaluation research and practice.

3. Main Results and Contributions

This work briefly introduces the Doctoral thesis approach regarding accountability evaluation to support SoIS modeling, which can be applied for the understanding of SoIS scenario, called AESoIS. AESoIS is a solution that comprises a framework and a tool. As shown in the thesis, SoIS research lacks models and tools addressing SoIS contexts. Furthermore, SoIS research lacks accountability evaluation and its impacts on the SoIS scenario. Therefore, the proposed accountability evaluation aims to model SoIS scenarios, using the systems thinking (ST) approach as a reference.

Such an approach is chosen due to the proximity between the accountability evaluation strategy and ST for representing elements, associations, and feedback. From the discussions, it was expected that the thesis assists IS/SoIS managers in better understanding SoIS arrangements as part of an accountability assessment strategy. In addition, with the SoIS scenario modeling, it is possible to evaluate potential interventions and improvements, considering accountability criteria. Finally, the Doctoral research provided the following contributions:

- **SMS of accountability and research challenges** addressed accountability studies in IS and research challenges supporting analyses of SoIS;
- **Conceptual model** evaluated with specialists was constructed with propositions and evidence, considering a pilot and interviews with IS specialists;
- **AESoIS framework and tool** considered an educational SoIS scenario. It encompasses the thesis contributions and provides an approach for accountability evaluation in SoIS based on ST;
- **AESoIS evaluation** considered SoIS practitioner's feedback who evaluated part of the proposed approach and infrastructure in a real scenario.

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