

# Design and application of socially- aware IT – Digital divide, process automation, trusted data processing and sustainable infrastructure implementation

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**Abstract**— As technology advances, it is increasingly important for software developers and product owners to adapt the development practices to ethical demands. Understanding the perspectives and needs of various groups when it comes to software artifacts might come to be the decisive feature of an information technology artifact. This special track will share research findings and explore three key areas related to socially-aware information systems: approach for trusted data processing, sustainable implementation of urban IT infrastructure, effects of process automation on the involved process workers and state of the art research overview on digital divide in workplace learning. Through empirical research and discussion, the papers presented in this track will serve as a catalyst for further exploration and dialogue. This track encourages interdisciplinary research as a crucial component in designing socially-aware and sustainable information systems.

**Keywords**- Process automation; workplace learning; municipalities; system implementation, trustful data management; socially aware informaiton technology.

## I. INTRODUCTION

Since technology is developing towards the increasing support of the business processes as well as individual needs, its impact on these environments needs a closer attention from the research and public discussion.

Socially-aware software refers to software that is designed to take into account the social context in which it operates [1]. This can include software engineering processes that provide a framework for developing socially-aware systems. The goal of socially-aware software is to create systems that are more responsive to the needs of society and can better serve societal needs.

The special track “Design and application of socially-aware IT” (DASAIT) is focusing on the research questions about how an information system should be designed and implemented to take the requirements of an indirect user, i.e., the affected user, into account as well as the effects of the IT on involved users and their environment. Furthermore, the impact of the usage of such a system on the process it is deployed in as well as on the direct and extended environment.

DASAIT aims to encourage research on these topics as well as to offer insights into the described issues based on quantitative and qualitative research results, thus providing a possibility to trace the developments in this area throughout the years.

Socially-aware software development takes the value-based approach from [2] to incorporate the stakeholder theory [3] into the development and selection of software and IT-infrastructure in operative contexts. Due to its wide application areas, the research covering this topic ranges from business software, to design approaches for processing sensitive data [4], automation within business processes [5], IT infrastructure [6] and workplace learning [7].

Hence, the current track offers submissions in the fields of software engineering with the approach for trusted data processing [4], sustainable implementation of urban IT infrastructure [6], effects of process automation on the involved process workers [5] and state of the art research overview on digital divide in workplace learning [7].

## II. SUBMISSIONS

Using the rapid literature review method, the authors of [7] analyse the state of the art in context of workplace learning and access to advanced learning technologies (ALT). The findings indicate a significant digital divide in workplace learning, with ALT predominantly concentrated in the education, health, and medical sectors. In contrast, smaller organizations, non-technical sectors, and workplaces with white-collar workers have limited opportunities for technology-enhanced learning. Furthermore, the study highlights the need for more inclusive and comprehensive research to address the digital learning divide, taking into account practice-based evidence and exploring the themes covered by training programs. The authors propose investigating the complexity and resource intensity of implementing ALT to enhance technology-based learning in all workplaces, as this might be a reason for the limited adoption in smaller institutions. This work establishes a foundation for understanding the digital learning divide in the workplace and calls for further research to explore the socio-technical nature of ALT systems and their suboptimal

design for diverse organizational contexts. The authors emphasize the importance of optimizing technology-enhanced learning practices to ensure equitable access to upskilling and reskilling opportunities across all workplaces.

The work in [4] describes a patient-centric trustee model that leverages dynamic consent and a distributed architecture to overcome barriers in sharing German sleep research data while prioritizing data privacy, security and transparency. By acting as a neutral intermediary, the trustee aims to unlock the full potential of sleep medicine research through seamless cross-institutional collaboration. First evaluation steps of the prototype were taken with a small group of patients and researchers. The core of the proposed approach is the concept of a "data trustee" - a neutral intermediary that acts as a trustworthy link between patients (data providers), sleep clinics (data producers), and researchers (data recipients). The trustee provides easy-to-use interfaces tailored for each stakeholder group. A key contribution is the use of "dynamic consent" which gives patients greater control and flexibility in managing permissions for their anonymized data compared to traditional broad consent methods. Patients can customize sharing preferences, get notified about incidental findings, monitor usage, and revoke access through a user-friendly app.

A socially-aware approach to implementation of IT-hardware is presented in [6]. The research focuses on the suggested LoRaWAN Collaboration Framework (LCF), a strategic blueprint for deploying and managing sustainable LoRaWAN infrastructures in smart cities, with a focus on rural areas and small municipalities. The LCF aims to address common challenges faced by small towns and rural municipalities in LoRaWAN projects, such as limited technical expertise, financial constraints, and the need for cooperation across multiple stakeholders including municipal authorities, IT providers, application developers, and end-users. The framework outlines clear roles and responsibilities for different stakeholders to enable successful long-term operation of LoRaWAN infrastructures. The work maps out the "wants and needs" of each stakeholder group that should correspond to the "capabilities" offered by others, creating a balanced system of responsibilities. Seamless interfaces between roles are outlined as being crucial for effective collaboration.

The authors synthesized insights from their experiences in several LoRaWAN projects across small German towns and municipalities. Hence, the LCF provides a foundation for municipalities to identify and align with suitable partners based on their respective needs and capabilities.

The research in progress presented in [5] examines the involvement and perceptions of process workers in the implementation of robotic process automation (RPA)

projects based on qualitative interviews with four RPA implementation experts from German companies.

This analysis is positioned against the backdrop of the growing RPA adoption as well as the lack of research on failed projects and the challenges faced by employees whose processes are being automated. The study provides insights into RPA implementation into business processes from the perspective of business analysts using the content analysis of semi-structured interviews. The analysis results show, that the human aspects of process automation were partly considered during the project initiation phase in form of an awareness session. This meeting is used to inform the process workers of the upcoming project as well as to sensitize business unit actors and process actors to identify suitable processes or activities for their automation.

Overall, the study provides valuable insights into the human aspects often overlooked in RPA projects, underlining the importance of addressing process worker concerns and integrating them effectively for successful technology adoption.

### III. CHALLENGES

The challenges presented in the paper by Levina [5] on the effect of RPA technology on the process workers address the social side of the technology introduction and job crafting. Since the process workers are not directly addressed during the RPA implementation into their processes, uncertainties and fears about losing the current occupation or change in activities are likely to arise. Using workplace learning and job designs that adopt to the technology introduction are some of the potential approaches that need to be expanded towards emerging technologies to absorb the effects of the change.

The paper by Frosch and Lindauer [7] identify the need for a more inclusive and comprehensive research to address the digital learning divide, taking into account practice-based evidence and exploring the themes covered by training programs. The authors propose investigating the complexity and resource intensity of implementing ALT to enhance technology-based learning in all workplaces, as this might be a reason for the limited adoption in smaller institutions. Furthermore, the paper emphasizes the importance of optimizing technology-enhanced learning practices to ensure equitable access to upskilling and reskilling opportunities across all workplaces.

Key challenges identified in the paper by Nitze et al. [6] were related to the realization of the hardware implementation within a geographic and governance community. They included limited funding, aligning stakeholder interests, site constraints, lack of technical expertise in administrations, and coordinating responsibilities. Although, collaboration would enable sharing of expertise, pooling financial resources, and access

to good practices for efficient LoRaWAN deployments, while benefiting all stakeholders.

In the described context, technical management was provided by the authors, they recommend a more holistic stakeholder coordination approach for sustainable operations aligned with economic viability and the UN's Sustainable Development Goals in the future.

The research by Burmeister et al. [4] aims to address challenges like legal restrictions, fragmented data landscape, lack of standardized formats, and data quality issues that currently hinder effective utilization of this valuable data. Therefore, the concept of a "data trustee" is suggested. This is a neutral intermediary that acts as a trustworthy link between patients (data providers), sleep clinics (data producers), and researchers (data recipients). The trustee provides easy-to-use interfaces tailored for each stakeholder group. To realize this prototype, the main obstacles in designing a secure data request and analysis process include: Data governance: Establishing a central point of contact for legally compliant data requests and utilization despite decentralized data storage across various sleep medicine facilities proves challenging.

#### IV. CONCLUSION

The research presented at the special track provides the outline of some of the topics and research methods that become increasingly relevant for the development and selection of socially aware information systems. Multidisciplinary

In addition to the further empirical insights, frameworks and methods for requirements elicitation, testing, evaluation and feedback implementation will be the focus of the future SAIS research.

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