

Editorial Introduction to Issue 42 of CSIMQ: Managing Enterprise Complexity – Integrating Digital, Physical and Human Dimensions

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This issue of CSIMQ includes articles that are extended versions of selected papers presented at the workshops of the 23rd International Conference on Perspectives in Business Informatics Research in 2024. The contributions reflect a cross-disciplinary approach, with studies applying conceptual modeling, digital tools, case studies, and surveys to deliver insights into digital transformation and complexity management in modern enterprises. The focus is on small organizations that can adopt solutions traditionally used by larger players to align with global societal goals, such as innovation, performance, ESG requirements. Whether it is about health services, energy management, smart grid optimization, business-IT alignment, all papers emphasize the integration of digital technologies with real-world operations.

Global disruptions such as the COVID-19 pandemic, the pursuit of digital transformation, the ongoing demand for innovation, and sustainability imperatives have all intensified the complexity faced by modern organizations. Managing this complexity increasingly requires more sophisticated solutions that integrate digital and physical systems, as well as the alignment of human, technological, and strategic dimensions.

Issue 42 of the CSIMQ journal contains articles that illustrate how diverse yet interconnected methodologies can support organizations in navigating digital transformation. These articles exemplify the journal's commitment to exploring the ways to address complex contemporary challenges.

The first article, authored by Martin Henkel, Erik Perjons, Kristian Borg, Uno Fors, Jan Johansson, Marika C. Möller, and Christer Wåhlander and titled *Digiphysical Approach in Post-COVID Rehabilitation: Process-Oriented Tool Support and Solution Patterns* explores the concept of digiphysical rehabilitation, which integrates traditional physical rehabilitation with digital tools to enhance therapy. Rather than addressing therapeutic activities in isolation, the authors advocate for an integrated approach that also supports related processes like administrative tasks, such as appointment scheduling, thus covering the entire rehabilitation workflow. The prototype system includes features like appointment booking, digital assessment forms, self-guided rehabilitation exercises, and tools for monitoring patient progress. It enables patients to

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self-assess cognitive function, fatigue, physical recovery, and general well-being through digital interfaces. Researchers, developers, and rehabilitation professionals developed the prototype collaboratively and iteratively. It is built on a platform that supports model-driven design, implementation, and execution of healthcare processes.

The second article, *Energy Management Systems in SMEs: Relevance, State of Research and Requirements*, written by Markus Triller and Kurt Sandkuhl addresses the importance of Energy Management Systems (EnMS) as tools to promote sustainability and reduce energy costs. While existing research focuses mainly on implementing EnMS in large companies, there is a significant knowledge gap concerning small and medium-sized enterprises (SMEs). To explore this issue, the authors conducted a survey among SMEs in a northern region of Germany, revealing both a clear need for energy management and a lack of knowledge on how to implement such systems. A systematic literature review was also performed to outline the current state of research regarding EnMS in SMEs. Building on these findings, the paper offers recommendations for supporting SMEs in adopting energy management practices. The study concludes with expert interviews to identify SMEs' specific requirements for implementing EnMSs, highlighting the need for tailored solutions and support structures.

In the third article, titled *AI-Enabled Predictive Analytics in Smart Grids: The Case of Sweden*, Theodore Kindong, authored by Björn Johansson, and Victoria Paulsson explore how artificial intelligence (AI) applications can be integrated into smart grids to enable predictive analytics. Using an Action Research approach, the study focuses on the phases of diagnosis and action planning. In the diagnosis phase, a systematic literature review provides an overview of existing AI applications in smart grids and identifies gaps in current development and implementation strategies. The authors highlight four key areas of predictive analytics: power outage prediction, demand response, control and coordination, and AI-enabled security. During the action planning phase, the authors analyze documents from smart grid stakeholders in Sweden to derive methods for implementing AI in smart grid contexts. Based on this analysis, they present insights into current trends, opportunities, and challenges related to AI integration in smart grids.

The fourth article, authored by Rikard Kloth and Gideon Mekonnen Jonathan, is titled *The Missing Link: Knowledge Management and the Social Dimension of Business-IT Alignment* and investigates the relationship between Knowledge Management (KM) and the social dimension of BITA (Business-IT Alignment), an important concern in the Information Systems literature. The authors report on a case study in a Swedish company, revealing several impediments regarding the social dimension of BITA (e.g., reliance on outsourced IT solutions, erosion of organizational knowledge due to staff turnover, fragmented communication, and failed planning due to siloed knowledgekeeping). They propose addressing the identified issues through the implementation of robust KM practices. The authors also highlight the relevance of KM in addressing ESG (Environmental, Social, and Governance) related goals.

In the fifth article, *Fractal Enterprise Model in Intangible Resource Analysis: Double-Hierarchy Method*, the author, Victoria Klyukina, explores the growing importance of intangible resources (e.g., knowledge) in achieving competitive advantage. She proposes using Enterprise Modeling (EM) to connect the theoretical understandings of intangible assets, on one hand, and their practical application, on the other hand. Specifically, it presents the use of the Fractal Enterprise Model (FEM) in strategic resource analysis. The proposed modeling method is exemplified within the product development process in pursuit of strategic leadership.

Together, these contributions reflect the evolving landscape of enterprise complexity management, where digital transformation, data insights, human-centered strategies, and conceptual modeling converge to support sustainable innovation.

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