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Editorial Introduction to Issue 40 of CSIMQ: Managing Different Forms of Complexity

Małgorzata Pańkowska[1*] and Erika Nazaruka[2]

[1] Department of Informatics, University of Economics in Katowice, 50 1 Maja Street, 40-287 Katowice, Poland
[2] Institute of Applied Computer Systems, Riga Technical University, 6A Kipsalas Street, LV-1048, Riga, Latvia

malgorzata.pankowska@ue.katowice.pl, erika.nazaruka@rtu.lv

The concept of complexity has been well-known for as long as natural science has existed. According to Edgar Morin's paradigm [1], complexity is a mixture of order and disorder of events, interactions, feedback, and coincidences, etc. Analysis of the order and, even more, of the disorder can lead us to a more complete understanding of the system's character. We can also say that analysis of the order helps us discover patterns in structures or behavior. In turn, analysis of the disorder can give us an extended understanding of the incompleteness of our knowledge.

The systems considered in the presented research can be characterized as dynamically complex open systems, which means that "the system's coherence lies not only within the system itself but also in its relationship with the environment" [2]. According to Vandenbroeck [2], four forms of complexity exist: dynamic, architectural, relational, and generative. No doubt that modern complex systems combine these forms. By analyzing different datasets, the researchers deal with relational and dynamic complexity. If analysis is focused on organizing architectural principles, then we may talk about architectural and relational complexity. Trying to solve problems of uncertainty in processes, we face dynamic, architectural, and relational complexity. The adaptivity of systems tells us about their generative complexity. This journal issue is devoted to managing the architectural, dynamic, and relational complexity of the considered systems.

The first article, "Supplementing the Build Activity in Design Science Research with Soft Systems Methodology: A Technique of Creating Frameworks for Guiding Interventions Against Unstructured Problems", represents the authors' original guidelines for the build activity of Desing Science Research (DSR), where the authors suggest a kind of logical thinking pattern to follow while building a framework artifact for solving an unstructured problem. The authors demonstrate a Technique of Building Frameworks for guiding Interventions against unstructured problems (TBUFI). The TBUFI is a result of leveraging the Soft Systems Methodology during the design cycle of the DSR in order to operationalize the existing general guidelines. The TBUFI has undergone 11 evaluation iterations from 2011 to 2023 and can be considered a well-elaborated supplement for the build activity in the DSR. The result of the twelve experts' evaluation of the TBUFI application case studies shows that the average score of its applicability, functionality,

* Corresponding author

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Additional information. Author ORCID iD: M. Pankowska – https://orcid.org/0000-0001-8660-606X, E. Nazaruka – https://orcid.org/0000-0002-1731-989X. PII S225599222400217X. Received: 30 October 2024. Available online: 31 October 2024.

usability, and traceability is more than 4.3 on a 5-point Likert scale, which is satisfactory. The results can serve as a solid base for extending this technique for building other DSR artifacts.

The second article, "Contextualization of Information Objects Towards Supporting Knowledge Management in Digital Workspaces", explores the critical role of context in managing unstructured data and increasing organizational productivity. The authors proposed the approach of extracting the set of attributes for building a context model by using the CASAD matrix modeling method and large language models (LLMs). Besides, a diagram of a digital workspace solution prototype operating in a cloud service environment is presented as a potential implementation of the approach. The application of the approach allows for achieving a set of reusable services, context dimensions, and metamodels, as well as case-specific contextual attributes. The application of the approach is demonstrated, and the relevance of the results is evaluated as satisfactory. The research results could be used to leverage together the much larger field of context-aware systems and context-oriented knowledge management systems.

The third article, "Process for Leveraging Enterprise Architecture in Information Systems Strategic Planning: A Case of Developing a Strategy and Master Plan for a National Integrated Health Laboratory Information Management System in Uganda", is devoted to the evaluation of using the Enterprise Architecture in Information Systems Strategic Planning (EAISSP) for Uganda's health laboratory subsector. The authors indicated two main issues related to the complexity of the case, namely, a lack of efforts to support coordination and regulation of laboratory services at sub-national and national levels and insufficient exploration and incorporation of data and information needs due to the complexity and scope of existing digital health solutions. The authors have identified challenges from the literature on Healthcare-ICT alignment as well as required interventions. The challenges were addressed by adopting strategic planning and enterprise architecture approaches. As a result, the authors were able to identify the root causes of the existing difficulties and suggest suitable improvements. The achieved results and the approach itself were evaluated by the experts, and more than 75% of them were satisfied with the results and the process, and the authors have achieved a high level of understanding of decision-making. The authors indicate that the approach is mature enough to be effectively applied in practice.

The concluding article, "Machine Learning Analysis of Arterial Oscillograms for Depression Level Diagnosis in Cardiovascular Health", illustrates findings on the application of machine learning methods for developing an automated classifier of depression levels based on correlated ultra-low-frequency (ULF) indicators in arterial oscillogram (AO) data. The proposed automated classifier can be used as an automated diagnostic classification Artificial Intelligence service. The patient data were normalized in order to exclude skewing the result. The authors have applied the UMPA method and "Lazy Predict" technique from the Scikit Learn library for dimensionality reduction and different classifiers for the classification task. The data analysis results revealed a potential relationship between ULF indicators and depression levels. During classification development and accuracy improvement, it was found that expanding the base feature set by searching for class-specific correlations with additional features and selecting those that most significantly improve classification accuracy can provide reliable results and may be used as a reliable service.

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References

[1] E. Morin, *On Complexity*. Hampton Press, 2008.

[2] P. Vandenbroeck, "Systems Thinking and Four Forms of Complexity," *White paper*, 2015. Available: https://shiftn.com/_uploads_pdf/shiftN_WP_Systems-Thinking_Web-kopie.pdf. Accessed on Oct. 29, 2024.