Preface to the Special Issue on Business Process Innovations with Artificial Intelligence

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The field of Artificial Intelligence (AI) continues to grow, with new and deeper techniques, and with applications across numerous areas. In the past few years, we have seen a strong interest from both industry and academia in applying AI techniques in the area of Business Process Management (BPM). Indeed, the application of AI is impacting additional areas where process management perspectives and techniques are relevant, including industrial engineering, IoT, and emergency response, to name a few. On the one hand, BPM inspires novel application domains for AI: planning for modeling business processes, Machine Learning (ML) for mining event logs, and constraint reasoning as key technology that underlies business rules engines. On the other hand, BPM and related fields influence the way AI develops.

This Special Issue on Business Process Innovations with Artificial Intelligence of the *Journal of Data Semantics* focuses on the interplay between BPM and AI. It includes the extended versions of three selected papers and of the keynote paper from the First International Workshop on Business Process Innovations with Artificial Intelligence (BPAI), which took place with the Business Process Management Conference (BPM) in September 2017, in Barcelona, Spain. The papers were selected by taking into account the quality, significance and relevance of the results they present. All the extended papers went through an additional peer review process.

The paper “Automated Planning for Business Process Management,” authored by the keynote speaker, Dr. Marrella, discusses how automated planning techniques, rather than hard-coded solutions, can be leveraged to enable new levels of automation and support for solving concrete problems in the BPM field. To this aim, a methodology for the

encoding of a concrete BPM problem into an appropriate planning problem and the steps required to integrate the planning technology in BPM environments are proposed in the work.

The paper “Process Coordination with Business Artifacts and Multi-Agent Technologies” by Baldoni et al. is motivated by the observation that business artifacts have the potential to be used as natural means of coordination rather than using orchestration and choreography languages. The paper proposes an approach based on social commitments to enrich business artifacts with a normative layer that defines the coordination. This way, coordination and business logic are decoupled and the reusability of both processes and business artifacts increases.

The paper “Ant-colony Optimization for Path Recommendation in Business Process Execution” by Comuzzi proposes a novel technique to implement process navigation based on the abstraction of business process models as a restricted class of directed hypergraphs, i.e., WF-hypergraphs. Once process models are transformed into WF-hypergraphs, finding the optimal way to complete the process becomes a generalized hypergraph shortest path problem. A solution based on the ant-colony meta-heuristic specifically customized to the case of hypergraph traversal is proposed for the resolution of this problem.

Finally, the paper “Entropy as a Measure of Log Variability” by Olling Back et al. reports about an exploratory study on the use of entropy metrics as measures of the variability of event logs. Variants of the classical notions of entropy suitable for the process mining field are proposed and evaluated on both synthetic and real-life logs.

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