Extended Abstract: Coordination, Cooperation, and Collaboration in Process Mining

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Abstract. Process mining is increasingly used to investigate the resource perspective of business processes. Many corresponding techniques, however, are developed without extensive consideration of theoretical concepts developed in the management literature. In this paper, we build on this literature to define inter-organizational work patterns (IOWP). More specifically, we adopt the concepts of coordination, cooperation, and collaboration for process mining and propose a set of requirements to guide the future development of resource analysis metrics.

Keywords: Process mining · Resource analysis · Interorganizational relations.

1 Related Research

The study of work patterns is part of the resource perspective in process mining. Russel et al. [3] were one of the first to acknowledge the resource perspective as being crucial for workflow management success. In their study, they defined a collection of language-independent resource workflow patterns to support resource allocation functionalities of process-aware information systems. In a more recent study, Leyer et al. [2] introduced a theory-driven approach to behavioral process mining to detect non-conforming behaviors of *agents*, i.e., resources embedded in a *principle-agent* constellation. In our study, we are interested in providing a clear distinction between the managerial concepts *coordination*, *cooperation*, and *collaboration*, which are fundamental terminologies to understanding inter-organizational activities [1]. To this end, the process mining literature needs an extensive framework based on management literature to define and distinguish these three concepts adequately.

2 Inter-Organizational Work Patterns

Conceptualization. We define coordination, cooperation, and collaboration (3C) as inter-organizational work patterns (IOWP), describing inter-organizational work behavior

between at least two organizational units working towards a collective goal. An organizational unit can be a human individual or a group of human individuals associated with one or multiple processes. Based on Castañer and Oliveira [1], we can differentiate these terms as follows. Coordination refers to the IOWP during the deliberation phase of determining goals. Cooperation follows coordination and describes the same IOWP during the implementation phase of the determined goals. Finally, collaboration is a special form of cooperation characterized by human resources helping each other voluntarily to ensure that the goals defined are met.

Considering the previous definitions, we propose the following five requirements (R). First, a resource analysis technique to identify any IOWP needs to be able to measure inter-organizational work-related behaviors over a designated time period (R1). Secondly, the technique must allow for the definition of goals associated with this behavior (R2) and should be able to measure the extent of accomplishment of these goals (R3). For this purpose, the technique should also include a temporal marker, differentiating between a planning and an implementation phase of the goals defined (R4). Finally, the technique must be able to measure the behavior of *helping out* (R5). These requirements are not exhaustive but are seen as the starting point for distinguishing the 3C in process mining.

Future Development. The next steps for this project are twofold. First, we will develop a conceptual framework that defines and distinguishes the 3C in process mining. The conceptualization above will be used as a starting point. Then, we will conduct an empirical study with process experts to validate the soundness and understandability of the framework and provide evidence for further improvement. Second, we will formalize a data-driven instantiation of our framework, subsequently implementing it as a proof-of-concept. For this purpose, we will apply and adapt existing IOWP resource analysis measurements. The effectiveness will be validated in an experimental study.

Acknowledgments. The research of the authors was supported by the Einstein Foundation Berlin under grant EPP-2019-524, by the German Federal Ministry of Education and Research under grant 16DII133, and by Deutsche Forschungsgemeinschaft under grant 496119880. Kate Revoredo is funded by the Berliner Chancengleichheitsprogramm (BCP) as part of the DiGiTal Graduate Program.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

References

1. Castañer, X., Oliveira, N.: Collaboration, coordination, and cooperation among organizations: Establishing the distinctive meanings of these terms through a systematic literature review. Journal of Management **46**(6), 965–1001 (2020)
2. Leyer, M., ter Hofstede, A.H.M., Syed, R.: Detecting weasels at work: A theory-driven behavioural process mining approach. In: BPM (Forum). Lecture Notes in Business Information Processing, vol. 490, pp. 337–354. Springer (2023)
3. Russell, N., van der Aalst, W.M.P., ter Hofstede, A.H.M., Edmond, D.: Workflow resource patterns: Identification, representation and tool support. In: CAiSE. Lecture Notes in Computer Science, vol. 3520, pp. 216–232. Springer (2005)