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## Abstract

Information systems research has a long-standing interest in how organizations gain value through information technology. In this article, we investigate a business process intelligence (BPI) technology that is receiving increasing interest in research and practice: process mining. Process mining uses digital trace data to visualize and measure the performance of business processes in order to inform managerial actions. While process mining has received tremendous uptake in practice, it is unknown how organizations use it to generate business value. We present the results of a multiple case study with key stakeholders from eight internationally operating companies. We identify key features of process mining – data & connectivity, process visualization, and process analytics – and show how they translate into a set of affordances that enable value creation. Specifically, process mining affords (1) perceiving end-to-end process visualizations and performance indicators, (2) sense-making of process-related information, (3) data-driven decision making, and (4) implementing interventions. Value is realized, in turn, in the form of process efficiency, monetary gains, and non-monetary gains, such as customer satisfaction. Our findings have implications for the discourse on IT value creation as we show how process mining constitutes a new class of [business intelligence](https://www.sciencedirect.com/topics/computer-science/business-intelligence) & analytics (BI&A) technology, that enables behavioral visibility and allows organizations to make evidence-based decisions about their business processes.

## Introduction

Recent years have seen an increasing uptake of process mining in industry (Reinkemeyer, 2020). Process mining is a business intelligence and analytics (BI&A) technology (Chen, Chiang and Storey, 2012) that is concerned with the real-time analysis and visualization of end-to-end business processes based on event log data (van der Aalst, 2016, Augusto et al., 2019, vom Brocke et al., 2021). Business processes are key to accomplishing work in organizations (Nelson and Winter, 1982, Dumas et al., 2018), and process mining provides an evidence-based means to observe, adjust, and communicate about process work on a continuous basis (Eggers et al., 2021, Martin et al., 2021).

Process mining vendors, such as the German company Celonis, report growth rates of 100 % and more in recent years, and analysts expect the market for process mining to grow tenfold over the coming years (Kerremans, 2019, Everest Group, 2020, Kerremans et al., 2020). Organizations expect further value realization from process mining as research and practice continuously develop more sophisticated algorithms and analysis techniques, which perform, for example, predictions about future process behavior (Polato et al., 2016, Mehdiyev et al., 2020). Despite its wide and rapid uptake in practice, however, research has insufficiently understood how organizations realize value through process mining. The few reports about process mining value are essentially sourced from process mining vendors (Grisold, Mendling, Otto and vom Brocke, 2020) or based on anecdotal evidence (Reinkemeyer, 2020). Understanding how process mining creates business value is important as respective insights can guide organizations in their decision to adopt and how to make the best use of this novel technology.

Research on BI&A has described a broad range of technologies that are used in various organizational contexts and for different purposes (Chen et al., 2012). In particular, several studies have focused specifically on mechanisms of value creation through BI&A (e.g. Lehrer et al., 2018, Müller et al., 2018, Bordeleau et al., 2020). However, previous research on value creation of BI&A technology is not well suited to explain the value generation mechanisms of process mining. This is because the established body of knowledge focuses on BI&A applications that are used for strategic and one-time decision making processes (Shollo and Galliers, 2016, Seddon et al., 2017), such as service innovation (Lehrer et al., 2018). To stress its distinctiveness in comparison to other BI&A technologies, and to emphasize its focus on the analysis of end-to-end business processes, process mining has been referred to as a business process intelligence technology (BPI) (Grigori et al., 2004, Castellanos et al., 2009, van der Aalst et al., 2015). Key to this shift in terminology is to highlight that process mining enables the continuous analysis of business processes (Grisold et al., 2020b, Eggers et al., 2021, vom Brocke et al., 2021), and thus enables different action possibilities for organizations, which may come with different value creation opportunities.

This study is the first to empirically investigate the research question: How do organizations use process mining to create business value? To this end, we employed a qualitative inductive study design (e.g., Sahay and Ranjan, 2008, Seddon et al., 2017, Grover et al., 2018). Specifically, we conducted a multiple case study with eight companies from different industries that have used process mining over an extended period and consider it an important technology for improving organizational work. We interviewed process mining stakeholders to explore why they use process mining in their organizations and how its usage has led to business value. To analyze our data, we drew on the affordance perspective (Seidel et al., 2013, Strong et al., 2014, Leidner et al., 2018, Markus and Rowe, 2018). Affordance theory is particularly useful as it allows us to distinguish between features of process mining and the action potentials (i.e., affordances) that key stakeholders, such as process analysts and process managers, enact in order to achieve certain goals. Prior studies have used an affordance perspective to understand, for instance, how features of information systems create affordances that can be used for green transformations (Seidel et al., 2013) or how BI&A can be employed for service innovation (Lehrer et al., 2018). We use affordance theory to examine value realization with process mining technology.

Grounded in our data, we identify-four process mining affordances: (1) perceiving end-to-end process visualizations and performance indicators; (2) sense-making of process-related information; (3) data-driven decision making; and (4) implementing interventions based on the obtained insights. These affordances are interrelated and have a cyclical relationship: after implementing interventions, organizations engage in another round of sense-making and decision-making to understand and decide whether further changes to the process are necessary. In doing so, companies are able to realize process efficiency, monetary values, and non-monetary values.

We continue as follows. First, we present the theoretical background of our work. We then introduce the research design of our study, followed by the presentation of our findings. Finally, we discuss the implications and limitations of our work and provide a brief conclusion.

## Section snippets

## Theoretical background

In this section, we outline the theoretical background of our work. First, we introduce process mining and discuss its key features. We then contrast process mining with the literature on BI&A and argue that further research is required to understand how organizations use the unique features of process mining to generate business value. Last, we introduce affordance theory as our theoretical lens and explain how it allows us to untangle features, affordances, and business values of process

## Research method

To study how organizations use process mining to create business value, we adopt a qualitative inductive research design. This decision aligns well with recent claims in the literature to identify mechanisms and evolving practices associated with big data use as well as affordance enactment from a qualitative-inductive perspective (e.g., Sahay and Ranjan, 2008, Seddon et al., 2017, Grover et al., 2018). For example, Trieu (2017) stresses that grounded theory-based study designs enable unpacking

## Findings

Our theoretical model summarizes the findings of our multiple case study and is depicted in Fig. 2. Grounded in the interview data from our multiple case study, our model illustrates how organizations use process mining to generate business value. It integrates three main categories: Process Mining Features, Process Mining Affordances, and Business Values. First, Process Mining Features are the technological characteristics of process mining software that our interviewees use (left part of the

## Implications

Our study makes important contributions to the understanding of how organizations use process mining (e.g. Mans et al., 2013, Eggers et al., 2021) and how they use process mining to realize business value, in particular. Focusing on process mining allows us to explore how organizations gain value as they leverage real-time process data on a continuous basis to assess their process performance, gain process visibility, detect root causes, and take appropriate decisions. Following a

## Implications for research on process mining: from technical to socio-technical contributions

Our research also speaks to the field of business process management. Process mining is emerging from this field, where but it is primarily looked at from technical perspectives (Grisold et al., 2020b, Martin et al., 2021). While recent claims suggest that process mining’s broader implications are key to understanding how and why process mining is adopted in organizations (or, for that matter, not adopted) (Grisold et al., 2020b, Reinkemeyer, 2020), empirical findings are scarce (vom Brocke et

## Conclusion

In this paper, we reported on a qualitative study to investigate how organizations create business value with process mining. We carried out a multiple case study with key stakeholders from organizations that differed regarding their size, industry, and objectives for using process mining. Grounded in our data, we derived a model that explains how process mining generates value for organizations. Our findings suggest that the features of process mining – data & connectivity, process

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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