

No Longer Out of Sight, No Longer Out of Mind? How Organizations Engage with Process Mining-Induced Transparency to Achieve Increased Process Awareness

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A Supplementary Material on the Design of the Multiple Case Study

A.1 Interview Guideline for the Semi-Structured Interviews

Block 0: Demographic Questions

- 0.1 What is your role in the company?
- 0.2 How many years have you been with the company?
- 0.3 How long have you been working with process mining?

Block 1: Reasons for the Use of Process Mining in the Organization

- 1.1 How and when did you become aware of process mining?
- 1.2 What are the reasons for the use of process mining in your company/department?
- 1.3 Who took the initiative to introduce process mining in your company?
- 1.4 How does process mining support the achievement of business goals?
- 1.5 How did you analyze processes before process mining was introduced?
- 1.6 Which methods did you use to analyze processes before process mining was introduced?
- 1.7 What were the challenges of analyzing processes without process mining?

Block 2: Design and Implementation of Process Mining

- 2.1 Which process did you first select for implementing process mining within your company/department?
- 2.2 What was the initial situation when your company/department started with the process mining implementation?
- 2.3 How would you describe the IT landscape within your company/department (e.g., in terms of systems used)?
- 2.4 What changes had to be made to your IT landscape to implement process mining?
- 2.5 Which departments/colleagues were involved in the implementation of process mining? What were their roles?
- 2.6 Who is primarily responsible for implementing process mining projects?
- 2.7 What design decisions were made for the process mining analyses and why?
- 2.8 Which relevant KPIs were derived for the process mining analyses?
- 2.9 What challenges did you experience while implementing process mining (e.g., technical, organizational, cultural challenges)?
- 2.10 How were these challenges addressed (e.g., regarding technical, organizational, cultural measures)?

Block 3: Use of Process Mining

- 3.1 Which processes are being analyzed with process mining in your company/department?
- 3.2 How are users enabled to use process mining?
- 3.3 Who are the users of process mining analyses in your company/department?
- 3.4 How did you/your team feel about the transparency induced by process mining?
- 3.5 Did you experience resistance in the workforce to use process mining?
- 3.6 How are process mining analyses used?
- 3.7 How are needs for new analyses communicated and addressed?
- 3.8 How and with whom are findings from process mining discussed?
- 3.9 How is the use of process mining monitored and managed within your company?
- 3.10 How has the use of process mining changed in your company/department since you introduced process mining?

Block 4: Outcomes of Process Mining

- 4.1 What findings were created through process mining in your company/department?
- 4.2 To whom are the findings of process mining analyses communicated?
- 4.3 How did these findings inform organizational changes (e.g., process changes, IT system changes)?
- 4.4 Who decides on the implementation of changes derived from the process mining analyses?
- 4.5 How did these changes impact the company/external stakeholders (e.g., customers, suppliers)?
- 4.6 What changes did you experience in the organizational structure resulting from process mining?
- 4.7 What changes did you experience in the organizational culture resulting from process mining?
- 4.8 Were you able to realize the expected benefits through process mining? Why, why not?
- 4.9 How are the outcomes of process mining analyses different from previously used process analysis methods?

B Supplementary Material on the Analysis of the Multiple Case Study

B.1 Data Structure

As we have described in the article, we conducted a grounded theory coding process (Glaser and Strauss 1967; Gioia et al. 2013) to analyze the qualitative data we obtained from the interviews and archival sources. From the coding process emerged the data structure that represents the different forms of process awareness created through process mining as aggregated dimensions and the mechanisms that lead to such process awareness as first-order concepts and second-order themes. As both the mechanisms and outcome depend on the firm's process mining governance approach, i.e., a top-down or bottom-up driven approach, we display the data structures related to each of the approaches in Figure 3 and Figure 4.

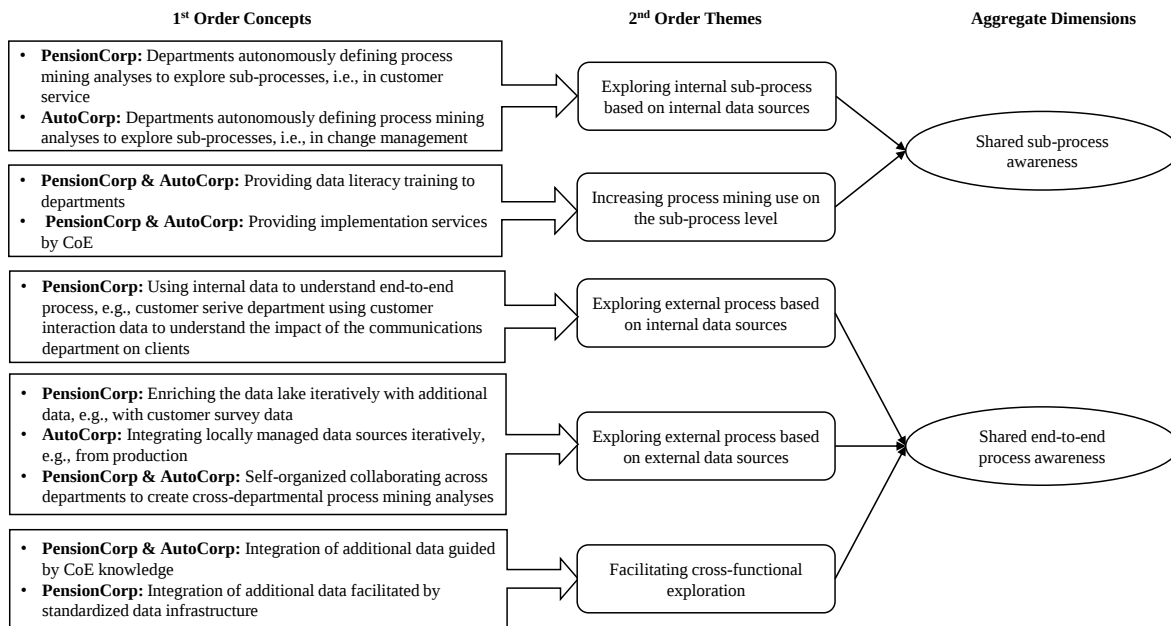


Figure 3: Data structure relating to a bottom-up driven process mining approach (based on Gioia et al. 2013).

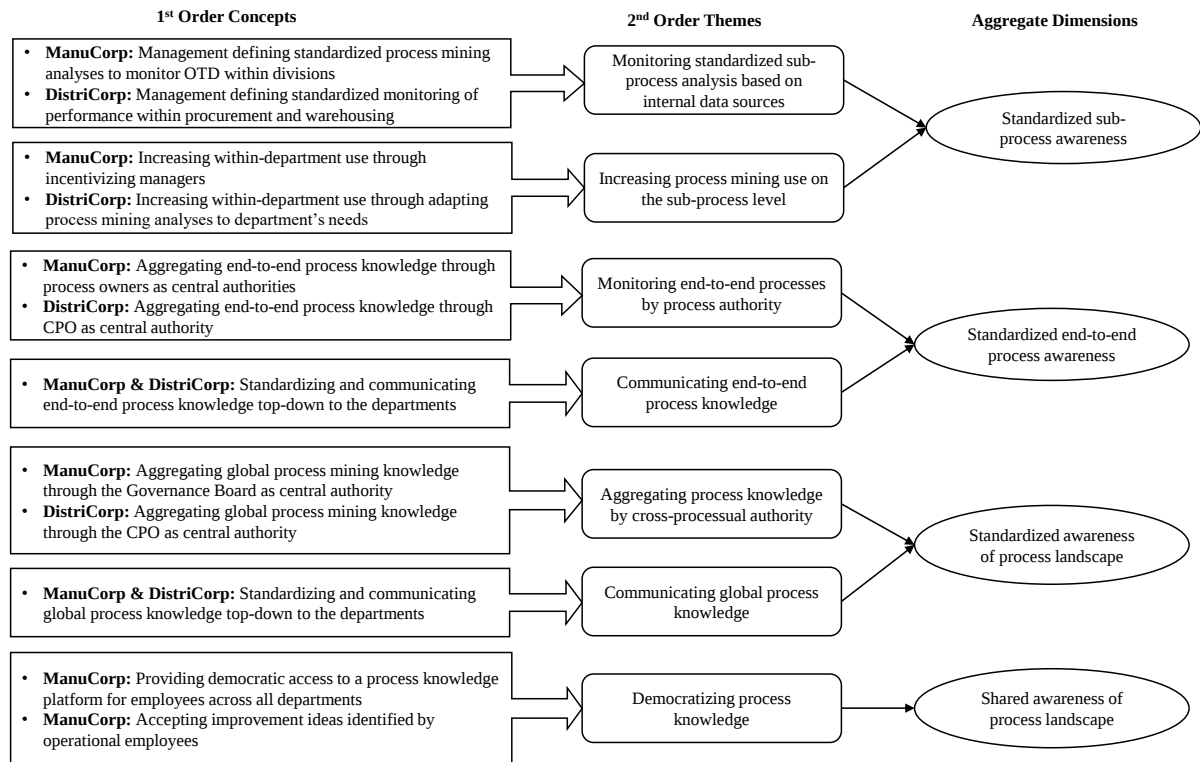


Figure 4: Data structure relating to a top-down driven process mining approach (based on Gioia et al. 2013).

B.2 Representative Quotes

To provide additional supporting material that illustrates how we obtained the data structure from the qualitative data, we provide an overview of representative quotes and archival entries for each of the underlying second-order themes. Therefore, Table 4 refers to the data structure emerging from the bottom-up driven implementation approach, and Table 5 refers to the data structure emerging from the top-down driven implementation approach.

Representative Quotes and Archival Entries	2 nd Order Themes	Aggregate Dimensions
“We work bottom-up, so the department faces a process with a concrete problem, and they cannot cope with the complexity any longer. They need transparency on their process, and this is the trigger for requesting a process mining analysis.” (Process Mining Developer, AutoCorp) “The departments come to us [the CoE], such as from administration, because they want to improve their processes with process mining.” (Data Scientist, PensionCorp) “The self-service concept was first applied in the retirement case. We see the need that internal clients of the DI-department want to create their own insights.” (Archival source, PensionCorp) “[...] the data belong to the departments.” (Head of Process Mining, AutoCorp) “First of all, there has to be a common understanding of the technology of process mining and the data, so that we all speak the same language.” (Process Mining Developer Production, AutoCorp) “[...] with process mining, we can confirm or disprove a subjective gut feeling or hypothesis with appropriately processed objective data.” (Process Owner Development, AutoCorp)	Exploring internal sub-process based on internal data sources	Shared sub-process awareness
“[...] they [CoE] are giving training on process mining for the managers and the product owners and operational employees.” (Data Scientist, PensionCorp) “Workshops were used to introduce concepts and develop users’ skills. Users were also given hands-on demonstrations of the key features of the [process mining software].” (Archival source, PensionCorp) “We [the CoE] do various workshops with the department. We show them what the process looks like now and discuss anomalies and root causes. We also discuss what other analyses they want to build with the data and iteratively proceed with the analysis.” (Process Mining Developer, AutoCorp)	Increasing process mining use on the sub-process level	
“[...] [we] measure why people are calling us. Once a year in the Netherlands you get a uniform pension letter which tells you about your pensions. During those weeks, a lot of people call about letters and documents, a lot of those documents are by pdf, but a lot of them are also on paper. So, it is important exactly about what the people are calling us. Because we discovered that they are calling a lot because the documents are not clear enough. So, by mining the date we can see better about which things the people are calling us about.” (Project Manager Customer Processes, PensionCorp)	Exploring external process based on internal data sources	Shared end-to-end process awareness
“When we started to explore the change management process, we realized that we had to expand the data model with data from [production system] and [development system]. So, we are actually always working in parallel: on the one hand, we always continue to work on the data model, and on the other hand, we also explore the analysis.” (Head of Process Mining, AutoCorp) “We combine [the retirement data], for instance, with call center data to see when and how often people called along this process. Then you get a much better idea of how the customer experienced this whole process. Once you add the NPS [Net Promoter Score] of that specific person for this specific business process, you have a complete image of all our client’s interactions around this retirement.” (Head of Customer Analytics, PensionCorp)	Exploring external process based on external data sources	
“I am trying to combine all the different process mining initiatives at [PensionCorp]. So, it is not only about the data department but also the pension department, the communication department, the change department. I am just walking around, trying to reach all those people, lead those people to meet each other.” (Data Scientist, PensionCorp) “That [the data lake] makes it quite easy to build an analysis that is more generic and not only focused on just one process or one department. Because all the data is structured in the same way, it is just as easy to do it for all processes and departments.” (Head of Analytics, PensionCorp)	Facilitating cross-functional exploration	

Table 4: Representative quotes and archival entries for the data structure emerging from the bottom-up governance approach.

Representative Quotes and Archival Entries	2 nd Order Themes	Aggregate Dimensions
<i>"The analyses are based on how [the CEO] and I designed them." (CPO, DistriCorp)</i> <i>"Our goal is, of course, to create standardized analyses that fit everyone." (Head of Process Analytics, ManuCorp)</i> <i>"We initiated process mining top-down [...] then everyone was basically obliged to use process mining for monitoring the on-time delivery." (Regional Process Mining Manager, ManuCorp)</i> <i>"Some units were not able to provide the right data to analyze. So, process mining helped us to identify investments for the units to improve their data quality." (Head of Process Analytics, ManuCorp)</i>	Monitoring standardized sub-process analysis based on internal data sources	Standardized sub-process awareness
<i>"We now discuss based on facts and use process mining to look at a problem together. [...] We get to the point much more quickly in discussions." (Regional CIO, ManuCorp)</i> <i>"We support the local and global units in creating transparency and improvement opportunities, including training and coaching." (Head of Process Analytics, ManuCorp)</i> <i>"We already knew that there would be much resistance in middle management [...]. So, we chose a KPI that is part of the corporate scorecard. So, if the managers don't cooperate, then they don't achieve their bonus. That was successful. I think 90% of them cooperated." (Head of Process Analytics, ManuCorp)</i> <i>"Process Mining enhancements. From strategic to operational tool." (Archival source, DistriCorp)</i>	Increasing process mining use on the sub-process level	
<i>"If we find process problems, we no longer give them to individual departments to solve. Instead, we have hired people explicitly for that, who are process owners and take care of the end-to-end process and communicate with all stakeholders involved." (Sales Manager, ManuCorp)</i> <i>"They [process owners] can follow a customer order up to almost the sales unit and see where did they buy it from, where did those guys buy it from. So, they can follow the whole chain and see the total lead time. They then realized that sales managers sell to the customer in 5 days, but the whole end-to-end process takes 50 days to get it there, so that's 50 days of inventories. So, we really start to understand what's the issue and what's the cost of delivering on time." (Head of Process Analytics, ManuCorp)</i>	Monitoring end-to-end processes by process authority	Standardized end-to-end process awareness
<i>"We take a look at their [the divisions'] processes in [process mining tool] and come up with concrete suggestions to direct their attention towards fruitful areas of analysis that are probably more useful than what they are currently analyzing." (Regional Process Mining Manager, ManuCorp)</i> <i>"[...] the departments look at a problem differently than someone who looks at a process across departments. Because there are always issues that seem highly relevant in isolation in the department, but when I look at the bigger picture, they don't necessarily are that important. And that is my job: to see what is important and to communicate it to the departments." (CPO, DistriCorp)</i>	Communicating end-to-end process knowledge	
<i>"Once every six weeks, we have a formal governance board meeting with representatives from all the divisions, from the business side and sometimes including representatives from IT. We sometimes invite the CoE for specific technical advice. But in the end, the divisions decide [on process changes] because they also have the budget." (Head of Process Analytics, ManuCorp)</i> <i>"We introduced the role of a CPO to really take care of cross-departmental processes. Because process mining breaks through departmental boundaries." (CEO, DistriCorp)</i> <i>"We [the Governance Board] also do the benchmarking much faster and much easier because we do not have to bring all those people physically together and go to the factories. For example, finding the division which claims to be the best in class in lean is not too difficult because everybody wants to show how good they are. If we do this based on process mining - we are doing that, by the way - we look at, for example, two business lines with comparable order volumes, comparable manufacturing products and then check who is doing better and see if there are any major differences in the process." (Head of Process Analytics, ManuCorp)</i>	Aggregating process knowledge by cross-processual authority	Standardized awareness of process landscape

Representative Quotes and Archival Entries	2 nd Order Themes	Aggregate Dimensions
<i>"We want to convey information to the departments so that they see: how did the process go in other departments? What's going on there? We want them to have a picture across departmental boundaries." (CEO, DistriCorp)</i> <i>"Of course, I can't do that alone, so I regularly talk to the process owners. They know their processes, and they can point out findings in [process mining tool], and then I can pass on the information immediately." (CPO, DistriCorp)</i>	Communicating global process knowledge	
<i>"We introduced a central platform where all processes are stored transparently with corresponding process diagrams including the interfaces and transitions between processes. All employees can access the platform and provide input. Besides, process mining is directly integrated so that they can compare the as-is and target processes." (Sales Manager, ManuCorp)</i> <i>"We have developed a process mining system that connects all countries in which we operate. If we can improve our internal processes, we can make efficiency gains and decrease lead times across the whole value chain." (Archival source, ManuCorp)</i> <i>"Covering entire organization with all relevant Data & Analytics in one place." (Archival source, ManuCorp)</i> <i>"Individual parts of the chain, for example, factories or distribution centers, they are sub-optimizing their subprocesses, because they have their own targets and they need to optimize their own plant. Which we all know for already 50 years is a bad thing to do: don't sub-optimize but optimize the chain. [...] But I think if you start to understand how you can optimize a complete value-chain with process mining, then, of course, the organization changes more in the direction of value chain management than managing the individual parts." (Head of Process Analytics, ManuCorp)</i>	Democratizing process knowledge	Shared awareness of process landscape

Table 5: Representative quotes and archival entries for the data structure emerging from the top-down governance approach. Continued.