Topic 1: Theories on Process Mining

So far, process mining research has focused mainly on technical innovations in the form of new algorithms. However, at its current stage of maturity, research is focusing more on its value for organizations. Therefore, we require theoretical models, most likely from the domain of information systems. Such novel theories about process mining provide valuable insights into how this technology is adopted, implemented, and utilized in organizations. For instance, understanding the socio-technical dynamics of process mining usage can shed light on its impact on decision-making, organizational culture, and process improvement initiatives. These theories help explain why some organizations succeed in leveraging process mining while others struggle, guiding practitioners in overcoming common challenges.

The goal of this seminar thesis is to analyze the existing research on process mining theory and theoretical models for process mining. Since the literature is expected to be sparse, the participant has the option to extend it to neighboring disciplines, such as business intelligence.

Literature:

[1] Vom Brocke, J., Jans, M., Mendling, J., & Reijers, H. A. (2021). A five-level framework for research on process mining. BISE, 63(5), 483-490.
[2] Badakhshan, P., Wurm, B., Grisold, T., Geyer-Klingeberg, J., Mendling, J., & Vom Brocke, J. (2022). Creating business value with process mining. JSIS, 31(4), 101745.
[3] Mendling, J., Jans, M., & Sahling, K. (2024). Structuring Empirical Research on Process Mining at the Individual Level using the Theory of Effective Use. ICPM, 520-532

Topic 2: Graph Layouting Algorithms and its Applicability to Process Mining

Visualizations are commonly used in process mining to make results easier to comprehend. This allows users not familiar with the processes or with the technical aspects to gain a faster overview of the acquired insights. In particular, directly-follows graphs (DFG) are often used to visualize the whole process with the different process executions. While almost all process mining tools offer some visualization option for DFGs, there are many differences between them, in particular with regard to the implementation of the underlying layouting algorithms. With research starting to connect the topic of visual analytics and process mining, a closer focus has been placed on the effectiveness of the currently available visualizations. Therefore, an understanding of the underlying layouting and visualization algorithms is also necessary.

This seminar thesis should aim to identify the layouting algorithms used across process mining tools or in research to visualize DFGs. The algorithms should be described in terms of how they work, their differences, advantages and disadvantages. As literature is most likely sparse, available layouting and visualization algorithms from other research fields, especially graph visualizations, should be discussed and compared with respect to their potential applicability in process mining.

Literature:

[1] Mennens, R. J., Scheepens, R., & Westenberg, M. A. (2019). A stable graph layout algorithm for processes. CGF, 38(3), 725–737.
[2] Berti, A., Van Zelst, S. J., & van der Aalst, W. M. P. (2019). Process mining for python (PM4Py): Bridging the gap between process- and data science. arXiv preprint arXiv:1905.06169.
[3] Sonke, W., Verbeek, K., Meulemans, W., et al. (2018). Optimal algorithms for compact linear layouts. PacificVis, 1–10.

Topic 3: Value Creation Strategies in Business Analytics

Business analytics tools, such as business intelligence and process mining, promise to provide value to organizations, e.g., by revealing areas of improvement. However, although many organizations invest heavily in those technologies, they do not achieve the expected value. Analytical results frequently fail to translate into changes in decision-making or process execution, indicating that value creation cannot be explained by analytical capabilities alone. Whether analytical insights lead to impact depends both on how analysts produce and interpret results and on how organizations structure and use analytical work.

The goal of this seminar thesis is to analyze the existing research on value creation strategies in business analytics as socio-technical and organizational phenomenon. Rather than focusing on analytical techniques, it addresses how analytical outputs become consequential within organizations and under which conditions they remain without effect. Since the literature in the process mining domain is expected to be sparse, the scope is set to include all business analytics tools and can be refined if necessary.

Literature:

[1] Badakhshan, P., Wurm, B., Grisold, T., Geyer-Klingeberg, J., Mendling, J., & Vom Brocke, J. (2022). Creating business value with process mining. JSIS, 31(4), 101745.
[2] Kunz, P. C., Spohrer, K., & Heinzl, A. (2025). Process-level value creation from business analytics: A theoretical literature review of value creation paths and changes induced by machine learning. JSIS, 34(2), 101902.
[3] Seddon, P. B., Constantinidis, D., Tamm, T., & Dod, H. (2017). How does business analytics contribute to business value?. Inf. Syst. J., 27(3), 237-269.

Topic 4: Provenance in Visual Analytics and its applicability to Process Mining

Provenance in Visual Analytics (VA) refers to the capture and representation of records and histories related to data, analysis steps, and visualization states. This includes among others *data provenance* (where data comes from and how it is transformed) and *analytic provenance* (the sequence of user actions, decisions, and interactions). Provenance supports transparency, reproducibility, and user orientation by documenting how insights were generated. In VA systems, it helps users revisit previous analysis paths, compare alternative workflows, and maintain awareness in complex, iterative tasks. As datasets and analysis processes become more intricate, provenance becomes increasingly important for supporting human reasoning and collaborative sensemaking.

This seminar thesis should investigate provenance in VA, examine existing methods for capturing and visualizing provenance information, and evaluate how these approaches could be applied in process mining. The overall goal is to provide a structured overview of provenance in VA and assess its potential benefits and challenges within the context of process mining.

Literature:

[1] Ragan, E. D., Endert, A., Sanyal, J., & Chen, J. (2015). Characterizing provenance in visualization and data analysis: an organizational framework of provenance types and purposes. TVCG, 22(1), 31-40.
[2] Camisetty, A., Chandurkar, C., Sun, M., & Koop, D. (2018). Enhancing web-based analytics applications through provenance. TVCG, 25(1), 131-141
[3] Xu, K., Attfield, S., Jankun-Kelly, T. J., Wheat, A., Nguyen, P. H., & Selvaraj, N. (2015). Analytic provenance for sensemaking: A research agenda. CG&A, 35(3), 56-64.

Topic 5: Knowledge Graphs in Process Mining

Process mining traditionally focuses on extracting and analyzing process behavior from event logs, often without leveraging the rich contextual and semantic information that surrounds process execution. Knowledge graphs provide a flexible and expressive way to represent relationships between entities such as activities, resources, documents, goals, and organizational roles. By integrating event data with structured domain knowledge, knowledge graphs can enhance process understanding, enable semantic queries, and support advanced reasoning tasks.

The goal of this seminar thesis is to explore how knowledge graphs are constructed and used in process mining. The participant should investigate: (1) How knowledge graphs are derived from process execution data, process models, and external sources (e.g., ontologies, enterprise data), (2) Which use cases are supported (e.g., semantic process discovery, conformance checking), and (3) How knowledge graph technologies are integrated with process mining tools and methods. The thesis should also evaluate the benefits and challenges of knowledge graph-based approaches, such as scalability, interpretability, and integration with existing process mining platforms.

Literature:

[1] Rott, J., Dorsch, R., Freund, M., Böhm, M., Harth, A., & Krcmar, H. (2023). Breaking Down Barriers with Knowledge Graphs: Data Integration for Cross-Organizational Process Mining. ICPM, 499-512.
[2] Fahland, D. (2022). Process mining over multiple behavioral dimensions with event knowledge graphs. Process mining handbook, 274-319.
[3] Klijn, E. L., Mannhardt, F., & Fahland, D. (2022). Aggregating Event Knowledge Graphs for Task Analysis. ICPM, 493-505.

Topic 6: Empirical Studies on Cognitive Aspects in Process Mining

Most research in process mining has traditionally focused on algorithmic contributions, developing new methods for gaining insights into process data. These technical advances are unquestionably important, but they overlook as aspect that is critical for the organizational utility and success of process mining: Users need to perceive, interpret and use the results generated by process mining algorithms. Studies on cognitive aspects in process mining address this gap by investigating how humans perceive, understand, and interact with process mining outputs. This includes challenges such as interpreting complex process models, identifying relevant deviations, and making decisions based on the insights provided. Empirical studies in this area help reveal common misunderstandings, cognitive limitations, and usability issues that can undermine the effectiveness of process mining in practice.

The goal of this seminar thesis is to provide a complete overview of existing empirical studies on cognitive aspects in process mining. Therefore, the seminar participant is expected to analyze existing literature of empirical research on cognitive aspects in process mining, with a focus on used methods and sub-areas of process mining in focus.

Literature:

[1] Sorokina, E., Soffer, P., Hadar, I., Leron, U., Zerbato, F., & Weber, B. (2023). PEM4PPM: A cognitive perspective on the process of process mining. BPM, 465-481.
[2] Ammann, J., Lohoff, L., Wurm, B., & Hess, T. (2025). How do process mining users act, think, and feel? An explorative study of process mining use patterns. BISE, 1-23.
[3] Zerbato, F., Soffer, P., & Weber, B. (2021). Initial insights into exploratory process mining practices. BPM, 145-161.

Topic 7: Culture in BPM and Process Mining

The success of Business Process Management (BPM) initiatives and process mining projects depends not only on technology and methodology but also on the organizational and national culture in which they are implemented. Cultural factors influence attitudes toward change, collaboration, transparency, compliance, and decision-making—critical aspects that determine whether BPM or process mining delivers value.

The goal of this seminar thesis is to explore how cultural dimensions affect the adoption, effectiveness, and sustainability of BPM and process mining initiatives. The participant should investigate (1) the methods used in the relevant contributions, (2) the cultural factors that influence BPM or process mining success (e.g., risk aversion, power distance), and (3) the dependent factors in BPM or process mining that are influenced by cultural factors (e.g., process model understandability, strategy, governance,...). The thesis should also include a detailed assessment of limitation in the current literature and avenues for future research. The number of publications with respect to process mining is expected to be very sparse. Therefore, a focus on BPM is highly likely.

Literature:

[1] Vom Brocke, J., & Sinnl, T. (2011). Culture in business process management: a literature review. BPMJ, 17(2), 357-378.
[2] Schmiedel, T., vom Brocke, J., & Recker, J. (2014). Culture in Business Process Management: How Cultural Values Determine BPM Success. Handbook on Business Process Management 2: Strategic Alignment, Governance, People and Culture, 649-66.
[3] Jayaganesh, M., & Shanks, G. (2009). A cultural analysis of ERP-enabled business process management strategy and governance in Indian organisations. ACIS.
[4] Kummer, T. F., Recker, J., & Mendling, J. (2016). Enhancing understandability of process models through cultural-dependent color adjustments. DSS, 87, 1-12.