

Topic 1: Visualizing Conformance Checking Results

Conformance checking is one of the main tasks of process mining. It comprises techniques for checking the relation between a designed process model and the real-life behavior of a process, with the goal of identifying and analyzing deviations between them. State-of-the-art conformance checking methods have become computationally very efficient and robust to many kinds of process behavior. They provide feedback in terms of an overall fitness or conformance measure between log and process model. However, in many application contexts, users are interested in seeing the results in more detail, for example inspecting the deviation of an individual trace or identifying patterns of deviations for one specific activity.

The goal of this seminar thesis is to identify the current state-of-the-art in visualizing conformance checking results. Therefore, the participant should first conduct a structured literature review to identify relevant research works. Because the original research in this area is expected to be sparse, the participant should as a second step analyze state-of-the-art process mining tools (such as Celonis, Disco, ProM, etc.) to analyze how they address the challenge of visualizing conformance checking results.

Topic 2: Conformance Checking with Regulations

Business processes often have to follow prescribed regulations, such as clinical practice guidelines in healthcare or laws and statutes in public administration. For both organizational success and official audits, it is essential to know whether processes adhere to those regulations. Conformance checking techniques, which analyze the relation between a designed process model and the real-life behavior of that process and identify deviations between them, can help organizations to address this challenge. However, conformance checking techniques are not directly applicable in this context, because, among other reasons, regulations are typically not represented as process models and the degree of abstraction between regulations and process execution logs is very different.

The goal of this seminar thesis is to identify existing approaches to conformance checking with regulations by means of a structured literature review. Those approaches will be specific to a certain application domain or an individual regulation. In addition, they will fulfill different kinds of objectives within the spectrum of conformance checking. The participant should analyze the identified approaches in detail and find commonalities that could serve as the basis for a general approach for conformance checking with regulations.

Topic 3: Measuring the Quality of Procure-to-Pay Processes

The quality of a business process is measured by means of the devil's quadrangle, which contains the four competing dimensions of time, cost, output quality, and flexibility. Stakeholders want their processes to be as efficient as possible, i.e., to use the lowest possible amount of resources (time, cost, personnel) to achieve the highest possible quality. Process inefficiencies are hence expenditures of resources that do not contribute to the quality of a process and should therefore be avoided. This is particularly relevant for support processes, which do not directly contribute to the value creation of a company, but are necessary for keeping up operations. One example for such a process is the procure-to-pay process, whose goal is to purchase all goods and services that the company needs.

The digitization of process execution within IT systems has enabled process management researchers and practitioners to objectively assess and measure the process quality in terms of outcome-related key-performance indicators (KPIs), such as the percentage of orders that is delivered on time. In addition, the availability of process event log data, which record the real-life execution of business processes, has extended those measurement capabilities by allowing to inspect the actual process flow and identifying, e.g., rework activities (activities that retroactively make changes to previous process steps). This is particularly relevant to processes like procure-to-pay, which are executed so often that even minor improvements in the process may yield substantial improvements in its overall efficiency and quality.

The goal of this seminar thesis is to identify existing approaches for measuring the quality of procure-to-pay processes. Therefore, the participant should conduct a structured literature review focusing on literature from both business process management and operations management. The focus of the literature review should lie on those quality measurements that consider event logs, but can be extended towards KPI-based measurements as well.

Topic 4: Business Processes and Organizational Routines

Research on business processes has so far been conducted in two rather disjoint research communities. Organizational researchers have focused on organizational routines, which are defined as “repetitive, recognizable patterns of interdependent actions, carried out by multiple actors” (Feldman & Pentland, 2003). Here, the research focus is mostly on routine dynamics, where research contributions focus on theories and explanations for why routines change. It often adopts a practice perspective to investigate how technologies influence (digital) transformations and relies mostly on qualitative methods that enable researchers to understand how routines work.

At the same time, business process management (BPM) defines a business process as a “collection of related, structured activities or tasks by people or equipment in which a specific sequence produces a service or product (serves a particular business goal) for a particular customer or customers” (Weske, 2012). BPM research concerns itself with methods to discover, model, analyze, measure, improve, optimize, and automate business processes, using mainly quantitative methods to develop new methods and practical applications.

The goal of this seminar thesis is to analyze the commonalities and differences between business processes and organizational routines. Therefore, the participant should first conduct a structured literature review to find any existing works that connect or relate the two terms with one another. As a second step, the participant should analyze the definitions of both terms (not limited to those given above) in great detail and point out any parallels and contradictions between them.

Topic 5: User Behavior Mining

Process mining is traditionally used to analyze the behavior of business processes that are executed on IT systems, based on their behavior as recorded in an event log. However, the application potentials of process mining techniques go way beyond traditional business processes. One application field of process mining, which has so far not received much attention, is User Behavior Mining (UBM), i.e., the analysis of how the end users of a software interact with its graphical user interfaces. By capturing high-resolution user behavior data in an event log, we can use process mining techniques to find out how exactly people use the software (process discovery), whether that software use corresponds to the intended software design (conformance checking), and how the software use can be improved in terms of conformance or efficiency (process enhancement). In addition, we can see how exactly users execute a certain high-level process activity (process abstraction) and potentially identify dangerous or fraudulent behavior (anomaly detection).

The goal of this seminar thesis is to identify the state-of-the-art in UBM research. Therefore, the participant should conduct a structured literature review to find existing approaches that capture low-level, high-resolution clickstream data from a software system and use methods from process mining to analyze how the data-generating users interact with that system. Given that the number of relevant papers is expected to be sparse, the participant should analyze the available approaches in detail, specifying the objectives, techniques, and available data.

Topic 6: Metrics for Software Usability

The usability of an Information System (IS) is a key factor in designing and selecting business application software. If an IS has a high usability, it is easy to use, easy to learn, leads to a satisfactory outcome for the user, is efficient to use, and easy to memorize. Because usability has been shown to be a clear competitive advantage for any software, the field of usability engineering has dedicated itself to researching how a high degree of software usability can be achieved. In addition to qualitative methods for assessing usability (such as think-aloud studies), quantitative methods for measuring software usability have received considerable interest. Those methods are typically based on so-called software usability metrics, which measure the usability of a certain software.

The goal of this seminar thesis is to compile a list of software usability metrics, which are used in state-of-the-art IS usability engineering. Therefore, the participant should conduct a structured literature review, with a focus on business software applications. For each usability metric, the objective, formula (if applicable), required data, and any other type of relevant property should be stated. If necessary, the resulting list should distinguish between mobile devices and PCs, focusing on the latter.