Processes within organizations can be highly complex chains of inter-related steps, involving numerous stakeholders and information systems. Due to this complexity, having access to the right information is vital to the proper execution and effective management of an organization’s business processes. A major challenge in this regard is that information on a single process is often spread out over numerous models, documents, and systems. This phenomenon results from efforts to provide a variety of process stakeholders with the information that is relevant to them, in a suitable format. However, this disintegration of process information also has considerable disadvantages for organizations. In particular, it can lead to severe maintenance issues, reduced execution efficiency, and negative effects on the quality of process results. Against this background, this doctoral thesis focuses on the spread of process information in organizations and, in particular, on the mitigation of the negative aspects associated with this phenomenon. The main contributions of this thesis are five techniques that focus on the alignment and comparison of process information from different informational artifacts. Each of these techniques tackles a specific scenario involving multiple informational artifacts that contain process information in different representation formats. Among others, we present automated techniques for the detection of inconsistencies between process models and textual process descriptions, the alignment of process performance measurements to process models, conformance-checking in the context of uncertainty, and the matching of process models through the analysis of event-log information. We demonstrate the efficacy and usefulness of these techniques through quantitative evaluations involving data obtained from real-world settings. Altogether, the presented work provides important contributions for the analysis, comparison, and alignment of process information in various representation formats through the development of novel concepts and techniques. The contributions, furthermore, provide a means for organizations to improve the efficiency and quality of their processes.