Algorithmic Synthesis of Structural Alternatives for Business Processes

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Design and management of business processes are key factors for companies to be competitive. Available computer aid for business process analysis and optimization can help evaluating decision alternatives if available. In contrast, no software in the market supports exploring or generating structural alternatives for business processes. A standard Business Process Modeling Notation (BPMN) provides businesses the capability of understanding their internal business procedures in a graphical notation and gives organizations the ability to communicate these procedures in a standard manner. BPMN defines a Business Process Diagram (BPD), which is based on a flowcharting technique tailored for creating graphical models of business process operations. In the last decades, several robust and reliable process network optimization algorithms have been developed and implemented on the basis of the P-graph framework (Friedler *et* al.). P-graph is the only approach for process-network optimization which provides algorithmic mathematically proven solution for its each step, i.e., superstructure generation, construction of the mathematical model, optimization, and the solution interpretation. Appropriate adaptation of these algorithms would be beneficial for business process design and optimization. The application of the P-graph framework for business process optimization requires the algorithmic reformulation of the available business process models in the form of P-graphs and adaptation of the algorithms to the special structural properties of the business processes. The aim of our research is to develop a methodology that provides an adequate basis to describe and model business processes, as well as to algorithmically synthesize optimal and alternative business processes. Widely used business process modeling notations and theoretical results of algorithmic process-network synthesis are to be integrated. A novel approach for BP optimization has been proposed based on the P-graph methodology. Model transformation of BPDs to P-graphs as well as algorithms for generating structural alternatives for business processes have been elaborated and implemented. The proposed methodology has been applied to practical problems of recent R&D projects.