Two Problem Formulations for Process Innovation Based on Operations Sophistication

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ABSTRACT

Process innovation is assumed to require a more intrinsic rethinking of business processes, which is typically a creative process. Nevertheless, in this creative, prolific process, there can be artifacts derived from rational practices that are capable to provide insightful recommendations. In this work, the authors claim that an event log, a file that registers the execution of the relevant business processes, can be the source of such an artifact. They describe the fundamental elements of two problem formulations, namely the set of alternatives; the set of potential actions that the decision-maker may undertake; the set of points of view (dimensions) from which the potential actions are observed, analyzed, evaluated, compared, etc.; and the problem statement (what is expected to be done with the alternatives) for two cases.

KEYWORDS

Evaluation Models, Problem Formulation, Process Innovation, Process Mining

INTRODUCTION

Typical business processes in contemporary organizations can be defined as *a collection of inter-related events, activities, and decision points that involve a number of actors and objects, which collectively lead to an outcome that is of value to at least one customer* (Dumas, La Rosa, Mendling, & Reijers, 2018). To pursue the challenge of improved efficiency and effectiveness, organizations may follow a variety of options (Harmon, 2007), ranging from process innovation to process redesign and to process improvement. The seminal work of (Rosemann & vom Brocke, 2015) identifies process innovation within the core element of *Methods* as the stage that includes all methods which facilitate the development of improved business processes, as well as within the core element of *Information Technology* as the (semi-) automated support for the generation of improved business processes. There are of course different types of process innovation and a plethora of approaches towards it, however, arguably, among the factors that can stimulate and promote it, we find the reduction of innovation latency (Rosemann, 2014) (i.e., to timely anticipate what improves the process), and the mitigation of the organizational resistance towards a process change endeavor (W. M. P. van der Aalst, La Rosa, & Santoro, 2016).

The research aim of this work is to support an organization's decision on what elements of a business process should gain emphasis and priority during a process change project. In such a problem,

there are several research questions that can be shaped: How organizations should proceed? What is the shape of a solution? Why such a solution should be preferred against another? In this context, this work contributes by defining two problem formulations that eventually allow the identification of the underlying structure of the relevant decision problem, and as such, they allow the re-use of procedures and models (Bouyssou, Marchant, Pirlot, Tsoukiás, & Vincke, 2006) forging a consistent process innovation technique.

Although it is typical to assume process innovation as a creative process (Figl & Recker, 2016), in this creative, prolific challenge there can be artifacts derived from rational practices that are capable to provide insightful recommendations. In this work, we claim that an event log, a file that registers the execution of the relevant business processes, can be the source of such an artifact. Therefore, we adopt a *process mining* perspective that commits to discovering process behavior (patterns) from the event log.

In this work, we propose a way to address the research questions we stated in the above paragraph by exploiting the outcomes of a process mining venture. We claim that this can be achieved by looking and taking action according to a metric that we call *Operations Sophistication*. This metric reflects how much diversified are the capabilities of an organization, and how difficult it is to deploy and apply those capabilities to the organizational operations. The core assumption is that a more versatile organization is expected to be able to demonstrate higher sophistication, manifest more complex sets of capabilities, and hence achieve better performance.

More specifically, we assume a tripartite network. The one part consists of the capabilities, the second of the organizations, and the third of the behaviors/ patterns they exhibit over their operations within a business process. Organizations are connected to their available capabilities, and patterns are connected to their required capabilities. Then, if a pattern is observed, we can assume that all the required capabilities are in place, therefore, we can reflect the tripartite network with a bipartite one, connecting organizations to patterns. In previous work (Delias, Acheli, & Grigori, 2019), we have shown that by analyzing the structure of such a bipartite network (an organizations-patterns network) and by iteratively considering the properties of the neighboring nodes of each part, it is possible to derive several metrics that reveal the potentials of the patterns to contribute to higher sophistication for the organizations. However, even after deriving several relevant metrics, it is not clear how a problem situation can be shaped and how a corresponding decision model can be formulated. This is exactly the topic that we address in this work.

More specifically, the focus of this work is to formally describe two relevant problem situations (one at the level of organizations, and one at the level of human resources) that will enable the stakeholders who will be involved in process improvement projects, to have a clear picture of what is at stake, and to shape solution paths. In the next section, we try to give an overview of the related work and of the concepts related to the Operations Sophistication notion. In the methodology section, we position our work on a process mining project. Although this work focus on a particular phase of process mining projects, with a rather conceptual nature, we try to put our contribution in a more applicative context. Therefore, in the next section (Business understating through problem formulation in context), we present the two problem formulations along with all the required definitions, and their implications. A fictional example is used for illustrated purposes to demonstrate the practical potential of the conceptual contributions that lead to the forging of the corresponding artifacts. A short discussion concludes the paper.

BACKGROUND

Related Efforts

The concept of *Process Innovation,* since its introduction four decades ago by (Utterback & Abernathy, 1975), and after having been pursued by an abundance of organizations, has been revived in 1993

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