Decision Support for Operational and Financial Risk Management - The ProcessGene Case Study

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Abstract. This work suggests a generic framework for risk related decision making from a business process management viewpoint. The framework is based on the methodology embedded in the ProcessGene Risk Management software suite. The suggested method aims to assist risk managers in making risk related decisions along the entire lifecycles of risk management, governance and compliance. This decision making is based on knowledge that is encapsulated within existing business process repositories. The method is demonstrated using a real-life process repository from a manufacturing industry.

Keywords: Business process decisions, Operational risk management, Financial risk management, Business process management, ProcessGene.

1 Introduction

With the increase of regulatory requirements on one hand, and the attempts to optimize business outcomes on the other, organizations are required to invest more efforts in identifying and managing risks. Executive officers are specifically required to demonstrate effective risk management practices, and to ensure corporate transparency and visibility into the business. The risk management process is continuous, and needs to be closely monitored. As management is personally responsible for monitoring risk levels, this responsibility requires significant management attention and allocation of time and effort.

As risk management is an ongoing organizational task, several decision making processes are required during its lifecycle. For example: deciding regarding likelihood and impact of the risk for the organization, deciding how to mitigate risks, and determining the organization's tolerance level regarding its risks.

Research in this field has focused mainly on specific business cases and business types, for example, on real-time decision making (e.g. [2,3]), on specific industries (e.g. [4,10]), or on specific risk types (e.g. [7,11]).

This work aims to suggest a complete framework for risk related decision making from a business process management viewpoint. The framework is based on the risk management methodology embedded in the ProcessGene Risk Management software suite [8]. The suggested method aims to assist risk managers in making risk related decisions along the entire lifecycle of risk management. The paper contributes to the state of the art literature in the following way: it presents

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a complete framework for risk decision making related to risk management that takes into account changes during the organization's lifecycle. Examples in this paper are taken from a real-life paper manufacturing process repository.

The paper is organized as follows: we present related work in Section 2, positioning our work with respect to previous research. In Section 3 we present the ProcessGene business process model structure and terminology as background to this work. We describe the method for risk related decision making in Section 4. We conclude in Section 5.

2 Related Work

The content layer of business process models can be utilized for supporting business users in performing several types of business tasks [15,16]. One of these utilizations is the support of process related decisions [14].

Research on decision making related to risk management focuses on several aspects. Some researches focus on real-time decision making. For example, the work in [2] suggests a framework for decision making support during unexpected events in the operation of large-scale systems. The authors of [3] suggest a decision support framework for situations in which a number of interconnected decisions are required at the same time.

Other works focus on a specific industry or risk category. The work in [12], for example, focuses on flood risk mapping, and provides support for forecasting of floods and inundation phenomena and evaluating the effects of decisions aimed at reducing social, economical and environmental related damages. Similarly, a generalized decision-support system for water-resources planning and operational management is suggested in [1]. The work in [9] analyzes how numeracy influences risk comprehension and medical decision making; and a framework for managing decisions in a child protective services is suggested in [4]. A specific analysis of risk related decision making in banks is presented in [10].

In addition, another stream of research focuses on decision making related to specific risk types, for example, on ethical [6,7], operational [2], or financial [11] risks.

Each of the above described frameworks focuses on a specific niche of risk related decision making. In doing so, these works assist in making risk related decisions related to a specific industry, risk type, or business situation. Nevertheless, an end-to-end, more generic framework is also required - to support the entire lifecycle of risk related decisions in any organization. Therefore, in this work we present a generic risk related decision support system.

3 Background: The ProcessGene Business Process Model Structure

This section describes the ProcessGene business process model structure. We first introduce the activity flow structure, and then we introduce the process

artifacts notion. To illustrate the process model and related GRC artifacts we make use of the paper manufacturing repository (see Section 1).

The Workflow Management Coalition (WFMC) [5] defines business process as a "set of one or more linked procedures or activities which collectively realize a business objective or policy goal." An example of such business process model is the "Pack paper" process model, presented in Fig. 1. This figure is based on YAWL [13] with two slight visual representation modifications, convenient for our needs: (a) roles were added at the top of each activity; and (b) predecessor and successor processes are presented as nested activities at the beginning and at the end of the workflow.

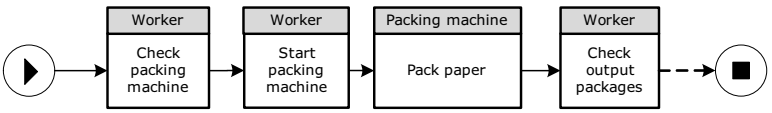

Fig. 1. An example: the "Pack paper" process model

In the ProcessGene process model each activity is related to several process artifacts (e.g. risks, controls, change requests), as illustrated in Fig. 2, using UML relationship symbols. Process artifacts provide an additional data to the activities. In particular, GRC artifacts (risks and controls) provide data regarding risks that are related to the activity, and controls-aimed at mitigating these risks.

For example, in Fig. 1, the activity "Check output packages" is related to the risk "Worker didn't pay attention to damaged packages" and to the mitigating control: "Sample packages for additional QA," that is executed by the QA team.

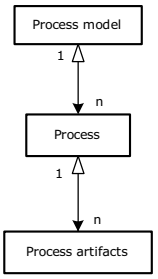

Fig. 2. The ProcessGene process model

4 Framework for Risk Related Decision Making

In this section we present a framework for supporting decisions related to the management of risks and mitigating controls during an organization's lifecycle.

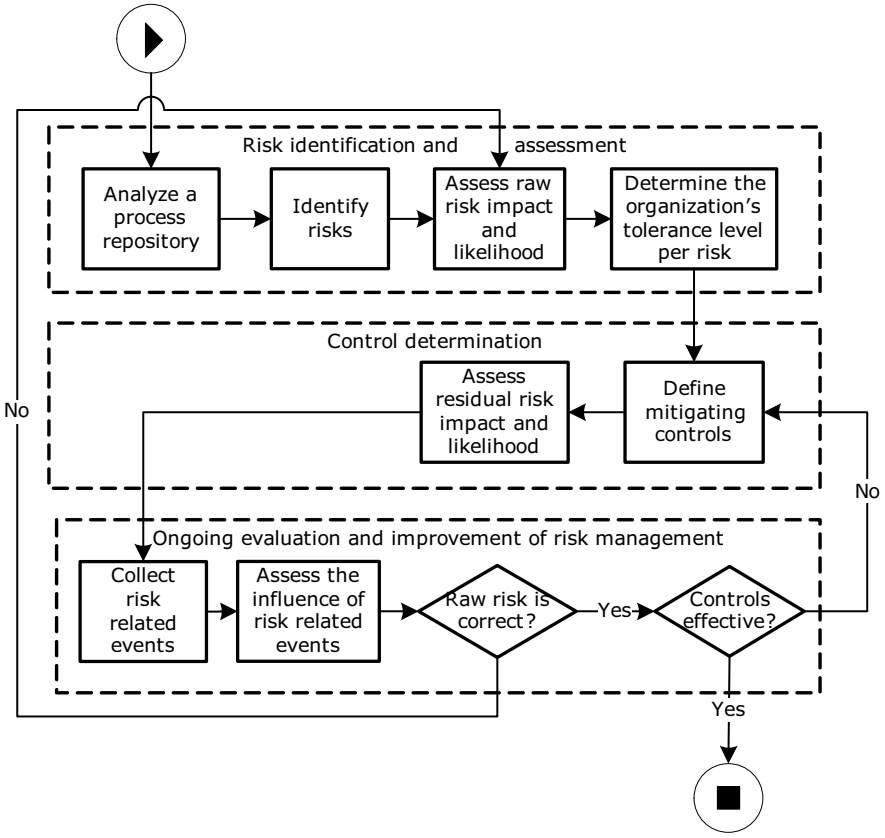

Fig. 3. ProcessGene's framework for risk related decision making

The framework receives a process repository as input and describes how to manage decisions related to risk identification, evaluation, mitigation and updates.

ProcessGene proposes a ten-step framework to support risk related decision making for organizations, as illustrated in Fig. 3 (using "Yet Another Workflow Language" (YAWL) [13]). According to this framework, we first analyze a process repository, and understand the organization's operations. Second, based on the process repository, we search for activities that may induce operational or financial risks. For example, in the paper manufacturing repository, the activity "Check packing machine" is related to the operational risk: "Worker injury," and the activity "Review financial quarterly report" is related to the financial risk: "Wrong financial data."

At the third step, we analyze each identified risk and assess its raw likelihood (the chance it will occur), and its raw impact (the magnitude of damage it may cause the organization, once the risk happens). As a fourth step we determine the organization's tolerance regarding each risk, meaning: the level of risk it would consider as acceptable. this threshold is calculated as the tolerated impact

multiplied by the tolerated likelihood. The above first four steps are conducted on a given process model repository based on the risk manager's assessment, and are considered as "preparation" phases - since they are conducted only once (or after each time the repository changes). The data determined in these first phases will be modified according to real risk events on an ongoing basis.

As a fifth step, the risk manager lists all risks in which the multiplication of raw impact and likelihood is above the organizational tolerance level. For each such "non-tolerated" risk, the risk manager defines mitigating controls - aiming at reducing the raw risk level. For example, in order to reduce the risk level of "Worker injury," the mitigating control: "Worker wears a helmet during machine checkups" is defined. After defining the mitigating controls, in the sixth step we re-assess the risk likelihood and impact levels while taking into account the execution of the related controls. The reduced impact and likelihood are referred to as "residual." The above two additional steps are also conducted based on the risk manager's assessment, and are also considered as "preparation" phases.

The next four steps aim at maintaining and updating the risks and controls in the process repository according to real risk events, as follows. The seventh step is an ongoing phase in which the organization collects risk related events. For example, a "Worker hand injury" event will be related to the "Worker injury" risk, and financial costs will be documented (e.g. costs related to treatments, law suits, loss of work hours, etc.). After each such risk event, the risk manager re-evaluates the risk and whether it was assessed correctly (see step #8). For example, if the "Worker injury" risk likelihood was defined as "unlikely" and there were ten injury events in 6 months-the risk manager should find a gap between the definition and actual risk likelihood level. As a result of this re-assessment, in the ninth step the risk manager checks if the raw risk was defined correctly (meaning-if the control was not carried out-are the raw risk levels compatible with the actual risk events?). If the answer is "yes"-the risk manager returns to step 3 and corrects the risk's raw impact and likelihood levels. He then continues to steps four-six and corrects their output data. If the answer is "no" (the raw data was defined correctly), we continue to the tenth step in which the risk manager determines whether the control is effective or not. This is the most important step-because it makes sure that risks are mitigated correctly with regard to the organization's risk tolerance. If no - the control needs to be redefined (step 5) and residual risk levels should be reassessed accordingly (step 6). If yes (the control was effective) - the risk manager completes the handling procedure of the specific risk event.

5 Conclusions

We presented the ProcessGene framework for supporting risk related decision making from a process management viewpoint. The proposed framework is already applied in real-life scenarios, yet several research issues remain open. We mention two such extensions here. First, analyzing the framework's strengths and searching for possible improvements. Second, adding a case study and experiments to measure the efficiency of the presented framework.

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