

Risk profile assessment embedded into the Bayesian framework

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Abstract. Adverse events in organizations are more than a serious concern. Over the last few years the awareness of this problem has raised and different organizational solutions have been tried. We focus on the problem of managing operational and clinical risks, in terms of events that influence the success of service delivery. This paper is aimed at proposing risk management as the basic methodological approach to deal with adverse events and risks. We propose Bayesian networks (BNs) to assess risk profiles given a context of application and benchmarks by Bayesian decisional theory to evaluate the profiles, i.e. defining the acceptability of them.

The method is described both at a theoretical and an empirical level, thanks to its application to health care (haemodialysis department) and banking field. The occurrences of these top events are modeled by Bayesian networks which gather posterior risk profiles for each patient or banking business line. The comparison of them with a reference risk profile is input for decision making. BNs augmented with decisional nodes and scenario analysis complete the risk management process. The ultimate goal is to improve risk profile and, consequently, service supply quality in the organization.

Keywords: Bayesian network, Distance measure, Bayesian decision theory, Risk management, Risk assessment, Predictive risk profile, Operational risk, Clinical risk

1 Introduction

Nowadays information technology monitoring systems collect large masses of data by close time windows (i.e. hours, minutes, seconds). Each application context needs of informations on which risk managers periodically assess risks. The dynamic nature of risks and the lack of some key informations require to extract all available knowledges through the merging of different data sources, e.g. coming from consortia, self-assessment of experts and internal collection. A risk is defined as a set of scenarios, each of which combines uncertainty and exposure, quantified by probability of the frequency with which an event might take place (uncertainty about the frequency) and by probability of the severity of the consequence (uncertainty about the severity of the consequence).

Among several risk categories this paper focuses on operational and clinical risk. Operational risk (OR) involves all activities with a poor organizational control environment and the term stresses the role of pertaining to the delivery of services [1, Alexander (2003)]; health care organizations (HCOs) emphasize the role of the particular service supplied, i.e. the functioning of the facility, the health care delivery focusing on patient safety, and introduce the clinical risk term (CR) [10, Lorton (2005)].

Internal and external industrial environments, such as new activities or machineries, service supply processes, markets or customer (also patients) modify quickly risk business profiles; the risk manager has to forecast adverse events and to detect the unacceptable risks. Furthermore, to forecast possible harmful events and to activate control systems the data have to be update on horizon time.

In the present work we intend a methodology for the evaluation of operational and clinical risk profiles, useful for different business domains. The method will be described both at the theoretical level and empirical one, involving health care and banking fields as examples.