Chapter XI

DQ Options: Evaluating Data Quality Projects Using Real Options

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ABSTRACT

Data plays a critical role in organizations up to the point of being considered a competitive advantage. However, the quality of the organizations’ data is often inadequate, affecting strategic and tactical decision-making, and even weakening the organization’s image. Nevertheless it is still challenging to encourage management to invest in data quality improvement projects. Performing a traditional feasibility analysis based on return on investment, net present value, and so forth, may not capture the advantages of data quality projects: their benefits are often difficult to quantify and uncertain; also, they are mostly valuable because of the new opportunities they bring about. Dealing with this problem through a real options approach, in order to model its intrinsic uncertainty, seems to be an interesting starting point. This chapter presents a methodological framework to assess the benefits of a data quality project using a real options approach. Its adequacy is validated with a case study.
INTRODUCTION

Quality control and management have become competitive needs for most businesses today. Approaches range from technical, such as statistical process control, to managerial, such as quality circles. An analogous experience basis is needed for data quality.

Many of the problems that come up when using poor quality data are well-known to software engineers. The NEAT methodology (Bobrowski, Marre & Yankelevich, 2001) provides a systematic way to determine data quality so as to develop an improvement plan. The output is a diagnosis of the present data quality condition and an improvement plan that comprises both corrective and preventive actions (in order to maintain the quality standards finally met). In particular, NEAT bases its approach on the goal question metric framework (Fenton & Pfleeger, 1997), GQM from now and on, a framework used for metrics definition.

However, there are no serious studies aimed at providing a framework to analyze the convenience of investing in data quality improvement. Many organizations come to action when they find they have very poor data (lawsuits filed by clients, returned posts, networks that do not match reality, etc.). The analysis is ad-hoc and, generally speaking, it aims at assessing the initiative cost alone, thus submitting the decision to the resulting amount (high or low) (Loshin, 2001; Trillium Software, 2002).

The question then is how to justify a preventive approach to these issues? The first approach would imply conducting a classic feasibility analysis, using standard techniques: net present value (NPV), profitability index (PI), and internal rate of return (IRR). Nevertheless, there are many limitations when applied to the analysis of quality investment projects: the benefits of this kind of projects are usually difficult to quantify economically, basically because they are not direct: they are related to the opportunities they bring about. In addition, part of the economic impact is associated with cost-saving resulting from prevented problems, which is difficult to measure and is not captured by traditional indicators.

Within this context, it seems interesting to use a real options approach (Brealey & Myers, 2000; Amran & Kulatilaka, 1999; Brach, 2002) to model the uncertainty that exists with respect to the subsequent decision. This model also allows capturing the essence of the NEAT methodology (Bobrowski, Marre & Yankelevich, 2001), which presents the need of making a diagnosis to assess, based on its output, the convenience of implementing a corrective improvement action on the data and also to establish specific improvement expectations. This model would allow assessing the best investment that an organization can make to improve its data, considering the performance evolution of the quality investment and future benefit expectations.

There are records of the use of the real options model to assess different software engineering projects (Boehm & Sullivan, 2000; Sullivan, Chalasani, Jha & Sazawal, 1999). However, their use to assess the benefits of quality investments has not been studied yet. We believe this model offers an interesting potential which is worth exploring.
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