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Alejandro Maté, Juan Trujillo, John Mylopoulos



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Specification and Derivation of Key Performance Indicators for Business Analytics: A Semantic Approach

Alejandro Maté^{a,*}, Juan Trujillo^a, John Mylopoulos^b

^a*Lucentia Research Group, Department of Software and Computing Systems, University of Alicante, Carretera San Vicente del Raspeig s/n - 03690 San Vicente del Raspeig - Alicante, Spain*

^b*Department of Computer Science, University of Trento, Via Sommarive 9 - 38123 Povo - Trento, Italy*

Abstract

Key Performance Indicators (KPI) measure the performance of an enterprise relative to its objectives thereby enabling corrective action where there are deviations. In current practice, KPIs are manually integrated within dashboards and scorecards used by decision makers. This practice entails various shortcomings. First, KPIs are not related to their business objectives and strategy. Consequently, decision makers often obtain a scattered view of the business status and business concerns. Second, while KPIs are defined by decision makers, their implementation is performed by IT specialists. This often results in discrepancies that are difficult to identify. In this paper, we propose an approach that provides decision makers with an integrated view of strategic business objectives and conceptual data warehouse KPIs. The main benefit of our proposal is that it links strategic business models to the data for monitoring and assessing them. In our proposal, KPIs are defined using a modeling language where decision makers specify KPIs using business terminology, but can also perform quick modifications and even navigate data while maintaining a strategic view. This enables monitoring and what-if analysis, thereby helping analysts to compare expectations with reported results.

Keywords: Business Intelligence, Conceptual Data Warehouse Models, Key Performance Indicators, Strategic Models, Business Analytics

1. Introduction

Key Performance Indicators (KPI) are used by enterprises to monitor the performance of their processes and business strategies [21, 33] relative to their objectives. KPIs are traditionally defined with respect to a business strategy or business objective using a Balanced Scorecard [18], to indicate what is to be monitored in different areas of the enterprise thereby providing a global overview of the enterprise's status. To monitor KPIs, enterprises rely on dashboards [10, 33] presenting one or more KPIs together with contextual information in order to help decision makers identify deviations and their root causes.

However, this practice presents several drawbacks. First, it provides only partial information to decision makers, as KPIs are created and analyzed in isolation without taking into account inter-relationships and influences between them. For example, how are we achieving our objective "Reduce costs"? How does this affect our other objective "Increase revenue"? Essentially, decision makers query for a strategic problem and obtain data, such as current cost totals, missing the rest of the strategic context as an answer. Then, they are required to interpret and link these raw data back to their business strategy and how it affects other business objectives. For example, our KPI "Manufacturing Cost" has increased as a result of an increase in the price of basic materials. What

*Corresponding author. Tel: +34 96 5909581 ext. 2737; fax: +34 96 5909326

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