Journal of Cases on Information Technology
Volume 21 • Issue 1 • January-March 2019

An Event-Based Data Warehouse to Support Decisions in Multi-Channel, Multi-Service Contact Centers

Andrea Brunello, University of Udine, Udine, Italy
Paolo Gallo, University of Udine, Udine, Italy
Enrico Marzano, G.A.P. Srlu, Udine, Italy
Angelo Montanari, University of Udine, Udine, Italy
Nicola Vitacolonna, University of Udine, Udine, Italy

ABSTRACT

Multi-channel contact centers are an increasingly important component of today's business world. They serve as a primary customer-facing channel for firms in many different industries, and employ millions of operators across the globe. During their operation, they generate vast amounts of data, ranging from automatically registered logs to handwritten notes and voice recordings. Unfortunately, in most firms, data of interest is unstructured, and stored in several databases, making their exploitation very hard. This article presents a decision support system for a multi-channel, multi-service contact center for front office business process outsourcing, along with its prospective extension to a decision management system. Its core is an enterprise-wide data warehouse, based on the general concept of an event. The proposed system supports a broad new set of advanced analysis tasks, ranging from operator performance assessment to call-flow simulation and data mining, providing operational and management staff the basis for taking effective operative and strategic decisions.

KEYWORDS

Business Intelligence, Contact Center, Data Integration, Data Mining, Data Warehousing, Operator Performance Assessment

INTRODUCTION

Nowadays, more and more companies deal with very large amounts of heterogeneous information related to their fields of interest, which are potentially extremely useful in developing current and future business strategies. Business Intelligence (BI) is a set of tools and techniques for the transformation of raw data into meaningful and useful pieces of information for business analysis purposes.[1] BI entails the management of (often huge) amounts of unstructured data to help in identifying, improving, and possibly defining new strategic business opportunities. In particular, BI aims at providing historical, current, and predictive views of business operations.

DOI: 10.4018/JCIT.2019010103

Unfortunately, apart from being unstructured, data of interest are often stored in several databases, possibly provided by different vendors, and may adopt different naming conventions or storage formats. Possible reasons for this situation are the gradual, step-by-step extension of company's information infrastructure, or the use of heterogeneous, independent software modules to satisfy different business needs. This makes the exploitation of information very hard. In many cases, the first step toward a profitable use of data is the creation of a single and unified repository, collecting and organizing all the needed pieces of information, namely, a data warehouse.

In most enterprises, a data warehouse is the core constituent of the company's Decision Support System (DSS) (March & Hevner, 2007). A DSS allows the company to manage all relevant pieces of information by leveraging a set of information technology (IT) tools and techniques, including traditional business intelligence and more sophisticated approaches to data analysis, such as data mining.

Decision Management Systems (DMSs) (Taylor, 2011) are a further development of a company's infrastructure, whereby an *Artificial Intelligence* (AI) layer complements a decision support system, allowing to take preventive automated actions based on input information, possibly affecting the production systems. Thus, one may think of the entire process as a sense-decide-act cycle. Various authors have proposed the adoption of such systems in different domains, ranging from infrastructure management (Park & Kim, 2013) to medicine (Polese, 2014) and education (Siguenza Guzman et al., 2014).

This paper presents the development of a DSS for a multi-channel and multi-service contact center for front office business process outsourcing (BPO), along with its prospective extension to a DMS. At the best of the authors' knowledge, such a domain, which offers various interesting insights, has not been thoroughly investigated so far. The authors chose the case project on the basis of an ongoing research collaboration between the authors and the R&D office of a contact center company, that provided many interesting insights on domain problems and inspired several meaningful research topics, part of which are explored in this paper. The others will be investigated in future work. Since a BPO contact center typically deals with many different clients, the DSS must handle a huge amount of heterogeneous data, continuously originating from different sources, thus dramatically benefitting from a centralized data repository that allows many advanced data analysis tasks, e.g., enterprise-wide activity tracking of employees. To cope with data heterogeneity and fragmentation, the authors devised an event-based data abstraction, which plays a fundamental role in the developed system.

The paper has the following structure. The first Section provides some background knowledge, giving a short account of DSS, DMS, data warehousing, and data integration concepts. Then, the second Section introduces the application domain, which is set in the context of BPO and contact centers, followed by a description of the infrastructure of a typical BPO information system, inspired by a real company. Afterwards, the third Section outlines a new system infrastructure based on an original DSS. In doing that, special attention is devoted to the development of the new enterprise-wide data warehouse, based on the general concept of event, which is the core of the infrastructure. Next, the fourth Section presents some of the many advanced analysis tasks supported by the system. Then, the authors discuss the impact of the new system on the company operational processes. The remaining part of the work outlines future work directions, that include the evolution of the DSS into a DMS, and the integration of more advanced analysis tasks, based on natural language processing. Conclusions provide an assessment of the work done.

BACKGROUND KNOWLEDGE

This section gives a short account of the fundamental notions of decision support system, decision management system, data warehouse, data loading, and data integration.