ENTERPRISE RELATIONSHIP MANAGEMENT IN THE CLOUD

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Abstract

Relationship management in the extended enterprise is a dominant value creation strategy in the new economy, where businesses are moving from the internal operational focus to the external focus of customer and supplier intimacy. Enterprise relationship management (ERM) concerns the management of relationships that includes customer relationship management (CRM), partner relationship management (PRM) and supplier relationship management (SRM). The emergence of Big Data and Cloud Computing provides new opportunities and values for ERM. New Big Data channels such as social media, machine-to-machine (M2M) and the Internet of Things (IoT) have impacted the entire ERM ecosystem. Cloud Computing emerged as a computing platform that uses technologies such as virtualization and grid computing, delivering information and communication resources as services through software and virtual hardware. It is a pull-based model allowing access to resources on-demand based on user needs anytime and anywhere. This paper examines the Big Data and Cloud characteristics of ERM. It describes the cloud platform supporting ERM operations, analytics and collaboration. A conceptual framework is presented for the deployment of ERM in the cloud.

Keywords: Enterprise Relationship Management, Big Data, Cloud Computing, ERM analytics.

Introduction

Enterprise relationship management (ERM) deals with the relationship assets between the firm and its constituents in the extended enterprise. It has become an important business value creation strategy in the new economy succeeding the production and information ages. Customer relationship management (CRM) has been a dominant relationship strategy in the past two decades to acquire and maintain customers and ultimately producing profitability for the firm. Supplier relationship management (SRM) is the other side of the same coin in relationship management, as suppliers' commitment to meeting production requirements and procurement costs can significantly impact a firm's performance. Aberdeen [1] described that procurement represents the single largest expense at most organizations. Similar to CRM, partner relationship management (PRM) is a downstream relationship strategy to acquire and retain channel and alliance partners. Tanoury and O'Leary [25] described that more that 50 percent of the high-tech industry's sales go through indirect channels. Alliance partners can promote a firms' sales by providing value added services and products. ERM concerns the management of relationship assets across the extended business enterprise through CRM, PRM and SRM.

The ecosystem of CRM consists of operational CRM, analytic CRM and collaborative CRM (Meta Group [17]). Similarly, the ecosystem for ERM can be defined to consist of operational ERM, analytic ERM and collaborative ERM. Operational ERM consists of marketing, sales, and service for CRM and PRM, where purchasing replaces sales in SRM. Gebert et al. [12] described a process model for CRM that consisted of the management of campaigns, leads, sales offer, contract, customer complaints, and service. Chan [3] described an extension of the CRM process model to ERM (Figure 1). In analytical ERM, operational data from ERM is collected, transformed and analyzed to produce actionable business insights to enhance ERM operations. Collaborative ERM concerns an integrated approach to manage the interactions between the firm and its constituents via many touch points and the coordination of various entities in the firm that handle constituent information. This paper examines the ecosystem of ERM in the age of Big Data and

Cloud Computing. A framework is presented utilizing the cloud as a service platform that is demand driven, supporting the ERM operations, analytics and collaboration.

Figure 1: The ERM Process Model (Adapted from Chan [3])

ERM PROCESSES	CRM	SRM	PRM
Marketing	Campaign Management	Campaign Management	Recruitment Management
			Campaign Management
	Lead Management	Lead Management	Lead Management
Sales / Purchasing			Referral Management
	Offer Management	Source Management	Contract Management
	Contract Management	Contract Management	
	Customer Order Management	Purchase Order Management	Partner / Customer Order Management
Service	Service Management	Service Management	Service Management
	Inquiry and Complaint Management	Inquiry and Complaint Management	Inquiry and Complaint Management

Big Data ERM

Big Data refers to datasets, whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze (McKinsey [16]), relative to the capability of prevalent technology of the time. The Gartner Group (Gartner [11]) characterized Big Data by the three V's: volume, velocity and variety. Other researchers later added veracity and value to its characterization. Relative to the prevalent technology of the time, hundreds of gigabytes of data in the 1980s would be considered as Big Data, where the IBM 3850 Mass Storage System with a capacity of 102.2GB was the monster storage device of its day (Columbia [5]). In today's environment, datasets that may be considered as Big Data could range from petabytes, exabytes to zettabytes. Minelli [18]) characterized velocity by the speed at which data is created, accumulated, ingested, and processed. Contributing factors to the volume characteristic include high volume data from enterprise transactions, web transactions, e-business and m-commerce transactions, machine-generated data, social media, and geospatial data.

Variety is a characteristic concerned with not only structured data, but also data types that are semi-structured and unstructured. They include text, video, audio, documents, and images from data sources such as clickstreams, industry reports, surveys, surveillance sensors, satellite images, and devices. Das and Kumar [6] described that unstructured data will account for 90 percent of all data created in the next decade. As the variety and number of data sources grow, establishing the quality of data becomes a concern. Veracity represents both the credibility of the data source as well as the suitability of data for the target audience (Sathi [22]). In addition to technical characterizations of Big Data, the value dimension adds the business perspective to Big Data that addresses the commercial value such as predicting the ROI and projected budget acquired **(**Oracle [19]).

Big Data sources for ERM include new channels such as social media and M2M communications. ERM operations can be conducted via social campaigns and social engagements utilizing the social media channels. Faase et al. [9] described the evolution of CRM from a strategy focused on customer transactions to social CRM, which is based on a strategy focused on creating engagement between customers and the company. Service and sales are using channels in social media as a source of new leads and intelligence on prospects (Gartner [10]). Orenga Rogl. and Chalmeta [20] described that the social customer is the customer that makes use of social software, which moves in a scenario characterized by permanent connectivity, mobility, being multichannel and the progress of the Internet of Things. Similar analogy can be drawn with PRM and SRM, where partners and suppliers interact with the company via social media.

Machine-to-machine (M2M) communication between devices in the wired and wireless networks can contribute to the velocity, volume and variety characteristics of Big Data. The growing use of sensors, smart meters, scanning devices, and wearable has fueled the proliferation of the Internet of Things (IoT). According to Machina Research [15], total number of IoT connections will grow from 6 billion in 2015 to 27 billion in 2025, and that by 2025, IoT will generate over 2 zettabytes of data. Suciu et al. [23] described that the convergence of Cloud computing, IoT and Big Data could lead to a range of new applications including eHealth. It further asserted that most IoT applications are based on M2Mcommunication protocols between large numbers of heterogeneous geographically distributed sensors and need to handle many hundreds or thousands of sensor streams, and could directly benefit from the immense distributed storage capacities of cloud computing infrastructures. According to Gartner [10], the Internet of Things has become the fifth driver for CRM, after the cloud, social, mobile, and Big Data. M2M communication provides a new channel for the information exchange and engagement of a firm and its customers, partners and suppliers, promoting marketing, sales, purchasing, and service in operational ERM. Sales and lead management can be facilitated by M2M communications (Ericsson [8], PLDT [21]). Connecting mobile devices to customer and partner data can facilitate real-time information supporting field sales. Assets can be monitored from remote and service activities can be triggered when anomalies are detected. Another emerging trend in M2M is geospatial computing utilizing mobile devices and sensors (Chen and Guinness [4]). Mobile geospatial technologies can be used in location-based marketing sales and service in ERM.

Big Data Relationship Management in the Cloud

According ISO/IEC [13], Cloud Computing is a paradigm for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable cloud resources accessed through services which can be rapidly provisioned and released with minimal management effort or service provider interaction. Cloud computing emerged in the last decade as a computing platform that uses advances in information and communication technologies such as virtualization and grid computing (Sultan [24]), delivering services through software and virtual hardware provisioned by cloud providers according to user demands and requirements. The real-time economy demands speedy responses to the needs of constituents at anytime and any location around the world. Cloud computing is a pull-based model based on user demands. Low et al. [14] described that the essence of the cloud-computing paradigm is derived from the idea that users shall be able to access on-demand to any application, wherever the users are located in the world.

Big Data processing requires a massive scalable computing platform that can handle the associated volume and speed. The costs of building on-premise data centers to meet the need of growth of Big Data could be prohibitive for many firms. Minelli et al. (2013) described the driving need for a new, value proposition that is being manifested in the cloud model. The cloud provides a platform of collaboration for ERM. Delic and Riley [7] envisioned that the cloud-computing environment was first an opportunity for massive collaboration between people, while the future of cloud-computing may involve the operation of intelligent virtual objects and devices that would collaborate with people. It described that the cloud infrastructure delivers the potential of having a gigantic amount of devices that are inter-connected, fostering the emergence of brand new applications stimulating the development and availability of innovative solutions and applications.

Figure 2: ERM in the Cloud

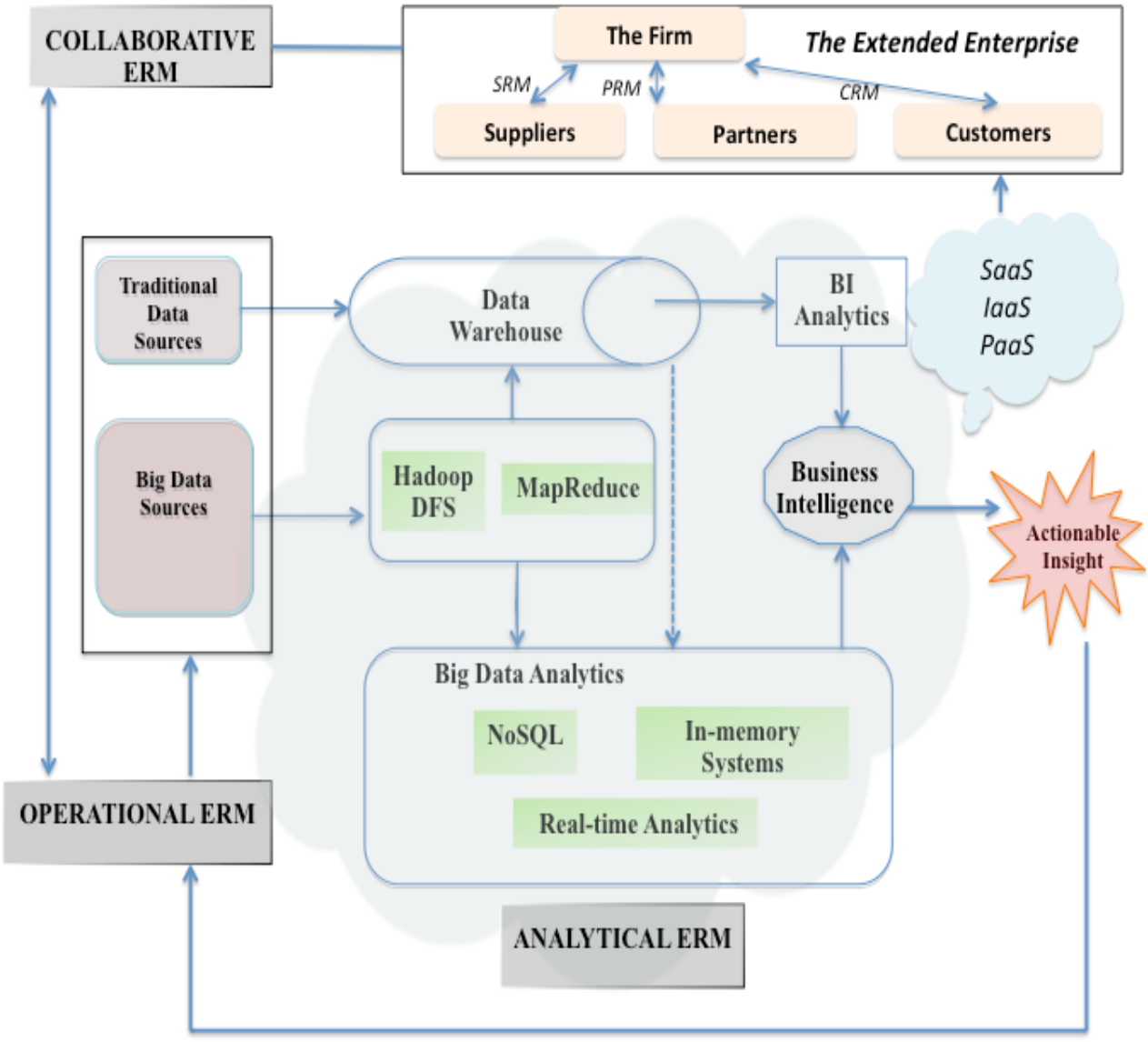

Figure 2 describes a conceptual framework of ERM in the cloud. The extended enterprise for ERM includes the firm, its suppliers, partners and customers, each in its own sphere of SRM, PRM and CRM in the relationship with the firm. The cloud provides an on-demand, collaborative service platform supporting the constituents in the extended enterprise. The cloud services include Software as a Service (SaaS), Infrastructure as a Service (Iaas) and Platform as a Service (PaaS). Data from operations include traditional data from enterprise transactions, and Big Data sources with high volume, velocity and variety, including social media, web data, industry reports, images, device data, geospatial data, M2M and IoT. Analytical processing of traditional data includes the ETL process of extract, transform and load to a data warehouse, where business intelligence (BI) analytics can be applied. A commonly used architecture for Big Data consists of clusters of loosely coupled commodity servers for distributed data storage and processing such as the Hadoop DFS and MapReduce. However, Hadoop is a batch system and does not provide real-time lookups and updates. Hbase, a NoSQL database built on top of Hadoop provides real-time read/write access to large datasets (Apache [2]). The big data analytic platform typically consists of NoSQL databases such as Hbase, in-memory systems for high speed real-time analytical processing. This combined with BI analytics creates the actionable insights to enhance ERM operations. The cloud provides the platform for the Big Data ERM ecosystem of operations, analytics and collaboration.

Conclusions

As we move to the relationship-based economy, building relationships with customers, partners, suppliers and other stakeholders has become an essential value creation strategy for business. Big data and Cloud Computing have emerged as latest in the evolution of technology in business. There exist synergies between relationship management, Big Data and the cloud, that can create new opportunities and values for business. Enterprise relationship management (ERM) consists of relationship management in the extended enterprise that includes customer relationship management (CRM), partner relationship management (PRM) and supplier relationship management (SRM). This paper examines the exploitation of enterprise relationship management utilizing Big Data and Cloud Computing to create an on-demand collaborative service platform for enterprise relationship operations enabled by actionable business insights. The Big Data characteristics of ERM were explored. The arguments for the cloud implementation of Big Data ERM were presented. A conceptual framework for Big Data ERM in the cloud was provided supporting the ERM ecosystem of operations, analytics and collaboration.

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