Collaborative Negotiation Platform using a Dynamic Multi-Criteria Decision Model

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ABSTRACT

Due to globalization, companies are frequently pushed to grow outside their political and geographical boundaries, forcing them to increase product diversification. As a side effect they can also optimize their resource’s management by looking at potential businesses for improving their relations with customers and/or open new markets through partnerships. In this context, implementing agile collaboration networks between businesses is a requirement. This paper proposes an approach to support the selection of businesses in the context of collaborative-networked organizations, through a negotiation process controlled by agents, which is based on a dynamic multi-criteria decision model (DMCDM). The approach combines a dynamic decision making approach - using past, current and future information - with a software agents approach, which autonomously captures business opportunities, select business partners, as well as award and process associated orders. An illustrative example of evaluation and selection of business partners clarifies the dynamic method.

Keywords: Autonomous Software Agents, Collaborative Negotiation-Based Platform, Collaborative Networked Organizations, Dynamic Multi-Criteria Decision Model, Platform Lifecycle

1. INTRODUCTION

Establishing agile business partnerships is of utmost importance for companies in order to maximize business. By aggregating individual strengths and skills, while sharing risks and opportunities, companies may be able to improve their responsiveness to the market demands and react faster than their competitors.

Agile networks of companies, sharing common goals, require flexible tools, supporting their creation and operation. These networks

DOI: 10.4018/ijdsst.2015010101
may be the result of strategic business decisions or as a dynamic reaction to a business opportunity detected by one or more of its members. A flexible platform is required to capture the opportunities, identify and select the best business partners and suppliers, assign partial orders and process their deliverables.

In this paper we propose a platform for supporting the evaluation and selection of businesses, in the context of collaborative networked organizations, based on a dynamic multi-criteria decision model (DMCDM) and software agents. The platform supports the dynamic selection of business partners and suppliers by combining a dynamic decision model, based on the works (Jassabi et al., 2014; Campanella et al., 2012; Campanella et al., 2011), with an information fusion method (Ribeiro et al., 2013), to support partner evaluation and selection, integrating historical information, present status and forecasting about future information. The current paper complements the work in (Arrais-Castro et al., 2012; Arrais-Castro et al., 2014), by exploiting an illustrative example, which demonstrates the performance of the used DMCDM adapted model.

Following this introduction, this paper is organized as follows: In section 2 we provide a brief description of the proposed platform for supporting collaborative networked organizations. Next, in section 3 we refer to the businesses evaluation and selection, based on the negotiation process and using an underlying multi-criterion dynamic decision model. In section 4 we illustrate the proposed negotiation process through an example of use for the selection of businesses in the context of Collaborative Networked Organizations (CNOs). In section 5 we present an extended case study for further explain the potential of the DMCDM. Finally, section 6 presents some main conclusions and future work.

2. COLLABORATIVE NEGOTIATION PLATFORM

Collaborative Networked Organizations (CNOs) may be defined as networks of largely autonomous organizations, geographically distributed and heterogeneous (in terms of their culture, social capital, goals and operating environment), which collaborate to better achieve common or compatible goals using computer networks to support their interactions (Camarinha-Matos & Afsarmanesh, 2006). CNOs are composed of organizations adhering to a base long-term agreement and adoption of common infrastructures and operating principles (Camarinha-Matos & Afsarmanesh, 2006). Moreover, among CNOs there are usually temporary alliances between organizations that come together to share skills or core competencies and resources, in order to better respond to a collaboration opportunity. Those alliances dissolve whenever their goal has been achieved (Camarinha-Matos & Afsarmanesh, 2006). Networking and reconfiguration dynamics are the main characteristics of CNOs, which aim at enabling and supporting business environments, assuring cost-effective integration in useful time and preventing the risk of leakage of private information about products or processes.

The establishment of business alliances among heterogeneous companies is an important challenge for a CNO creation. Business relations among companies spanning across several countries must consider aspects such as on mutual trust, sharing of common goals and cultural alignment, because they are ingredients for the success of any business collaboration. In fact, cultural elements, like language, aesthetics, social interactions, education, material life and value systems, may have an impact on the business partnership (Kotabe & Helsen, 2001). Factors such as cultural hostility, cultural heterogeneity, cultural interdependence, culture variability and national ideologies should be taken into account while establishing business