Development and Validation of the Method for Value Assessment of SOA-Based IS Projects

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ABSTRACT

Responding to the rapidly growing market share for Information Systems (IS) based on Service-Oriented Architecture (SOA), the demand emerges for methods of measuring the value of SOA-based IS projects. The goal of the present research is to adapt available methods of project assessment to this expanding demand. This study describes a new method which takes into consideration a possibility to divide deployment and evolution of SOA-based IS into separate flows, one per service. Like that the process of value assessment could become more precise and exact compared to other known methods which use the single flow for the whole project. In addition the work proposes Real Options for calculating such components of the value as flexibility. The described method is validated using a specific simulation model. Value assessment of a real IS project is performed using the developed method and the simulation model.

Keywords: Information Systems (IS), Investment Appraisal, Service-Oriented Architecture (SOA), Simulation Modeling, Value Assessment

INTRODUCTION

More and more often the IT projects which include deployment or evolution of complex Information Systems (became known as IS projects) use Service-Oriented Architecture (SOA) (MacKenzie, 2006). The service-oriented market share is constantly growing; the total market value of SOA solutions reached $5.518 billion in 2011 while it was $3.987 billion in 2010 (Bodimeade, 2012). Taking it into account, in the nearest time it will be more important to
adapt generic methods of measuring the value of IT projects to new intrinsic features of SOA-based projects.

The goal of our research is to develop an efficient method of accurate value assessment of complex IS projects which may apply such concepts of SOA as service outsourcing, Software as Service concept (SaaS) and others. This method will be in demand among companies looking for developing their IT landscape with the help of SOA-based IS projects. The method helps those companies to decide whether the IS project should be implemented or not, providing estimations of Net Present Value (NPV) of the project. The valuation of an IS project aimed to redesign a nation-wide network management system according to SOA principles represents an example of a proper target for the method proposed.

In order to carefully account particular characteristics of SOA the proposed method suggests several modifications to the generic assessment method of Hares and Royle (Hares & Royle, 1994) (referred further as the framework method). These modifications include separate calculations of Discounted Cash Flows for each service and new principles of measuring the risk-factor (its project and flexibility components). Such modifications were suggested because Discounted Cash Flow (DCF) became the main instrument of the majority of modern value assessment methods (Kruischwitz & Loeffler, 2005). This instrument renders the discount rate which depends on risk as the most important factor. For investors risk means variability whether it concerns the returns in the company’s shares or a project’s cash flow (Hares & Royle, 1994). Thus the risk factor becomes very significant variable which importance cannot be underestimated. While the component of project risk is covered by estimating the discount rate, event risk is offset by flexibility which value should be especially highlighted in SOA-based projects. This follows from the fact that there are alternatives in such projects because services may be provided both internally or externally using the SaaS approach.

During the research we found that the direct validation of the value assessment method is hardly achievable, but alternative solutions should be found. The direct validation requires a comprehensive set of empirical data describing results of multiple considerably large IT projects. Such projects may last several years and their objective detailed characteristics become a valuable asset which not many companies want to disclose. As an alternative solution of the validation problem we suggest to use a simulation model based on the System Dynamics approach. The latter solution was selected and the System Dynamics simulation model was developed that integrates several well-known sub-models as well as newly designed sub-models. To prove correctness of the model developed we carried out its validation and verification as it is recommended by Law and Kelton (2006).

We performed elasticity analysis to compare three different methods of value assessment: (1) the framework method of Hares and Royle; (2) the new proposed method; (3) the System Dynamics simulation model. In the result it was determined that both the proposed method and the simulation model have no issues related to robustness and they behave consistently with different parameter values. It was also identified that the simulation model yields results which are closer to the results of the new method than to the results of the framework method, providing the adequacy of our proposed method.

The paper presents major assumptions, findings and experimental results of our research as follows. First we present conceptual foundations for value assessment of IS projects which shape our research. Next section describes in detail the proposed assessment method for SOA-based projects in comparison with the framework method. Then we demonstrate application of the proposed assessment method in the particular case of assessment of the SOA-based Network Management System. In a separate section we describe the System Dynamics simulation model, its verification
Linking Natural Modeling to Techno-centric Modeling for the Active Involvement of Process Participants in Business Process Design

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