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A CRITICAL ANALYSIS OF SOA APPLICATIONS USING SOFT-COMPUTING TECHNIQUES

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ABSTRACT

Service Oriented Architecture based application development is supposed to be easier as compare to those traditional software development methodologies, but the end product become much complex due to its service oriented nature. In this literature review distinct approaches for SOABA effort estimation are presented.

1. INTRODUCTION

Various researchers have proposed many distinct approaches to estimate the efforts involved in SOABA development. Some important approaches analysis is presented in this section.

2.1 SOA SPECIFIC EFFORT ESTIMATION TECHNIQUES

Various researchers have proposed many distinct approaches to estimate the efforts involved in SOABA development. Some important approaches analysis is presented in this section.

O'Brien (2009) proposed a novel framework for SOA effort estimation. But Most of the components of this framework are still in development phase and need more development to incorporate all the factors affecting estimation process in SOA projects. However, a case study is presented, where capability of this framework is demonstrated by identifying the shortcomings in standard estimation approaches. Li and Keung (2010) presented a new framework powered by divide-and-conquer approach for SOABA effort estimation. Upside of this approach is that it provides flexibility to assess the software sizing and their corresponding cost estimation modelling by switching in between the metrics within the given environment. Oladimeji's et al. (2011) proposed a WBS based framework for SOA effort estimation. However, this approach was much similar to one presented by Li and Keung (2010).

Lewis et al. (2005) presented Service Migration and Reuse Technique (SMART), this method proposed the reuse of legacy systems and integration of existing system into service oriented environment. This method may prove to be a good first step to identify the type of legacy systems

that may be estimated in SOA context. Zhao's et al. (2006) proposed to make use of design metrics namely, change cost and coordination cost. These metrics may guide cost-effective effort prediction if implemented properly by the SME who has in depth expertise in the given field.

People from industry also contributed in this field like Linthicum (2007), mathematical formulas based on complexity measurement is provided by him for SOABA development estimation. Tansey and Stroulia (2007) proposed a hybrid approach for effort estimation by incorporating Constructive Cost Model (COCOMO) II and real option theory. Santillo (2007) presented a method powered by COSMIC function points. It was a theoretical framework for boundary positioning problem in effort estimation.

Liu et al. (2009) gives an effort estimation model powered by Bayesian net for SOA based service governance processes (SGPs). SGPs are critical for SOA applications and efficient effort estimation of these is provided by the Bayesian net approach. Umar and Zordan (2009) proposed a strategic decision model for SOA effort estimation. A cost benefit analysis is also presented to evaluate the strategic alternatives. Akkiraju and Van Geel (2010) presented a linguistic analysis along with artefact- centric approach to estimate the

development cost. This method may work even when least information is available in hand, for example business process model. Li and O'Brien (2011) proposed a qualitative way of effort estimation for SOA WSC. It is a generic strategy for effort judgement.

Gomes (2012) proposed an effort estimation method for SOA applications to calculate the functional size, cost and effort with the help of Function points (FPs). An advantage of this method is that companies may pay based on FPs instead of man hours.A novel service centric effort estimation model is proposed by Gupta (2013) for SOA applications that can be applied across multiple product development initiatives. It is generic and technology agnostic model. This model can be utilizes for technology conversion, and large scale service migration along with service development activities too.Three traits of service design, namely, development environment, functional complexity and quality of service expectations are being carefully considered while assessing the size of service. This approach is a blend of estimation techniques and quality of experience in developing SOA applications.

Mishra and Kumar (2014) presented a BPMN model to estimate the development size and effort. Once sizing is achieved by this method, COCOMO model may be employed to predict the effort and

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[2019]

time estimation. Farrag et al. (2014) proposed a phased effort estimation approach. Several cost factors are identified that are distributed among different project phases. Cost of overall SOA project may be estimated early and efficiently using this approach by estimating the cost of just one phase involve.

2.2 SELECTED SERVICE SELECTION APPROACHES

SOABAs are much complex in comparison to those software applications that are based on traditional software development methodologies. As the complexity and functionality of services increases, effort estimation of same also becomes more complex. Not much research has been reported on SSE estimation for SOABAs. However, in recent past, service selection is receiving much interest of researchers. Various researchers have proposed many approaches for service selection for WSC. Analysis of some important approaches of service selection is presented in this section.

Guo et al. (2010) presented a QoS ontology based four-level matching model (FLMM) for service selection. The proposed matching engine attempts to match the domain, description, function, and QoS in a sequence. Significant QoS parameters reported are Stability, Reliability, Integrity,

Security, Reputation, Performance, Accessibility, ExceptionHandling, Accuracy, Robustness, Economic, Scalability, Capacity, Interoperability, Network_related and Availability. Dimensionless methods are used to assess the QoS ontology. As per test results, FLMM matching model prove to be an efficient method for the service selection and user satisfaction.

Liu et al. (2009) expanded the Universal Description, Discovery, and Integration (UDDI) to make room for the functional and non-functional parameters of a web service and proposed a novel approach for WSC based on QoS and service providers' benefit. Qi et al. (2010) presented a QoS-aware web service selection method powered by a novel credibility evaluation method. This method makes use of past empirical data, like execution log of a service to select an optimal and credible web service. Credibility is calculated for each candidate service and service with largest credibility value is selected ultimately. Main QoS parameters/dimensions considered by this method are divided into negotiable (Execution time, Availability, and Price) and non-negotiable (Reputation, and Successful rate) category. Credibility of identified QoS parameters are computed individually then SAW (Simple Additive Weight) technique is employed to calculate the aggregated credibility of each service. Author also

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[2019]

presented a case study to show the feasibility of this selection method.

CONCLUSION

SOA based application development is supposed to be easier as compare to those traditional software development methodologies, but the end product become much complex due to its service oriented nature. In this literature review distinct approaches for SOABA effort estimation are presented.

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