SOFTWARE OFFSHORE DEVELOPMENT
A Criteria Definition for References Models Comparison

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Abstract: Software development has been a challenge. This complexity significantly increases when company team member are working in an offshore environment. The need for a set of processes increases after every project, including those to organize the development strategy. Reference models, maturity models and frameworks can be found in literature trying to solve this problem. However, few comparative analysis have been done in order to validate the appropriate solution. The objective of this paper is to elaborate and define a set of criteria to perform a comparative analysis of the main global software development reference models, focusing the offshore development, having as basis an extensive literature review and a case study in industry. The case study was conducted in two different sites in Brazil.

1 INTRODUCTION

Managing information technology projects is become more complex over the years. Because the project's size, requirements even more complex, time to deliver the product and the growth in the software development team. Teams are now spread between countries and located in different time zones. People are even more getting used to interact with co-workers from different cultures and beliefs. One of the major benefits is the flexibility in having almost non-stop work around the globe – when the teams are strategically located. For companies it has being an interesting experience since they increase their profits margin over time since can have access to qualified workers from third world country by on-third their values (Carmel et al, 2002).

Variants of the Agile or Extreme Programming methodologies are applied during the software conception, developing and testing. It is common that these companies also have a proprietary code library about their softwares. However, the majority of this library only exists in theory. There aren't processes or procedures to support it (Reponen, 2002).

It is necessary for the site and organization in define a structure that supports the development process. It is not a maturity model, rather than, a static structure that can be used in order to define and better compound the methods used to build the software, use better use the policies and distributes their business in order to maximize the offshore development strategy (Khan, 2003).

This paper/poster presents criteria composition for references models in the global software development area. A comparative analysis is also done between them, based in the criterions. A case study was conducted in two different organizations in order to increase the criteria's accuracy and generalization. The research method is exploratory and based in extensive literature review.

2 THEORETICAL BASE

2.1 Global Software Development

As some authors pointed the global software development is characterized by having one (or both) of the elements involved: time and distance (Coar, 2004). Companies can work locally or distributed. Working in a distributed environment, time and/or distance are present as elements that differentiate both of them. Working in a global software development approach denotes a revolutionary way for a company in conducting its business. Managers and directors are even more considering global variables when defining and running global projects. Time zones, cultural differences, communication, trust, among others,

need to be well aligned in other to not let the team members loose their focus. It is known that this strategy is delineated by positive or negative forces.

2.2 Offshore Development

The Offshore Development is strategy used by companies in other to take the benefit from others site countries. The projects and services can be reallocated in a specialized-different-country-site where a high level of specialization can take place (Carmel et al, 2002).

Countries like Russia, Brazil and India has been playing a major role in such strategy, mainly because the low taxes and low labour cost in hiring employees from these locations (Gopalakrishnan, 2003). Some of the key factors include cost reduction, working with specialized workers world-wide and the capability in implementing follow-the-sun methodology (working 24 hours a day, round the world) (Khan, 2003).

2.3 Reference Models for Offshore Development

2.3.1 By Kishore et al (2003)

In (Kishore, 2003) the author defines a framework creating a relationship between the service provider and the service requester. Know as Four Outsourcing Relationship Types (FORT), it defines dimensions and presented factors that need to exist between the two involved parts (requester and provider) in order to achieve the completion of the service.

Figure 1: FORT Framework.

Figure 1 shows its dimensions: the strategic impact of the outsourced business and the work amount being outsourced.

This reference model has the objective to enumerate dynamic and static aspects that will exist

between the service requester and service provider. It is important for managers and directors in understand how the relationship with the service provider organization can grow and where it is during a specific moment in time. All these analysis were done always considering the strategic impact that the service provider has over the service requester. Furthermore, the model intends to establish a clear link between both organizations and how they impact each other during time, as well their impact in terms strategic aspects.

2.3.2 By Khan et al 2003

In (Khan, 2003) the author identifies offshore organizations by the type of work provide. He classifies organizations involved in offshore development as service providers or requesters. Similar as (Kishore, 2003), however including risks, benefits and drawbacks of the relationship they develop. During time, the involvement and work methods are being specialized in the service provider, in order to attend the requester demand.

This model maps the possible relationships along time that the organization may have. As higher is the cooperation between them, higher is the aggregated value and higher is the risk for the requested core-business. Services were mapped between the types of involvement that the requester has with the provider and were related in figure 2.
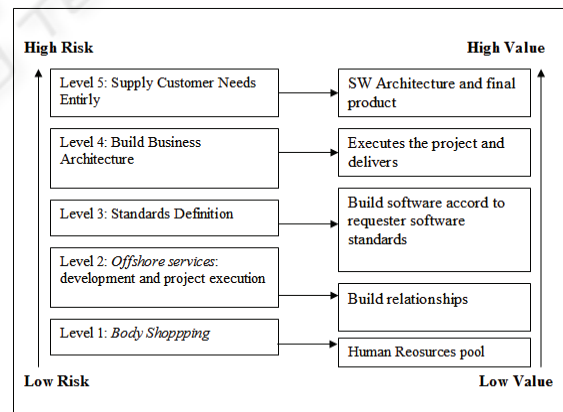

Figure 2: Reference Offshore Model by (Khan, 2003).

As can be noted there is a direct relationship between aggregated value and associated risk that the provider brings to the requester. Has complex the type of the service, as risky can be for the service requester. Following this concept, the author represented the model in a scale in five levels, from one to five, containing the possible types of Works

and their respective impacts for the requester. As higher the risk, higher the aggregated value, level 5.

2.3.3 By Loh & Venkatraman (2002)

The authors developed a conceptual modelling to offshore organizations using a set of criterions as being determinants to the company's performance. Using the offshore strategy, in the conducted studies the authors create a relationship between the benefits and risks when choosing a subsidiary or company when offshoring heir services. Figure 3 presents denotes the model concept.
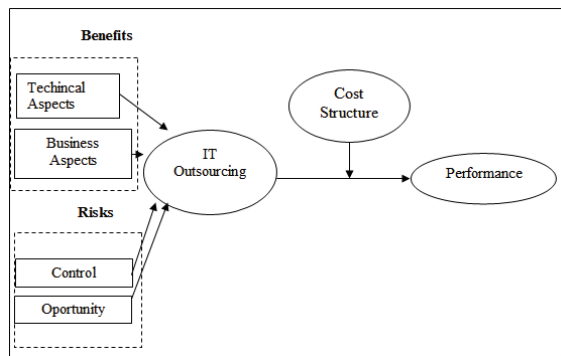

Figure 3: Offshore Reference Model for organizations (Loh & Venkatraman, 2002).

2.3.4 By Song et al (2003)

In the work from (Song, 2003) a reference model is created in order to help the decision maker to which offshore company the work should be sent. Similar to works from (Khan, 2003) and (Kishore, 2003), the relationship between service provider and requester is a key factor in the offshore strategy. However to which country the service is sent is here a fundamental factory too. It is important to note that social and technical aspects are delimitated by countries' culture, and hence, defines if the implementation was successful or not. Other social elements, such as economics, political and cultural, between the provider and the requester were also considered as fundamental in this model.

3 RESEARCH METHOD

As described in (Yin, 2001), this study is characterized as being mostly exploratory, involving literature review about the main offshore references models and findings from a case study. These findings were important in order to compose the

criterions. The research method was presented in figure 4 and related the phases as described below.

This research was organized in four (3) phases. First (Phase 1) was a literature review about the main offshore development maturity models, the sites will be referenced by letters as "Unit A" and "Unit B".

In the step (Phase 2) was the criteria elaboration and in third step (Phase 3) a comparative analysis from the reference models was done.
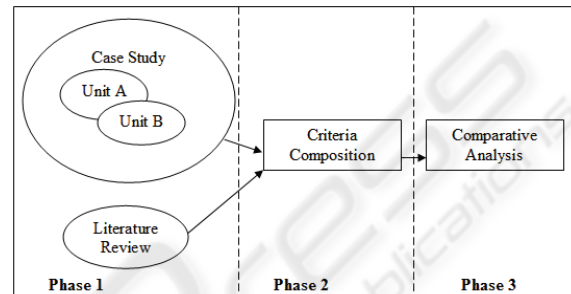

Figure 4: Research Method.

4 CRITERIA DEFINITION AND COMPOSITION

The process to compose the criterions started by the reference models analysis found in literature. A caution was taken in order to consider only elements that could be observed in all models; otherwise the comparison would be pointless. For each defined criteria, the case study finding proven if it could be finally used as formal criteria in the model analysis. All the criterions were presented by table 1. It also presents: The criteria itself; A reference from where in literature, or in case study findings, or both it was found; And the explanation for its use. An acronym "CsA" is used to define the finding from unit A and "CsB" for unit B.

Defining criterions is not a trivial task and raise questions in considering such criterions and not other ones. During the analysis only criterions that could be found in all models were consider.

In order to perform the comparative analysis, a combination between the defined criterions and the models were defined and presented in table 2. These combinations have in the header the criterions defined in this section. In the first column all reference models found in literature were listed.

Table 1: Offshore Reference Criteria Composition.

Criteria	Found in case study/literature	Justification
1- Practical Appliance (Case Studies/Surveys)	CsB, Literature	Validate the models is a key element in every research method. It distinguishes models that were test or were taken case studies as part of its composition;
2- Social Aspects	CsA, CsB, Literature	Identifies if the model consider social factors (such as cultural aspects, trust, etc);
3- Business Aspects (alignment between the core-model and offshore units)	CsA, CsB, Literature	If the reference model presents a clear representation or connection for business and functional objectives;
4- Existence of Relationship level between requester and provider	CsA, CsB, Literature	Consider if the model refers to existence relationships between the provider and requester.
5- Type of Service Segmentation	CsA, Literature	Reference models that separate offshore environment in insourcing or outsourcing;
6- Process Planning	CsA, CsB, Literature	Checks if the analyzed model has characteristics in order to compose offshore driven process;
7- Technical Aspects	CsA, CsB, Literature	Identifies if the model support specific process for software engineering;
8- Support for Distributed Teams	CsA, CsB, Literature	Identifies if the model has structure to support distributed teams;

5 COMPARATIVE ANALYSES

The analysis was verified in order to validate if the model attended the criteria. When it was satisfied – meaning that it was found in the model – a symbol (√) marks the intersection column between the model and the criteria. If the symbol is not present, the model does not attend the criteria.

The reference offshore model defined in (Song, 2003) was the one with lower criteria marks (3 from 8 defined criterions). However, the model from (Khan, 2003) and (Kishore, 2003) attended 5 from 8 criterions. Finally, the reference model from (Loh & Venkatraman, 2002) attends 6 from 8 criterions and was the one with higher number of satisfied criterions. Still accord with this description it can be used as guideline to implement software engineering practices and process, meaning that it is complementary and serve as additional model to maturity models. As from the case study findings it was noted that the offshore models should be complementary to other maturity models already present in the industry. It was noted that (Loh & Venkatraman, 2002) refers to this implementation and guideline as well.

Table 2: Comparative Analysis from Offshore Reference Models.

Reference Model	Criterias							
	1	2	3	4	5	6	7	8
[Kishre et al 2003]	√	√	√	√				
[Khan et al 2003]	√	√	√				√	√
[Loh et al 2002]	√	√	√	√		√		√
[Song et al 2003]		√	√			√		√

An important finding is that the most missing criterions were criteria 5 (Type of Service Segmentation) and criteria 7 (Technical Aspects). Even criteria 5 being identified in "CsA", it lacks in the majority of the models.

6 FINAL CONSIDERATIONS

It is important to note that the criterions have a higher scope since were found in case studies. From the interviews, the comments were considered when elaborating the criterions as well. Some of these elements had direct impact in the software quality, as enumerated by some managers – the social and relationship aspects between the requester and the provider.

Results from this work contribute for the offshore area – as comparisons between such models were not found in previously researches. The case study brought practical validation and important findings from managers and offshore units.

As future researches this study will continue to expand the applicability and involve other offshore unit's as well different models. Quantitative analysis, including surveys would also increase the generalization.

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