ITO-TRACKER
A Tool for Evaluating ITO Projects based on Critical Success Factors

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Abstract: Nowadays, the Latin American software industry, as it is mostly represented by Small and Medium Enterprises (SMEs), should focus on improving its service capacity towards high quality, low costs, and timely delivery. Within this context, SMEs providing Information Technology Outsourcing (ITO) services require information that allows to assess and monitor their contractual relationships and the agreements contained therein, considering a set of critical success factors that may vary depending on the type of project addressed. This article is aimed at describing the development of a tool named ITO-Tracker designed for the evaluation of ITO projects oriented to software, hardware, network and databases, based on Critical Success Factors (CSFs). ITO-Tracker offers guidance to the parties involved in the service through regular control and follow-up activities. The methodology used for developing this tool was the iterative and incremental process known as Rational Unified Process (RUP). For this purpose, we documented the development process and results from ITO-Tracker conceptualization, analysis, design and construction. Besides it is presented the evaluation of an ITO project in the software development area using the tool.

1 INTRODUCTION

The Latin American software industry is mainly comprised of Small and Medium Enterprises (SMEs) and it is still conceived as incipient and immature (Mayer & Bunge, 2004). This has led to a lack of competitiveness, which has impeded its growth. However, the rise of Information Technology (IT) and the abundance of software development tools have made available valuable tools to SMEs, not only to improve software production, but also to evaluate the development process or the product obtained (Rivas et al., 2007). In addition, Information Technology Outsourcing (ITO) is an increasingly widespread practice among enterprises (Lee et al., 2003) and one of the most prevailing businesses among SMEs, since these enterprises are involved in the development, maintenance and marketing of software products for third parties (Rivero et al., 2007), mostly acting as suppliers and sometimes as clients, and sometimes they subcontract other SMEs to perform specific tasks. Therefore, it is essential counting on tools that allow evaluating those aspects that influence successful relationships between the client and the ITO provider; both wish to know their level of success to control and monitor the status of their projects, so that this information is used for their enhancement.

This article describes the development of the ITO-Tracker tool designed for assessing CSFs proposed in a previous research (Méndez et al., 2007a) and it is intended to provide SMEs with a supporting tool for ITO projects' evaluation. Also, it provides guidance as to this service to the parties involved, so that they can consolidate their strengths and overcome their weaknesses for ITO projects' development.

2 BACKGROUND

According to Fairchild (2004) and Sheehy et al. (2003), ITO is defined as the organization's practice, which consists in contracting an external provider with expertise in performing one or more IT functions, so the enterprise does not have to do it itself. In order to achieve a successful ITO, certain practices known as CSFs should be considered. Austin (2002) defines CSFs as critical areas where satisfactory performance is required for the organization in order to achieve its goals. For this

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purpose, efforts in this research are directed towards developing a tool supporting the CSFs model associated to IT: data center, network, software development and hardware support (O'Brien, 2005). This model consists of 22 CSFs and 400 metrics (Méndez et al., 2007a). Table 1 shows the model's CSFs used as a basis for defining the ITO-Tracker requirements.

Table 1: Technological Critical Success Factors for ITO.

Critical Success Factors
1. Define services from a modular perspective
2. Agree on the transfer of initial resources
3. Agree on the ownership of new resources
4. Define a service evaluation structure
5. Define a predictable cost structure
6. Coordinate and standardize tasks integration
7. Invest in technology innovations and planning
8. Maintain ownership and internal capabilities
9. Consider licenses restrictions
10. Invest in value-added ecosystems, which integrate services from different providers
11. Establish multilateral agreements with the right providers
12. Consider corporate regulations
13. Consider governmental regulations
14. Consider personnel resources planning
15. Establish exclusivity agreements for key areas
16. Manage risks and assign responsibilities
17. Consider potential service changes
18. Define contract termination strategies
19. Accelerate services life cycles
20. Take into account cultural compatibility
21. Study client-provider relations
22. Learn from the experience of allies organizations

It should be noted that there is another tool used for ITO project evaluation (Méndez et al., 2007b), which is based on a CSFs model that focuses only on Management aspects of the client-provider relationship (27 out of 29 CSFs correspond to this area), thus leaving aside technological aspects (only 2 out of 29 CSFs correspond to this area).

The tool developed for this work provides support to researchers and SMEs in ITO projects evaluation, since it considers technological aspects and allows overcoming the former tool's weaknesses.

3 ITO-TRACKER DEVELOPMENT

For developing this tool, the Rational Unified Process -RUP- (Kruchten, 2003) methodology was used. Due to space limitations, we will cover only the most relevant aspects of the artifacts designed for ITO-Tracker development.

3.1 Inception Phase

In this phase, it was collected information to establish the needs, characteristics, requirements and scope of the tool. This process was documented in the Vision artifact.

The software requirements were identified and documented in the Software Requirements Specification (SRS) artifact. The functional requirements are listed in Table 2.

Table 2: Functional Requirements of ITO-Tracker.

Functional Requirements
Log system users, Authenticate users
Create, Edit, Delete, View project types
Create, Edit, Delete, View, Assign/Remove CSFs
Create, Edit, Delete, View, Assign/Remove questions
Create, Edit, Delete, View, Assign/Remove question metrics
Create, Edit, Delete, View points
Create, Edit, Delete, View enterprises
View enterprise's projects
View enterprise's users
View user profile
View user's projects
View user's enterprises
Create, edit, delete, view projects
View project's users
Assign/remove user
View project's enterprises
Evaluate projects
Generate Corporate Report on project Evaluations
Generate Research project on performance of CSFs for similar projects between one enterprise and others
View projects (Project Leader)
View operations log for a project

As to non-functional requirements, the system should:

a) be user-friendly and include an easy-to-use interface with menus and help options.
b) be available for a minimum of 40 hours weekly (i.e. 8 business hours a day).
c) be fault-tolerant.
d) be able to provide a maximum 3-second response and processing time

e) support approximately 50 concurrent users
f) be documented and allow for easy maintenance.
g) consider access restrictions and encryption devices for users' logins.

Then, 67 use cases were identified for system development. Figure 1 shows the general use cases diagram, grouped by packages.

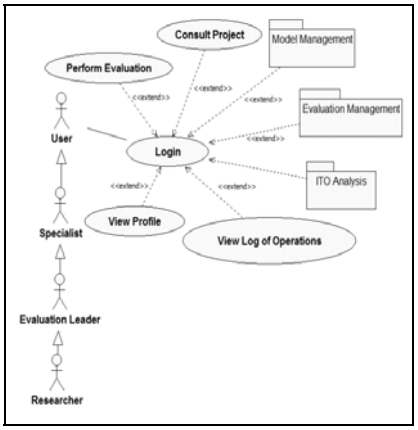

Figure 1: Use Case Model.

3.2 Elaboration Phase

The milestone of this phase is establishing the system architecture that guarantees efforts invested in the next phase's design and implementation, the main artifact being the Document of Architecture Work. For system development, the Model-View-Controller (Veit and Herrmann, 2003) architectonic pattern was used which consists of three layers.

The architectonic views suggested are as follows Use-Case View (Figure 1), Logical View (Figure 2), Deployment View, Implementation View and Data View. Due to space limitations, we will show only the most relevant views.

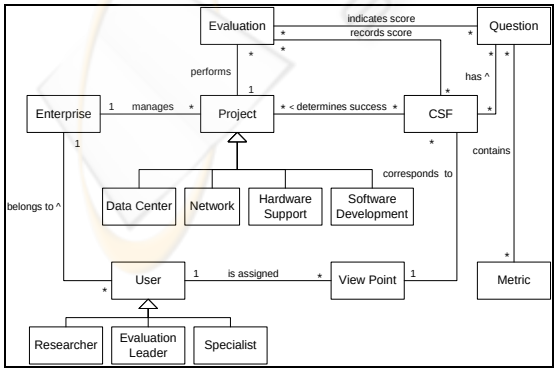

Figure 2: Domain model associated to the ITO-Tracker system.

For Deployment View, it was decided that the tool worked under a client-server architecture. The application and database server is a Linux server where the application is installed. Clients can use any device with a web browser and can connect to the server through local area network (LAN).

The Implementation View (Figure 3) shows the components diagram with the main physical devices included in the software deployment unit.

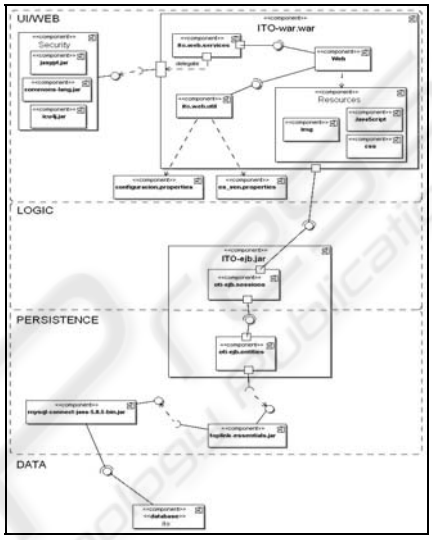

Figure 3: Hierarchy of ITO-Tracker System Components.

3.3 Construction Phase

The milestone of this phase consists in refining some of the requirement specifications and complementing the system development on its basic architecture. Accordingly, the necessary development environment was installed and all product functionalities were constructed. All architectural layers, the group of use cases proposed, and the system database were implemented. In addition, unit tests were applied to each use case. This phases' main deliverable was an ITO-Tracker version, including the source code of all implemented classes.

ITO-Tracker has been basically divided into four sub-systems, as follows:

- Model Management: It includes management of GQM-related objects (Basili et al., 1994) used for operationalization of the model (Figure 4).
- Evaluation Management: It includes object management related with project evaluation.
- ITO Analysis: It corresponds to graphic reports' generation and view of results of the ITO projects' evaluations (Figure 5).

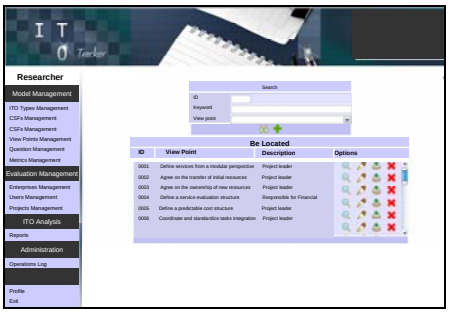

Figure 4: ITO-Tracker Management Model Screen.

Figure 5: ITO-Tracker Analysis Screen.

- System Administration: It contains the operations log that records all users' activities.

3.4 Transition Phase

This phase is focused on the description of tasks performed to guarantee availability of the implemented ITO-Tracker to its final users.

Two separate installations were performed, first at the enterprise owner of the project subject to be evaluated; this installation allowed to establish a project evaluation case study with automated support; and at same time allowed experts involved in the project pilot to make their observations, and detect potential failures or improvements. The second installation represented the tool's transition to the server of the Information Systems Research Lab (LISI, by its abbreviations in Spanish) at Simón Bolívar University (USB by its abbreviations in Spanish), i.e. its final certification/pre-production environment.

4 PROJECT EVALUATION AND RESULTS

ITO-Tracker was used to evaluate a software development project at the banking sector, named SIGMSUAF. It provides a solution for prevention and reduction of bank frauds, capable of monitoring bank transactions in real time and detecting irregular consumption patterns. Hope you find the information in this template useful in the preparation of your submission.

The software provider is in charge of configuring the project evaluation with the tool, and preparing the necessary environment to be used by evaluators; these will receive an e-mail with their respective login and password, which will allow web access to the tool.

The project selected was incorporated as a software development ITO. Roles considered for the project evaluation included the following: Project leader, Responsible for Financial Evaluation & Purchases, Responsible for Technology Planning, Responsible for Negotiations with Suppliers, Responsible for Strategic Planning. Individuals responsible for playing such roles were the ITO-Tracker users.

ITO-Tracker displays for users/evaluators those questions corresponding to each type of project. By means of this tool, answers were provided to the questions of the CSFs corresponding to each role assigned during project development. Once the evaluation was completed, the project leader queried the results through different views provided by the tool.

Figure 6 generated by ITO-Tracker tool shows the detail of the SIGMSUAF evaluation per each CSF. The evaluation results are as follows:

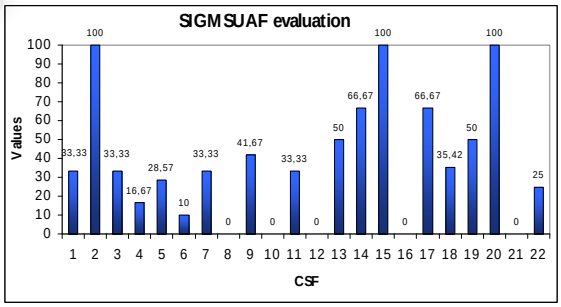

Figure 6: Results of the pilot project evaluation.

Only 3 CSFs were 100% satisfied for the pilot project. It can be observed from these results, that the client is concerned about specification activities, rights on new applications, and visualization of the support of the personnel involved. Even though the evaluation shows an efficient communication in the project, we may infer it is only for specific stages or activities, instead of for the entire project.

The pilot project shows 2 CSFs that almost reached a 75% satisfaction (CSFs 14 and 17) i.e. the minimum percentage for CSF satisfaction; 2 CSFs with a 50% satisfaction (CSFs 13 and 19), and 10 CSFs between 0% and 49% (CSFs 1, 3, 4, 5, 6, 7, 9, 11, 18 and 22). Following are presented some CSFs that require further improvements:

- Since standardized SOW (Statement of Work) is not provided, defining a service evaluation structure is somewhat useless; and a 16.67% satisfaction is observed (CSF 4). We may infer that the enterprise has not provided the necessary policies for defining and categorizing its services.
- The enterprise does neither coordinate nor standardize methods for integrating tasks to its services (CSF 6, with a 10% satisfaction). This may originate failures at planning levels and influence the efficiency and use of the project's resources.
- No integrated knowledge basis has been defined for storing management and performance reports from different suppliers (CSF 22, with 25 % satisfaction). This may lead to failures at knowledge management and to misuse of experience that could be reverted into other projects.

The pilot project shows failures for 5 CSFs (8, 10, 12, 16 and 21), which reached a 0% satisfaction. Comments are as follows:

- CSF 8: No mechanisms and/or policies have been defined for change management and change support.
- CSF 10: The client does not encourage understanding and integration among providers, No development standards are followed and no system integration perspective is adopted;
- CSF 12: There are no signed corporate agreements.
- CSF 16: The lack of a penalty policy and requirements' efficient management summarizing the interest of both, the client and provider, puts the project management and quality product delivery at risk.
- CSF 21: The provider has no ability to negotiate new services or improvements once the project is initiated, thus affecting the contractual relationship and leaving aside quality aspects that might have an impact on the development process and product/service acceptance.

5 DISCUSSION OF RESULTS

Upon the usage of ITO-Tracker at evaluating SIGMSUAF project, we noted that the tool provides effective support to SMEs in the follow-up and control of their ITO projects, by assisting project managers and leaders in the decision-making processes aimed at consolidating their strengths and overcoming their weaknesses based on the results obtained from this tool, which shows clarity, efficiency and accuracy.

Outsourcing project participants who used ITO-Tracker listed the following tool strengths:

- It allows identifying areas to be addressed in accordance with CSFs. When a CSF does not reach a 75% satisfaction, certain measures should be adopted to improve its performance.
- It allows regular automated project evaluation through follow up, correction and/or maintenance in order to analyze their behavior and evolution.
- ITO-Tracker complies with non-functional requirements.
- It displays the project strengths and weaknesses and allocates respective responsibilities to both, client and provider.
- It is based on the premise that project success does not depend on one single party, and it highlights the importance of a higher commitment, communication and management between SMEs and their clients.
- ITO-Tracker represents an interesting alternative for benchmarking, and may be used for ITO projects' development and analysis.

The results of the pilot project evaluation did not surprise evaluators, since they acknowledged that the provider did not make its best effort, and that its weaknesses as a client are susceptible of being improved. Furthermore, they suggested that ITO-Tracker included the following functionalities in a new version:

- Ability to weight each CSF and all related questions upon determination of those CSFs with the highest impact according to the project type.
- Improvement and inclusion of new reports aimed at enhancing the results analysis and guidance, by making them more understandable to users.

6 CONCLUSIONS AND FUTURE WORKS

ITO-Tracker main characteristics include: user-friendly, fault-tolerant, high performance, documentation, and restricted access. Being a CSF-based tool that uses a GQM approach, some of its components might be reused for designing other tools under this approach and needing to automate a CSF-based model.

SMEs taking part in this pilot project stated that the use of ITO-Tracker in these organizations is highly feasible, since it provides an alternative for project management and diagnosis.

ITO-Tracker is also expected to provide support to researchers, specifically to LISI Lab at USB, which will be able to offer this tool to SMEs, while maintaining an updated database on the status of the ITO projects developed by these organizations. The tool allows LISI Lab to monitor their evolution, generate evaluation reports, study project success/failure statistics and suggest effective solutions for improvement of the tool and/or CSFs model supported. This way, SMEs shall be able to identify those aspects with superior performance, thus representing an added-value when it comes to determine which strengths sustain their consolidation and future development.

ITO-Tracker has been used for the evaluation of software development ITO projects. We recommend to validate its efficiency in all four ITO project types identified: data center, network, software development and hardware support.

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REFERENCES

Austin, D., 2002. Understanding Critical Success Factor Analysis. W. W. Grainger, Inc. W3C/WSAWG Spring. Retrieved February, 2007, from: www.w3.org/2002/ ws/arch/2/04/ UCSFA.ppt.

Basili, V., Caldiera, G. and Rombach, H., 1994. Goal Question Metric Paradigm. Encyclopedia of Software Engineering (Vol 2), 528-532. John Wiley & Sons.

Fairchild, A., 2004. Information Technology Outsourcing (ITO) Governance: An Examination of the Outsourcing Management Maturity Model. Hawaii, EUA: Tilburg University. Retrieved September, 2006, from: http://csdl2. computer.org/comp/proceedings/ hicss/2004/2056/08/205680232c.pdf.

Kruchten, P., 2003. The Rational Unified Process: An Introduction. Third Edition. Addison-Wesley Professional.

Lee, J., Huynh, M., Chi-Wai, R. and Pi, S., 2003. The Evolution of Outsourcing Research: What is the Next Issue. 33rd Hawaii International Conference on System Sciences.

Mayer & Bunge, 2004. Informática LTDA. “Panorama de la Industria Latinoamericana de Software”. Page 97. Brazil.

Méndez, E., Pérez, M., Mendoza, L., Ortega, M., Nuñez, C. and Fernández, M., 2007a. “Factores Críticos de Éxito Tecnológicos para Outsourcing de Tecnologías de Información: Modelo Conceptual”. Technological Critical Success Factors for Information Technology Outsourcing: Conceptual Model. LVII Annual Convention of the Venezuelan Association for the Advancement of Science - AsoVac. San Cristóbal, Venezuela. November.

Méndez, E., Pérez, M. and Mendoza, L., 2007b. A Tool for Evaluating IT Outsourcing Projects based on Critical Success Factors. Venezuelan Meeting on Information Technology and Software Engineering, EVETIS'07, Porlamar, Venezuela. Financed by FONACIT through project G-2005000165.

O'Brien, J. A., 2005. Introduction to Information Systems. Nueva York, NY: McGraw-Hill.

Rivas, L., Pérez, M., Mendoza, L. and Grimán, A., 2007. Software Development Tools: Towards the Construction of an Ontology. Venezuelan Meeting on Information Technology and Software Engineering, EVETIS'07, Porlamar, Venezuela. Financed by FONACIT through project G-2005000165.

Rivero, D., Montilva, J., Granados, G., Barrios, J., Besembel, I. and Sandia, B., 2007. The Software Industry in Venezuela: A Characterization of Human Resources. Venezuelan Meeting on Information Technology and Software Engineering, EVETIS'07, Porlamar, Venezuela. Financed by FONACIT through project G-2005000165.

Sheehy, D., Baker, G., Chan, D., Cheung, A., Grunberg, H. and Henrickson, R., 2003. Information Technology Outsourcing. Toronto, Canada: The Canadian Institute of Chartered Accountants. Retrieved September, 2006, from: http://www.cica.ca/multimedia/Download_Library/Research_Guidance/IT_Advisory_Committee/English/eIToutsou rcing0204.pdf

Temnenco, V., 2006. UML, RUP, and the Zachman Framework: Better together. IBM. Retrieved June, 2007, from: http://www.ibm.com/developerworks/ rational/library/ nov06/temnenco/#author

Veit, M. and Herrmann, S., 2003. Model-View-Controller and Object Teams: A Perfect Match of Paradigms. 2nd International Conference on Aspect-Oriented Software Development, Boston, March.