Automating the Service Identification from BPMN Diagrams

Ali Seridi

Department of Computer Science
LabsSTIC Laboratory
University of 8 May 1945 Guelma
24000 Guelma, Algeria
Seridi.ali@univ-guelma.dz

Lynda Dib

Department of Computer Science
University of Badji Mokhtar
BP12, 23000 Annaba, Algeria
Lynda.dib@univ-annaba.dz

***Abstract*--SOA (Services Oriented Architecture) is considered since its appearance as a solution to enterprise information systems which allow agility, reusability and interoperability. In the last decade, a big trend for the adoption and migration to SOA has been noticed. Studies have shown that the cost of migration to SOA using reengineering techniques is much less than that from a redevelopment of Information system.**

Service Identification is a critical phase in services engineering, particularly in the SOA design. The position, direction and service identification activities differ from one context to another.

Our work falls within the field of the re-engineering of legacy systems and more particularly object-oriented applications towards a service-oriented architecture. Through this article, we propose to evaluate the results of the identification of services from the object code by comparing the resulting services with those expected by the company.

The services identification being made automatically from the analysis of object-oriented code can generate services that will not make sense for the company. To validate the identified services we have to take into consideration the point of view of the company, the latter is represented in BPMN diagrams.

To achieve this goal we have proposed conversion rules and developed a tool that automates the identification of services from BPMN diagrams in order to compare them with the services identified from the object code and validate them.

***Index Terms*--SOA (Services Oriented Architecture), Reengineering, Service Identification, Migration Towards SOA, BPM, BPMN2.**

1. INTRODUCTION

Business Process Management (BPM) includes methods, techniques, and tools to support the design, enactment, management, and analysis of operational business processes [1]. It enables organizations to be more efficient, more effective and more capable of change than a functionally focused, traditional hierarchical management approach [2]. Business process is defined as "a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer. A business process has a goal and it is affected by events occurring in the external world or in other processes." [3].

Business Process Model and Notation (BPMN) is a standardized graphical notation for modeling business processes. It will enable businesses to understand their internal business procedures in a graphical notation and will give organizations the ability to communicate these procedures in a standard manner. Furthermore, the graphical notation will facilitate the understanding of the performance collaborations and business transactions between the organizations [4].

In order to increase the efficiency of the company's business process, a good choice would be to combine BPM and SOA. BPM will bring through its approach and its overall view of all business processes a level of understanding that will permit more simplicity, flexibility in the optimization and process control. Thus, service identification will be better conducted through an approach combining the technical aspect of the SOA and the comprehensive aspect of BPM, hence the choice of the meet-in-the-middle approach.

2. BACKGROUND AND OBJECTIVES

To achieve service identification, several approaches have been proposed, among them Top-down, bottom-up, Inside-Out and Meet-in-the-Middle (Outside-In) "Fig. 1". The latter consists of conducting in parallel a top down approach to define high level of services necessary for the implementation of business processes (in our case represented by BPMN2 diagrams), as well as a bottom-up approach in order to identify and extract services from the existing application code (in this case the source code of Object oriented applications). Through our previous works, we proposed a solution to the automation of service identification stage following a bottom-up approach (intervening on the object oriented source code) in which we used the classification algorithms to constitute class groups each forming a service.

Although this work has allowed us to propose a re-engineering of object-oriented applications to service-oriented architecture, and each proposed service complies with the quality requirements and characteristics of a service-oriented architecture. This approach does not guarantee that the services automatically identified meet

the enterprise's expectations and point of view. To remedy this problem we proposed automation of service identification based on the perspective of the company represented by the BPMN diagrams.

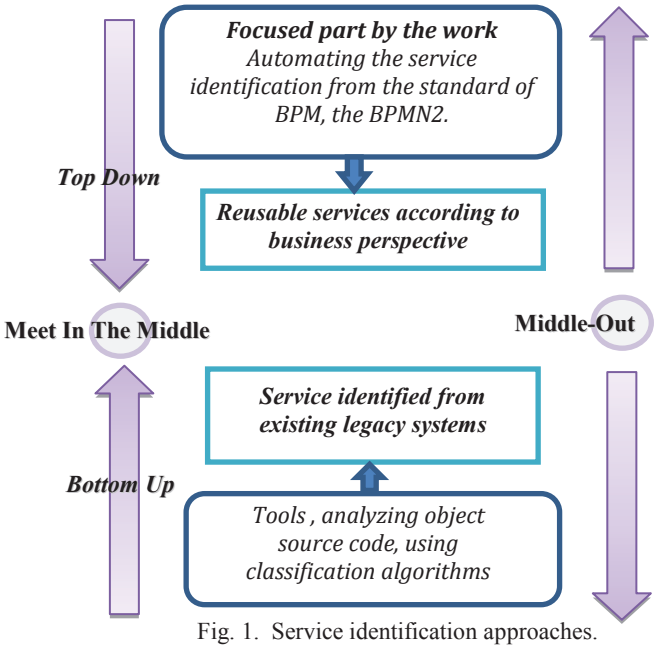

Fig. 1. Service identification approaches.

The objective is multiple: First, this work allows validating the results of the identification of services from existing object oriented applications, second it also giving companies the means to verify compliance of their IT developed according to SOA with their expectations and their tender specifications.

3. RESULT AND DISCUSSION

Our goal is to automate the identification of services from the perspective of the company represented by the BPMN 2.0 diagrams. We want to break down all of the functionality provided by this graphical representation into a consistent set of features called basics services. In our case a task or set of tasks may form a service provided to respect the properties of a service. To achieve this goal we have to follow the steps described in Figure "Fig.2".

A. File analysis

The analysis stage can extract information from a given representation, in our case we rely on two types of diagrams: process diagram and collaboration diagram. These informations, are about the components of a process such as the events, activities, messages, connections, etc.

B. Extracting information

During the diagrams analysis, our tool will scan all the elements of the XML file to organize them into a usable data structure and easy to navigate.

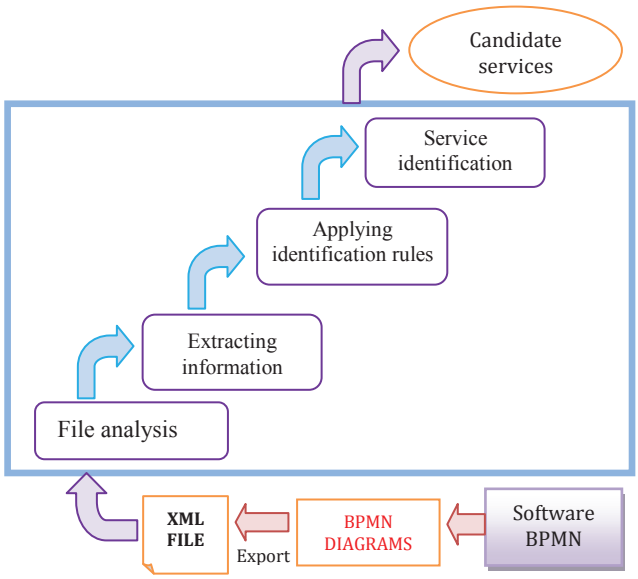

Fig.2. The steps for the automatic identification service

C. Applying identification rules

In In this step, we proceed with the extraction of services from BPMN diagrams by applying some rules that we have deduced from the properties of the services. These rules can be updated on a continual basis in order to improve identification. We present, in the following, some examples of rules that we used to identify services.

- r1. A Task with the type service is an automatic task ie without human interference. Such task could be considered directly as a web service.
- r2. A process is a service constitute by all its tasks if all its tasks are of the manual type.
- r3. A process that contains at least one manual task cannot be considered globally as a service, but it can be constituted of a finer granularity services.
- r4. Each path after a conditional branch can be considered as a service on condition that: the path is parallel and it does not contain any manual task.

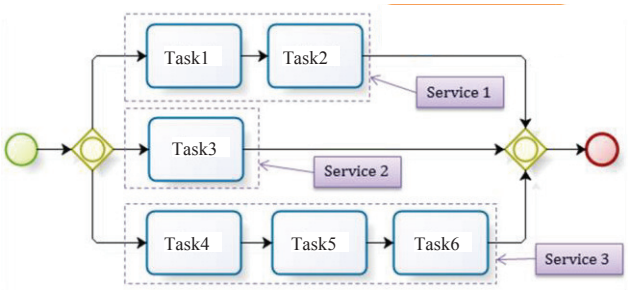

Fig. 3. Example of applying rules to identify services.

Many other rules where proposed and tested on samples.

D. Services assessment

After the identification of services from BPMN2 diagrams, we begin the results assessment stage of candidate services (web service). This assessment can be done by comparing manually the results of the automatic

identification of services from BPMN2 with the results of the identification service from object code analyzed.

5. CONCLUSION

Through this work we wanted to complete preliminary work which was to provide a solution and a tool for automatic migration of legacy systems (such as object-oriented systems) to a service-oriented architecture using the analysis of the source code of legacy system and application of unsupervised classification algorithms [5]. We noticed that the resulting services were purely technical; they were independent and reusable modules that meet the characteristics of a good service as defined SOA. But, these services lack the semantic aspect of business processes.

In order to improve the quality of services identified from the source code, we proposed to exploit the semantic contribution provided by the BPM. To identify services according to business perspective, our proposal is based on the automatic interpretation of BPMN2 diagrams, and to automate the identification of services, we proposed a set of rules complying with the SOA service characteristics. So we can assess IT services developed by programmers, and confirm their alignment with the expectations and business requirements.

As perspective we propose to improve our work by making it more general by allowing updates with new rules. Furthermore, we wish to extend our work with a new part that will automate the assessment and verification of the alignment of IT services with business needs that remains in our case a manual stage.

REFERENCES

[1] VAN DER AALST, Wil MP, TER HOFSTEDE, Arthur HM, et WESKE, Mathias. Business process management: A survey. In : International conference on business process management. Springer Berlin Heidelberg, 2003. p. 1-12

[2] KO, Ryan KL. A computer scientist's introductory guide to business process management (BPM). Crossroads, 2009, vol. 15, no 4, p. 4.

[3] Hammer, M. and Champy, J. 1993. *Reengineering the Corporation: A Manifesto for Business Revolution*. Harper Business, New York, NY.

[4] Object Management Group: Business Process Model and Notation; http://www.bpmn.org/ consulted: 30 October 2016.

[5] W.Nebili, R.Chelaghmia, A.Seridi: Master memory 'Identification des services web à partir d'application orientée objet en utilisant les algorithmes de classification (étude comparative).' University 8 Mai 1945 Guelma - 2015