A STRATEGY-ORIENTED AND AGILE FRAMEWORK FOR MANAGING BUSINESS PROCESSES: A CASE STUDY ON E-BANKING

UN FRAMEWORK AGILE ET ORIENTE STRATEGIE POUR LA GESTION DES PROCESSUS METIER: UNE ETUDE DE CAS SUR L'E-BANKING

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ABSTRACT

The present paper provides a framework for developing a supervision system of business processes in enterprises. This methodology is based on a strategy-oriented architecture covering three phases: analysis, design and implementation. It combines concepts of the Balanced Score Card method, UML, Business Processes Execution Language for Web Services and of the agent paradigm. The proposed methodology aims to ensure the agility property that permits easily to change and refine the architecture elements without involving the other ones. In order to evaluate this framework, a prototype system has been developed with a case study related to the Algeria Gulf Bank, with showing its practical applicability through a simulation under the JADE platform.

KEYWORDS: Business Processes, Enterprise Business Strategy, Monitoring, BSC, BPEL4WS, Agent, Agility.

RESUME

Le présent document fournit un framework pour développer un système de supervision des processus métiers dans les entreprises. Cette méthodologie propose une architecture basée sur la notion de stratégie, couvrant trois phases: analyse, conception et implémentation. Elle combine des concepts de la méthode Balanced Score Card, UML, Business Processes Execution Language for Web Services et ceux du paradigme agent. La méthodologie proposée vise à assurer la propriété d'agilité permettant de modifier facilement et d'affiner les composants de l'architecture sans impliquer les autres. Afin d'évaluer les idées proposées, un prototype a été développé avec une étude de cas relative à l'AGB (Algeria Gulf Bank), afin de fournir son application grâce à une simulation via la plate-forme JADE.

MOTS-CLES: Processus métiers, Stratégie métiers d'entreprise, supervision, BSC, BPEL4WS, Agent, Agilité.

1 INTRODUCTION

In order to ensure their functioning, the Information Systems (IS) of enterprises use many Business Processes (BPs) as a set of activities realizing jointly a business goal. Each BP is enacted by a single enterprise. But, it may interact with other BPs performed by other enterprises. According to Weske (2012), BP Management (BPM) provides a life cycle includes: BP modelling or designing; implementation of BP models, execution and supervision of BP instances, monitoring and auditing of running BP instances, and evaluation and improvement of BP models. Therefore, BPM aims to help enterprises for improving their effectiveness and provides a greater visibility in the area of business operations (Rosemann, 2015).

In this context, the supervision or monitoring of BP is an improvement operation permits to measure, to verify and to analyse the observed differences between the expected values and the measured ones. Any deviation is sanctioned by conducting corrective actions on BP (Briol, 2008). Norton & Kaplan (2014), suggest that the supervision permits an interaction with all the key players in a company through the taken decisions: redefinition of a process or a part of activity, interruption of the execution of a running process or improvement of the goals and strategic objectives. Consequently, Hammer (2015) believes that the enterprises need to monitor the process performances, to recognize and to correct such performance problems. It also stayed alert to opportunities to modify the design process to make it performing even better.

However, the problematic is due to the lack of good monitoring methods, because of the control of internal and external BP involved for achieving both company business

strategy and its global objectives. In this case, the important issue is what are the concepts used in order to provide in real-time systems that access to critical indicators of BP, improving the performance and the efficiency. Mainly, the problem is due to the fact that companies are not able to respond to last-minute changes if a possible action is integrated into the process. This last should be more flexible to lead companies to cope with all the situations, being not only reactive but also proactive. It is essential that the static processes become complex, dynamic and able to advance in order to adapt to new requirements as they arise. To deal with these problems, the monitoring stage has been the solution that will be addressed in the present work.

In the same field, and in a previous work (Ouaar & Boufaida, 2016a), a simple approach has been proposed for developing a supervision mechanism of BPs. This approach, which leads to build a Business Supervision System (BSS), suffered from a clear methodology based on an enterprise strategy. The objective of this paper is to propose a framework for developing a BP supervision system in an enterprise. This framework that is based on a strategy-oriented model covering three phases: analysis, design and implementation use concepts as BSC, BPEL4WS and those of agent paradigm, for several motivations:

Balanced ScoreCard (BSC) (Kaplan 2001) is a performance measurement method that includes traditional financial measures and also qualitative measures. It gives a way to traduce a vision into a clear set of goals translated into a powerful measurement system (Kaplan 1996). Therefore, BSC is adopted in our solution because it is among the few methods available for widespread monitoring process.

The Business Process Execution Language for Web Services (BPEL4WS) (Papazoglou 2007) allows designers to orchestrate individual services so as to construct higher level business processes. The specification of the orchestration is expressed in XML-based language and it is deployed in a BPEL execution engine, making thus available for invocation by consumers.

The implementation phase is based on the behaviour of four agents. In fact, the Multi-Agent System (MAS) (Luck et al., 2005) paradigm is called because it is became an important design tool for inter-operating open and distributed systems. Also, the notion of Mobile agent is adopted. These both paradigms of mobile agents and intelligent ones are targeting adaptive and flexible co-operation, particularly for interoperability between distributed systems in a dynamically changing environment.

The rest of this paper is structured as follows. In Section 2, we discuss some conceptual and technological tools allowing the development of a monitoring system. In Section 3, a brief literature review is given. Section 4 gives the different phases of the proposed framework. A case study related to the e-banking is presented in Section 5. Conclusion is given in Section 6.

2 CONCEPTUAL AND TECHNOLOGICAL TOOLS FOR DEVELOPING A BP MONITORING SYSTEM

In the present paper, the business strategy is been considered as an important tool for activity analysis and decision making in an enterprise. It is the basic source for building elements of a new BSC structure: perspectives, objectives, measures, targets and initiatives. Business strategy is used also to define the coordinated actions, leading the achievement of the overall objectives over the long term. In the proposed framework, the business strategy is translated to action plans that are transmitted to the operational teams of an organization. The plan may include alternative tasks covering certain predictable situations like alerts or notifications (Briol, 2008). Thus, researchers have been suggested that there is an important need between enterprise's business strategies in the proposed supervision system.

Kaplan & Norton (2001), the founders of Balanced Score Card (BSC), defined a structure respecting four perspectives: Financial, Customer, Internal business processes and Learning and growth. In the context of B2B (Business To Business), the authors of BSC do not consider the aspects related to the public BP. For this, it is necessary to define a new perspective for the management of external or public BP. BSC has been adopted because it constitutes a good solution among the few techniques that are available for a widespread monitoring process to the enterprise's strategy (Briol, 2008). Also, BSC creates a reporting system that allows the progress against the strategy to be supervised and the corrective actions to be taken as required. According to Kaplan & Norton (2001), BSC serves as a link between the control process operations and the strategies. It has been noticed again that the terms of control, monitoring and of strategy are always bound to the BSC. Finally, it has been used in order to increase focus on a business strategy and the recent results are concentrated on the drivers of future performances, improving the communication of the organization's vision and strategy.

Also, BPEL4WS can be an efficient solution to specify the cooperative behaviour that links the new perspective of 'Public Process' and to exploit into an XML setting file. BPEL4WS is a tool used to specify the interaction of BPs that are fairly stable, and to involve the invocation of web services that are known beforehand. Therefore, a BPEL4WS scenario designer specifies, at the time where this scenario is crafted, the exact services to be invoked for the realization of the BP.

Otherwise, the MAS paradigm helps to dynamically adapt interfaces and services of remote systems, to reduce dependency on the constant availability of underlying network connectivity, to achieve dynamic load balance and to enable a dynamic distribution of functions.

In a software engineering viewpoint, agility is defined as "the ability of a sensitive organization that exhibits flexibility to accommodate rapidly expected or unexpected changes, following the shortest time span, using economical, simple and quality instruments in a dynamic

environment and applying updated prior knowledge and experience to learn from the internal and external environment" (Qumer & Henderson, 2007). This context asserts that an organization should be able to create or adapt a business or service efficiently and effectively when changes occur in its environment, which evokes the idea of speed, talent, flexibility, suppleness, ability to get out of an unstable or dangerous to reach a safer position or sustainable. Furthermore, this property means the need of an organizational ability of a company to continually sense promising competitive opportunities and to respond through innovative moves in the form of new product introductions, new process improvements, new alliances, or of other similar competitive actions.

3 SOME RELATED WORK

This section organizes some research works that are related to the present work and that are based on the concepts mentioned in Section 2.

Shen et al. (2016), proposed an Enterprise Resource Planning as a performance measurement framework that integrates the BSC dimensions, linguistic variables, and non-additive fuzzy integral. Abo-Hamad & Arisha (2016) integrated a simulation modelling framework based on BSC and an approach oriented towards a multi-criteria decision analysis with the aim to provide a decision support system for health-care managers and also to improve planning and efficiency of health-care processes. Also, (Jahantigh et al. 2016) presented an approach to prioritize the strategic objectives of BSC. However, these approaches ignore the usefulness of the company business strategy like the proposed solution. In another context, many studies have combined the formal specification languages and BPEL4WS like Abstract State Machines (ASM) (Fahland & Reisig, 2005) or Petri net (Aalst & Lassen, 2008). In contrast to our methodology, the BPEL4WS elements are used to specify an interaction between the internal and external BP. Afterwards, this specification is used again in a multi agent system as XML database to enact the monitoring of this BP at run time. According to (Chen et al., 2016), another work is proposed to develop a cloud system based on a network monitoring and a threat detection system to make the critical infrastructure systems more secured. Also, Natarajan & Srinivasan (2014) presented a multi-agent architecture for the supervision of large-scale chemical plants. In Liang & Yuan (2015), a multi-agent fusion and coordination system has also developed to deal with the damage identification for the strain distribution and the joint failure in a large structure. The result shows that the method can significantly improve the monitoring performance for the large-scale structure, but without any consideration of strategy and interaction.

As shown before, several important research works strand to the relevance of the BP monitoring have been carried out before. It has been synthesized that the enhancement and the application of these techniques prove that in the BPM discipline with all the paradigms such as business strategy, BSC, agent paradigm, BP modelling and specification, used in a sole system can constitute an original contribution.

4 AGILE METHODOLOGY FOR DESIGNING A SUPERVISION SYSTEM

The present paper proposes a methodology allowing an agile way for obtaining a supervision system that makes a strong link between the business strategy of an enterprise and the BP specification. This type of strategy constitutes an important advantage because it is an input guideline that defines the coordinated actions of policy, leading to the achievement of the overall objectives in a defined period. Agility brings an added-value to other approaches, when only agile businesses, which can flexibly design or reconfigure their operations and processes in a declared analysis, can survive in the rapidly evolving systems by testing currently the taken measures. In our solution, the agility is located in the flexible manipulation of the BSC objective properties, targets and measures for each dimension. Agility emerges in an easy graphic modelling of the BP using interaction diagrams, which are flexible to handle and easy to refine. The agility quality exists again in BPEL4WS abstraction, when the interface is the only part , which is visible of these components. As shown in Figure 1, the proposed framework follows the three phases: analysis, design and of implementation. Their descriptions are given below:

4.1 Analysis Phase

This phase provides four steps:

Step1: Identification of the enterprise business strategy.

Step 2: Listing of the internal and the external monitored BP.

Step 3: Identification of the system internal role.

Step 4: Proposition of the structure of the database.

4.2 Design Phase

This phase contains four steps:

Step 1-a: Construction of the monitoring dashboard

There is a need to think in a strategy for the status of its private and of its public BP. In order to accomplish the requirements of distributed and dynamic companies', an extension of the original structure of the BSC is proposed with adding 'Public Process' as fifth perspective. This new structure is built according to the enterprise business strategy: For each of the five perspectives, its objectives are defined and for each objective, the measures, the targets and the initiatives must be identified.

Step 1-b: Elaboration of the XML DTD (Document Type Definition) structure of the monitoring dashboard.

Step 1-c: Generation of the monitoring dashboard XML file

Step 2-a: Elaboration of the UML activity diagrams.

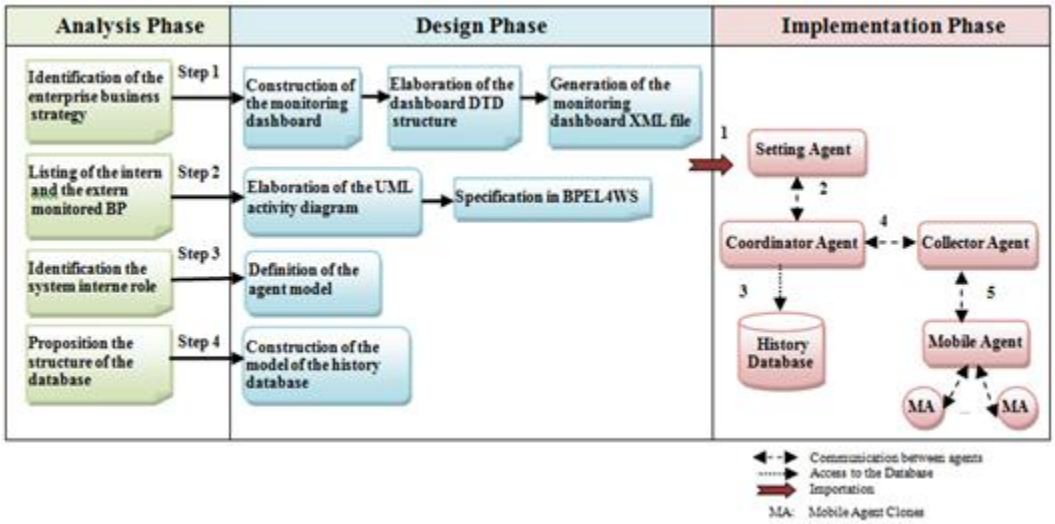

Figure01: Different Phases of the framework

Step 2-b: Specification in BPEL4WS: The cooperative behaviour of each monitored external BP is specified with a graphical design accompanied with a WSDL description.

Step 3: Definition of the agent Model

In (Ouaar & Boufaida, 2016b), system architecture has been proposed and is based on two levels: conceptual and operational. But this architecture has demonstrated inefficiency, due to the lack of coordination model and mobility quality. In this research work, we consider the system roles identified during the analysis phase for be ensured with a multi-agent system.

In order to study the structure and the role of the involved agents: setting agent, coordinator agent, collector agent and mobile agent, a model has been proposed when it is possible to modify the structure of agent independently of the others. This representation uses the UML class diagram showed in Figure 2. The detailed description of the four agents is provided in the flowing paragraph:

4.2.1 Setting Agent (SA)

It manages the communication between the monitoring system and its users (administrator and the other users) (link 1 in Figure 1) and (link 2 in Figure 1). This agent is structured with the following components: Communication Module, Dialogue Manager Interface, Library of monitoring interactions, Dashboard, User profile database and Supervised results Table.

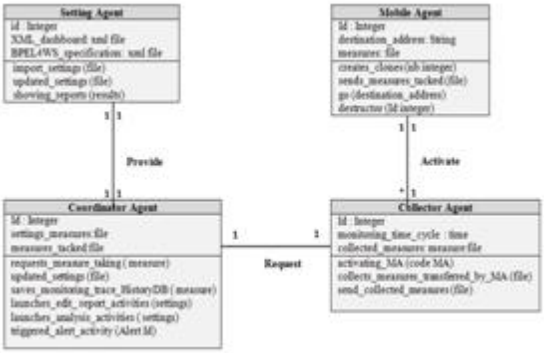

Figure 02: Model of the proposed multi agent system

4.2.2 Coordinator Agent (CA)

It is the basic agent that interacts and coordinates with the other agents (link 2 in Figure 1), (link 4 in Figure 1) and (link 3 in Figure 1). The structure of this agent is specified as: Communication Module, Monitoring and Coordination Module, Knowledge and Report File.

4.2.3 Collector Agent (LA)

According to the well-defined cycle times, LA triggers the operation of measures taking, by activation of MA specialized in the measures taking toward a specific destination. LA receives and collects the transferred measures by MA (link 4 in Figure 1) and (link 5 in Figure 1). The structure of this agent is detailed as following: Communication Module, Launching and Collecting Module, Measures settings Table and Collected Measures File.

4.2.4 Mobile Agent (MA)

According to a determinate destination like the BP instances through their logs files, the enterprise IS through the current values in a database, and other applications through a captor variables, this agent has the ability to clone it self and to migrate from each clone to an outsourcing destination, in order to take measures. After that, the taken measures are transferred toward the LA (link 5 in Figure 1). The structure of this agent is specified as: Communication Module, Processing Module, Mobility management module and Measures file.

We have been motioned that in this MAS the agility is ensured during the coordination, the collaboration and the communication between agents. Also, an agent is dynamically adaptive, robust and flexible in the realization of the interoperability mechanism of distributed dynamic systems.

Step 4: Construction of the model of the history database: This database is a source of all the measure traces. The following paragraph represents its logic model:

- Perspective: <perspective_Id: Integer, perspective_name: String>.

perspective_Id: perspective code of the dashboard.

perspective_name: perspective name such as: Financial, Customer, Private_Processes, Public_Processes, learning_growth.

- Objective: <objective_Id: Integer, objective_name: String>

objective_Id: objective code in such perspective.

objective_name: objective name.

Across the model connectivity, this table inherits the key of Perspectives table to use it.

- Measure: <measure_Id: Integer, measure_name: String, measure_val: Integer>

measures_Id: measure code. Each objective can provide a various measure.

measures_name: measure name.

measures_val: measure value, which will contain the information.

As the previous case, this table will use the inherit key of Objectives table.

- Trace: <agent_mobil_Id: Integer, address_distination: String, measures_date: Date, measures_time: Time>

agent_mobil_Id: identifier of the mobile agent that takes this measure.

address_distination: address destination of the source of measure taken by this mobile agent.

measure_date: the date of the measure taken by an agent.

measure_time: the time of the measure taken by an agent.

4.3 Implementation phase

Using the most suitable software tool, the business monitoring system could be implemented as an agent society (MAS) through the specified agents: SA, CA, LA and MA. This system operates thanks to their roles. Also, the history database is implemented. In the proposed framework, the activity of the supervision must be implemented: The required measures are taken by a set of mobile agents. The targets values are initialized in the BSC XML file and they must be compared ant analysed with the taken measures. As results of analysis, the initiatives or actions are projects or programs launched to meet the enterprise objectives.

5 A CASE STUDY: ALGERIAN GULF BANK

In order to illustrate the exploitation of the proposed framework and to validate it, a case study has been chosen in a modern banking company, called AGB (Algeria Gulf Bank). It is a good example that would be the implication of the framework practice. The choice of AGB is motivated for several reasons. First, the banking domain provides the most convenient environment to prove all the aspects of the proposed framework. Second, this bank pursues clearly its own business strategy. Third, it provides many internal services and it also publishes some external services via the net like the e-banking service. The principal objective is to implement a supervision system of the various transactions of internal and external BP in this company. The developed approach is evaluated in the following application:

5.1 Analysis phase

Step 1: According to the AGB (2016) web site, its business strategy is briefly presented as follow:

- Total quality management.
- Network agency enlargement.
- A human resource management focuses on performance.
- Growth and market shares of conquest.
- Innovation.

Step 2: Listing of the internal and the external monitored BP:

a) Internal BP: the statement of account, the currency exchange, a new check book request and delivery of Card Inter Bank (CIB), calculation of statistics.

b) External BP: Internet banking (Website); Telephone banking (Fax), SMS banking (SMS), Automatic Teller Machines (ATM) and E-Payment (Electronic Payment Terminal).

These external BP are published as Web Services when

their user contract is mentioned below:

- The Service Internet banking: The user contract is the PIN code and the Password.
- The Service Telephone banking: The user contract is the Fax number and the message sending.
- The Service SMS banking: The user contract is the mobile number, the sending message.
- The Service ATM: The user contract is the PIN code, the retired amount and the IBC.
- The Service E-Payment: The user contract is the PIN code, the paid amount and the IBC.
- Step 3 & 4: Identifying the internal roles of the and proposing the structure of the database (the same than those that are determinate in Section 4.2).

5.2 Design phase

Step 1-a: According to the study of the AGB business strategy with the definition of a new BSC structure. Table 1 show a part of the overall monitoring dashboard, when the entire line of the new perspective is coloured.

Step 1-b: the monitoring dashboard DTD has been elaborated as the following file:

```
<! ELEMENT BSC (Perspective) >
<! ELEMENT Perspective (Financial, Customer, Private_processes, Public_processes, Learning_growth) + >
<! ELEMENT Strategy (Objectives) + >
<! ELEMENT Objectives (Measures +, Targets +, Initiatives *) >
<! ELEMENT Measures (#PCDATA) >
<! ELEMENT Targets (#PCDATA) >
<! ELEMENT Initiatives (#PCDATA) >
<! ELEMENT Financial (Strategy) >
<! ELEMENT Customer (Strategy) >
<! ELEMENT Private_processes (Strategy) >
<! ELEMENT Public_processes (Strategy) >
<! ELEMENT Learning_growth (Strategy) >
```

Step1-c: The monitoring dashboard XML file is obtained by the association of the DTD structure described upstream. This file is considered as a standard serialised and independent file of the new proposition of the BSC structure, with the set of perspectives, objectives, measures and targets that are gathered with their real values.

Step 2-a: According to the AGB environment, a model of interaction between the internal and external BPs is designed.

Step 2-b: Among a set of external BP, the choice is taken to present the SMS banking that respects the following scenario (Figure 3):

The system receives a blank SMS by a client, and stores his phone number.

If the phone number exists in the system database **then**

Sending a SMS containing the balance of this client.

Else the system ignores this request.

Step 3: Setting agent, coordinator agent, collector agent and mobile agent are specified with four dependent classes contained attributes and methods. This structure is very helpful for the implementation phase, respecting the structure proposed in figure 2.

Step 4: The design of the history database structure is presented as a set of linked independent tables.

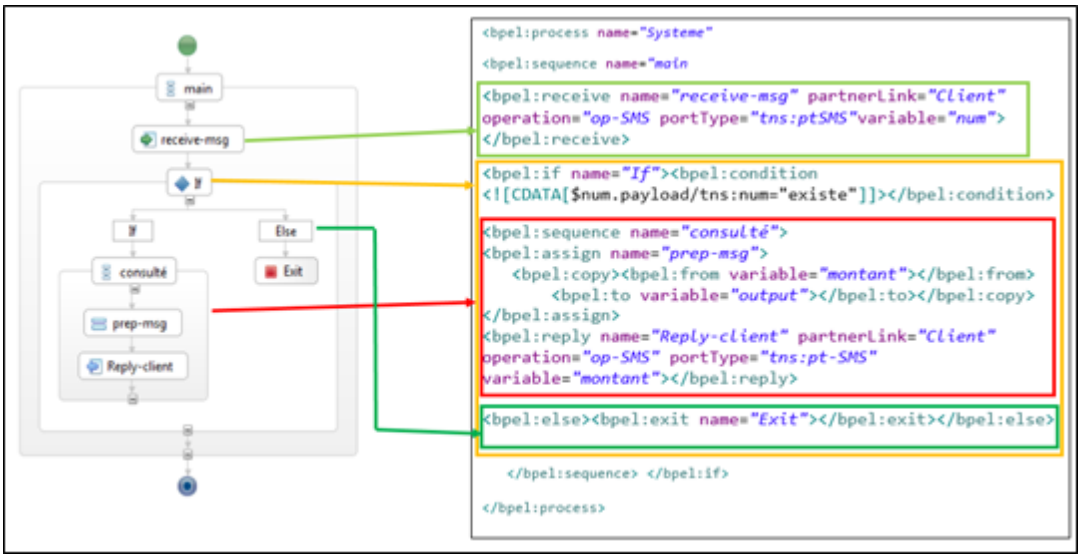

Figure 03: SMS Banking BPEL4WS design

Table 01: AGB monitoring dashboard

Perspectives	Strategy Map	Balanced Scorecard (BSC)		Action Plan
	Objectives	Measures	Targets	Actions / Initiatives
Financial	Increase in revenues	- Own capital -Total revenue - Charges -Tax	- Social capital> 20% in 2022 -ROA +3% -ROE +2%	-Increase sponsoring -Analyze reports
	Economic growth	- Social capital -Turnover -Exchange rate - Rate of growth	-Rate growth> 5% in 2019 -Exchange reserve> 0,5% -Social Capital= 1.93%	-Review monthly balance sheets. - Edit the annual report. -Establish performances in the financial report.
Customer	Evolve in customer wallet	-Number of customers -Deposits from Customers	-Total account +5% -Credit total =3% -Total assets+0,1% -Own Fond+1%	-Align claims with the trade - Provide available services and easily accessible
Private processes	Mark as a reference bank in terms of technology and innovation	-Critical processes - Failed processes	-Critical processes<0.001% -Process failed =< 0,00 5%	-Apply information technology -Improve capacity of information systems
Public processes	Optimize the use of the published web services	-SW Successfully invoked -SW invoked with Failure	- Rate Failure = (Failure/ invoked) < 0,00001%	- Reinforce the security conditions
Learning and Growth	Improve the performance of current and future Collaborators	- Number of organized training - Number of trained employee -Employee productivity (Hour/Day)	- Rate human failures <0,5% -Employee trained> 80% in 2020	-Master the existing and new businesses in the banking industry

5.3 Implementation phase

The suggested system could be implemented in order to have in this company an application allowing the BP supervision. In this section, the behaviour of the four agents is simulated to specify the system. JADE (2016) (Java Agent DEvelopment Framework) has been chosen, which is a software framework fully implemented in the Java language. The choice of this platform is made for implementing of the different agents with providing a support for the agent communication and coordination aspects. It simplifies the implementation of multi-agent systems through a middleware that complies with the Foundation for Intelligent Physical Agents FIPA (2016) specifications and through a set of graphical tools that support the debugging and deployment phases. Within the agent communication paradigm, the cooperation mechanism is realised via Agent Communication Language (ACL), whose the FIPA standardisation efforts focus on the dynamic interoperability between static software systems like agent systems or intelligent agents. The different agents are represented as instances of the Java classes. Each java class is an extension of the basic agent class (included in jade.core).

Table 02: A trace of the History database

Perspec tives_Id	Perspecti ves_Name	Obje- tives_Id	Objectives_ Name	Measures _Id	Measure s_Name	Measures _Val	Mobil_Agent_ Id	Destination _Address	Measures _Date	Measures_ Time
1	Financial	12	Increase in revenues	121	Social capital	2.000.000	MA@srv-ec: 1099/ JADE	Local_hoste @1024	03/01/2 016	11:20
3	Private Processes	31	Mark as a reference bank	311	Critical processes	0, 0001	MA@srv-ec: 1099/ JADE	Local_hoste @1024	03/02/2 016	20:20
4	Public Processes	41	Optimize the use BP published	412	SW invoked with failure	00	MA@srv-ec: 2017/ JADE	Local_hoste @370	16/04/2 016	15:05

Classes implement the "setup" method in which the agent behaviours are added. These behaviours allow the description of the agent actions and tasks by implementation of the method "action" within the class "Behaviour". Since the design phase presented the structure and behaviour of each agent, the four agents have been created in the main container. The mobile agent and its cloned one are created in runtime within the other container that represent the host destination. Otherwise, each new cloned MA will be in own container. All the conversations (the sent messages and the received ones) between agents can be sniffed, monitored and displayed on the graphical user interface of "Sniffer Agent" tool. The proposed framework is defined in a supervision system package that includes a self container and four classes corresponding to the cited agents. Also, all the messages which are sent and received by the different agents can be captured and displayed using the JADE graphical interface.

Thanks to the structure of history database that is defined in the design phase, it is necessary during the implementation phase, to create the table perspective, Objective, Measure and Trace and also the links between them, using the most suitable database tool. The objective is to provide a softly save and restore queries to all the users. As result of some supervision cycle, Table 2 shows a trace of the history database captured in a precise time from several data sources like the values of the line 1 and the line 2 of Table 2. These sources are extracted form the AGB database. The value of the line 3 is captured from the log file of the Web Service server. This trace helps managers during the analysis phase to take the best decision.

6 CONCLUSION AND FUTURE WORKS

This paper outlines the problems of BP performances for a better process visibility and to improve the overall flexibility, with providing framework for developing a system managing public and private BP of a company. This framework combines concepts derived from several paradigms: company business strategy, interaction model, intelligent agent, and mobile agent.

The outcome showed that the integration of the extended BSC and the business strategy in a monitoring system allow helpful reporting, a better decision making and an efficiency analysis. The findings of this research work reveals that this methodology is a reliable method and shows acceptable results: to edit an interactive reports, to improve business efficiency via the respect of a company BSC strategy, to reduce the time response of the operations BP via a BPEL4WS specification, to allow one to access to real-time process performance indicators via the dashboard measures against their targets, and also to exploit the data that resident in the enterprise database for the decision making. Thus, the framework allows BPM developers to build an independent technologic solution.

The framework advantage is the agility handling during the development process that making changes easy. Furthermore, this approach can be applied to various BP systems. But it has some limitations: The first problem is related to the difficulty to find the best indicators (objectives and measures) of the BSC, the suitable time to update them, and to associate with them a real value (target) in the market by applying the analysis. The second problem is about the complexity to model the composed BPs, as a set of intern and extern activities. Finally, there is a lack of an automatic transformation from a business strategy to an XML dashboard, which needs to a human intervention.

In a future work, we will investigate to accomplish all the system's implantation, and to think to a tool permitting the automatic generation of the XML dashboard despite the proposed manual way. Also, we intend to specify the behaviours of the MAS trough a monitoring protocol using a formal model.

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