

FACILITATING AND BENEFITING FROM END-USER INVOLVEMENT DURING REQUIREMENTS ANALYSIS

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Abstract: Problems related to requirements analysis of information systems are frequent. System analysts usually lack understanding of the business and focus on the purpose of the system, and can easily miscommunicate with end-users. To prevent these problems, this paper describes an approach that tries to facilitate and benefit from end-user involvement during requirements analysis. The business environment is modelled in the form of business process diagrams by means of BPMN. The diagrams are validated by end-users, and the purpose of the system is then analyzed through the goal/strategy Map approach in order to agree on the effect that the system should have on the business processes. Finally, functional requirements are specified by means of the description of the business process tasks to be supported by the system.

1 INTRODUCTION

Requirements analysis is a success factor of software projects. Nevertheless, problems can easily arise from the requirements stage of information system (IS) development for organizations.

One of these problems is lack of understanding of the business by system analysts. As a solution, it has been acknowledged the importance of organizational modelling (Kirikova, Bubenko, 1994). Business process modelling has been declared as a good approach for organizational modelling and also as a must for IS development (Dumas, Aalst, Hofstede, 2005).

Nevertheless, business process diagrams (BPD) alone might not be enough to understand the business. System analysts should focus on the purpose of the system and explore both the goals of different stakeholders and the activities that they carry out (Rolland, Salinesi, 2005). The use of an approach that facilitates goal analysis is advisable.

End-user involvement is essential and very positive during organizational modelling and requirements analysis (Stirna, Persson, Sandkuhl, 2007). To benefit from end-user involvement, good communication between end-users and system analysts is necessary. However, miscommunication can appear because of their different background. Therefore, models that facilitate communication should be used, such as BPDs.

This paper presents an approach that tries to facilitate and benefit from end-user involvement during requirements analysis. It is characterized by the use of BPMN (OMG, 2006) for business process modelling and the goal/strategy Map approach (Rolland, Salinesi, 2005) for system purpose analysis.

Organizations are modelled in the form of BPDs. End-users validate the diagrams, and the system purpose is then analyzed in order to come on agreement on the effect that the IS should have on the business processes. Finally, requirements are specified by means of the description of the business process tasks to be supported by the IS.

The paper is organized as follows: section 2 describes the approach, and section 3 presents our conclusions and future work.

2 APPROACH DESCRIPTION

As explained above, the approach is characterized by the use of BPMN and Map. Map focuses on system purpose and can be used for business process modelling. However, BPMN is better suited for business process modelling, but it does not provide any mechanism for purpose analysis. Therefore, BPMN and Map can complement each other.

The approach (Figure 1) consists of three stages: organizational modelling, purpose analysis, and

functional requirements specification. The first one depicts the current business environment (As-Is), which has a problem that could be solved by an IS. The organization will change to solve the problem (To-Be), and business processes will be affected.

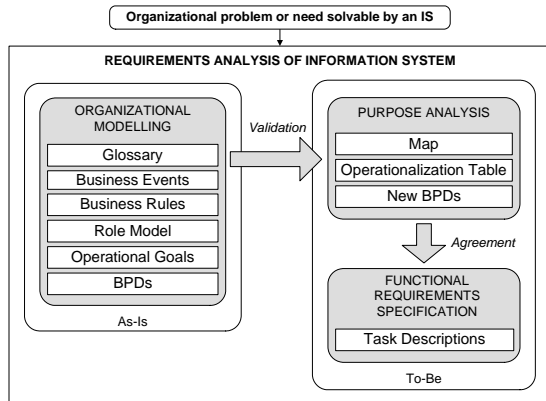


Figure 1: Approach overview.

The organization is modelled in the first stage. End-users must validate the models in order to guarantee that the organization has been properly depicted. Several iterations are usually needed.

The organizational problem is analyzed during purpose analysis stage. The aim is to find strategies that can solve the organizational problem, determine how to operationalize the strategies, and agree on the effect on the business processes.

Finally, functional requirements are specified by means of the description of the business process tasks to be supported by the IS. Every task will have a textual template that describes it.

Section 2.1 describes organizational modelling stage, and section 2.2 describes purpose analysis stage. For further details about task descriptions, see (Lauesen, 2003).

2.1 Organizational Modelling

To model an organization, the first step is to interview the staff so that people that play the different roles of the organization describe their daily work. In addition, it is advisable to look through the available documentation related to the organization activity and the business policies.

A glossary is created in order to precisely define all the organizational concepts difficult to understand. Business events are recurrent and significant things that happen while the organization activity goes by and to which the organization has to respond. Business rules constrain or define the organizational behaviour. In the role model the

different organizational roles and the activities they are in charge of are specified. The operational goals are the goals that the processes must fulfil. They indicate both the process purpose and when a process instance can be considered completed, and are used to identify business processes.

Finally, BPDs are modelled. Every business process has a BPD. BPDs are created from the weaving of the information gathered previously, so BPMN graphical elements correspond to this information. The activities of the roles are modelled as tasks and included in the business processes whose operational goals they contribute to. Events have to be classified as start, intermediate or final, associated to some trigger, and included in the BPD where the activity they trigger is. Business rules are modelled as gateways, or defined as documentation of the business process tasks if they cannot be represented graphically.

As a case study, we will use the business processes for the product development of a software company.

The organization develops a software product that is provided to several customers. The product is standard, so no customer has a personalized product. However, customers can request improvements in the product, and the request is included in a future version of the product.

The product manager defines the activities that have to be carried out to develop the product through product workflow. When a customer requests a new improvement, an employee defines the work item that is necessary to provide the customer with the request. Next, employees are assigned the activities that are necessary to develop the work items, and employees have to estimate how long the activities will take.

The product manager is also responsible for the periodical creation of product versions, which have a strict deadline, and must decide the version in which a work item will be developed. However, problems may arise while developing versions. Employees may not be able to finish the activities they are responsible for. If a problem arises, the product manager has to try to solve it.

2.2 Purpose Analysis

After organizational modelling, the system analyst has enough knowledge to properly understand the organizational activity. Nevertheless, he also needs to understand the organizational problem to solve. Consequently, purpose analysis is based on the business processes and the organizational problem.

Purpose analysis consists of map construction, map operationalization, and BPDs creation.

2.2.1 Map Construction

The organizational problem is modelled in a Map diagram (called map) where the solutions that the IS can provide are analyzed. The map is created in a participative manner with end-users to agree on the solution. First, a map is created to analyze the problem. Second, the goals that the end-users want to achieve in order to solve the problem through the use of the IS are modelled as goals (nodes). Third, system features that can fulfil the end-user goals are modelled as strategies (edges), which link the nodes. Finally, sections are refined if needed.

The map that corresponds to the case study is shown in Figure 2. The organization has been experiencing problems with delivery requests. Lack of knowledge about version development has caused requests to be delivered later than expected by customers. The main reason for the delay is that activity development is not always performed as planned because of the great amount of work that employees have to do. The product manager needs to be able to better project, for example, if an employee will miss working days, or if an employee has spent more time than planned on an activity. The product manager needs to foresee problems and find solutions quickly. In addition, employees need to be able to determine more accurately the time they have to finish the activities and how long these activities will take.

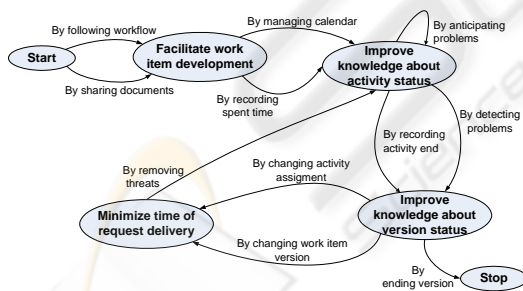


Figure 2: Map for product development processes.

To solve the problems, employees wanted the IS to facilitate work item development and to improve their knowledge about the status of the activities. The product manager wanted the IS to improve the knowledge about the status of the versions and to minimize the time that it takes a request to be delivered. The system analyst proposed system features that could fulfil these goals and modelled them in the map in accordance with end-users.

2.2.2 Map Operationalization

When the map is finished, the system analyst has to determine how to operationalize the map strategies, and come to an agreement on the effect that the operationalization will have on the old business processes. Existing BPD elements can be removed or maintained, and new elements may be introduced. A table with three columns is created: a column to list the strategies; a column to specify the BPD elements that will operationalize each map strategy and if the element has been removed (R), maintained (M), or it is new (N); and a column to specify the participant that will be in charge of the element.

Table 1: Map operationalization for the case study.

Map strategy	BPD element	Participant
By following workflow	Define Product Workflow (M)	Product M.
	Assign Activities to Emps. (M)	
	Start Activity (N)	Employee
	Carry out Activity (M)	
	Finish Activity (N)	
By sharing documents	Start Activity (N)	Employee
	Finish Activity (N)	
By managing cal.	Manage Calendar (N)	Employee
By recording spent time	Carry out Activity (M)	Employee
	Finish Activity (N)	
By anticipating problems	Estimate Activity (M)	Employee
	Need to start activity (N)	
By rec. activ. end	Finish Activity (N)	Employee
By detecting problems	Check Version Developm. (M)	Product M.
	Problem detected (M)	
	Carry out Activity (M)	Employee
	Unable to finish on time (M)	
By changing act. assignment	Change Activity Assignment (N)	Product M.
By changing work item version	Change Work Item Version (N)	Product M.
By ending version	Version deadline (N)	Product M.
	Release Version (N)	
By removing threats	Carry out Activity (M)	Employee
	Notify changes (N)	Product M.

Table 1 shows the BPD elements that operationalize each map strategy for the case study. There are several new elements: “Start activity” refers to the task in which an employee begins the performance of an activity and has to receive the necessary documents to carry it out; “Finish Activity” refers to the task in which an employee finishes an activity and has to share the documents related to its performance; “Manage Calendar” refers to the task in which an employee divides the time that can be spent in a working day; “Need to start activity” refers to the condition in which

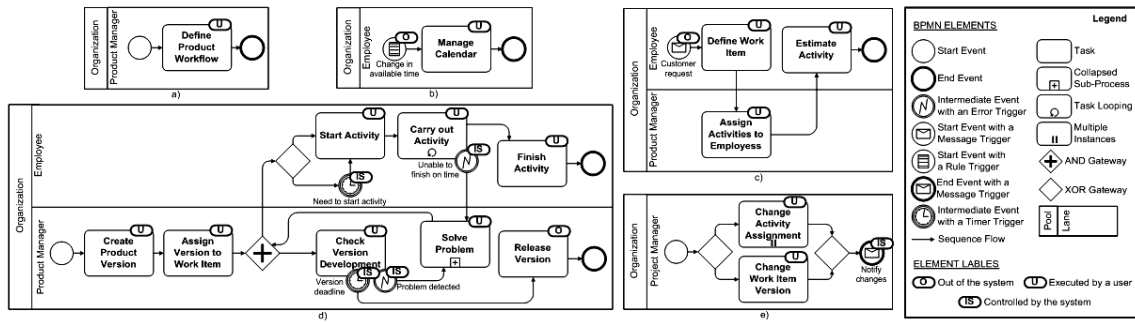


Figure 3: New BPDs for product development of a software company: a) definition of product workflow; b) calendar management; c) request management; d) version development; e) problem resolution.

an employee must be notified that an activity has to be started in order to finish the work item before version deadline; “Change Activity Assignment” refers to the task in which a product manager changes the employee that is responsible for an activity; “Change Work Item Version” refers to the task in which the product manager changes the version of a work item due to some problem.

2.2.3 BPDs Creation

Finally, the analyst and the end-users agree upon the design of the new processes. First, changes are modelled, i.e., elements can be removed or introduced according to the operationalization of the map strategies. Next, BPD elements are labelled according to the IS support on them. Tasks, events with triggers, and gateways that depict decisions are labelled as: “O” (out of the system), if the element will not be part of the IS; “IS” (controlled by the system), if the IS will be in charge of its control and execution with no human participation; or “U” (executed by a user), if the element will be executed by a person that interacts with the IS.

For the case study, Figure 3 shows the new BPDs.

3 CONCLUSIONS

The approach presented in this paper allows system analysts to properly understand an organization, its needs and the system purpose in a participative way with end-users. Business people and system analysts share a common language that is understandable to both of them thanks to BPMN and Map. BPDs are the basis for the end-user to validate that the organizational structure and behaviour have been properly understood so that the system analyst can propose solutions based on the system purpose.

Furthermore, the approach tries to mitigate the weaknesses of a separate use of BPMN and Map, and benefit from the advantages of their joint use.

The approach is the result of a project with the company CARE Technologies (<http://www.care-t.com>). It has been used in several small/medium size projects. End-users stated that they could easily understand and validate the models of the approach, thus facilitating communication with them.

As future work, it is planned to use the approach in more projects, to develop a tool that supports it, and to introduce a technique for the analysis of non-functional requirements.

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