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MAP REQUIREMENT ENGINEER MODEL (SHIPPING DOMAIN)

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Abstract

The failures in the implementation and use of computer systems are due in numerous studies to a bad comprehension of the needs that these systems attempt to answer. The consequences of this misunderstanding can be critical and needs huge efforts to deal with the situation.

So, it is necessary to define methods, technologies and tools to clarify, validate and represent needs relative to the systems on appropriate and structured manner. In this article, we will summarize main characteristics of different requirement modeling approaches such us I star, EKD, KAOS…therefore we choose MAP as the most adequate modeling approach. And we propose a model based on MAP in the Shipping domain.

Indeed, our choice of the model Map approach has been based on a comparison of different characteristics and contributions of t e MAP compared to other models. In addition to that we choose the field of shipping, because of the abundance of stakeholders and activities (business process), to present needs in map model.

A concrete model of the shipping import service allows us to on the alignment between organizational and operational sight of a company. This rapprochement is fundamental to ensure dynamism imposed to all system to be update facing a rapid and continuous evolution.

Key word: Model, MAP, intent, strategies, role, shipping

1. APPROACHES OVERVIEWS

We will start by presenting a small summary of some models and approaches used in requirement engineering [Kavakli, Loucopoulos, 2003].

RE Activity	Goal Analysis Contribution	Goal-oriented
Requirements elicitation	Understanding the current organizational situation Understanding the need for change	I*, EKD
Requirements specification	Relating business goals to functional and non functional system components	KAOS
Requirements validation	Validation system specifications against stakeholders' goals	GQM

Table1: Activity – goal – approach

Goal modeling has been proposed during requirements elicitation in order to describe and understand the actual sate of the enterprise. Working in this domain focus on technologies and conceptual tools that describe the environment of the enterprises considered as cooperation between different organizational actors (for example, the human being, Information systems, work groups…). These actors have common aims to realize and concerns to resolve. The enterprise models represent, implicitly or explicitly, the aims of individuals, groups or organizations, where an aim is seen as a condition potentially reaches at the end of an action (or a process). These aims are viewed as a potential of motivation to the action regardless of the procedures. Among these approaches we state:

The I* approach [Yu, Liu, 2001] that provides a description of the work organization in terms of dependence relations between the actors according to the intentional components in order to know how to reach aims, the tasks to accomplish, the resource to produce and the non functional demands to satisfy.

The EKD approach [Kavakli, Loucopoulos, 1999] describes an enterprise like a network of business process that collaborates to achieve some aims of the enterprise. So, the EKD model is a network of aims to express to express the causal structure of the company.

Modeling aims has been also used in the requirements specification to describe how organizational change can be developed in terms of implementation of the new components of the system based on the alignment between the functional and non functional system specification and the company goals.

We state here the KAOS approach [Dardenne, Lamsweerede & Fickas, 1993]. This approach underlines explicitly the importance of the representation and the modeling of the organizational aims and precise their relations with the operational components of the system. KAOS is intended to support the development process requirements.

Finally, the system validation purposes to certify that the specification system product is consistent with the needs of users.

The system validation is very important, particularly when it comes to the design of safety-critical applications. To this end, validation is done through the construction of a safety case, a collection of documents and data, which together present clear, complete and defensible arguments

We mention here the GQM approach that consists to define an outfit of parameters (qualitative or quantitative) like reference of measure of system properties. This approach is proposed by Basili and it supports the identification of metrics via goals through the use of appropriate questions. The construction of a GQM model begins with the formulation of measurable goals. Each goal is refined into a number of issues which represent an operational definition of the purpose concerned. Each question, in turn, defines a number of parameters.GQM Aspects are supported by software tools such as GQMaspect [Kavakli, Loucopoulos, 2003]

Approaches		MAP	I star	KAOS	EKD	GQM
Categories	Determinist approach			+		
	Non determinist approach	+	+			
	Context		+	+		
	Evolution of the strategic needs	+				
	Analysis of gaps	+				
Usage	Understanding actual organization		+		+	
	Connecting business goals to components of the system	+		+		
	evaluate the system specifications in relation to the stakeholders needs	+				+
Subject	Enterprise goals	+	+	+	+	
	Process goals	+				
	Evaluation goals	+				+
Representation	Formal		+	+		
	Semi-formal	+			+	+
development	way of working		Propose steps and the associated strategies			
	Tools of help		Support models construction			Proce ss guide

Table2: Summary and comparison of the different approaches of goal engineering

Researches on requirements engineering have produced two major modeling techniques goals: KAOS and I *.

Other approaches, such as Tropos and RESCUE [Kavakli, Loucopoulos, 2003] are essentially the extensions or the integrations of the established technologies.

Probably all these mentioned technologies allow permit to clarify the requirements in terms of system goals and actors. These approaches are preferred for modeling organizational objectives and implement a software solution.

During the requirements elicitation, almost all of these technical support refinement of goals and deal with any change in requirements model.

The evolution and refinement of the process are often treated to a lower level of goals and for a small case study. But any of these techniques have managed to discuss or present these changes into a

strategic level, the level that describes the strategic objectives of an organization. Therefore the community of searchers is focused on the emergence of strategic oriented approaches.
The MAP approach has been proposed as a strategic -oriented process that takes account of changing requirements in an architectural perspective.

2. CONTRIBUTION OF MAP

2.1 Presentation

Representing engineering processes of information system allows the representation in the same model in many ways the conduct of an engineering process.

It is a multi-model for constructing a model throughout the course of a project dynamically from multiple models in representation. The system Map [Etien, 2006] beyond the linearity of conventional models process, it goes further than the opportunity to select an alternative among several to execute a task in order to allow construction of the dynamic model of process.
The MAP contains a collection of intentions connected by strategies to achieve these intentions during the process. A strategy can be an executable action which leads to changes in the product or it can be a process modeled by a sub-map.

Users of Map process aren't obliged to follow a specific process and they have a large freedom in scheduling the execution of intentions and in the choice of techniques to implement.

2.2 Contribution

MAP is a simple approach that model goals during engineering by using two notations, intention and strategy, to support complex systems and helping so analysts to understand easily the models.
Technically, the intention is a goal that will be achieved by using a strategy. A strategy is a process or task that is used to reach a goal.
However there is always a pre-requisite goal before achieving a target goal. But the objective model identifies a process consisting of two goals and a strategy known as a facet <Source Intention, Strategy, Target Intention>.

The modeling technique Map has the ability to deal with business strategies by representing explicitly business processes.
Indeed it models the strategic objectives of the company in order to generate the software requirements and thus to build software whose features are complying with these requirements. Therefore, MAP is a strategy-driven approach for modeling business processes. In modern RE processes, a growing number of researchers don't use any more traditional approaches such as model AND / OR but rather flexible-to-evolution goal which is a modeling approaches that take into account the flexibility and the changing goals [Babar 2007]. MAP is one of the approaches that address the changing needs adequately. Indeed The main reason for the shift from traditional goal modeler AND/OR to goal/strategy map is to response to the challenge of multipurpose nature of new emerging systems.

Indeed, the trend now is in RE is to enhance current software systems and its functionality in a multiple organizational perspective in order to be able to be changed customized or configured to a relevant context.
It turns out that the changing requirements may occur not only at a lower level (business process), but also at a strategic level. There was only the MAP that offers mechanisms to deal with such extensive level of requirements evolution by using models (As-Is and To-Be) to represent current and future requirements of the systems.
The Map uses also a technique of gap analysis to adjust changes to existing systems.

Finally, Map allows a facet-driven refinement process of maps it means that facets of strategic system can be refined singly through decomposition to identify more maps in the following levels

We can then summarize the contributions of the MAP approach in principally:

- Explicit mechanism to the identification of the aims of the system
- Using the resource to complete the aims
- Identifying the needs in a context of business processes
- Non deterministic identification of the process

3. MAP MODEL

All organizational system faces changes affecting not only the operational aspect, but also the organizational or even the intentional aspect.
So there is always a conversion from a common initial situation to a target final state because of the dynamism imposed to all system to be update facing a rapid and continuous evolution.

This conversion is far to be easy and stable because any wrong choices can threat the system existence.

We focus here on a very important point: the alignment between organizational sight (presented by the organizational structure of the company) and operational sight (presented by the operational business processes) in an intentional context.

We consider the Map as the most appropriate model for organizational needs and form so a bridge between different aspects of the business while providing a higher level reflecting goals and strategies. In what follows we will present a model MAP which ensures alignment between the organizational chart presented by a hierarchy of posts (actors and their profiles) with roles that link them to the business processes of the company.
So as shown in figure 1 below there is an initial situation with an organizational chart and a set of business processes. Any change in the organizational or business processes of the company will have a mutual impact that will affect all aspects.

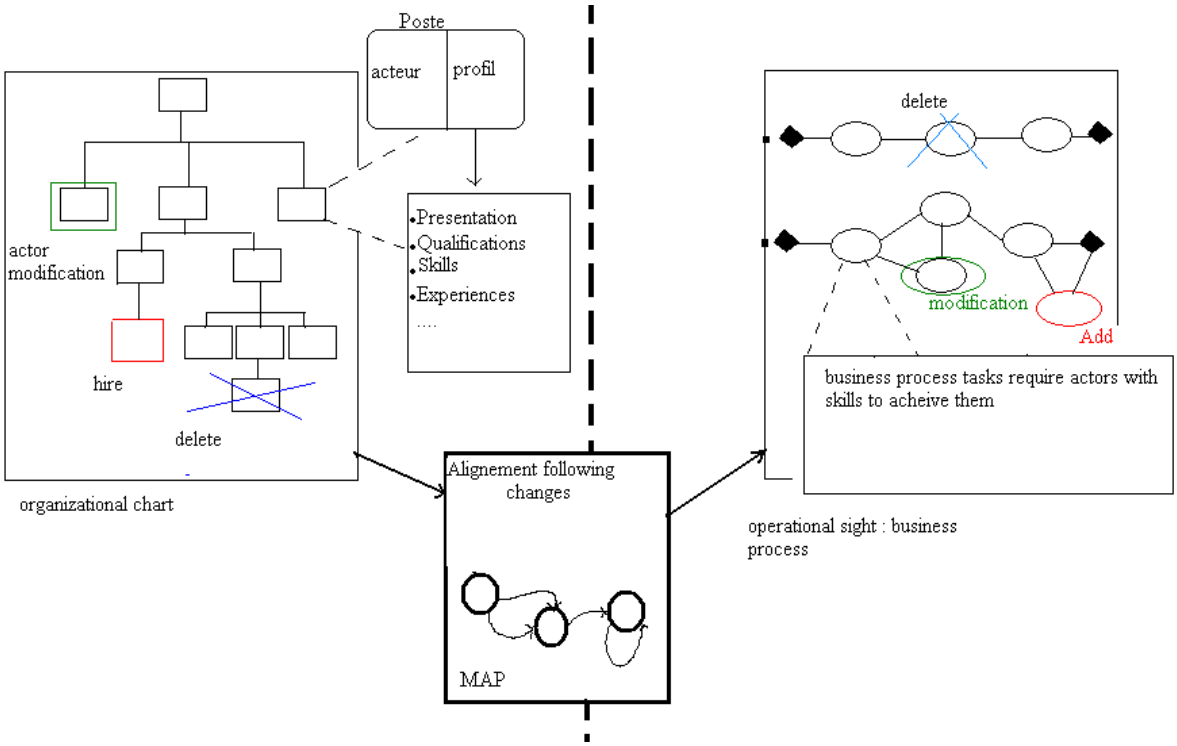

Figure1. *Presentation of problem*

In this figure we identify the organizational chart and business processes that face changes of various kinds as an example delete of posts, changing internal or external actors as well as new hires.

It also cites the level of business processes removing, adding and changing tasks.
Therefore it is essential to be able to manage this change and especially to ensure an alignment between organizational chart and business processes while recognizing that these changes are the result of strategies evolution and they take place to respond to clearly defined goals.

So we must also take into account the intentional aspect behind all these transformations.
We can reduce the situation into an analysis of needs that requires a clear requirements specification of one or several changes made within the company and based on the current situation to reach a final situation itself will be the first step of another phase of evolution.

3.1 The model

In this model presented in the figure2 we present our ultimate goal which is to take better account of new requirements imposed by several internal or external factors through an appropriate alignment of roles depending on changes type:

We identify here the changes affecting only the business processes sight or the organisation sight, or changes that affect both organizational and operational sight.
We proposed 3 categories of strategies to achieve alignment.

The informal methods in natural language, formal mathematical methods such as matrix calculus or semi-formal methods such as modelling by the Business Process Execution Language (BPEL), which is a language describing Procedures Company like WSLF (Web Services Flow Language) and XLANG.

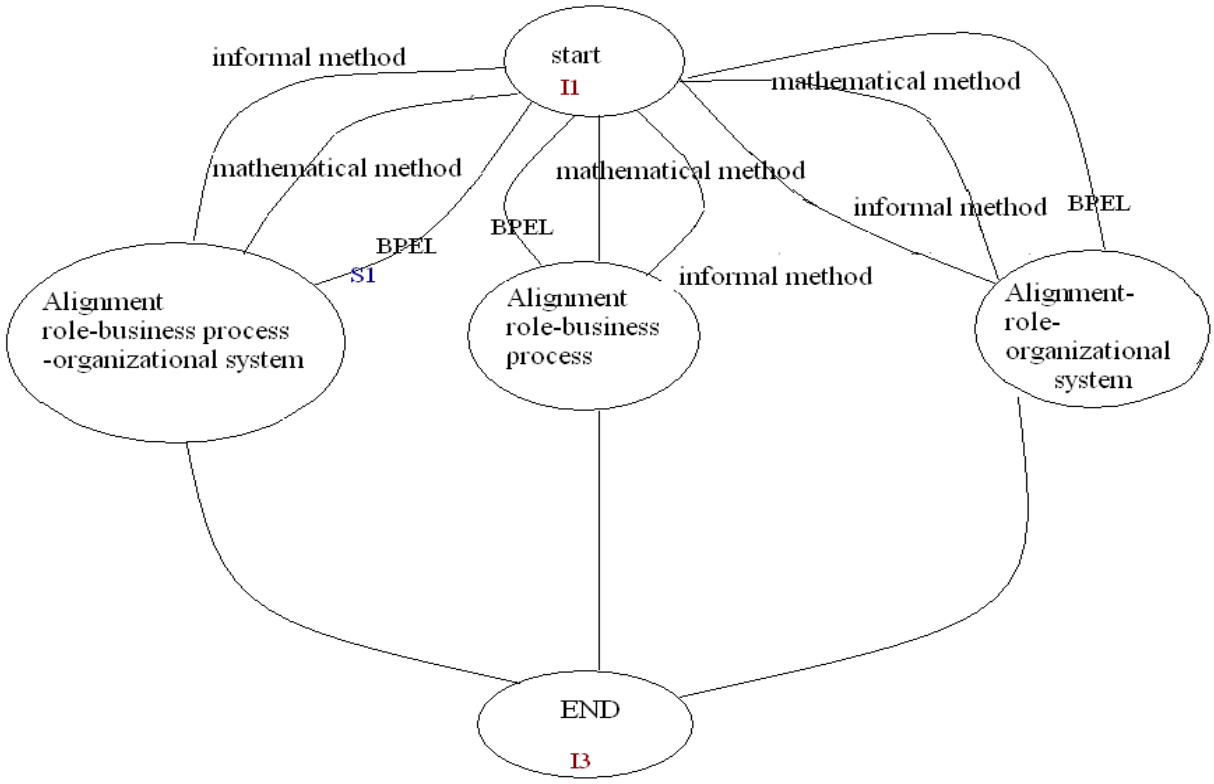

Figure2 .model in Map

In the previous model each section requires a more refined modelling in Figure 3 we modelled the section S = <I1, I2, S1> as follows:

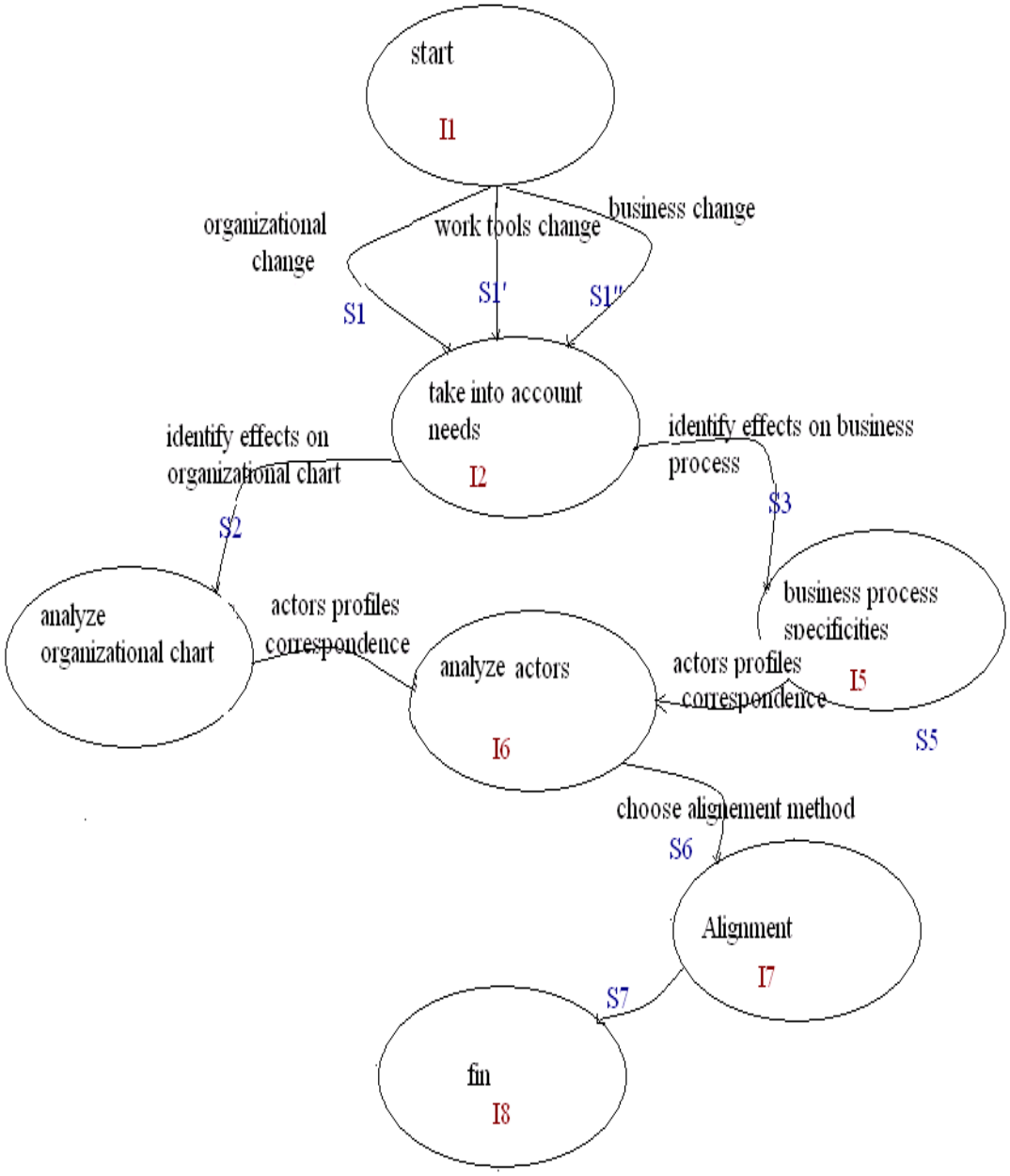

Figure3. Model in MAP of the S section

In this model we show with details how to make a rapprochement following a change. Indeed after taking into account changes that may eventually affect the business process, organization or even the tools of work, we identify the effects on the organizational chart and actors as well as the effect on the processes themselves.

We will in what follows propose a MAP model on shipping area.

3.2 Shipping domain

3.2.1. General presentation of the enterprise:

The K.DAMAK Shipping Company is a corporation in the domain of the transport: shipping agent, transit, land carrier, all types of specialized transportation, etc.

The main business activities of Shipping are divided among several departments such as: the store hold (SH) department responsible for commercial, operational, administrative and stamping service, this department ensure the management of records (Import), Export files...
The shipping department is responsible for operational, stamping, administrative and contentious services. It manages the preparation of PROFORMA, the elaboration of an account of call, the flow ship in the chain of shipping service…

We will take the commercial service of import for the department store hold (SH).
As shown in Figure 5 below several actors are involved in achieving tasks to ensure the completion of this business process.

The process begins with the contact made by the department; the commercial agent begins by contacting various clients to offer service using brochures.
After confirmation of the offer and the opening of the case and its transmission to correspondents, the stamping agent receives:
A notice of shipment, a copy of all documents for the cargo, a notice of arrival and a clear rectification (before the ship arrived avoid customs penalties).
Then the K. DAMAK stamping officer forward to clients a notice of arrival and an ETA (estimated time of arrival).
When the ship arrived, the office agent receives a notice of arrival, provides stamping and gets issue order. Then the stamping agent prepares a notice to clients to come at the K. Dammak and pay costs related to the merchandise since his arrival on the vessel until his expedition.
Following the payment, the customer gets an issue order from he stamping agent so that it can make the approval of his merchandise.
Let’s present now the description of all actors:
commercial Agents: contact customers and handles brochures.
Section Head: confirm the offer and opens the commercial file, he manipulates a copy of the offer and reached the final bill.
Office Agent: is involved in many tasks of the process and manipulates the opinion of embarkation and destination, copies of all cargo documents, arrival notice, merchandise issue, ETA.
Stamping Agent: Just as the agent of office he took part in the completion of all work processes and handles the same evidence.
Driver: merely to transmit the necessary supporting documents between the agent and service stamping.

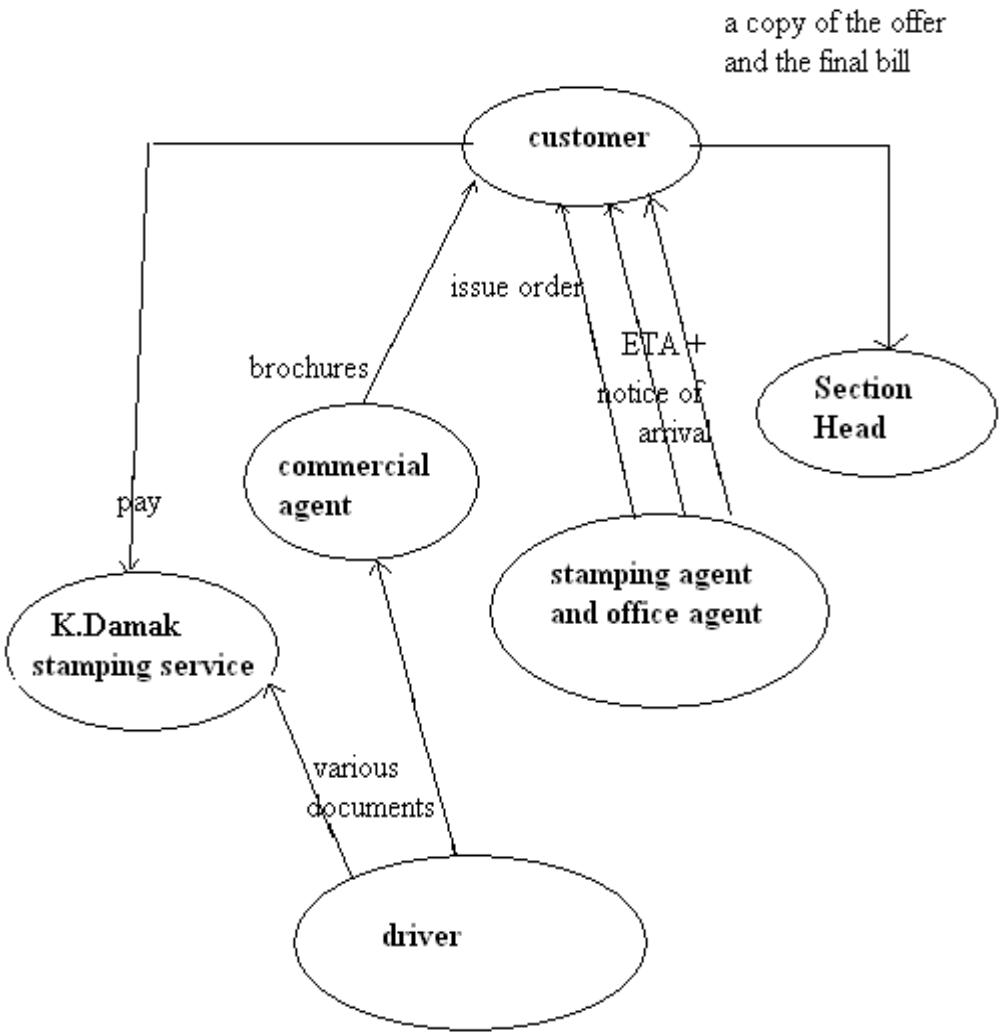

Figure4. The commercial (import) service workflow on SH department

3.2.2 Shipping Map model

We will propose in what follows a prospect to make a change in organizational and / or business and present it in a MAP model.
Several scenarios are possible as: the fusion of tasks or having new tasks or fragmentation of existing tasks.
We will assume that this process requires, for example, a legal officer to follow the legal documents.

This new requirement involves:
Adding a task of monitoring and validation of legal documents at the level of business process and adding a new actor who is the legal officer responsible for this task.
Several possibilities are offered:
on organizational level:

- The addition of a new actor
- The combination with the tasks of an existing agent such as the section head.

In terms of business processes:

- Monitoring can be done in parallel with each operation
- Sequential monitoring at the end of the procedure.

All these possibilities depend on the role of the actor within the company during the specification requirements.
Indeed this notion of role in our case occurs when we faced the possibility within the company to recruit a new employee to fill the post of a legal officer or to merge this activity with the tasks of an actor already existent.
The role notion reflects not only the ability of an actor to perform these tasks but also those intentions and ambitions to have the most appropriate choice.

So visibly our choice will be fairly flexible and scalable in the sense that even if the current actor does not have the right skills, we can anticipate early enough his profile on the future thanks to these intentions so we can easily consider opportunities to affect to him other activities in the future.

We are based on models of Figure 2 and 3 to try to apply in our case the MAP model that allows us to assimilate in a particular case different scenario and to show us the importance of role concept and MAP presentation to identify all the needs trigger after a change.
The model proposed deal just with a section of general MAP model as shown in Figure 5:

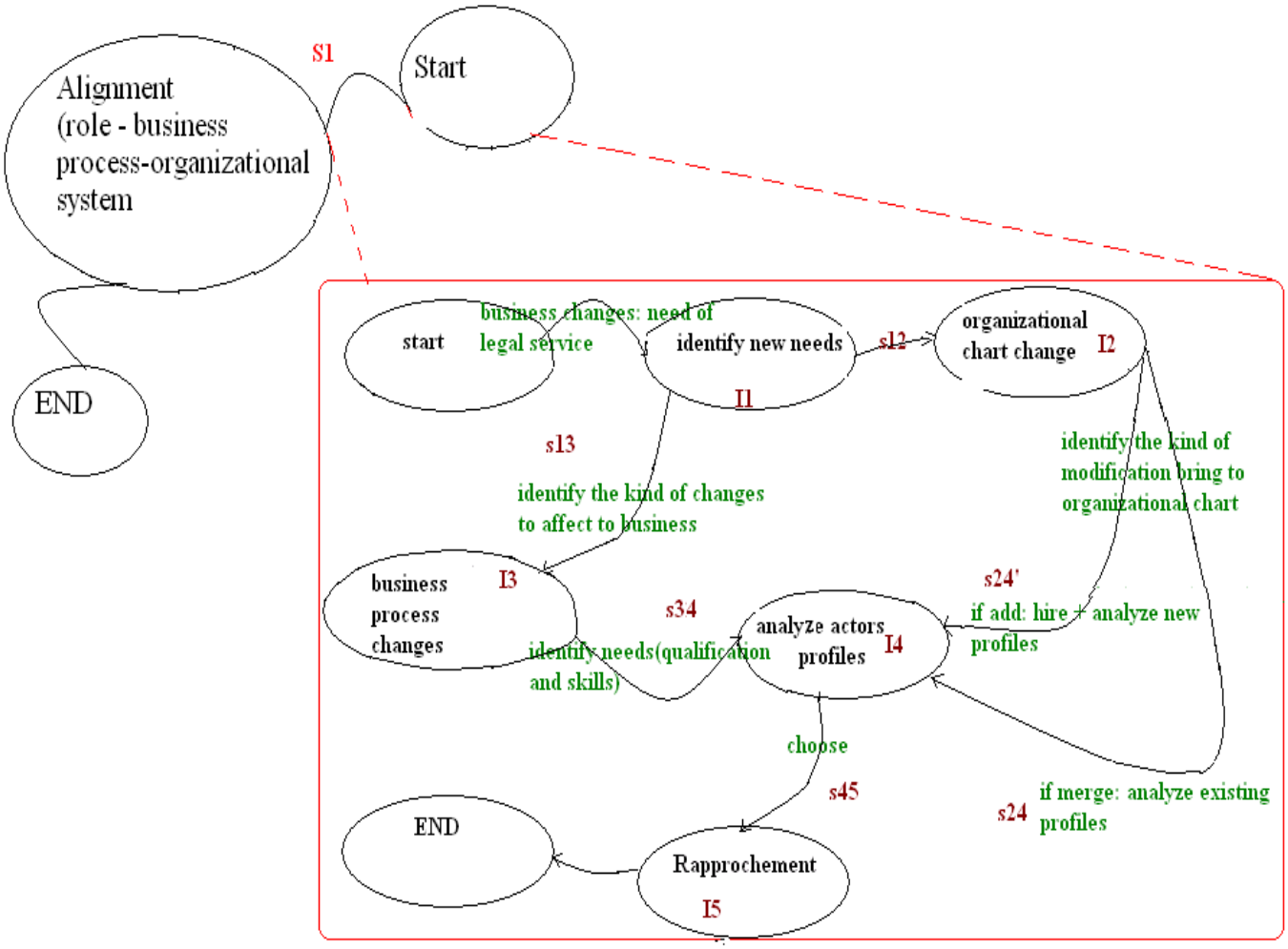

Figure 5. MAP model for the import department

As shown in Figure 5 above can be divided into different sections very interesting to know:

Identify a new need I1 is to determine the requirements for legal follow-up of documents. We will only focus on necessary human resources and needs at the business level.

- <I1, I2, S12> needs that affect the organization: Following the recruitment of a new employee and to create a post or amending a current position
- <I1, I3, S 13> needs affecting the business process because the activities (tasks) will undergo a change: in order of execution, the actors involved, resources required….
- <I2, I4, S24>: This section covers the case of a new recruitment, in this case is based on skills and qualifications of candidates while considering external to situate the post which are associated.
- <I2, I4, S24'>: This section covers the case of a merger of legal followed with the activities of an existing agent, for example, the head section.
  In this stage the notion of role can not afford to advance knowledge in representing the intention of this actor will be whether or not the skills to manage this task.
- <I3, I4, S34>: changes in processes also need to take into account obligations staff to perform the tasks that such knowledge required or expected mastery of the field and also the way of achieving this work in parallel with other tasks or sequentially.
- <I4, I5, S45>: This step is crucial because it will enter any necessary data: actors profiles based on the concept of role and needs to carry out business processes and it remains to make a choice. This choice is based on rapprochement.

This notion of alignment is very interesting because it opens the horizon on several methods of refinement such as mathematics formal representations semi-formal (BPEL diagrams) or even informal (natural language).

CONCLUSION

Modeling needs in requirements engineering is a crucial task to fully understand the needs and the necessities imposed by new technologies and research in this area.
We have tried to propose more comprehensive model and identify problems from several perspectives.
studies have provided different models that were the scope of several case studies but we believe that the reliability and consistency of a model can not be properly assessed only after a real application and using significant metric taking into account whenever the specificity of the project.
In this context we proposed the MAP model for the representation of needs in a particular area the shipping but still face several problems such as
How MAP allow us to take account of strategies and intentions to ensure flexibility and a maximum of dynamism that we believe the fundamental criterion for the continuation of the model.

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