Normatively Regulated Activities

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Abstract: This paper describes basic components and principles for support of the normatively regulated organizational activities. These activities are characterized by precise objective or purpose, participation of actors as role-holders, and norms and rules that govern the performance of these activities. Particular aspect and modelling of the normatively regulated activities are presented. Some aspects of object view on normatively regulated activities are described, with particular case of procurement activity.

Key-Words: Normatively regulated organizational activities, object oriented modeling, business processes

1 Introduction

In this paper we are working on the class of the organizational activities that are normatively regulated. Activities that have a defined goal and task, time of realization, responsible actors and for which particular norms and rules of performing are in effect, are called normatively regulated activities - NRA. Norms, rules and obligations of the actors in the activities are defined to fulfill rights of all activities actors and to protect specific category of subjects (i.e. client in the bank, parties in the court). If it is proved that those activities are not performed according to the norms and rules, NRA are announced as irregular and their results are cancelled. To understand meaning of one activity, it is not enough to know that it happened and that it has particular result (i.e. "Credit approved", "Claim request process", "Manufacturing", "Purchasing"). Content is also derived from better knowledge of the process of performing activities: did all actors perform according to their role and their authority; was the process performed in expected phases and was it finished in expected time; was the legitimate procedure taken into consideration, etc. On such basis, it is decided whether the activity was regular and whether all activities were legitimate.

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Typical transactional information systems were successful in data processing and in giving information to employees, but they were not efficient enough in treating norms and rules and in interaction with users of the information system. Interest to support normatively regulated activities was initiated by increased technological possibilities of the computers, communications and networks. Aside from this, organizations, which key activities are normatively regulated, such as banks, insurance companies, government administration, manufacturing are requesting more and more “intelligent” information system that will be able to process rules and norms for performing these activities in efficient manner. In this paper approach for understanding and view of the normatively regulated activities is presented. Next section gives short theoretical description of NRA. Third section describes basic elements and of normatively regulated activities that are essential for their modelling. Forth section presents object view of normatively regulated activities. Fifth section gives some additional observation of whole process.

2 Problems During NRA Performance

In the practical situations activities are not usually performed according to strict rules and expectations. Reasons for aberration are different problems that are indicated during performing of organizational activities as inaccurate and incomplete definitions of activities, different perception about competence and responsibilities, different interceptions of the rules and norms to perform activities etc. Problems that are the most often present during the performance of NRA come in the phases:

during the planning of the activity (prediction of the duration and dynamics of the activity, allocation of the human resources and responsibility for performance some activities, mutual coordination activities which are in any possible way restrict or
connected, focusing on the cooperative and coordinative aspects).

-during the performance of the activity (monitoring of the actual state and timely respond of the actor responsible for particular activity, availability of the relevant knowledge for the estimation of the situation and selection of appropriate action, prediction of the action effects and future states, discovering (non)regularities in the actions performed in the past and in the actions that will be performed, determining legitimacy of the actors to perform particular action, prediction of conflict situations and resolution of this situations if they happened. The criterions of the quality in the performing of the activities are efficiency of the realization (finishing activity as soon as possible), effectiveness of the realization (archiving the aim of the activity under existing constraints) and regularity of the action performance (according to regulated norms). The fist two criterions can be found in all models of decision-make processes and it depends of the process itself which one has higher significance. Efficiency and effectiveness can be considered in the sense of one or set of the activities in one organization. The third criterion, regularity of the action performance, had an essential importance for the activity, which is described in this paper. In the performed empiric research, which will be present, regularity of the activity became the main criterion for the successful activity performance. Primary motive in the designing of the computer support is assistance to activity actors to achieve bigger effectivity and efficiency of the activities, and also to help in the realization of the “regular activities”. Software systems that give support to this type of the activities will be called intelligent computer system.

Examples of the business processes are issuing of the purchase order, insurance policy, placing the order, call centre etc. Coordination is determined by starting the activity, assigning the tasks, remaining of the deadlines, alarming using applications or e-mail. Control is determined by control of the process flow, process deadline, process duration, access rights, and established protocol of the behaviour. But there are still many systems that do not comply to some, and very often with most of these components. Issues are raised in understanding the activities. We heave to understand what activity is, what its components are and how to gather knowledge about these activities.

3 Elements of the Activity Modeling

For description of NRA it is necessary to define the following basic concepts: actions that are performed by actors who are role holders, states or phases which the action is executed through, rules for bringing about the actions i.e. transition from one state to the other, resources and document [1].

a) Actions. When an actor issues a linguistic expression with an intention to produce change in a social environment, this linguistic expression is called an action. Participant in the activities undertake actions that initiate activities, perform different tasks during activities and bring final assessment or document. Participants that perform the actions are called actors. Each action that is performed by actors brings some additional knowledge into given situation and also causes change of activity state.

b) States and Transitions From State to State. Performing of an activity causes successive change of state i.e. phases of activity performing. The additional states come after the legitimate actors take out requested actions. Because of that, for each state it is necessary to identify rules-transitions that define required preconditions to come into that state.

c) Roles and Actors. Roles are defined independently from actors and employees in the organizations and present set of duties and responsibilities, which are assigned to specific actors. Actors present position profile and they are marked in form A#n:m (n- identification actor, m- identification role)

d) Resources. It is necessary to make evidence for all resources in the system, and to give a type for each resource: is it divisible or no divisible resource. After that, for each activity that has connection with some of the resources the type of the connection is given: does activity use resource (U), does it arise in that activity (A) and does activity spend that resource (S). Resources are marked as R#nX, where R is resource, #n is resource identification number and X can be marked as U, A or S.

e) Document. By describing the activity we also introduced a concept “document”, which contains important elements to route case and its regular execution. For each document we will introduce identification of the document, document name, type of the document (internal, external), identification of the subject that produces the document, content of the document, date of issuing. Content of the document consists of information, obligations, responsibility i.e. normative content and time clauses (it is valid from date d1, it is valid till date d2, it has to be applied till date d3 etc.). Documents and information are requested and used inside the activities and that is the way how they are produced inside the activity. Document is marked with symbol identification_document.

During the execution of the event, it is important to respect temporal constraints. Temporal constraints are different rules that regulate the time component of business process. Temporal constraints are classified as basic temporal constraints (also called duration constraints), limited duration constraints, deadline constraints and interdependent temporal constraints [2]. Particular activity that is performed according to given model is called instance of NRA.
4 Object View of the Activity

It is well known that software development starts with gathering and analysis of user requirements. There are many problems in this phase, and some of them are:

- system developers and end users have knowledge of different areas
- end users even been experts in their area very often cannot express precisely what do they expect from the final product before product has been completed and presented
- formal method is usually not used in this phase
- testing is not included also in this development phase

But one of the main reasons, and it not been consider enough, is that we don't think object oriented from the very beginning. We are also not aware that many activities are normatively regulated and it is necessary to make model of all elements above.

During interviews in order to gather user requirements the end users are aware only of their actions, responsibilities and rights for particular action inside one activity. Developers in that case follow up the same course of action e.g. concentrate on who is doing what. That has consequences that real connection between jobs of particular actions has been overseen. Current organizations' structures in the companies of author’s country are established in the way that they are divided in many small organizational parts where actors perform particular actions part of one entire activity. As example we’ll consider company that has department for accounting, procurement, inventory, and manufacturing and will analyze process of raw materials procurement for manufacturing.

During analysis in company we have following steps:

Step 1: Analysis in accounting department
Invoice that was send by vendor arrives in accounting department for data entry. Accounting department controls vendor’s data, account’s amount, calculated PDV and other elements that are prescribed by law on the invoice form. After all controls are performed invoice is entered into system and it is processed for payment

Step 2: Analysis in procurement:
According to internal requisition purchase order is formed toward selected vendor. Contractual price and delivery date are negotiated.

Step 3: Analysis in the inventory:
Materials are received from vendor. They are stored in warehouse and information about delivery status is updated in the system. Vendor sends also document called bill of lading that is signed by inventory assistant. Bill of landing is than send to the accounting department.

There are many unresolved issues:
- inspection of the received items performed correctly and are items according to required specifications
- the accepted item what has been originally ordered
- the price the same as it has been negotiated.
- delivery on time
- requisitioner notified about reception of items

Even this partial analysis bring us to conclusion that this activates are related and that they are normatively regulated activities. It is very important that procurement of item regarding price, quantity and quality was in accordance with regulations and organizational norms. Moreover, it is of paramount relevance for manufacturing and sale process in many companies.

Action: issuing purchase order, receivable of materials, account update are performed in different organizational segments and actors assigned on this duties perform what is regulated by existing job classification.

If we take a look into analysis of the case above we can see that it is one activity. We'll call this activity «Procurement process for manufacturing».

Action has been started in organizational part of procurement (procurement – responsibility) and it has to have full insight in this activity e.g. receiving of materials and invoice, and has to control that everything is performed by rules and contractual arrangements.

In this process objects are listed below:

In the procurement
- Object purchase order
In the finance and accounting:
- Object invoice
In the inventory:
- Object receipt

In this case it cannot be seen that there is some link in the organizational parts for described activity. Improve this scenario with the facts that invoice has to be first evaluated in procurement department. Inventory and procurement has to exchange information about order and receipt.

In this case objects are listed below.

In the procurement:
- Object purchase order
- Object invoice
In the inventory:
- Object receipt

In the accounting and finance:
- Object invoice
- Object purchase order
- Object receipt
If we make model of each activity in the isolation we’ll get more instances of the same object during the activity flow.

All roles are performed on the same objects in accordance to their rights, but analysis itself and modelling has to be considered as this is one activity. For activity procurement of materials objects are:
- Object purchase order
- Object invoice
- Object receipt

Actors are:
- Procurement department
- Accounting department
- Inventory department

During the class modelling the type of data for the objects listed above we’ll base on the attributes by which they are described. As example for invoice: account number, date of issue, place of issue, amount, tax, items, but also what is very important we'll look into behaviour of the objects e.g. methods. Besides methods that determine behaviour of the object (check account amount), methods will also include methods for: role on the object, responsibilities inside the role. That means it will include elements of normatively regulated activities.

Generally, we can make conclusion that all elements for normatively regulated activities can be mapped in object oriented elements as it is shown in Table 1.

<table>
<thead>
<tr>
<th>NRA element</th>
<th>Object oriented element</th>
</tr>
</thead>
<tbody>
<tr>
<td>actions</td>
<td>method</td>
</tr>
<tr>
<td>roles and actors</td>
<td>method</td>
</tr>
<tr>
<td>resources</td>
<td>class, object</td>
</tr>
<tr>
<td>document</td>
<td>class, object</td>
</tr>
</tbody>
</table>

Table 1. Mapping of the NRA and object oriented elements

In order to make formal model we can use UML that has all elements to support software development in all of its phases. But, we have to think object oriented in the first phase of software development.

5 Additional Observation

In the previous section we described simplify mapping of the normatively regulated activities in the object model to present one of the possible approaches. In this straightforward example it is easy to observe that it is possible to make bad design of future system just because we did not consider and did not apply object oriented paradigm in the early phase.

Analysis of user requirements is mandatory not only for design of customized applications but also during the implementation of off-the-shelf ERP solutions in the company. Working on the project of implementation of one widely adopted ERP solution in one enterprise company, project group faced many problems during implementation caused by the following reasons:
- Company did not perform reengineering of their business processes before implementing system. As ERP solution itself already has object view to the company, this lack of reengineering resulted in model that does support ERP solution.
- During the phase of gathering users’ requirements project manager for ERP system didn’t use formal method. Interviews are performed separately without observing enough links between departments and business functions in the early phase of implementation e.g. the phase of analyzing users’ requirements. It resulted in the efforts to change ERP system to match to requirements of specific company, instead to present particular suggestions to apply system effective and efficiently. Both of these reasons will be easily eliminate if way of thinking was object oriented.

6 Conclusion

In this paper the concept and object view of the normatively regulated activities are described. Normative activities are of paramount importance for organization functionality. These activities can be supported by computer only using intelligent software system. To arrive to that kind of system we have to have adequate analysis of these activities and we also have to perform reengineering of business processes. Many companies require reengineering of their business processes by introduction of new systems. Reengineering will be much more efficient if the object oriented approach will be considered from the very beginning by the people who regulate working procedures. Experience and talent are required to do a good job at detailed design.

In the initial phases of our research we were looking into normatively regulated activities from theory aspect. At the beginning of this activity we were trying to make model using Petri nets as they have all elements to make this model possible. But this approach was not object oriented. After diverting our focus into object design and better understand of object oriented modelling, we noticed that objects are all around us and they are fundamental part of any of
our activity, which includes also normatively regulated activities.

References:


[6] Gabriela A. Perez, “Model consistency in the object oriented software development process”, 18th annual ACM SIGPLAN conference on Object-oriented programming, systems, languages, and applications (OOPSLA ’03) 2003; 74-78

