Identification of the Risk Related to a Process on Hospital Emergency Service: a Case Study

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This paper, framed in a vast investigation, describes the application of techniques and methodologies in Organizational Engineering connected to the associated risk to the processes developed in an Emergency Service of an important Portuguese Hospital. The transactions performed in an emergency service and the consequent risk identification (negative behaviour associated to those transactions) is done based on static and dynamic models, developed during the business modelling. Any non-trivial system is better portrayed trough a small number of reasonably independent models. From this point of view it is important to look at the systems from a "micro" perspective, which allows us to analyse the system at the transaction level. All processes have some associated risk (inherent risk). Its identification will be decisive for future analysis and for the consequent decision over the need, or not, to study internal control mechanisms. This decision will depend on the risk level that the organization considers acceptable.

Keywords

modelling; organizational transaction; risk identification; business process

1. Introduction

The complexity of an hospital information system requires great detail, relatively to its components, structure, activities and procedures. Thus, the evaluation of this kind of system implies a description, as accurate as possible, of how systems work before creating simulation models. These will allow the study of control mechanisms that assure, at all time, its auditability.

This paper presents a set of reflections connected to risk identification, based on models, associated to the organizational transactions at a "micro" level. As an enhancing factor of these models' development, the modelling of the organizational process should be previously performed.

All organizational transactions, particularly those connected to health care services, are more than interactions, with different levels of complexity. This is mentioned in [2]: "the medical care services provided in modern hospitals are complex and they involve the interaction among patients, nurses, doctors, pharmacists, technicians and others." An interaction (transaction) is formed by a sequence of messages and its different components are, as

referred by Guiochet in [3]: (1) the transaction itself; (2) the previous and following message; (3) the dispatch and reception events; (4) the parameters (number, type and value); (5) the implicit answer (defined by the arguments and events that receive and dispatch) and (6) the message's treatment period.

In order to simplify the risk identification we use semi-formal models, which are based on "positive and negative scenarios", as mentioned by Alexander in [4]. These models should be accurate enough to serve as a support to the application of the above mentioned analysis' methodologies and simple enough to make the risk perceptive by all the interested parts and not only by specialists.

The remainder of this paper is organized as follows: in the next section we will approach the problem of modelling and emergency service of an important hospital. For space purposes only one process, "Patient Admission", will be presented. Then we shall approach the risk identification related to the process "Patient Admission". Lastly, the conclusions and a suggestion for future works are presented, as the result of the performed work.

2. Modelling of Emergency Service

The Emergency Service where our case study has begun is equipped with a multitask emergency room, an open-spaced one, where patients are assisted in several cabins. These are properly equipped and assure the legitimate right to privacy. They allow the proper functioning of health care assistance in suitable conditions, according to the good practises in medical emergency services.

Besides the multitask emergency room, the emergency service (which has its own entrance), is also provided with a short period internment service, an emergency room, a plaster room, an x-ray service (equipped with ultrasound scan technology) and two private surgery rooms.

2.1 Chain of Value

The chain of value of the Emergency Service (see figure 1) consists of three main processes:

- "Patient's Admission"
- "Patient's Sorting"
- "Providing Health Care Services"

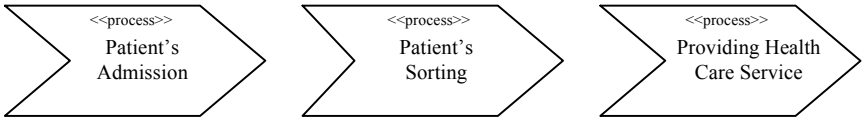

Figure 1 Chain of value of emergency service.

2.2 Patient's Admission

This process (see fig 2) is composed of two sub-processes:

- "Patient's Reception"
- "Patient's Identification"

Due to space limitations of this paper, we will only approach the presentation of diagrams that portray the structure of the sub-process "Patient's Reception", included in the main process "Patient's Admission".

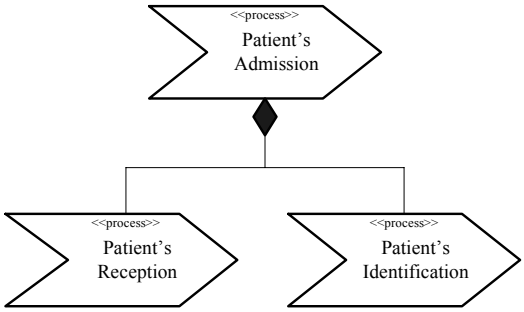

Figure 2 Structure of the process "Patient's Admission".

2.3 Patient's Reception

If the patient depends on someone else, two situations can occur: either the patient is an urgent dependent or he/she is an emergent patient. If the patient is emergent, he/she enters directly to the emergency room, being his/her admission taken care of later. If the patient is urgent, he/she is removed to a wheelchair or a litter and his/her companion does his/her identification, while the patient waits his/her turn in the Sorting. The dynamic perspective of this scenario consists of the relation between the processes and the resources (see fig 3). It is according to this relation that the main transactions of the sub-process "Patient's Reception" will be analysed.

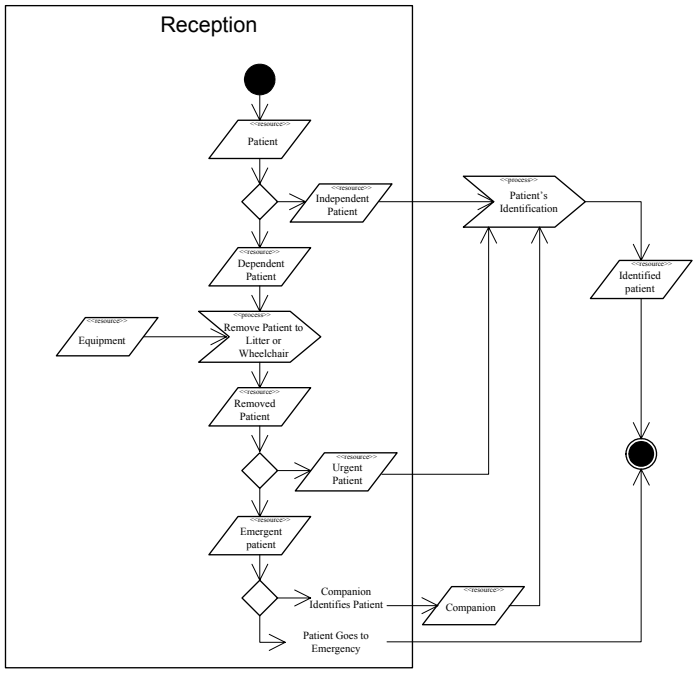

Figure 3 Diagram portraying the relation between processes and resources in sub-process "Patient's Reception".

3. Risk Identification

In this paper we have tried to identify the risk that's usually associated to the transactions connected to the sub-process "Patient's Reception". In order to recognize the risk associated with these transactions, we shall use the pattern behaviour "use-case", considering that it has two main characteristics: the positive-case behaviour and the negative-case behaviour.

It is equally important to identify the actors that are involved in each of these behaviours, those that support the positive functioning of the transactions and those responsible for the negative behaviour of the transactions [5].

In this sub-process we have identified four transactions: PRT1, PRT2, PRT3 and PRT4. Fig 4 shows the respective positive and negative behaviour of the transactions of "Patient's Reception".

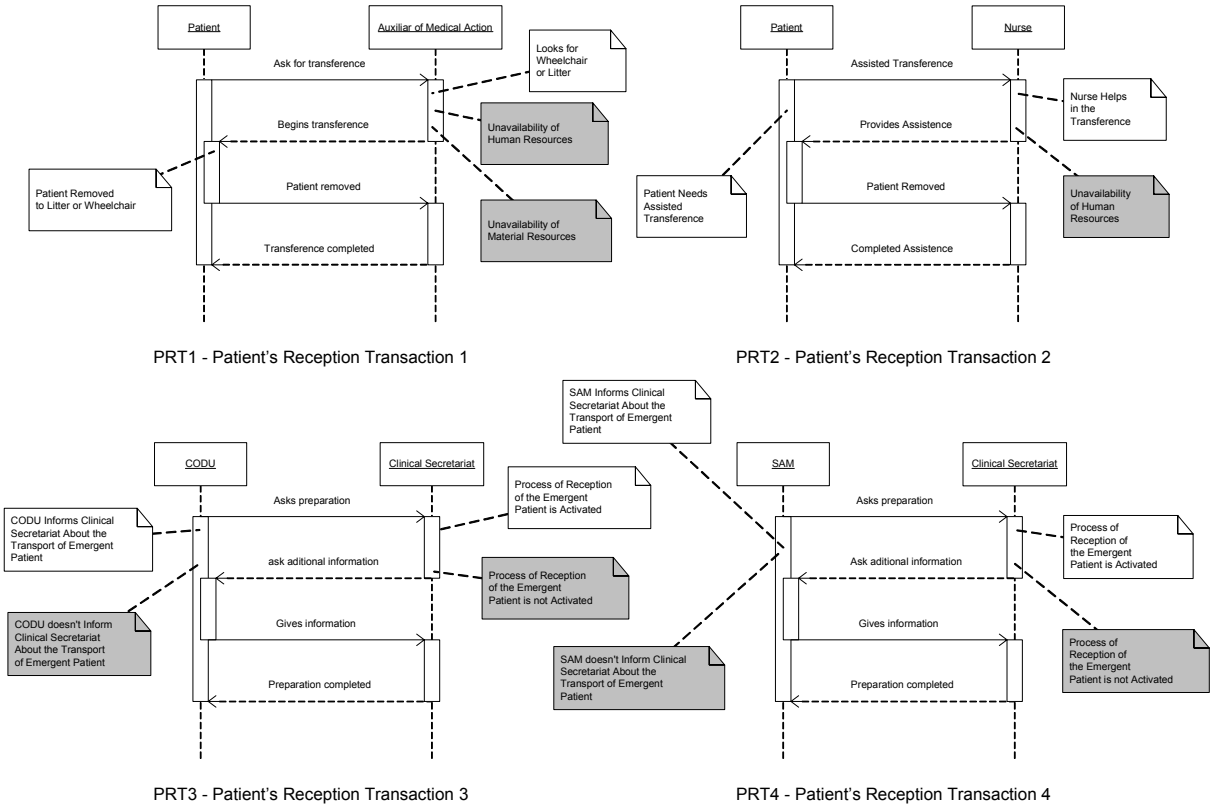

Figure 4 Positive behaviour and negative behaviour of transactions: PRT1; PRT2; PRT3 and PRT4, identified as associated with the sub-process "Patient's Reception".

The negative behaviour (enhancer of inherent risk) associated to the above mentioned four transactions, connected to the sub-process "Patient's Reception", may have the following negative consequences. (see Table 1).

Table 1 Negative behaviour associated to the transactions PRT1, PRT2, PRT3 and PRT4, identified as associated to the sub-process "Patient's Reception" and the respective consequences.

Negative Behaviour	Consequence
Unavailability of human resources	Procedural delay
Unavailability of material resources	Procedural delay
Lack of communication (by CODU) in emergent patient transport	Decrease in quality of services
Lack of communication (by SAM) in emergent patient transport	Decrease in quality of services

The "use-case" of the sub-process "Patient's Reception" diagram (see fig 5) portrays all the simultaneously involved agents.

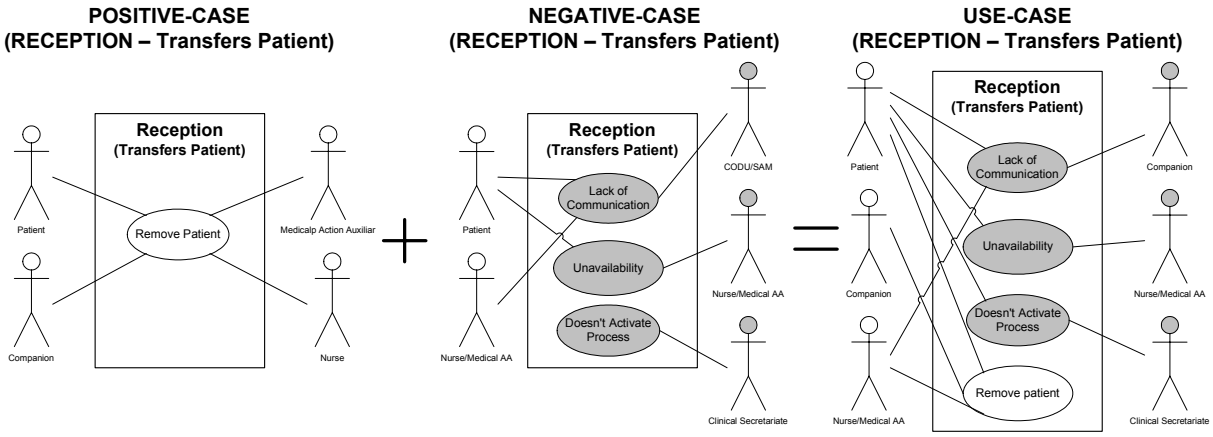

Figure 5 "Use-case" diagram of the sub-process "Patient's Reception".

4. Conclusions and Future Work

The process' modelling is an important tool in the definition of a risk evaluation methodology. We have used a methodology based on the application of modelling techniques using the UML language. This will allow the use of diverse analysis methods normally used in risk management processes.

While doing the investigation that supports this paper, we have concluded that, for an uncompromising representation of a transaction's behaviour, a model based on a single perspective (to which corresponds the desired functioning of the system) is not enough. It is necessary a model that will cope with both perspectives, the desired model ("positive-case", positive behaviour) and the undesired model ("negative-case", negative behaviour). The respective actors will then be associated to these models, those that are responsible for the positive and negative behaviours.

This approach, based on the transactions associated to a process, sub-process or activity not only has the above mentioned advantages, but it has also the great advantage of supporting the definition of a "Risk Objective Function".

The definition of this function will allow the decrease in the risk (optimising the objective function. This will be a task for future developments of the present study case.

The possibility of optimisation of the risk objective function, decreasing the risk, will ultimately lead to a change in the pattern of real time information systems' auditing. Thus, the auditing pattern will change from the present monitoring stage to a future optimisation stage.

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