The Experience of Using ERi*c in a Telecom Corporation

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Abstract. Intentional Requirements Engineering (ERi*c – **E**ngenharia de **R**equisitos **I**nten**c**ional) is a method that produces i* models. It is a six steps interactive process that uses the notion of "Strategic Dependency Situations" a modularization strategy applied to situations of an organization. ERi*c uses an elicitation strategy that mines goals from the description of the context vocabulary. This paper reports on its use in the context of Investment Contracts - of a Telecom Company. The experience of using ERi*c served as basis for the dissertation of one student at UERJ (State University of Rio de Janeiro). A summary of the method application is provided as well as the final remarks on the effects of the modeling experience. Although not institutionalized in the company, the process used in the modeling experience did enact changes on important decision processes.

Keywords: GORE - Goal Oriented Requirements Engineering, Intentional RE, i-star Framework, Investment Contracts modeling experience.

1 Introduction

The aim of this work was to evaluate all steps of a Requirements Engineering method in a case study in a real problem into a big company. This article describes the application of the ERi*c method in the context of Investment Contracts - of a Telecom Company. A GORE method, named Intentional Requirements Engineering (ERi*c – Engenharia de Requisitos Intencional) [1] [2], which is based on the i* Framework modeling language [3], received its first usage without a "laboratory" controlled experience.

Figure 1 portrays the method, which is composed of six steps, divided into activities pertaining to elicitation, modeling and analysis. The six steps rapidly described below are composed of activities and they are integrated through a requirements baseline that is an evolving base.

1) Elicit Actors' Goals: the elicitation heuristics of ERi*c has a strategy centered in natural language descriptions applied to identify both hard goals and softgoals (functionality and quality attributes).
2) Identify SDsituations – Strategic Dependency Situations: This step works to detect how goals arrangements should be composed to set context dependency situations. SDsituation modeling strategy tackles the scalability problem taking into account goals interconnection due to the distributed intentionality, a consequence of modeling on how the actors interact to achieve goals. A special map, called "Intentionality Panel" helps on the identification of SDsituations, a concept that helps building i* models as one assemble of components.

3) Model Actors' Goals: driven by SDsituations, goals are modeled in i* SD models. Identifying actor's rules, a Strategic Actors diagram is also built.
4) Model Actors' Goals Rationale: i* SR models and NFR models (**SIGs** – Softgoal Interdependency Graphs) are built following the "Intentionality Panel" and following the constructs provided by SDsituations.
5) Specify SDsituations: each SDsituation (component) is described by applying a scenario based description technique.
6) Analyse SD and SR Models: a technique called i* Diagnoses [7] provides verification and validation tasks to enhance the quality of the models.

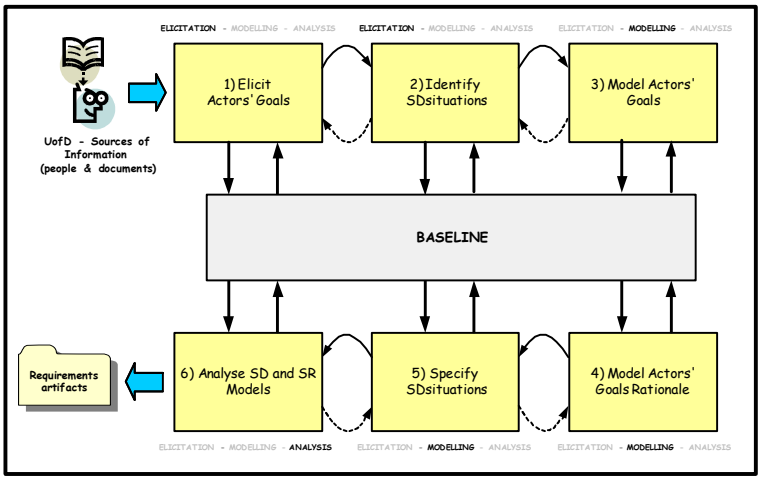

Figure 1 – ERi*c Method overview diagram

This paper is based on the final undergraduate project of a student from UERJ, who is a financial analyst with nine years of experience both in IT projects and in the overall financial area of the company. He recently graduated in Computer Science at UERJ and has used the ERi*c method as the central theme for his dissertation. The method was used to model the process of investment decision for the company [5]. The company uses SAP R/3 systems and the investment decision process was modeled using SAP's business process modeling language (see Figure 2). This process description, and the Investment Contracts Pattern together with several interviews and meetings were used as the main sources of information [4] for the application of ERi*c, in the production of an intentional model for the referred process.

The investment decision process starts by a request from the responsible area. This request should be detailed with overall objectives and project costs and must pass several tests and evaluations, including analysis of economic and financial viability, budget forecasting and the nature of costs. This process includes feedback to the requester in order to improve the project. After these assessments, a sub-process is created to handle all purchase requisitions in the project for the procurement of materials and services with suppliers. After these steps, the solicitation of investment is still subject to the approval of the executive board, which may, depending on the

value, involve the company CEO. Only after all these evaluations the project implementation can start (see Figure 3).

In next section the experience will be described and resultsexplored either by diagrams or key points after enforcing this perspective into representing the i* language.

2 Description - Objectives of the research

This paper summarizes the experience of applying ERi*c to a real situation in a very large organization. The student who did the final undergraduate project described here, works for the organization as a financial analyst and had access to this investment approval process.

The first author was the creator of the ERi*c method and the second author was the the first author's advisor to ERi*c. The student used Oliveira's Ph.D. thesis [1] as the main source for the method, and consulted Oliveira during the process of creating the first draft. The second author provided guidance for the final version of the student's dissertation.

3 Results - Following ERi*c method

The student spent 107 hours applying the method. The breakdown, considering Figure 1, is as such: Step 1: 45 hours; Step 2: 15 hours; Step 3: 10 hours; Step 4: 12 hours; Step 5: 11 hours; Step 6: 14 hours.

The first step (Elicit Goals) is very important for the performance of the method. The result in this work confirmed previous laboratory experimental experiences. The elicitation strategy used is Actors' Goals from Lexicon – AGFL [6] which considers all kinds of actions revealed by LEL and performed inside the selected context. AGFL can improve the performance of the rest of ERi*c phases.

a) Elicitation

The method's step "Elicit Actors' Goals" [6] elaborated the LEL – Lexicon Extended Language (application vocabulary) of the application area, and detected 38 entries or symbols (10 subjects, 15 objects, 11 verbs, and 2 states). The behavior responses of lexicon symbols produced 144 goals in a preliminary list (concrete and flexible (softgoals). The step "Identify SDsituations" mapped 11 strategic dependency situations which are shared by 10 strategic actors. See Table I for overall data. Consequently, using i* language concepts engineers can design one particular approval process to meet specific goals.

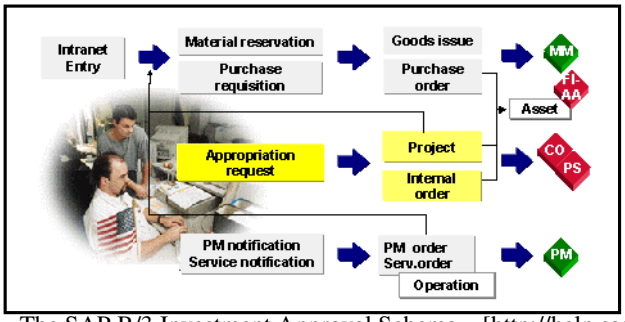

Figure 2 – The SAP R/3 Investment Approval Schema – [http://help.sap.com/r3]

Figure 2 and Figure 3 (left and right) with the process descriptions show two important sources of information used in the elicitation and were relevant for the Lexicon definition. As a rule, appropriation requests are objects to an approval process.

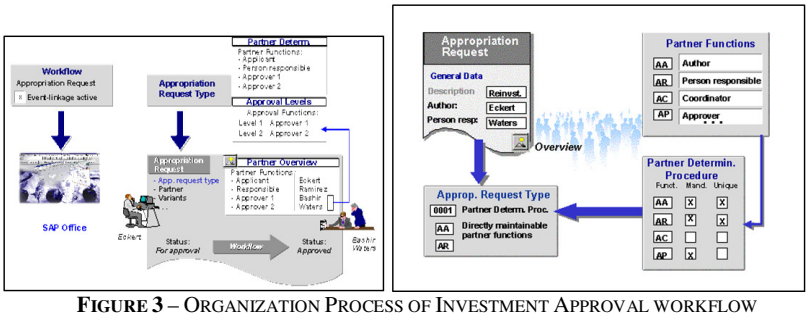

FIGURE 3 – ORGANIZATION PROCESS OF INVESTMENT APPROVAL WORKFLOW [http://help.sap.com/r3]

Below we show one example of goal elicitation of the actor Contracts Analyst. The example shows the elicitation of one goal and one softgoal for the SDsituation. The softgoal's correctness [purchase requisition] was elicited because the action "**analyses**" is a flexible action and this indicates a softgoal. The action "**negotiates**" results a concrete end "one value was established by negotiators" and consequently this action indicates a concrete goal.

LEL´s behavioral responses: actor's responsibilities, in order to achieve goals.

- **Action flexible/concrete** (WHY?) **Concrete Goal / Softgoal** (quality attribute)

Contracts Analyst **-** Contracts Analyst works over a contract negotiation by communicating with the Supply Director.

- Analyses "purchase requisition". (was considered as flexible action)
  BECAUSE correctness [purchase requisition] →
  purchase requisition should BE approved BY Supply Director
- Negotiates values (was considered as concrete action)
  BECAUSE purchase requisition should BE approved BY Supply Director

The investment approval process frequently encompasses several organizational units as actors within the enterprise context.

b) Modeling

The step "Model Actors' Goals" separated the problem into 11 parts (SDsituations) and consequently 11 diagrams of each type were produced. The SDsituation: **Contract Negotiation** is shown in Figure 4a and Figure 4b.

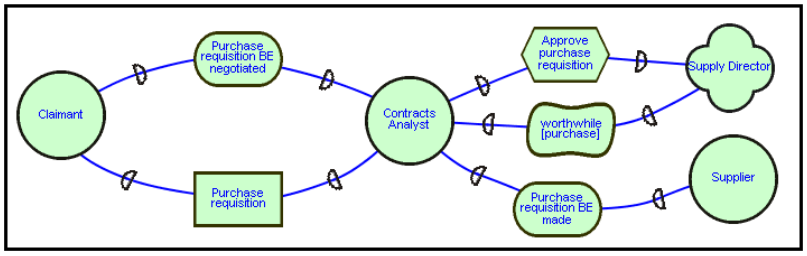

Figure 4a – SDsituation - **Contract Negotiation** : SD Model

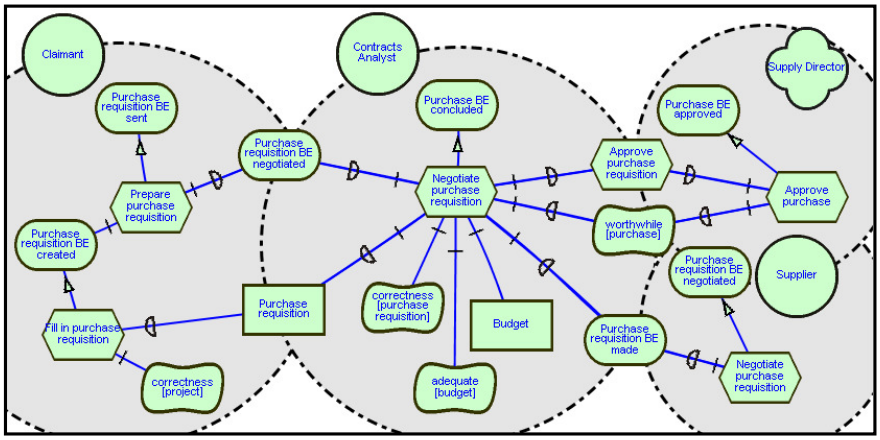

Figure 4b – SDsituation - **Contract Negotiation** : SR Model

During the modeling process a refinement of goals was conducted, see Table I and II.

TABLE I. WORK INTENTIONAL RESULTS

SDsituation	***Actors***	***Concrete goals***	***Softgoals***	***Goals***
1	2	5	1	6
2	3	5	1	6
3	2	6	2	8
4	3	4	1	5
5	2	4	1	5
6	2	5	2	7
7	2	4	1	5
8	2	4	1	5
9	2	4	1	5
10	2	12	1	13
11	4	4	1	5
Total	10	57	13	70

TABLE II. GOALS EVOLUTION DURING THE WORK

Goals	*elicited*	*grouped*	*refined*
Concrete	104	57	57
Softgoal	40	17	13

c) Anaysis - Verifying Model's Elements

The last ERi*c step "Analyse SD/SR Models" pointed potential problems in the diagnose product "Matrix: Goals x Problems". These problems were important feedback both to the modeling and for the investment process.

4 Conclusion

Although the ERi*c has not been evaluated formally by the company, the student reported that the modeling exercise improved his understanding of the whole process and made him aware of improvements that could be made. He reported the possible improvements to the company managers, who agreed to change parts of the activities related to Investment Contracts. The student also reported that the breakdown of responsibilities, by looking at the SDsituations, made him more aware of the inner tasks of the whole area. We understand that even being experienced with investment analysis for the company, it was the method he followed that allowed him to better grasp the different situations and made him even more knowledgeable about the area.

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