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GoBIS: An integrated framework to analyse the goal and business process perspectives in information systems

Marcela Ruiz [a,*], Dolors Costal [b], Sergio España [a], Xavier Franch [b], Óscar Pastor [a]

[a] PROS Research Centre, Universitat Politècnica de València, Camino de Vera s/n, Edificio 1F, 46022 Valencia, Spain
[b] GESSI Research Group, Universitat Politècnica de Catalunya (UPC), Calle Jordi Girona 1-3, Campus Nord, Edifici Omega, 08034 Barcelona, Spain

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ABSTRACT

Context: Organisational reengineering, continuous process improvement, alignment among complementary analysis perspectives, and information traceability are some current motivations to promote investment and scientific effort for integrating goal and business process perspectives. Providing support to integrate information systems analysis becomes a challenge in this complex setting.
Objective: The GoBIS framework integrates two goal and business process modelling approaches: *i** (a goal-oriented modelling method) and Communication Analysis (a communication-oriented business process modelling method).
Method: In this paper, we describe the methodological integration of both methods with the aim of fulfilling several criteria: i) to rely on appropriate theories; ii) to provide abstract and concrete syntaxes; iii) to provide scenarios of application; iv) to develop tool support; v) to provide demonstrable benefits to potential adopters.
Results: We provide guidelines for using the two modelling methods in a top-down analysis scenario. The guidelines are validated by means of a comparative experiment and a focus-group session with students.
Conclusions: From a practitioner viewpoint (modeller and/or analyst), the guidelines facilitate the traceability between goal and business process models, the experimental results highlight the benefits of GoBIS in performance and usability perceptions, and demonstrate an improvement on the completeness of the latter having an impact on efficiency. From a researcher perspective, the validation has produced useful feedback for future research.

1. Introduction

Organisations are aware of the importance of evolving to keep pace with changes in the market, technology, environment, law, etc. [1]. As a result, continuous improvement and reengineering have become common practices in information system (IS) engineering. Understanding organisations and their needs for change often requires several interrelated perspectives [2,3]. The IS engineering community has contributed a number of modelling languages that are typically oriented towards a specific perspective, requiring approaches to their integration [4].

In this paper, we focus on extending a business process perspective with intentional aspects of organisations. Business process modelling languages provide primitives to specify work practice (i.e., activities, temporal constraints, and resources). Despite the fact that processes are widely

* Corresponding author. Tel.: +34 96 387 70 00x83534.
E-mail addresses: lruiz@pros.upv.es (M. Ruiz), dolors@essi.upc.edu (D. Costal), sergio.espana@pros.upv.es (S. España), franch@essi.upc.edu (X. Franch), opastor@pros.upv.es (Ó. Pastor).

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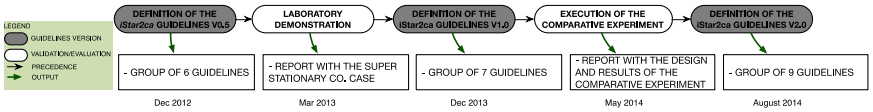

Fig. 1. Evolution time-line for the *iStar2ca* guidelines.

accepted as a means to achieve organisational goals [5], process models give little attention to the strategic dimension [6]. The analysis, prioritisation, and selection of organisational strategies are the scope of intentional modelling languages, which focus on the business roles, their goals, and their relationships.

Business processes and goals are intrinsically interdependent [7] and several works provide detailed arguments in favour of combining both perspectives: (i) an integrated approach allows understanding of the motivation for processes [6]; (ii) in a non-integrated approach, goals may be used to guide process design [8]; (iii) traceability is enhanced, which is necessary for enterprise management [9] and facilitates the sustainability of organisations [10]; (iv) integration also helps in identifying cross-functional interdependencies during business change management by supporting the identification of the goals that motivate change and the analysis of their impact on processes [8,10,11].

The GoBIS framework (Goal and Business Process Perspectives for Information System Analysis) pursues this aim by integrating a goal-oriented and a business process-oriented modelling language. There are several criteria that one would expect from modelling language integration. For the framework definition, we highlight the following: (i) the languages to combine need to be formally described; (ii) the integration itself should be well founded in theory; (iii) it should clarify the scenarios where the integrated approach can be applied and provide some scenario-dependent guidelines; (iv) it should provide tool support; (v) empirical studies should demonstrate some benefits to potential adopters. These criteria guided our research. A comparative review (see Section 2) reveals that proposals with similar aims do not fulfil one or several of the above-mentioned criteria, revealing that the challenge remains open.

This paper presents our design science endeavour [12] from the problem investigation to the solution design, the implementation of a modelling tool, and the solution evaluation. We have chosen to integrate the languages proposed by *i** [3] (a goal-oriented modelling method), and Communication Analysis (CA) [13] (a communication-oriented business process modelling method). The reason for choosing *i** is its expressiveness to specify dependencies, with which we intend to trace strategic motivations and processes. In the case of CA, we aim to get the most out of the communicational techniques in order to analyse business processes; its notation is not what is important, but rather the underlying concepts and modularity guidelines. Moreover, some current business process modelling suites use BPMN with a communicative approach. In addition, the authors are competent in these languages and are able to confront the challenge.

The contributions of the paper are the following:

- We present the *iStar2ca* guidelines v2.0 which are intended for a top-down modelling scenario and are an evolution of the *iStar2ca* guidelines v1.0 reported in [14] (see the evolution time-line in Fig. 1). The guidelines design is a method engineering effort; throughout the paper, we use the terminology introduced in [15].
- We report a comparative experiment and a focus-group session, which was carried out with students and whose feedback has been taken into account to produce the *iStar2ca* guidelines V2.0. The results demonstrate that the subjects' effectiveness (specifically, business process model completeness) is greatly improved by the use of the iStar2ca guidelines, without compromising efficiency. Also the perceptions of the usability of the guidelines are positive.

The paper is structured as follows. Section 2 compares related works. In Section 3, we introduce and exemplify the methods selected for integration. Section 4 describes the research methodology and Section 5 details the process and proposal for integrating *i** and CA. Section 6 presents guidelines for a top-down modelling scenario. Section 7 describes the modelling tool and technical support. Section 8 presents how the top-down scenario guidelines were evaluated through a lab-demo, a comparative experiment, and a focus group session with students. Finally, Sections 9 and 10 conclude with a discussion and future lines of work.

2. Related work

The combination of different methods and models to obtain a profund and comprehensive understanding of the system to be produced has received much of attention in the IS literature. On the one hand, some general frameworks have been proposed to reconcile different perspectives; for instance, Salay et al. [16] propose the concept of macromodel for the development, comprehension, consistency management, and evolution of a collection of related models. On the other hand, different approaches focus on some of these perspectives (typically two) in a specific domain of interest and provide a customised solution for their particular case. This is the approach followed in the GoBIS framework presented in this paper.

There are several related works that focus on the integration of goal and business process perspectives in the domain of business process management and maintenance. These approach goal-oriented business process reengineering from diverse angles. We analyse these approaches based on the criteria mentioned in Section 1, which may take different values:

(a) Ontological foundation: none; conceptual framework (concepts and their relationships are defined); based