The S^3 (Strategy-Service-Support) Framework for Business Process Modelling

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Abstract. One of the central activities in developing requirements for business processes is that of modelling the constituent parts of both existing and future processes. This position paper examines requirements engineering issues for business processes in terms of the nature of the problem domain and of the development activities. The paper proposes a modelling framework which, in addition to the traditional treatment of modelling processes from an organisational support perspective, deals with strategic and service oriented issues.

1 Introduction

The relatively recent emphasis on process-centred approaches has highlighted the need for appropriate mechanisms for the elicitation, representation and validation of requirements for business processes. This position paper is motivated by two factors based on the author's personal experiences: (i) observations that much of the work in RE for business processes is essentially a continuation of techniques advocated for information systems development and (ii) reflections on industrial applications requiring a total process-oriented approach to the development of the organisation and of its support systems. Consequently, the paper argues that RE for business processes needs to adopt a multifaceted approach that addresses issues that arise from the nature of the business processes and of the RE process itself. To this end, the paper examines in section 2, the characteristics of business process, the issues arsing from the nature of these systems and the process of developing requirements for them. The highlighting of these issues gives rise to a set of criteria for improving RE approaches for business processes and a proposed framework is presented in section 3.

2 Business Process Modelling

2.1 Characteristics of Business Processes

There is a commonly agreed set of features pertaining to business processes [Alderman, Maffin, et al 1997; Broadbent 1999; Davenport 1993; Ould 1995; Scheer

and Nuttgens 1994; Yu and Mylopoulos 1996]. In summary a business process demonstrates the following characteristics:

- a business process has well identified *products* and *customers*;
- a business process has *goals*, i.e., it is intended to achieve defined business objectives aiming to create value to customers;
- a business process involves several *activities* which collectively achieve defined business process goals and create value to customers;
- a business process crosses functional/ organisational boundaries; it concerns the *collaboration between organisational actors* that are contributing to (or constraining) the satisfying of business objectives.

2.2 Requirements Engineering Issues

Given that business processes exhibit the kind of characteristics outlined in the preceding section, the question that must be addressed is "*what kind of issues arise when attempting to develop requirements for systems supporting business processes?*". This question is answered in this paper in terms of two aspects: (a) the nature of the problem domain and (b) the nature of the RE process for business processes.

The Nature of the Problem Space

Business processes for organisational change deal with both *physical* structures (e.g. supply chain) as well as *human* and *behavioural* structures (e.g. human resource chain). This implies that both 'hard' and 'soft' aspects are present in business processes and in order to consider the implications of change both types need to be considered in a synergistic manner.

Business processes involve many different *stakeholders*. People are heavily dominated by the systems around them and any change to the business processes will inevitably involve such system stakeholders in considering alternative scenarios to the re-engineering of the processes.

Business processes exhibit *dynamic* behaviour. Things change over time and one is interested in understanding this rate of change.

Business processes represent *complex systems*. This complexity is not so much a result of voluminous components (although this could indeed be true in some cases) but, rather because of the behavioural characteristics of business processes. Even in systems with a relatively small number of parts, changes that involve the simultaneous change of many variables, some of which may be distant in space and time, can be difficult or impossible to understand without appropriate support mechanisms [Brehmer 1989; Paich and Sterman 1993; Sterman 1989].

The Nature of the RE Process for Business Processes

The overriding purpose of requirements development for business processes is to support *organisational change*. Organisational change concerns the transition from an initial situation, which is unsatisfactory in some aspect, to a desired situation where the problem is treated. The problem state is not a-priori specified and there is no definitive formulation. Formulating the problem amounts, to a great deal, to solving it.

To this end, one needs to develop hypotheses as to the nature of the solution and subject these hypotheses to evaluation in order to gain confidence as to their validity. Requirements engineering techniques therefore, need to be applied within a cycle of *hypothesis formulation*, *testing*, and *re-formulation* until stakeholders have enough confidence about the efficiency of the proposed design. Essentially, one is developing theories about the Universe of Discourse and tests these theories for their validity.

This methodological stance demands firstly, the use of a common medium of communication to deal with the often fragmented, and individualistic knowledge held in the mental models of participating stakeholders. The results of this activity would be conceptual models representing the *structure* of the system. Since the models are to be shared by all stakeholders, they should be expressed in such a way so as to be amenable to inspection and critique.

Secondly, because of the impossibility of proving the validity of any conceptual model, attention must be turned to establishing confidence in the model through the use of techniques that offer stakeholders the ability to experiment with alternative realisations of the system [Carroll 2002].

And finally, when stakeholders have reached agreement on desirable levels of service for the intended system, attention must be turned to the way that organisational processes will be implemented by organisational actors.

3 The S^3 Framework

The discussion in section 2, leads to a framework based on three orthogonal modelling orientations, shown schematically in Figure 1. The framework henceforth referred to as the S^3 framework, concerns the modelling of *Strategy*, *Service* and *Support* processes.

This framework is based on the premise that RE for business processes for organisational change needs to consider:

a. **S**trategic process modelling. This activity considers processes involved in 'external projection' and deal with goals, policies and actions for improving the organisation's performance. The performance may manifest itself in improved products or services to customers, and society or improved financial conditions for the organisation or its shareholders.
b. **S**ervice process modelling. This activity considers the levels of improvement considered by the organisation. The models will need to consider the resources that may be required to meet different levels of service. To decide on the appropriate balance between service level and resources, this activity will also involve experimentation with different scenarios.
c. **S**upport process modelling. This activity considers the processes that need to be put in place by the organisation in order to utilise the resources to reach the desired service levels that in turn will meet the overall organisational strategy.

Strategic processes determine the intention for structural changes to the system; service processes determine the potential levels for change; support processes deter-

mine the actors and their activities for implementing the strategy. The three modelling orientations are intertwined, hence the orthogonal representation in Figure 1. This orthogonality is an essential element for addressing the issues outlined in section 2, pertaining to both the nature of the business processes and the nature of the RE process.

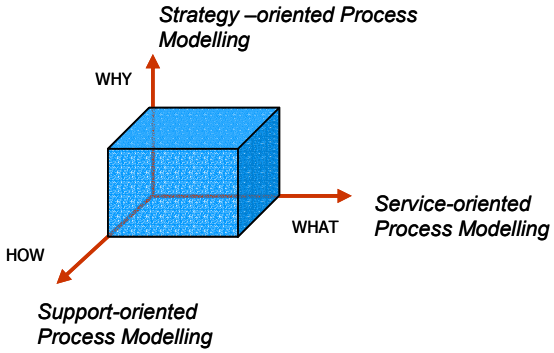

Figure 1: The Strategy-Service-Support Framework

To date, RE approaches for business processes and organisational change, fall broadly into two categories: (a) those that focus solely on procedural matters (support processes) or (b) those whose centre of attention is on stakeholders' intentions (strategy processes). However, experiences from many different industrial applications indicate that the two viewpoints are not mutually exclusive.

The S^3 framework represents a confluence of these two viewpoints with the additional element of service process modelling to deal with those factors that determine the parameters that control the potential behaviour of the system.

Experiences with the use of the framework (c.f. [Loucopoulos, Zografos, et al 2003]) indicate that stakeholders could realistically define their requirements only through an interplay between *qualitative* and *quantitative* modelling. The field of RE is dominated by conceptual modelling approaches, the majority of which yield *qualitative* models. Whilst these are useful their real value is small, for without testing of the models it is impossible to comprehend their implications by merely observing, walking through, and debating about their contents; nor is it always feasible to test them through observations from experimentation in the real world. The deployment of testing parameters at each key process element encourages group brainstorming through which participants could focus on alternative solutions and envisage potential behaviour of the system prior to its implementation.

4 Conclusions

Process-centric business engineering has had its impact on RE practice, creating the need for a horizontal view of the enterprise, its activities and its products. This position paper argues for the need to model process in terms of three key notions: strat-

egy, service, and support. Each of these three orthogonal axes focuses on a different viewpoint of the business problem, thus requiring a different RE reasoning stance.

This multifarious stance ensures that different aspects of the overall problem are covered individually but also in a synergistic manner, since the final system is defined as the composition of all three types of knowledge.

Methodologically, the framework supports a 'solution-first strategy' [Carroll 2002] to requirements definition. Analysis guides design and design guides analysis -and all in an effort to gain an understanding of the problem, of the situation in hand.

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