

Synthesis of Actor Dependency and Business Motivation for Service Requirements Engineering

Soo Ling Lim
School of Computer Science and
Engineering, University of New
South Wales and NICTA
Sydney, Australia
slim@cse.unsw.edu.au

Eric Platon
National Institute of Informatics
Tokyo, Japan
platon@nii.ac.jp

Karl Cox
NICTA
Sydney, Australia
karl.cox@nicta.com.au

Abstract

Service-oriented information systems should be built with the understanding of how they meet stakeholder intentions and support enterprise motivation. Existing requirements engineering approaches for services do not address the alignment of service-oriented information systems with business needs. This paper presents a model to support alignment based on the relationships between stakeholder intentions and enterprise motivation. A case study of the Japan Post procuring customer relationship management services illustrates the model.

1. Introduction

Service-oriented computing aims to handle dynamic changing environments where services can be composed, configured and customised [3] to fulfil the needs of an enterprise with respect to its business plans. These plans are not static and are constantly shaped by influencers such as regulations, customers, and competitors [2].

Existing requirements engineering approaches (e.g. [4], [6]) do not address the alignment of services with business needs. As a result, it is difficult to determine how well the services support business activities due to the loss of business context information. To better manage service requirements, the stakeholder intentions for system interaction should be captured, along with the enterprise's intentions that motivate these interactions. This allows reasoning about the impact of influencers on service requirements.

The paper proposes a model to reason about the alignment of service requirements with business needs. Business context information is preserved by modelling how stakeholders use the service-oriented information system as a means to achieve ends. This enables IT to support business

change better. The model integrates the actor dependency model [8] with the Business Motivation Model [2] to support the alignment of dependencies over business elements. The different views from actor dependencies are aligned with enterprise intentions (End) that can be met by services requirements (Means). Requirements are expressed using the vocabulary of business motivation, whereby volatile elements of the business plan are expressed as Directives to support the End while governing the Means. This enables stakeholders to express business change and service requirements in a vocabulary familiar to them.

The remainder of the paper is organised as follows. Section 2 discusses background research. Section 3 presents the proposed model with a case illustration. Section 4 concludes the paper.

2. Background

2.1. Actor dependency model

An actor dependency model is a graph involving actors and the dependencies that exist among the actors [8]. A dependency describes an agreement between two actors: the depender and the depensee. The depender is the actor who depends on the other actor for some "object", and the depensee is the actor who is depended upon. The object around which the dependency relationship is centred is called the dependum.

Figure 1 illustrates four types of dependencies describing the nature of the agreement: goal, task, resource, and softgoal. *Goal dependencies* are used to represent delegation of responsibility for fulfilling a goal. *Task dependencies* are used in situations where the depensee is required to perform a given activity. They specify how but not why the task needs to be performed. *Resource dependencies* require the depensee to provide an informational entity to the

dependers. *Softgoal dependencies* are similar to *goal dependencies*, but their fulfilment is subjective.

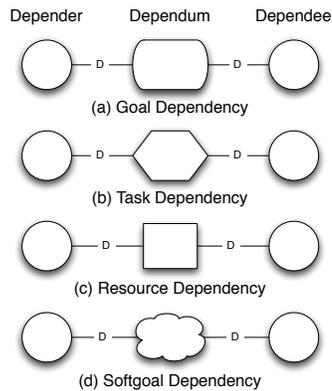


Figure 1. Actor dependencies [8]

2.2. Business Motivation Model

The Business Motivation Model (BMM) is the Object Management Group specification [2] for modelling elements of a business plan. These elements motivate, provide governance and guidance for the business. BMM provides business vocabulary understood by business stakeholders for developing, communicating and managing business plans in an organised manner. BMM is specific for managing business knowledge to understand, rationalise and capture service requirements. Generic knowledge management and intention modelling frameworks (e.g. [8], [1]) lack in these aspects.

Figure 1 illustrates the elements of BMM and their relationships to support the business with Means to achieve its End. Means include the Mission, Course of Action (i.e. Strategy and Tactic) and Directive (i.e. Business Policy and Business Rule) that governs the Course of Action and supports the achievement of End. End includes the Vision and Desired Result (i.e. Goal and Objective). Table 1 summarises the definitions of the Means and End elements.

BMM answers the questions of what is needed to achieve the organisation’s intentions and the motivation behind them. Developing a business model in the planning process for service-oriented information systems allows these systems to align with their business intentions. The business vocabulary is suitable for business analysts, and provides an abstraction to simplify business change reasoning. The consideration of Business Policies and Business Rules provides governance for and guidance to the selection of services. For example, the Directives of an organisation may impose various reporting and security requirements that cannot be satisfied by some or all service providers. Hence, Directives

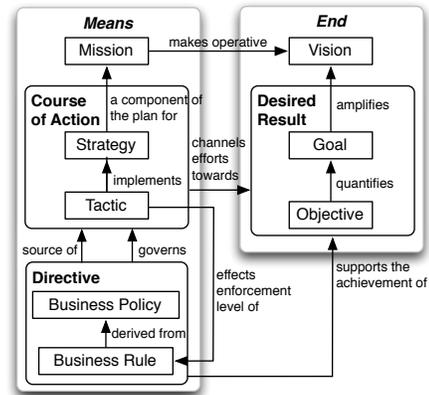


Figure 2. BMM Means and End [2]

can be used as evaluation criteria for service selection.

3. Aligning service requirements with business needs

To align service requirements with business needs, we propose a model that adapts the concepts of business knowledge management in BMM to analyse how actor dependencies can be fulfilled by the information system. The model captures the relationships between: (1) the enterprise’s intentions (Ends); (2) the plans on how the information system can realise the intentions (Means); and (3) how the stakeholders use the Means to achieve the Ends (actor dependencies) (Figure 3).

In our model, actor dependencies are used to describe the dependency relationships between stakeholders and the system. Means are used to understand possible alternatives and configurations of the information system to meet actor dependencies and achieve the Ends. This can mean different services, service providers, compositions, and configurations. Directives are Means that are used to evaluate among the alternatives and configurations to select one that is aligned with business needs while meeting stakeholder dependencies. Ends are used to understand what business reason the information system is intended for. They are used to measure how well the changes in Means are implemented based on the Directives. Together, these elements support reasoning about business changes in enterprise intentions that affect the business plans for the system.

The case study of the Japan Post procuring CRM (customer relationship management) services [7] is used to illustrate the model in this section. Japan Post is Japan’s largest financial services institution. Besides providing postal services, it also serves as a savings bank and provider of financial products. The purpose of the CRM system is to

Table 1. BMM elements and definitions [2]

Element	Definition
End	result that the enterprise seeks to accomplish
Vision	the future state the enterprise would like to achieve
Desired Result	state or target that the enterprise intends to maintain or sustain
Goal	long-term, qualitative, general and ongoing Desired Result
Objective	short-term, quantitatively measurable, and specific Desired Result
Means	a device, capability, regime, technique, restriction, agency, instrument, or method that may be called upon, activated, or enforced to achieve Ends
Mission	ongoing operational activity to achieve the Vision
Course of Action	a way of configuring some aspect of the enterprise to channel efforts towards Desired Results or enable other Courses of Action
Strategy	a component of the plan for the Mission selected to move the enterprise towards its Goals
Tactic	short-term and specific Course of Action formulated to meet Objectives and implement Strategies
Directive	an element of a business plan that governs how the Courses of Action should, or should not, be carried out to assert business structure or to control or influence the behaviour of the business
Business Policy	Directive that control, guide and shape Course of Actions by defining what can be done and what must not be done, and may indicate or set limits on how it should be done
Business Rule	formally structured, atomic and directly actionable Directive that is derived from Business Policy

manage information relating to customers who have consented to the use of their personal data. The system will enable Japan Post to cross-sell services such as insurance and other financial products handled by post offices. This is part of Japan Post's privatisation plans to improve its customer service to compete with other financial institutions.

3.1. Actor dependency

Actor dependencies are used to understand the role of various processes in the business. They generate collective views of functional requirements across dependencies. For the Japan Post case, the Market Analyst has a *goal dependency* on the CRM system for understanding customer behaviour. It does not matter to the Market Analyst how the goal is achieved, for example the CRM system can fulfil the dependency by forecasting customer needs or projecting past data.

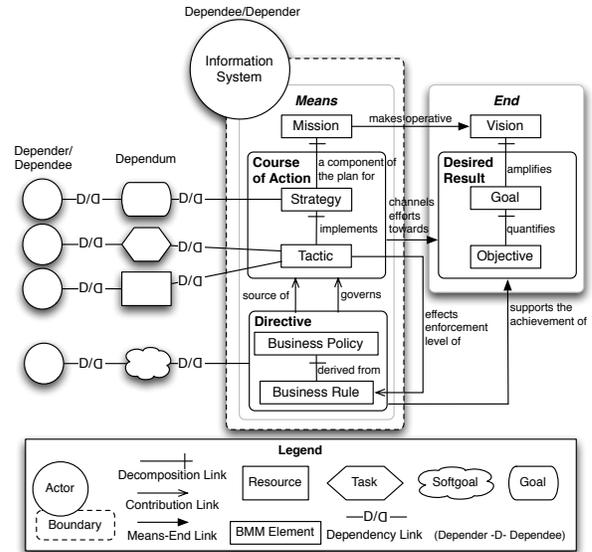


Figure 3. A model for alignment of service requirements

The Customer Service Officer has a *goal dependency* that the customer information is managed. For this dependency, the CRM system has a *resource dependency* on the Customer Service Officer for customer information and cross-selling consent forms ¹. If these resources are not provided, the CRM may not be able to fulfil the *goal dependency* from the Market Analyst to understand customer behaviour. Both the Customer Service Officer and the Market Analyst have the *softgoal dependency* for ease of use.

3.2. Ends

While the actor dependencies describe the relationships between the information system and the stakeholders, it does not show the business intentions for the information system's existence. BMM Ends complement the actor dependencies by capturing these intentions which can be derived from business plans.

The Vision for the information system is defined as the future state the enterprise plans to achieve with the information system. For the Japan Post case, the Vision for the CRM system is to enhance sales capabilities of Japan Post. This information is not available from the actor dependency

¹A cross-selling consent form is a document used to obtain agreement to the use of personal information for activities such as cross-selling. As Japan Post acts as an agency for banking services, it is required by law to obtain prior customer consent if conducting cross-sales beyond the bounds of its contracted work [7].

model but provides enterprise intentions on the information system that is important for business alignment.

Goals are decomposed from the Vision. For example, the Goal of the CRM system is the dissemination of appropriate customer information. By providing and acquiring the right information at the right time, Japan Post can increase customer satisfaction, hence amplifying the Vision of enhancing its sales capabilities.

Objectives are quantifiable components and their achievements as a whole contribute to the achievement of the Goal they are decomposed from. For example, the CRM system has an Objective of storing cross-selling consent forms. The storage of cross-selling consent information from customers contributes to the Goal of dissemination of appropriate customer information. The achievement of the Objective can be quantifiably determined by checking whether the forms are stored. Hence, Objectives provide measures to determine how well the services (from Means) can meet the Ends which represent the business needs.

3.3. Means

The Mission of the information system is defined as plans for how the information system can realise the Vision. To work towards the Vision, Japan Post deems that the Mission of the CRM system is to understand customer needs and their business value [7]. This provides the justification of why the service-oriented information system is required.

Strategies are specifications of workflows that can be implemented by services. For their alignment with business needs, Strategies should: (1) be part of the plan for the Mission; (2) meet *goal dependencies* from the actor dependency model; and (3) channel efforts towards the Desired Results or enable other Strategies. For example, a Strategy that is aligned should meet the *goal dependency* that customer information is managed, and channel efforts towards the Goal of disseminating the appropriate customer information.

Tactics are implementations of services provided by the service provider(s) to achieve some functionality. For alignment with business needs, Tactics should: (1) implement the Strategies; (2) meet *resource dependencies* or *task dependencies* from the actor dependency model; and (3) channel efforts towards the Desired Results. For example, a Tactic that is aligned should meet the *resource dependency* for customer information and cross-selling consent forms while channelling efforts towards the Objective of storing cross-selling consent forms.

Finally, Directives are Means that govern the services and support the achievement of the Desired Results. Directives are formulated based on the identified influencers providing knowledge about opportunities and threats that can assist or hinder the organisation's operations [2]. These influencers are directly related to volatile market conditions,

making Directives the most volatile elements of the business plan. These elements represent non-functional requirements that services have to fulfil [5].

From the actor dependency diagram, *softgoal dependencies* are refined into Directives. Directives determine what business constraints apply to the actor such that the information system can achieve the Desired Results. For the Japan Post case, the *softgoal dependency* ease of use is refined into the Business Policy that the system should be consistent with the standard Japan Post user interface. The Business Rule input and display must be in Japanese is derived from this Business Policy. Due to these Directives, services for managing customer information is evaluated based on whether they support the required features. For example, CRM services that cannot accept Japanese input cannot be chosen based on the Business Rule.

4. Conclusion

In order to align requirements in service-oriented business systems with business needs, it is important to take into account the relationships between stakeholder needs and business intentions. This paper proposes to model these relationships by integrating actor dependency with business motivation. The resulting model can express requirements for services in terms of meeting stakeholder dependencies and supporting business needs.

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