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## Strategy Representation Using an i\*-like Notation

### Abstract

Assessing and achieving alignment between an organization's strategies and its IT/business functions has long been recognized as a critically important question. This paper reports on a project that seeks to overturn established management orthodoxy by establishing that strategies can be adequately modeled using conceptual modeling notations and that methodological and tool support can be provided for the task of assessing and achieving alignment between the strategies of an organization and its service offerings. A key element of this enterprise has been the design of SML - the Strategy Modeling Language. This paper presents an interim report from this project that describes how a notation inspired by i\* has been used to obtain the diagrammatic modeling component of SML, and how i\*-like notions have been used to represent strategy decomposition (required to be able to refine strategies to a level where there is an ontological match between the languages used to describe strategies and services). We also comment on how i\*-like notions would play a greater role in this project, as a complete model of the enterprise context is brought to bear on the alignment exercise. We provide a brief illustration, and a description of the toolkit implemented on the Eclipse platform.

### Disciplines

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# Strategy Representation Using an i\*-like Notation\*

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**Abstract.** Assessing and achieving alignment between an organization's strategies and its IT/business functions has long been recognized as a critically important question. This paper reports on a project that seeks to overturn established management orthodoxy by establishing that strategies can be adequately modeled using conceptual modeling notations and that methodological and tool support can be provided for the task of assessing and achieving alignment between the strategies of an organization and its service offerings. A key element of this enterprise has been the design of SML - the Strategy Modeling Language. This paper presents an interim report from this project that describes how a notation inspired by i\* has been used to obtain the diagrammatic modeling component of SML, and how i\*-like notions have been used to represent strategy decomposition (required to be able to refine strategies to a level where there is an ontological match between the languages used to describe strategies and services). We also comment on how i\*-like notions would play a greater role in this project, as a complete model of the enterprise context is brought to bear on the alignment exercise. We provide a brief illustration, and a description of the toolkit implemented on the Eclipse platform.

**Key words:** i\*; strategy modeling; strategic alignment;

## 1 Introduction

A large body of literature, spanning several decades, has highlighted the critical importance of strategic alignment to the management and information systems communities. Yet there is also considerable pessimism about the prospects for solving this problem using computer-mediated tools and methodologies. This

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paper presents an interim report from a project on strategic service alignment, within the Australian Cooperative Research Centre for Smart Services. We have approached the problem by first devising a language for modeling organizational strategy in a manner amenable to machine processing (the Strategy Modeling Language - SML), then defining a high-level business service modeling language (the Business Service Representation Language - BSRL) [2] and finally developing a machinery that enables the assessment of alignment and supports dynamic re-alignment in the face of changing business contexts.

In this paper, we focus on the modeling of strategy. The Strategy Modeling Language (SML) has been designed to include both a textual and diagrammatic interface for modeling and visualizing the strategic landscape of an organization. We describe how the  $i^*$  framework [7] provided the basis for the design of the diagrammatic strategy modeling notation. We also note that the Strategy Modeling Language augments the  $i^*$  ontology in two critical ways. First, it provides for modeling strategies as plans (see examples later in this paper). This is a significant departure from  $i^*$ , which is sequence-agnostic. Second, it provides for modeling strategies as optimization objectives. While  $i^*$  provides for modeling softgoals, which arguably have similar intent, SML explicit strategy modeling via *objective functions*. Unlike the informal account of softgoal decomposition in  $i^*$  and related work on softgoals, our approach provides for *formal decomposition* of objective functions (the full explication of this is outside the scope of this paper).

Our current work has mainly focused on alignment within a single enterprise context, but is currently being extended to address cross-enterprise value chains. The capabilities offered by  $i^*$  SD diagrams to model enterprise structure via actor/dependency models is critical for modeling strategy in a cross-enterprise context, and represents an important direction for future development.

## 2 Background

Current work on strategic alignment looks at how strategies can be specified in relation with other artifacts such as actors, business processes, resources. The key approaches in this space (outside of  $i^*$ ) include e3 Forces [3] (a framework for modeling perspectives of an organization including a strategy-oriented perspective) and the InStAl method [5] (aligning the strategy and functional aspects). Other proposals include GRL<sup>2</sup> (supports goal-oriented reasoning), GOORE (a goal-oriented method for requirements elicitation) [4]. None of these encompass the full range of modeling constructs that SML supports.

Modeling the decomposition of business strategy plays a vital role in the landscape of enterprise strategic alignment. To be able to align business services to organization's strategy, we need to have a rich model that represents the organization's strategy to work with.  $i^*$  is the main the source of ideas that particularly influences our vision on strategy modeling. Our initial idea in this

<sup>2</sup> GRL online <http://www.cs.toronto.edu/km/GRL/>

direction explores the notion of contextual consistency in goal decomposition [1]. In this paper, we aim to tailor the notion of goal decomposition to capture organization's strategy and define a specific notation for it.

### 3 Business Strategy Decomposition

In this section, we present how we extend i\* to cope with strategy decomposition (Subsection 3.2), which is illustrated by an example (Subsection 3.1).

#### 3.1 Example

Let us consider an example that describes a multi-national book-seller whose management decides to provide their services via the Internet. The management sets out the strategy for the book-seller is to become the market leader amongst book-sellers in Australia. As the business of selling books involves marketing, optimizing operating costs and dealing with book suppliers, the main strategy is then broken down into three more concrete component strategies (i) To first gain market-share in New Zealand, then use United Kingdom market credibility to enter Australia (ii) To minimize operating costs (iii) To manage supplier relationships by providing purchase volume guarantees, and fast payment against invoices. This process can be carried out until the management reaches a set of strategies that are concrete enough to map to business services or business processes<sup>3</sup> that operationalize them.

Figure 1 gives the decomposition hierarchy of strategy for the book-seller. Note that each strategy is prefixed by a string followed by a colon that is in turn followed by textual description of the strategy being represented. The prefix is actually a concatenation of an abbreviation and a number. The former denotes the strategy type and the later signifies the hierarchical branch at which the strategy being represented is. To reason on strategy decomposition more effectively, we differentiate three types of strategy: business plan, functional goal and optimization objective [6].

#### 3.2 Diagrammatic Representation of Strategy in Toolkit

In our project on strategic alignment, we have been developing a toolkit called ServAlign. This tool manages a repository for strategy and a catalog of business services. In addition, the tool permits diagrammatic representation of strategy and decomposition of strategy. The diagrammatic notation of strategy modeling

<sup>3</sup> Business services and processes can be regarded as the main vehicle for the operationalization of an organization's business strategy in a manner akin to the way in which object-oriented components have provided the basis for implementing software requirements in traditional software engineering thinking. The topic of how to align business services and processes to organization's strategy is out of the scope of this paper.

- Main strategy:** (FG) To become the market leader amongst book-sellers in Australia. This strategy can be decomposed into
- P1: To first gain marketshare in NZ, then use UK market credibility to enter Australia
    - FG11: Establish market presence in NZ
    - FG12: Establish market presence in the UK by
    - FG13: Establish Australian market leadership
      - OO131: Maximize market visibility
        - OO1311: Maximize proximity of store locations to high customer traffic locations
        - OO1312: Maximize customer "mindshare" via an advertising campaign
        - FG1313: Develop a website that supports sophisticated product search, online payments and a customer feedback facility
          - FG13131: Leverage a comprehensive back-end ERP system
            - FG131311: Re-use ERP systems built for the NZ and UK markets
      - OO132: Maximize market coverage
        - OO1321: Maximize product offerings covering all age segments
        - OO1322: Maximize product offerings covering all genre segments
        - OO1323: Maximize product offerings covering all relevant language/ethnic segments
  - OO2: Minimize operating costs
    - OO21: Minimize inventory
      - OO211: Minimize warehouse-to-store delivery time
        - FG2111: Build inventories at each major metropolitan centre
        - FG2112: Engage efficient trucking service provider
      - FG212: Leverage demand forecasting capabilities of back-end ERP system
        - FG2121: Re-use ERP systems built for the NZ and UK markets
    - OO22: Minimize logistics costs
      - FG221: Build inventories at each major metropolitan centre
      - FG222: Engage efficient trucking service provider
- P3: Manage supplier relationships by providing purchase volume guarantees, and fast payment against invoices
  - FG31: Provide suppliers with minimum purchase volume guarantees
  - OO32: Minimize invoice-to-payment delay

**Fig. 1.** Decomposition of the main strategy of the book-seller

used in ServAlign is tailored from  $i^*$  (see Figure 2). We reuse the  $i^*$  pictogram of hard goal for our functional goal while introducing additional pictograms for other types of strategy. This addition includes a block arrow for business plan and triangles for optimization objectives (i.e. either maximization or minimization).



**Fig. 2.**  $i^*$ -like diagrammatic notation used in ServAlign for modeling strategy

Figure 3 is a screenshot of our ServAlign prototype that is implemented as an Eclipse<sup>4</sup> plug-in. The Eclipse perspective to the left offers a tree-view that shows the entire strategy decomposition hierarchy. Each strategy in Figure 1 is now represented as a tree node. An out-zoomed notation is attached as icon to each tree node to visually illustrate the type of the strategy being represented by the tree node. The panel in the middle of the Eclipse window is dedicated to a diagrammatic interface of ServAlign. The diagram shown in Figure 3 shows the decomposition hierarchy of the book-seller's main strategy using the notation shown in Figure 2. Textual description of each strategy is printed below its pictogram. In this diagram, lines represent decomposition links.

<sup>4</sup> Eclipse homepage <http://www.eclipse.org/>

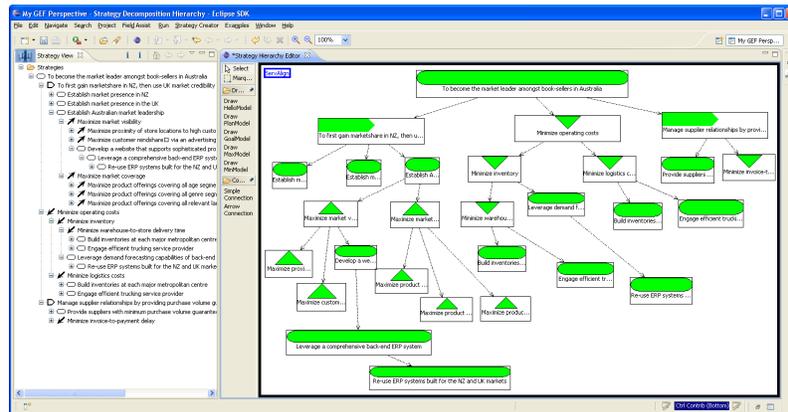


Fig. 3. Diagrammatic representation of strategy decomposition in ServAlign

## 4 Conclusions and future work

The novel ways in which i\*-like notions can be deployed in strategic service alignment can provide useful insights to the i\* community. We also expect to further leverage i\* as we extend our account to cross-enterprise value chains. We are working towards (semi-)automatic, ontology-based strategy decomposition and establishment of strategic service alignment.

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