Linking Strategic Innovation to Requirements: a look into Blue Ocean Strategy

Constantinos Giannoulis, Jelena Zdravkovic

Department of Computer and Systems Sciences (DSV),
Stockholm University,
Forum 100, SE-164 Kista, Sweden
constantinos,jelenaz@dsv.su.se

Abstract. Business Strategy encapsulates an organisation's intentions towards the achievement of its vision. As such, business strategy frames the overarching business roadmap towards the accomplishment of strategic goals driven by competition, by own capabilities, or by innovation. Consequently, such a roadmap needs to be considered when building systems aimed at supporting the functionality of an enterprise. Introducing business strategy to system's design using models facilitates the propagation of strategic notions to development techniques and methods. This study focuses on bringing a business strategy formulation driven by innovation into system requirements; specifically, relating Blue Ocean Strategy to the notions of i*, an established goal modeling technique within requirements engineering.

Key words: Business Strategy, Business-IT alignment, Requirements Engineering

1 Introduction

Alignment between business and IT has been extensively addressed in research - there exist approaches that consider business strategy in a holistic manner [1, 2, 3] but also specifically through distinct business strategy formulations [4, 5]. From an IT perspective, business strategy should function as an initial frame within which IS development takes place; ergo provide initial organisational rationale to a system.

Strategic planning is the process during which a strategy is defined by analysing the current status of an enterprise and the competitive environment in which it resides. Good planning is driven by three different aspects [6]; the resource based view, where strategy formulation is driven by the capabilities of the enterprise; the industrial organization view, where the positioning is the main driver; and the Shumpeterian view, where radical innovations are in focus disrupting the environment in which the firm operates, thus giving opportunities for taking advantage over companies whose capability to innovate is lower. The first two views have been traditionally dominant both in research and practice, with formulations such as Strategy Maps and Balanced Scorecards (SMBSC) [7]

and the Value Chain [8] respectively. Primary focus has been on value creation by improving how products and services are offered in respect to competition aiming at differentiation, low cost. or focus [8]. Efforts to link such business strategy formulations with requirements have been already proposed, such as mappings between SMBSC and i* [9], a goal modeling technique used in requirements engineering, informally in [5], and semi-formally in [10].

However, no such effort exists for business strategy formulations of the Shumpeterian view. Such effort would enable the linkage of strategically innovative intentions and requirements. Although strategic initiatives do not change constantly, though they are monitored and altered regularly due to today's rapid changing business scene, modelling business strategy allows for establishing and maintaining a strategic frame in IS development. Therefore, the goal of this study is to link a business strategy formulation belonging to the Shumpeterian view, to a technique used in requirements engineering. The purpose is to facilitate the relationship between strategic innovation and IS development supporting such innovation. Such linkage constitutes a frame for IS development because it captures strategy and expresses it using a requirements' notation, thus enabling the use of strategic intent when deriving system requirements contributing to the alignment between business and IS development.

Specifically, Blue Ocean Strategy, BOS [11] is used, a business strategy formulation that has recently attracted attention due to successful innovative solutions. One such case is the one of Apple introducing their online music store iTunes, thus revealing a blue ocean in digital music [12]. Blue Ocean shifts strategy from value creation, to value innovation, where old things are no longer done, i.e. either new things are done, or similar ones in a fundamentally new way, while pursuing differentiation and low cost simultaneously. i* [9] is used due to its known support expressing social intentionality and rationale enhancing the early phase of requirements engineering [13].

Section 2 provides an overview of Blue Ocean Strategy along with a proposed conceptualisation of the formulation in the form of a meta-model and related constraints. Section 3 provides the conceptual relationships identified between the BOS meta-model and the i* meta-model [10] along with an illustration using a case from the airline industry. Section 4 provides a discussion on the usage of proposed relationships, as well as it outlines the directions of the future work.

2 Modeling Blue Ocean Strategy

2.1 Overview

Blue Ocean Strategy [11] aims at competing where there are no competitors by challenging industry's structural conditions and therefore, the objective is to redefine the problem an industry is focused on rather than finding solutions to existing problems. It moves from value creation, doing similar things in an improved way, to value innovation, which means stop doing old things and either start doing new ones or do similar ones in a fundamentally new way, while

pursuing differentiation and low cost simultaneously. The core elements of the formulation are the strategy canvas and the four-actions framework (structured of the eliminate-reduce-raise-create factor grid).

The strategy canvas offers a graphical representation of the current state in a known market by identifying the range of factors an industry competes on and invests in (horizontal axis), as well as their offering level to buyers (vertical axis). A factor is a feature or benefit identified as essential to the provision of the product or service a company offers to buyers. A basic component of the strategy canvas is the value curve capturing a company's relative performance across the aforementioned competition factors of a given market (Figure 1).

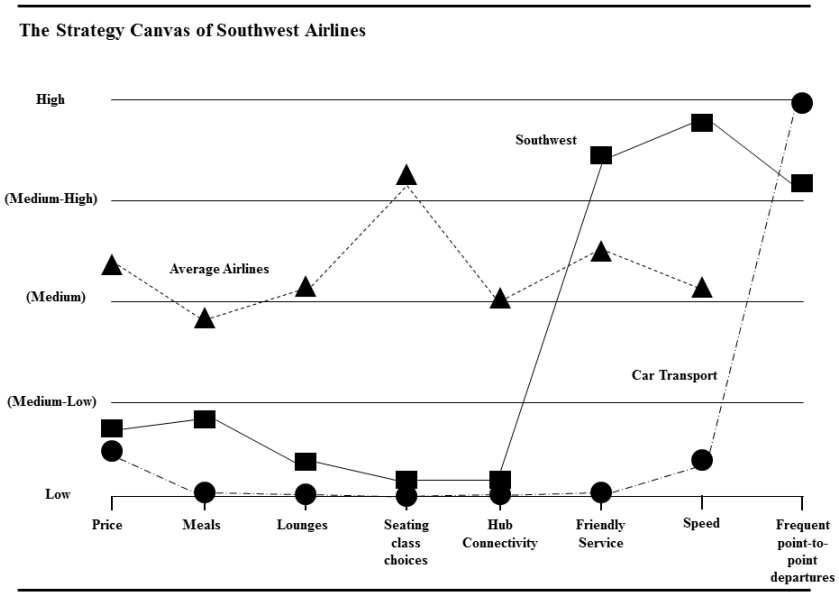

Fig. 1. The strategy canvas captures an industry's current state, in dotted and in dashed lines and the result of the four-action framework, a new value curve in solid line (adapted from [11]).

The four-actions framework challenges current strategic logic along the eliminate-reduce-raise-create factor grid and by driving chosen changes on the factors, creates a new value curve. Eliminate and reduce aim at dropping the current cost structure by looking into which of the factors that the industry takes for granted should be eliminated, and which factors should be reduced well below the industry's standard, respectively. Raise and create strive for how-to in terms of lifting buyers value and creating by looking into which factors should

be raised well above the industry's standard and which factors should be created that the industry has never offered respectively.

Blue Ocean Strategy Meta-model (BOSMM) Our conceptualisation of Blue Ocean Strategy is based on its original formulation presented in [11] and focuses on the main constructs and their underlying concepts, while methodological aspects, such as the process of building a Blue Ocean Strategy, are reflected through the outcome, i.e. the strategy itself:

- BlueOceanStrategy class captures the strategy and carries three attributes being its main characteristics. Tagline captures the strategy's clear message/slogan with great commercial potential, Focus confirms whether the strategy is focused, as indicated by the strategy canvas, and is captured through a boolean variable, and Divergence shows whether the new value curve is different than the existing one(s), also captured by a boolean variable. The class adheres to the following constraint: Focus must be true and Divergence must be true when comparing NewValueCurve to IndustryValueCurve.
- Enterprise captures the organisation for which Blue Ocean Strategy is formulated.
- Resource captures the enterprise's offering to buyers, while Service and Product capture types of resources offered to buyers.
- Factor captures the key competing factors. This includes both the factors an industry currently competes on as well factors introduced to shape a blue ocean. Each factor carries an offering level attribute that captures the offering that buyers receive; high means buyers receive more and thus the enterprise invests more in that factor. For price, high offering level means a higher price.
- ValueCurve captures a graphic depiction of a company's relative performance across its industry's factors of competition.
- NewValueCurve captures a value curve capturing the value curve created by applying the four-action framework. This class adheres to the following constraint: an instance of NewValueCurve always ConsistsOf more instances of Factor than the ones that Shape instances of IndustryValueCurve due to the create action of the four action framework that introduces factors that existing market play does not capture.
- IndustryValueCurve captures a value curve where the industry currently competes on; it's used to build the new value curve and to confirm it constitutes a blue ocean strategy (evidence for comparison on focus and divergence).
- StrategyCanvas captures both the current state of play in a known market space, as well as the desired one. This class adheres to the constraint: an instance of StrategyCanvas includes at least two instances of ValueCurve, where at least one must be an instance of IndustryValueCurve and at least one must be an instance of NewValueCurve.

2.2 A reference model for i*

Since the introduction of i* in 1995 [9] several variants of the notation have emerged [14, 15, 16, 17, 18]. For this study the i* reference model [13] is chosen,

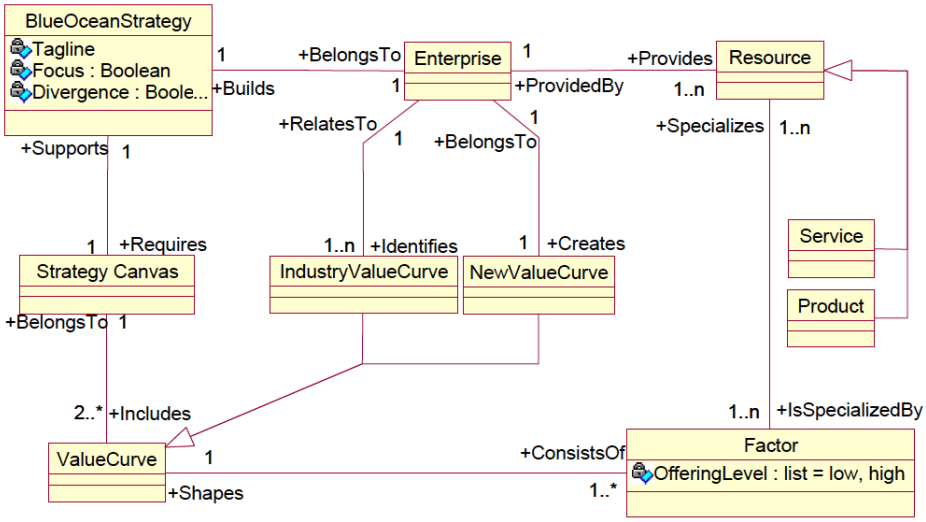

Fig. 2. The Blue Ocean Strategy meta-model (BOSMM).

because it allows the use of the aforementioned variants of the notation and to the best of the authors' knowledge it is the most comprehensive i* reference model, thus minimising the risk of excluding i* variants (e.g. the unified model of [19] captures only the original i* [9] and [15]). Additionally, this model has been built considering the possibility of new i* variants emerging and as such it is open to accommodate them by not being strictly restrictive considering the existing variations of certain concepts from different i* variants.

3 Mapping Blue Ocean to i*

Mapping Blue Ocean Strategy to i*, requires the concepts of BOSMM presented in Section 2 to be mapped to the concepts of the i* reference model when possible. When not possible, the lexicon of the reference model terms for i* is used to propose a basis for mapping:

– Enterprise from BOSMM is mapped to i*.Actor because it carries out actions to attain goals and may depend on other actors to attain these goals. An enterprise carries out actions to attain their goals, expressing their blue ocean strategy and depends on other enterprises to attain these goals by comparing their value curve with existing ones (from enterprises constituting the industry) which effectively express a desired state, thus a set of goals related to each factor that altogether constitute the value curve. This mapping also allows the use of actor with relationships is-part-of and is-a, therefore, when further refining enterprise actors within can be identified.

- BlueOceanStrategy is related to the parts of the SD and SR models relevant to blue ocean strategy. Therefore, it can be mapped to the derived SR, which includes a goal expressing the strategy's tagline, along with a task to achieve this goal, the resource offered to buyers and the set of goals and soft-goals stemming from the factors of the new value curve.
- Focus and Divergence are i* dependums expressed as goals for the tagline for blue ocean strategy, being focused and being divergent. Depender is the Enterprise to whom the new value curve BelongsTo and dependee is the Enterprise to whom the existing value curve RelatesTo. Focus and Divergence are true only if compared to existing value curves, thus making the enterprise dependent to other actors to confirm focus and divergence for blue ocean strategy.
- Factor is mapped to two i* elements: Goal and Soft-Goal. For a value curve, factors express a desired state to be achieved without neither specifying how nor being able to validate their satisfaction. This desired state is aligned with the definition of a goal or a soft-goal in i*, the former strictly referring to a desired state without knowing how to achieve it, the latter without being able to define their achievement a priori as true or false [13]. Such goals and soft-goals express enterprise intention in i*, therefore, formulating these should include both the factor itself as wells its offering level. For Southwest the goal Low Lounges be Provided is achieved by the task Provide Low on Lounges which uses the resource Lounges (Figure 3).
- Goals and soft-goals can be then decomposed in i* according to how factors are planned to be provided (not captured by the Strategy Canvas), thus capturing how they can be achieved. When mapping factors to goals and soft-goals, one should always check whether there exists a resource related to that factor, as it would influence that factor's analysis through decomposition in i*. In this case, a relevant task would be defined in i* and consequently through task decomposition, appropriate resources would be modeled.
- Resource is mapped to i*.IntentionalElement with Resource as IntentionalType but only for resources provided to customers, thus in a traditional i* model this would be the physical or informational entity provided by the enterprise to buyers, constituting the line of business for the enterprise.
- NewValueCurve captures the intentionality and rationale within the enterprise, which in i* is captured through the SR model apart from the goal expressing the tagline, the task being means to this goal and the resource required by this task. A new value curve of an enterprise is related to an SR model of this enterprise including its factors as goals or soft-goals.
- IndustryValueCurve captures the intentionality and rationale within the enterprise, which in i* is captured through the SR model. The existing value curve is mapped to an SR model of the actor enterprise other than the Enterprise for which blue ocean strategy is built, and includes the factors as goals/soft-goals that shape it.

Mappings are summarised and illustrated by the BOS of Southwest Airlines in Table 1.

Table 1. Proposed mappings

BOSMM	**i***	**Example for Southwest Airlines**
Enterprise	*Actor*	*Southwest Airlines, Average Airlines and Car Transport are captured as actors in i* (Figure 3).*
BlueOceanStrategy	*SR model*	*The SR model for the actor Southwest Airlines.*
Focus and *Divergence*	*Dependum*	*Southwest depends on Average Airlines and Car Transport for its blue ocean strategy expressed by the goal: Airline Service with "The speed of a Plane at the Price of a Car-Whenever You Need It" be Provided to be focused and divergent thus good blue ocean strategy (Figure 3).*
Factor	*Goal* and *Soft-Goal*	*The factor "Price" from the strategy canvas becomes: i*.Node.Label:LowPriceBeOffered is-a i*.IntentionalElement.IntentionalType:Goal.*
Resource	*Resource*	*For Southwest the resource is Airline Services.*
NewValueCurve	*The SR model of the enterprise with its factors.*	*Southwests goals and soft-goal within its boundaries in figure 3 capture their offering; Southwest's NewValueCurve.*
IndustryValueCurve	*The SR model of other markets from the strategic canvas with their factors.*	*Existing value curves capturing the offerings of Average Airlines and Car Transport expressed by factors as goals/soft-goals, within the actors boundaries (Figure 3).*

The aforementioned mappings are operationalised into an i* SR model for Southwest Airlines including the dependencies to other actors that compete on existing offerings (Figure 3). i* addresses the early phase of requirements engineering aiming at understanding the rationale for a system and provides the modeling features to capture strategic rationale. The strategic rationale of BOS scopes the refinement around system goals by defining the highest level of goals set by the organisation. It is within that scope that systems serve some purpose. Capturing that scope allows the understanding of what needs to be done by the organisation. For example, the strategic offerings proposed by an enterprise, such as the goals and soft goals for Southwest Airlines.

Thereafter, organisational actors influencing the goals set as well as their achievement can be identified, intentional elements (goals, soft-goals, resources, tasks) can be refined (the SD model) [20]. For example, within the organisational boundaries of Southwest Airlines all actors influencing the goals and soft goals set need to be identified, as well as all their dependencies.

Furthermore, actors can be refined to capture their intentionality and provide means of analysis for achieving something by identifying workability of achieving that something by decomposition of tasks and means-ends links, by checking viability of achieving that something based on some quality conditions, etc. For example, goals and soft goals set need to be decomposed through means-

end and contribution links into goals, soft goals, tasks, and resources, similarly to the goal "Low lounges be provided" of Southwest Airlines (Figure 3). These decompositions eventually allow identifying, and establishing dependencies with, actors who can accomplish a goal, carry out a task, or deliver some needed resources.

This early phase of requirements is input to the late phase of requirements. For example, [21] proposes a set of guidelines to map i* models to UML use case diagrams, where the use of i* to derive use cases allows traceability and evaluation of the impact into the functional requirements of the intended system; use cases are derived from the actors' perspective, as well as from the explicitly captured actor dependencies of i*.

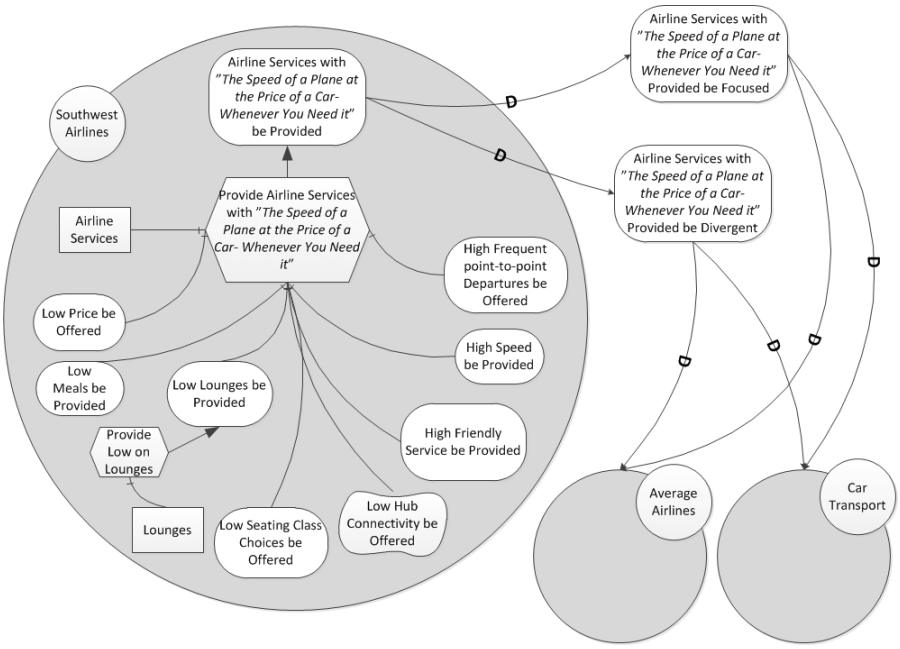

Fig. 3. The Blue Ocean Strategy of Southwest Airlines in i*.

4 Discussion and Future Work

The goal of this study was to map a business strategy formulation belonging to the Shumpeterian (i.e. innovation) view, exemplified by Blue Ocean Strategy, to a technique used in requirements engineering, exemplified by i*. Model-based mappings between the two formulations were created to facilitate both informal and semi-formal relationships of the two abstractions. Conceptualisations

of i* already exist, and a wide-used one in the means of a reference model, has been chosen. However, no conceptualisation existed for Blue Ocean Strategy; therefore, such conceptualisation has been built into a set of defined notions and associations between them in the form of a conceptual model (BOSMM) aimed at decreasing ambiguity thus allowing model-level mappings towards i*. Consequently, the concepts of BOSMM have been mapped to i* and exemplified by a BOS from the airline industry, Southwest Airlines.

The proposed mappings constitute the main contribution of this work because they provide an initial set of strategic innovation rational serving as a frame for developing systems aimed at actualising such strategic initiatives. Thus they provide information systems development with an early-phase requirements model expressed in i* that captures the strategic rational within which the system of interest is developed.

Mapping Blue Ocean Strategy to i* leverages from the notation's ability to identify links between the actors and intentional elements. Once Blue Ocean is laid out as an i* model, all possible links provided by the notation, means-end, decomposition and contribution can be identified revealing relationships that could not otherwise have been foreseen (e.g. dependencies, conflicting goals, negative contributions, etc.). Moreover, using the i* reference model [13] for the proposed mappings allows for exploring concepts from other variants of the notation or proposals that can be relevant to strategy. For example, Formal Tropos [16] includes temporal aspects formally expressed allowing the assessment of temporal synchronisations between actors, or precedence and preference rules [22], also relevant in business strategy formulations like Blue Ocean. Such use of i* can provide an additional assessment mechanism for business strategy from the IS perspective.

Additionally, contribution of this work lies also on the conceptualisation of Blue Ocean Strategy. BOSMM can be linked to other enterprise models allowing business-IT alignment efforts to leverage from such model-based linkage. It enhances traceability between business strategy and the system-to-be, which in turn allows (by considering cause/effect relationship) their fine-tuning. Also strategy communication among actors is enhanced allowing a better understanding of IS capabilities and the solutions IT is capable of providing, which supports business strategy formulation. Furthermore, BOSMM supports the integration with business strategy formulations facilitating the other two aspects of strategic planning (i.e. resource- and industrial organisation views) as mentioned in the Introduction of this study, allowing them to complement each other and IS to support such integration. An effort in this direction has been reported in [23], where well-established business strategy formulations from the aforementioned strategic planning perspectives, SMBSC and the Value Chain, have been integrated into a Unified Business Strategy Meta-Model (UBSMM).

Steps forward in this work have many possible directions as this is a first proposal for such conceptualisation and mappings. From one side more depth in the current work can be pursued, while on the other hand further extensions can be also derived.

The contributions of this study can be further assesses for correctness, both BOSMM and the mappings to i*, through structured reviews with practitioners. For example involving business strategists in the conceptualisation process of BOS. Additional case examples can be conducted to allow for more the assessment of the proposed mappings towards a distinct system being developed, resulting into additional iterations for the refinement of such mappings. Both on the semantic level, correspondences between a real BOS and BOSMM, and the syntactic level, model checking for BOSMM, as well as the pragmatic level, practitioners' interpretation of BOSMM.

The proposed mappings can be extended further than the i* reference model towards particular variants of the notation. Real case evaluations to reflect strategic innovation from Blue Ocean Strategy to system-to-be requirements will be beneficial for the mappings. Another possible direction of this work is within business strategy modeling by using BOSMM to explore its integration capabilities with other business strategy formulations and various enterprise architectures.

References

1. Thevenet, L.H., Salinesi, C.: Aligning IS to organization's strategy: the INSTAL method. In: 19th International Conference on Advanced Information Systems Engineering (CaiSE'07), (2007)
2. Bleistein, S.J., Cox, K., Verner, J.: Validating strategic alignment of organizational IT requirements using goal modeling and problem diagrams. J. Systems and Software. 79, pp. 362–378 (2006)
3. Singh, S.N., Woo, C.: Investigating business-IT alignment through multi-disciplinary goal concepts: Requirements Engineering, 14, pp. 177–207 (2009)
4. van der Raadt, B., Gordijn, J., Yu, E.: Exploring web services ideas from a business value perspective. In: 13th IEEE International Conference on Requirements Engineering (RE05), pp. 53-62, IEEE CS (2005)
5. Babar A, Zowghi D, Chew E.: Using Goals to Model Strategy Map for Business IT Alignment. In: 5th International Workshop on Business/IT Alignment and Interoperability (BUSITAL 2010). 1630 (2010)
6. Barney J.: Types of Competition and the Theory of Strategy: Toward an Integrative Framework. J. Academy of Management Review, vol. 32, 11, 1231–1241 (1986)
7. Kaplan R.S., Norton D.P.: Strategy Maps: Converting Intangible Assets into Tangible Outcomes. Harvard Business School Press, Boston (2004)
8. Porter M.E.: Competitive Advantage: Creating and Sustaining Superior Performance. Free Press, (1985)
9. Yu, E. Modeling strategic relationships for process reengineering: PhD Thesis, Department of Computer Science, University of Toronto, (1995)
10. Giannoulis, C., Zdravkovic, J.: Modeling Strategy Maps and Balanced Scorecards using i*: In: 5th International i* Workshop (iStar2011), pp. 90-95 (2011)
11. Chan, K. W., Mauborgne, R.: Blue Ocean Strategy. Harvard Business Review Press, Boston (2005)
12. Blue Ocean in Music: `http://www.blueoceanstrategy.com/abo/itunes.html` (last accessed on 21-06-2012)

13. Cares, C., Franch, X., Mayol, E., Quer, C.: A Reference Model for i*. In: Yu, E., Giorgini, P., Maiden, N., Mylopoulos, J. (eds.): Social Modeling for Requirements Engineering. The MIT Press, Cambridge, pp. 573-606 (2011)
14. GRL: Goal-oriented Requirement Language. http://www.cs.toronto.edu/km/GRL/ (last accessed on 21-06-2012)
15. Bresciani, P., Perini, A., Giorgini, P., Giunchiglia, F., Mylopoulos, J.: Tropos: An Agent-oriented Software Development Methodology. Autonomous Agents and Multi-Agent Systems, 8, 3, pp.203-236 (2004)
16. Donzelli, P., Bresciani, P.: Improving Requirements Engineering by Quality Modeling: A Quality-based Requirements Engineering Framework. Journal of Research and Practice in Information Technology, 36, 4, pp.277-294 (2002)
17. Mouratidis, H., Giorgini, P., Manson, G., Philp, I.: A Natural Extension of Tropos Methodology for Modeling Security. In Proceedings of the Agent Oriented Methodologies Workshop (OOPSLA 2002) http://www.open.org.au/Conferences/oopsla2002/accept.html (last accessed on 21-06-2012)
18. Fuxman, A., Pistore, M., Mylopoulos, J., Traverso, P.: Model Checking Early Requirements Specifications in Tropos. In: 5th IEEE International Symposium on Requirements Engineering, pp. 174-181 (2001)
19. Lucena, M., Santos, E., Silva, C., Alencar, F., Silva, M.J., Castro, J.: Towards a unified metamodel for i*. In: 2nd International Conference on Research Challenges in Information Science (RCIS 2008), pp.237–246 (2008)
20. Yu, E.: Modeling Strategic Relationships for Process Reengineering: An Empirical Evaluation. In: Yu, E., Giorgini, P., Maiden, N., Mylopoulos, J.(eds.): Social Modeling for Requirements Engineering. The MIT Press, Cambridge, pp. 11-152 (2011)
21. Castro, J., Alencar, F., Santander, V.: Integration of i* and Object-Oriented Models. In: Yu, E., Giorgini, P., Maiden, N., Mylopoulos, J. (eds.): Social Modeling for Requirements Engineering. The MIT Press, Cambridge, pp. 457-483 (2011)
22. Liaskos, S., McIlraith, S., Sohrabi, S., Mylopoulos, J.: Representing and reasoning about preferences in requirements engineering. Requirements Engineering, 16, 3, pp.227-249 (2011)
23. Giannoulis, C., Zdravkovic, J., Petit, M.: Model-driven Strategic Awareness: From a Unified Business Strategy Meta-model (UBSMM) to Enterprise Architecture. In 17th International conference on Exploring Modelling Methods for Systems Analysis and Design (EMMSAD2012), Springer, p. 255-269 (2012)