Model-Centric Strategy-IT Alignment:
An Empirical Study in Progress

Constantinos Giannoulis[1], Jelena Zdravkovic[1], and Michaël Petit[2]

[1] Department of Computer and Systems Sciences
Stockholm University, Forum 100, SE-164 40 Kista, Sweden
{constantinos,jelenaz}@dsv.su.se
[2] PReCISE Research Center, Computer Science Department
University of Namur, Rue Grandgagnage 21, B-5000 Namur, Belgium
mpe@info.fundp.ac.be

Abstract. IT pervades all sectors of today's organizations. To support efficient business solutions, business-IT alignment has been long-time discussed as a solution. Given the complexity of achieving alignment, in our research we have hypothesized the importance of one partial possible solution, namely, the fit between strategy and information system requirements. To systematically investigate the influence of widely-used business strategy formulations, such as Porter's Value Chain, Kaplan & Norton's Strategy Maps, and others, we propose a model-centric approach to strategy-IT alignment where the strategy formulations are represented in the form of models, and mapped to requirements models. The objective of this paper is to present a pilot empirical investigation assessing if strategy-IT alignment is an issue of concern, and seeking to obtain insights from practitioners about relevance of our model-based view for strategy-IT alignment. The empirical information is collected through a well-prepared questionnaire-based survey.

Keywords: Business, Alignment, IT, Strategy, Requirements.

1   Introduction

Alignment between business and IT is a topic that has been widely addressed in literature. Already in 1961, organizational performance was defined to entail a coherence between at least the factors like strategy, structure, and technology, where it aimed at aligning the organization with the environment and internally organized resources to support this alignment [1]. Since then, alignment has been consistently acknowledged as an important open issue of a top-management concern [2], as well as from the IT side, for IT executives [3]. Within the literature, several dimensions and levels of the alignment have been identified [4] making the topic quite complex to be addressed holistically.

Business strategy is defined as the determination of long-term goals and courses of action using resources to achieve them, thus enabling organizations to enact it [5]. Attaining to a long-term business vision and the objectives following it makes

strategy prone to a changing environment, varying from external opportunities and threats as well as internal strengths and weaknesses. A *business strategy formulation* refers to established text-based representations of business strategy within the discipline of *Strategic Management.*

Given this complexity, *our work lies on a subset of business-IT alignment focusing on the fit between strategy and information system requirements, which we refer to as Strategy-IT alignment.* From one end, strategy encapsulates a general undetailed plan of action, encompassing a certain period of time to achieve a vision, and thus, should be understood and communicated for an enterprise to define the means required for its successful execution. On the other end, information system requirements comprise the essential information needed to build the IT means to support and facilitate business operations intended at delivering offerings to customers. A core concern within Strategy-IT alignment is coordinating strategic initiatives and plans with Information Systems (IS).

Substantial work has been done on linking strategy to requirements for IS development, but typically in either an informal manner, where text-based strategy formulations are used to guide IS development from a high perspective, or by taking into consideration only basic elements of business strategy like the case is with current enterprise architectures and models.

Our proposal envisions a model-centric strategy-IT alignment based on modeling prevalent business strategy formulations such as Strategy Maps, Value Chain and others [6], which can then be mapped to requirements techniques, such as goal-oriented, or complement other strategy-IT alignment methods. Goal orientation enhances the association of desired functionality of systems to strategic goals by reinforcing the evaluation of system features towards business strategy, as well as strategy towards consumer preference.

The novelty of this approach lies in leveraging characteristics from model-driven development (MDD) such as automation and traceability, allowing for the propagation and assessment of features and/or changes towards strategy (e.g. strategic goals, targets and objectives for balance scorecards, value proposition, etc.), making changes less prone to creating problems. Traceability enhances maintainability and adaptability of systems with respect to strategy and requirements [7], making the impact of their modification traceable, which allows for impact assessment (e.g. system disruptions, conflicts, etc.).

The objective of this paper is to justify the theoretical argumentations of our Strategy-IT alignment research from an empirical perspective, namely, to validate that this alignment is an issue of concern, as well as to collect insights from practitioners about appropriateness of our model-centric approach. The main questions that are we going to address in the study are the following:

- Is strategy-IT alignment an issue of concern in practice?
- If so, what kind of solutions do practitioners consider addressing the issue?
- Do practitioners consider models as means to address this issue?

In this paper we present a work in progress concerning the design of an empirical study. A pilot study has been performed with the questionnaire and we report on the process followed, as well as present preliminary results. The following section includes the arguments motivating the need for our study. Thereafter the design of the study is presented, followed by the presentation of the pilot results. The paper concludes by presenting the intended remaining steps to complete the empirical study.

2   Related Work

Despite the acknowledged importance of the topic, very few solutions have been widely used by practitioners. Noteworthy exceptions include the *Strategic Alignment Model (SAM)* [8], and the *Business IT Alignment maturity model* [9]. During the past decade a strong empirical motivation for business-IT alignment has been put forward [4], [10]. Empirical analysis of Business-IT alignment mainly concerns the motivation for and desirability of business-IT alignment globally: (1) the relation between the alignment and business performance or (2) the relation between types of business strategies (such as conservative or innovative) and (3) the degree of alignment.

When it comes to Strategy-IT alignment, to the best of our knowledge, no such focused empirical basis exists to investigate the need for and the existence of an explicit strategy definition and the use of models for achieving the alignment. At best, the usefulness of specific theory-based proposals was shown on case studies [11, 12, 13, 14]. When looking into empirical studies published in business-IT alignment literature, Luftman's work, and annually publishing survey results with CIOs being respondents [15], is the most cited. However, his perspective is not concerned with Strategy-IT alignment particularly, and the focus is mostly on the alignment's maturity. Moreover, strategy-IT alignment is not only relevant to CIOs - Luftman's primary respondents, but also to all those affecting it, or being affected.

Possible ways to address Strategy-IT alignment include business-IT alignment approaches, whether that is alignment between business strategy and distinct enterprise models, or business strategy and Enterprise Architecture (EA). However, alignment approaches are falling short in two ways. From one side, business strategy formulations from *Strategic Management*, such as Porter's *Value Chain* [16], *Strategy Maps and Balanced Scorecards* (SMBSC) [17], and others, are overlooked in [2, 8, 11, 18]. On the other hand, EA proposals such as Zachman [19], ARIS [20], or TOGAF [21], providing the principles, methods, and models used to design and realize an enterprise's organizational structure, include business elements without linking them to business strategy formulations.

3   Overview of a Model-Centric Strategy-IT Alignment

Introducing strategy to system's design and architecture using models has a potential to facilitate the propagation of strategic notions to system development techniques and methods. In our effort to align business strategy with IT through enterprise architecture and system requirements, we have formalized established business

strategy formulations as conceptual models. Conceptualizations of the strategy formulations are designed for each of the three views identified by Barney [22]:

- For *the resource-based view*, where internal capability shapes strategy, a conceptualization of Strategy Maps and Balanced Scorecards [17] exists in the means of the SMBSC meta-model [23].
- For the industrial organization, where positioning based on *competition* shapes strategy, a conceptualization of the Value Chain [16], the Value Shop and the Value Network [24] exists in the means of the Value Configuration (VC) meta-model [25].
- For the "Schumpeterian view of competition", where *innovation* shapes strategy, a conceptualization of the Blue Ocean Strategy [26] exists in the means of the BOS Meta-model [27].

Furthermore, we have designed a Unified Business Strategy Meta-Model (UBSMM), a unified conceptualization of the strategy formulations mentioned above [6], to facilitate the alignment of different business strategies, and can also serve as a pivot model between different business strategy formulations of a single or multiple enterprises.

For the scope of this study the conceptualization of SMBSC is used as an illustration of our approach [23]. A strategy map is a business strategy formulation serving as a mediator between the mission, core values, and the vision of a business to the work performed.
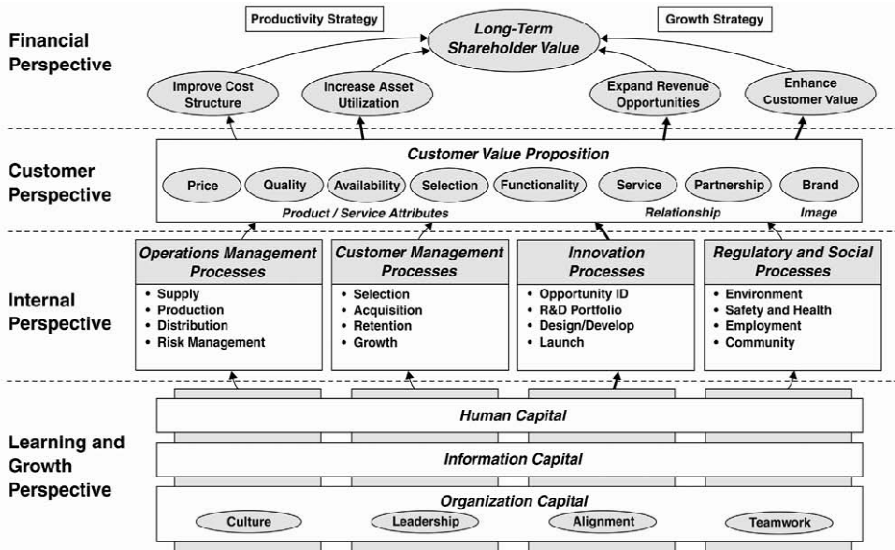

Fig. 1. The Strategy Maps and Balanced Scorecards template [17]

Kaplan and Norton proposed a template for strategy maps representing how an organization can create value [17]. A set of goals is defined and initially grouped

within the financial and customer perspectives, along with goals for all types of capital, both human and economic. Goals are extended to a set of targets using measures to evaluate their achievement, and thereafter, initiatives are identified to achieve the targets, the balanced scorecard. This extension of the strategy map is the *balanced scorecard*, which is essential for monitoring and assessing the cause-effect links between strategic goals across an organization. Scorecards consist of strategic objectives and related measures, which include concrete targets and initiatives towards their achievement. Scorecards present an organization's business activities through a number of measures typically from four organizational perspectives: financial, customer, internal, learning and growth, and provides a language to communicate priorities within an enterprise. The figure below presents our current conceptualization of SMBSC, originated from [23].
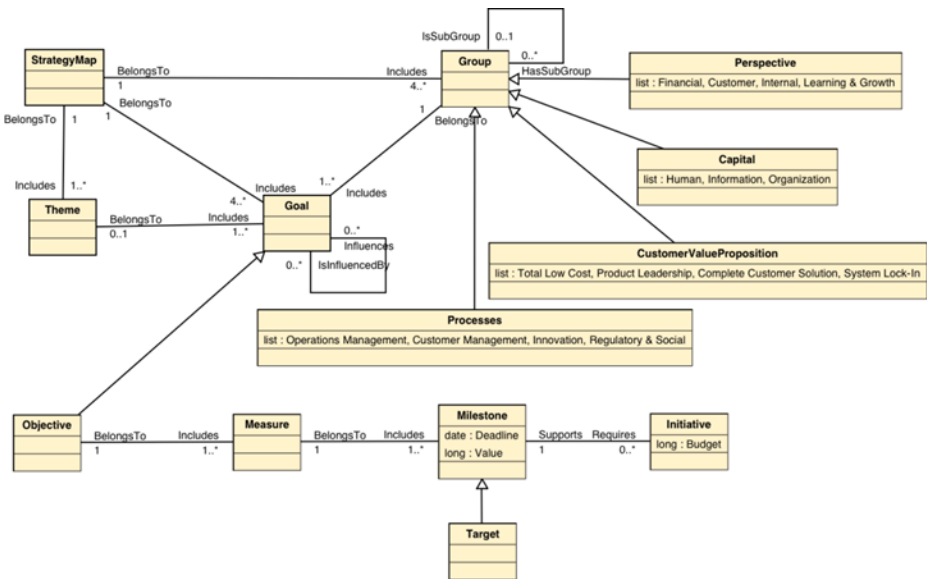

Fig. 2. The Meta-model of Strategy Maps and Balanced Scorecards [23]

Once a strategy formulation is conceptualized, it becomes possible to map it to an enterprise model, such as a goal model. For example, the mappings from the SMBSC conceptualization from Figure 2 to the i* goal modeling technique has been proposed in our previous work [28]. The i* is known for being used in the early phases of requirements engineering by focusing on the social aspects of systems by capturing the intentionality and rationale of actors within an organizational setting. It additionally supports derivation of system requirements, as presented in the OO-Method [29], where it is used to capture the organizational context and the actors' intentions for a business requirements model, as the basis for the elicitation of a conceptual model capturing the functional requirements of a system.

In addition to the theoretical proposal briefly described in this section, the objective of this paper is to present a pilot empirical investigation assessing if

strategy-IT alignment is an issue of concern, and seeking to obtain insights from practitioners about relevance of our model-based view for strategy-IT alignment. The empirical information is collected through a well-prepared questionnaire-based survey.

4   Designing an Online Questionnaire for Strategy-IT Alignment

Designing, conducting and reporting an empirical study constitutes a complex operation involving several steps. In our in progress study, we have followed Öppenheim's framework [30] with fourteen stages for a social study, among which we have completed first eight, as we present in this section.

Stages one through four refer to looking into literature, reflecting upon it, and choosing an appropriate form for the study. Our study aims at validating strategy-IT alignment with an empirical basis and collecting insights about using models to address it. Due to the need for a large reach to practitioners, the design of study selected is an online questionnaire.

The assumption to be investigated (stage five) is expressed through the three questions formulated in Introduction.

For the questionnaire design (stage six) guidelines from [31], [32] have been used. These include establishing objectives, measure and scales to be used, types of questions, layout, wording, flow of questions, and identifying validity concerns. We have set the following two objectives for the questionnaire:

1. Identify whether strategy-IT alignment is a concern for the Business and IT actors within a company, and particularly for strategy and requirements for systems development (to whom, and why).
2. Identify whether an understanding gap exists between the Business and IT, why, does it affect strategy-IT alignment, and how could it be addressed.

The questionnaire was built with the free online tool *Survey Gizmo* (accessible at *http://www.surveygizmo.com*), and consists of 41 questions spreading across six sections. Sections are derived from the questions discussed in the introduction; sections one to three are related to the first two questions, focusing on the topic holistically (section one) but also on the main variables, with section two on strategy and section three on systems development. Sections four and five are related to the third question.

- The first section focuses on strategy-IT alignment capturing whether it is a concern, and whether this concern is being addressed (and how), etc.
- The second section focuses on business strategy and IT strategy.
- The third section focuses on the alignment of business strategy and systems development.
- The forth captures the respondents' background knowledge and familiarity with models and is intended to be a way to assess responses of section five.
- The fifth section focuses on the use of models for strategy-IT alignment.
- The sixth captures demographic information.

All sections include examples and explanations of core terms used, together with information motivating some questions. Types of questions used, include open-ended, multiple choice, checkboxes, and *Likert* scale questions. They cover possible alternatives making sure options offered are relevant to the questions, do not overlap, units/scales are consistently used, and double-barreled questions are avoided [32]. Questions have been neutrally formulated to avoid bias, and questions for consistency checking across answers have been used [32]. The questionnaire is available at: *http://edu.surveygizmo.com/s3/1185501/Strategy-IT-Alignment-Pilot-Study.*

The questionnaire has been tested through a pilot study (step seven) for assessing its validity and understandability. This has been done using a group of four academic experts on business-IT alignment, and a convenience sample of 52 professionals from around the world. Domain experts piloting the questionnaire have confirmed conformance to the hypothesis defined (construct validity), and sufficient domain coverage (content validity). Using a sample of professionals has simulated a real setting, which allowed testing the questionnaire by providing input on all functional aspects (language, structure, layout, etc.). The response rate was 52% (from 100 messages sent via email and through *Linkedin*). Moreover, the pilot study has offered preliminary results discussed in the next section.

Step eight entails sampling, including method and drawing. Our sampling approach includes input both from a large population across different companies, but also input from whole companies. For the former, we have selected a simple random sample of companies registered in Kista, Sweden, which includes a population of 1500 companies across multiple domains and lines of business (information provided by the *Swedish Agencies registration Office, http://http://www.bolagsverket.se)*. In both cases companies employ at least 10 people.

## 5   Results from the Pilot Study

The pilot study has provided results with respect to the objectives defined. Results are preliminary as their collection purpose has been to improve the questionnaire and not to draw solid conclusions. This can happen only after the actual study will have been conducted, as it requires information that includes bias and error in respect to the target population and sample used. Therefore, validity of the results to support any conclusions drawn from the pilot study is not conclusive, but only indicative. When the study is completed, statistical analysis of the results entails taking into account several perspectives such as demographics and through descriptive statistics present data for the sample either through univariate or through bivariate analysis.

Figure 3 presents answers for the question "*Is Strategy-IT Alignment an issue of concern for your company?*" based on respondents' functional role (columns 2-4), on the job function (columns 5,6), and on the size of the company (columns 7,8).

Regarding the first objective, 56.2% confirmed that strategy-IT alignment is an issue of concern for their company (first column in Figure 1). 50% of the respondents acknowledge business utilizes the capacities of IT, but 65% thinks they do not work in sync. While 85% think that IT adds value to the business, only 25% think it

contributes to strategic decision-making. Moreover, respondents are split about whether strategy insights are communicated adequately to IT (33,3% positive, 27,8% negative). Though 55.3% acknowledge IT is able to derive requirements from strategy a greater 61.1% claims that strategy can be traced to information systems.

Regarding the second objective, in terms of information dissemination between the business and IT, 54,6% think communication between the Business and IT is hindered due to the difference in information representation, 40% think strategy is understood by all. When it comes to using models for strategy-IT alignment, 50% of respondents reacted positively that it would improve communication between the Business and IT and 61.1% think it would lead to improvements of Strategy-IT Alignment. Finally, 77,7% disagreed with the statement that "strategy expressed in the form of a model would not bring any value to their company".
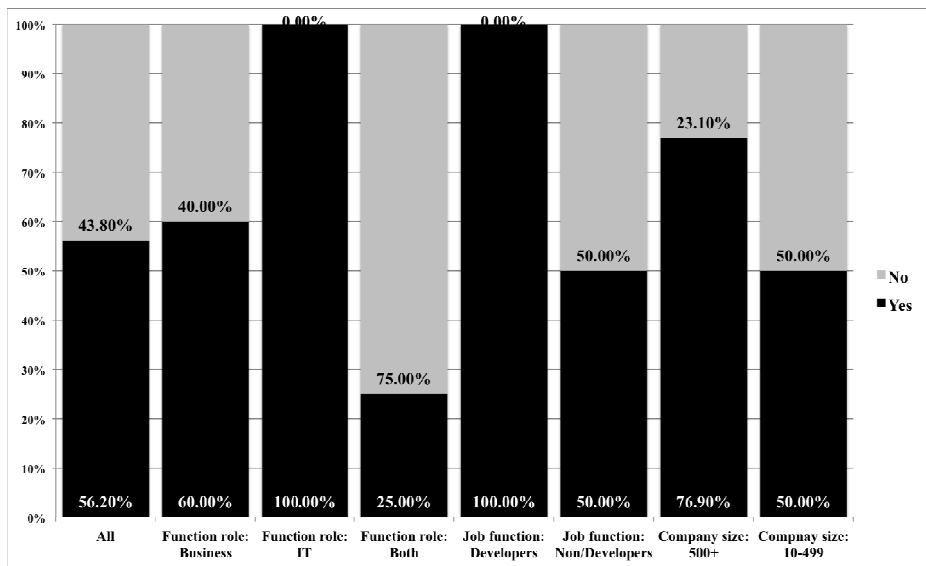
Fig. 3. Is Strategy-IT Alignment an issue of concern for your company?
Answers coming from different demographic groups

Considering the research questions presented in the introduction, the results indicate strategy-IT alignment is an issue of concern for practitioners, with an interesting variation depending on respondents' functional role, job and also size of company employed (indicated by Figure 1). However, no concrete method or technique has been identified as a solution practiced to address the issue. The sample also indicated an increased familiarity both with distinct business strategy formulations as well as with various types of models, with only a very small portion of respondents not involving models in their work. Finally, results have indicated that the use of models would lead to improvements in terms of communication between the business and IT, as well as to strategy-IT alignment. This indicates that a

model-centric proposal would be well received by practitioners for strategy-IT alignment bringing value to their company.

6   Conclusion and Future Work

In this paper we have argued for the need to enrich the current body of knowledge in strategy-IT alignment with an empirical basis. We proposed the conduct of a study in the form of a questionnaire. We presented the design steps required methodologically and also reported on the current status of our work by explaining our steps and presenting sample results of the pilot study we have carried out. The study complements our theory-based research on a model-centric Strategy-IT alignment, presented in the previous work [6, 23, 25, 27, 28].

Apart from addressing the objectives of our research, the questionnaire can be also used by companies and organizations as a mechanism to assess their progress on strategy-IT alignment periodically. Feedback received from the pilot study both by domain experts as well as by the sample population involved, has provided us with suggestions for improvements important to assure the quality of the final questionnaire both in the terms of functionality and clarity but also in terms of conceptual soundness. This will constitute the core of our future work to complete the questionnaire and carry out the empirical study.

References

1. Burns, T., Stalker, G.: The Management of Innovation. Tavistock, London, UK (1961)
2. Luftman, J.N., Kempaiah, R., Nash, E.: Key issues for IT executives. MIS Quarterly Executive 5(2), 81–101 (2005)
3. Tallon, P., Kraemer, K.: Investigating the Relationship between Strategic Alignment and Business Value: The Discovery of a Paradox, pp. 1–22. Idea Group, Hershy (2003)
4. Chan, Y., Sabherwal, R., Thatcher, J.: Antecedents and outcomes of strategic IS alignment: an empirical investigation. IEEE Transaction Engineering Management 51, 27–47 (2006)
5. Chandler, A.D.: Strategy and Structure. The MIT Press, Cambridge (1962)
6. Giannoulis, C., Zdravkovic, J., Petit, M.: Model-driven strategic awareness: From a unified business strategy meta-model (UBSMM) to enterprise architecture. In: Bider, I., Halpin, T., Krogstie, J., Nurcan, S., Proper, E., Schmidt, R., Soffer, P., Wrycza, S. (eds.) EMMSAD 2012 and BPMDS 2012. LNBIP, vol. 113, pp. 255–269. Springer, Heidelberg (2012)
7. Atkinson, Kühne: Model-Driven Development: A Metamodeling Foundation. IEEESoftware 20(5), 36–41 (2003)
8. Henderson, J.C., Venkatraman, N.: Strategic Alignment: Leveraging information technology for transforming organizations. J. IBM Systems 32(1), 4–16 (1993)
9. Luftman, J.N., Bullen, C.V., Liao, D., Nash, E., Neumann, C.: Managing the Information Technology Resource: Leadership in the Information Age. Pearson Prentice Hall (2004)
10. Aversano, L., Grasso, C., Tortorella, M.: A Characterization Framework for Evaluating Business/IT Alignment Strategies. In: Proceedings of the 14th International Conference on Enterprise Information Systems (ICEIS 2012), pp. 155–164 (2012)

11. Singh, S.N., Woo, C.: Investigating business-IT alignment through multi-disciplinary goal concepts. Requirements Engineering 14, 177–207 (2009)
12. Basili, V.R., Lindvall, M., Regardie, M., Seaman, C., Heidrich, J., Munch, J., Rombach, D., Trendowicz, A.: Linking Software Development and Business Strategy Through Measurement. Computer 43(4), 57–65 (2010)
13. Gordign, J., Akkermans, J.: Value-based requirements engineering: exploring innovative ecommerce ideas. Requirements Engineering 8, 114–135 (2003)
14. Thevenet, L.-H., Salinesi, C.: Aligning IS to organization's strategy: The iNSTAL method. In: Krogstie, J., Opdahl, A.L., Sindre, G. (eds.) CAiSE 2007. LNCS, vol. 4495, pp. 203–217. Springer, Heidelberg (2007)
15. Luftman, J.N., Derksen, B.: Key issues for IT executives 2012: Doing More with Less. MIS Quarterly Executive 11(4), 207–218 (2012)
16. Porter, M.E.: Competitive Advantage: Creating and Sustaining Superior Performance. Free Press, New York (1985)
17. Kaplan, R.S., Norton, D.P.: Strategy Maps: Converting Intangible Assets into Tangible Outcomes. Harvard Business School Press, Boston (2004)
18. Campbell, B.: Alignment: Resolving ambiguity within bounded choices. In: 9th Pacific Asia Conference on Information Systems (PACIS 2005), pp. 1–14 (2005)
19. Zachman, J.A.: A Framework for Information Systems Architecture. IBM Systems Journal 26(3), 276–292 (1987)
20. Scheer, A.-W.: ARIS-Business Process Frameworks. Springer, Berlin (1999)
21. The Open Group: The Open Group Architectural Framework (TOGAF) Version 9. The Open Group, Reading, UK (2009), http://www.opengroup.org/togaf/
22. Barney, J.B.: Firm Resources and Sustained Competitive Advantage. Journal of Management 17(1), 99–120 (1991)
23. Giannoulis, C., Petit, M., Zdravkovic, J.: Modeling Business Strategy: A Meta-model of Strategy Maps and Balance Scorecards. In: 5th IEEE International Conference on Research Challenges in Information Science (RCIS 2011). IEEE, New York (2011)
24. Stabell, C.B., Fjeldstad, Ø.D.: Configuring Value for Competitive Advantage: On Chains, Shops, and Networks. J. Strategic Management 19(5), 413–437 (1998)
25. Giannoulis, C., Petit, M., Zdravkovic, J.: Modeling competition-driven business strategy for business IT alignment. In: Salinesi, C., Pastor, O. (eds.) CAiSE 2011 Workshops. LNBIP, vol. 83, pp. 16–28. Springer, Heidelberg (2011)
26. Chan, K.W., Mauborgne, R.: Blue Ocean Strategy. Harvard Business Review Press, Boston (2005)
27. Giannoulis, C., Zdravkovic, J.: Linking Strategic Innovation to Requirements: a look into Blue Ocean Strategy. In: Proceedings of Practice of Enterprise Modeling (PoEM 2012), CEUR 933, pp. 118–128 (2012)
28. Giannoulis, C., Zdravkovic, J.: Modeling Strategy Maps and Balanced Scorecards using i*. In: 5th International i* Workshop (iStar 2011), CEUR 766, pp. 90–95 (2011)
29. Alencar, F., Marín, B., Giachetti, G., Pastor, O., Castro, J., Pimentel, J.H.: From i* requirements models to conceptual models of a model driven development process. In: Persson, A., Stirna, J. (eds.) PoEM 2009. LNBIP, vol. 39, pp. 99–114. Springer, Heidelberg (2009)
30. Oppenheim, A.N.: Questionnaire Design, Interviewing and Attitude Measurement, Continuum, NY (1992)
31. Parasuraman, A.: Marketing Research. Addison-Wesley (1991)
32. Rattray, J., Jones, M.C.: Essential elements of questionnaire design and development. Journal of Clinical Nursing 16, 234–243 (2005)