Strategic Coopetition – A Conceptual Modeling Framework for Analysis and Design

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1. Introduction

1.1 Background

Coopetition describes a relationship in which two or more actors cooperate and compete simultaneously [1]. It is a counter-intuitive social phenomenon because it is comprised of seemingly antithetical behaviors that are undergirded by contradictory logics, antipodal hypotheses, and diametrical assumptions [2]. However, coopetition is frequently observed within strategic relationships among actors [3] such as partnerships, joint ventures, alliances, and networks.

Actors may cooperate with each other because they share certain goals that cannot be attained by any single actor alone. However, they may also compete with each other because they have certain objectives that each actor must fulfil by itself. Designing and implementing such coopetitive strategies is challenging due to the paradoxical nature of cooperation and competition.

Information Systems (IS) play a key role in establishing and supporting coopetition due to the importance of technologies including social media [4] in coopetitive strategies. Moreover, IS can also be impacted by the coopetitive strategies of actors. Therefore, a modeling framework that allows the structured and systematic expression and evaluation of strategic coopetition can be valuable for planning and decision-making.

1.2 Problem Statement

This PhD research project focuses on the modeling and analysis of simultaneous cooperation and competition between actors. This focus is motivated by the complexity of strategic coopetition as well as the impact of IS on coopetitive strategies and vice versa.

At present, coopetitive strategy is generally articulated and assessed using approaches that are partial (e.g., solely quantitative) or ad hoc (e.g., lacking rigorous semantics). For example, game theoretic modeling techniques, such as Game Trees, Payoff Tables, [5] and Value Net [1], are typically used to support the analysis of strategic coopetition.

Game Trees and Payoff Tables are purely quantitative approaches that attempt to encode qualitative factors into numerical rewards or penalties. However, these approaches do not offer the means for directly and explicitly representing the internal intentional or preference structures of actors. Value Net is a mixed approach that supports quantitative and qualitative reasoning, but it is not based on a rigorous semantics. Therefore, Value Net is typically used in an ad hoc manner.

Partial and ad hoc analysis with these approaches can expose actors to omissions and confusions that manifest into errors and mistakes. By contrast, a conceptual modeling framework, with strong semantics and a systematic methodology, for analyzing coopetition can be used to uncover problems and gaps in reasoning that are obscured or elided by partial and ad hoc analysis. Such a framework can be advantageous for co-designing and aligning coopetitive strategies and IS.

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1.3 Research Objective

The objective of this PhD research project can be refined and elaborated as follows,
1. Understand the main characteristics that are relevant for modeling strategic coopetition. Ascertain key factors that are necessary for analyzing abstract patterns and decontextualized representations of strategic coopetition.
2. Identify key requirements of each characteristic that are necessary for modeling strategic coopetition. Determine the relationships between the requirements of each characteristic. Understand the implications of each requirement on the analysis of strategic coopetition.
3. Develop constructs, models, methods, and instantiations to enable analysis of strategic coopetition. Develop a modeling framework by using, extending, and combining existing modeling languages. Propose a new modeling approach, when existing approaches are not adequate, for analyzing strategic coopetition regardless of domain or context.

1.4 Research Questions

RQ1. Which characteristics are necessary for modeling strategic coopetition?
RQ2. What are the requirements for modeling each characteristic that is necessary for analyzing strategic coopetition?
RQ3. Which constructs, models, methods, and instantiations are necessary for analyzing strategic coopetition regardless of domain or context?

1.5 Research Method

Design Science Research. Design Science Research (DSR) offers an appropriate paradigm for studying socio-technical phenomena [6][7]. DSR focuses on constructs, models, methods, and instantiations to portray and ponder IS in their environments. This allows a researcher to understand what IS do (functionality) as well as why (intentionality) and how (application) they are used. The concept of design in DSR refers to an activity (verb) as well as an artefact (noun) [6] that are joined together in a process of continuous improvement. This virtuous cycle of ongoing validation is described as the "build and evaluate loop" by March and Smith [8].

This PhD research project will apply each of the seven guidelines for conducting DSR that are recommended by Hevner et al. [6]. These guidelines encompass the full lifecycle of a research project by covering the following areas: (1) Design as an Artifact, (2) Problem Relevance, (3) Design Evaluation, (4) Research Contributions, (5) Research Rigor, (6) Design as a Search Process, and (7) Communication of Research [8].

The key artefacts of this PhD research project will be constructs, models, methods, and instantiations for understanding strategic coopetition (1 and 2). These will be developed using widely-accepted research best practices (5). These artefacts will be validated by applying them to analyze test cases from the published literature (3, 4, and 6). Findings from this PhD research project will be shared with researchers and practitioners via workshops, conferences, and publications (7). Evaluation will be performed by testing framework on an empirical case study.

A prospective research outline for this PhD, based on March and Smith [8], is presented in table 1.

			Research Activities			
Research Output			**Build**	**Evaluate**	**Theorize**	**Justify**
	Constructs		Explore key characteristics for modeling coopetition from literature	Discern relevance, necessity, and sufficiency of key characteristics with reference to test cases		
	Model	Ontology	Develop an ontology for representing coopetition	Use a case study from the industry to validate conformance and compliance of ontology and language with reality		
		Language	Develop a modeling language for expressing coopetition			
	Method	Analysis Techniques	Develop techniques for analyzing strategic coopetition	Test adequacy and compatibility of techniques and methods using a case study from the industry		
		Model construction method	Develop method for building models of strategic coopetition			
	Instantiation	Sample models to demonstrate expressiveness and analysis	Build models that express strategic coopetition	Validate models and design knowledge via case study relating to strategic coopetition from the industry		
		Sample design knowledge to achieve coopetition objectives	Codify design knowledge to document goals of coopetition			

Table 1 Prospective research outline based on March and Smith [8]

Case Study. An empirical case study from the industry will be conducted as a part of the Design Science Research (DSR) methodology. Case studies accommodate the consideration of human interpretations [9] and hence they are appropriate for conducting research, such as model-based analysis, into socio-technical phenomena including strategic coopetition.

The key characteristics that are necessary for modeling strategic coopetition are based on a comprehensive review of Strategic Management literature that is documented in [P2]. Strategic coopetition has been studied extensively by Strategic Management researchers and they have identified the primary attributes of this phenomenon [P3].

In this PhD research project, an industrial case study will be conducted to evaluate, improve, and validate models that depict these key characteristics and primary attributes of strategic coopetition. In table 1, the second column (Evaluate) lists the relevance of case studies for evaluating artefacts (i.e., constructs, models, methods, and instantiations).

This case study will focus on the coopetitive relationships of an actor. Site selection will be based on the scope and intensity of the strategic coopetitive activities undertaken by actors. Case study will concentrate on the utility of the modeling framework for analyzing coopetition by actors in contrast to ad-hoc or unsystematic/unstructured analysis.

As recommended by Yin [10], data will be gathered from a variety of sources including questionnaires, and interviews. Analysis and exposition of data shall be done in conformance with appropriate procedures and protocols.

1.6 Research Contribution

It is expected that this PhD research project will advance the field of IS design and analysis. It will propose a visual and conceptual modeling framework that will be designed for modeling and analyzing abstract patterns and decontextualized representations of strategic coopetition that are domain independent.

This framework will be designed and developed by using, extending, and combining extant frameworks that are widely-used by IS researchers and industrial practitioners. Moreover, new artefacts will be proposed when existing artefacts are found to be insufficient for modeling and analyzing strategic coopetition.

Currently, there is a dearth of visual and conceptual modeling approaches for representing and reasoning about strategic coopetition in a structured and systematic manner. Game theorists have proposed Game Trees, Payoff Tables [5], and Value Net approaches. IS researchers have also offered frameworks for modeling and analyzing IS designs with reference to strategic management concepts (e.g., [11, 12]). The conceptual modeling framework developed in this PhD research project will complement and supplement these approaches. It will aid decision-makers using any of these approaches to secure stronger rationales and justifications.

This PhD research project will advance the state of research on conceptual modeling of strategies. By doing so, this research project will undertake original, significant, and substantial work that will aid researchers and industry practitioners.

2. Proposed Modeling Framework

2.1 Overview

A framework for analyzing strategic coopetition will be designed and developed in this PhD research project. This framework will include a set of prescriptive constructs and methods that will be useful for building models and instantiations of relevant problem and solution domains.

A conceptual modeling base will ensure that meanings of ideas are incorporated within models. This semantic support will help to ensure that models are well formed, logically sound, and use ideas in a consistent manner.

A visual modeling interface will ensure that entities and relationships are depicted graphically. This diagrammatic support will ensure that models are intuitive, interpretable, and explainable by humans.

Assessment of Stakeholder Goal Achievement. This framework will support a qualitative, interactive assessment procedure of goal satisfaction [13]. Analysts will be able to iterate over successive versions of a model to refine and elaborate the design space. They will be able to "go upwards" and ask 'why' questions pertaining to the goals that motivate a focal strategy. They will also be able to "go downwards" and ask 'how' questions about the impact of various alternatives on certain goals. Therefore, a problem would be understood by elaborating the goal structure while solutions would be identified by elaborating the alternatives for satisfying goals. This approach of continuous refinement and elaboration will help to uncover new goals and novel solutions in the design space. It will distinguish this framework from other frameworks, such as Game Trees and Payoff Tables from game theory [5], that support the analysis of pre-set problems and pre-defined solutions.

Two-tiered Framework. This framework will be comprised of distinct tiers to support incremental analysis. Each tier will yield specific insights about an aspect of strategic coopetition. Various aspects of a coopetitive relationship will be articulated in an additive manner. Therefore, the Advanced tier will progress the level of understanding about a coopetitive relationship obtained from the Foundational tier. The proposed modeling approach will comprise of the following modeling activities: goal and basic actor modeling, value modeling, sequential and temporal modeling, and complex actor modeling.

2.2 Modeling Tiers

Foundational Tier: The Foundational Tier shall be comprised of two components which are goal modeling and basic actor modeling.

• **Goal Modeling.** *i** Strategic Rationale (SR) diagrams will be used to express and analyze multi-level goal structures. The rationale for selection of *i** is explained in [P2, P3]. Codification of intentional and preference structures in *i** SR diagrams helps to minimize possibility of erroneous analyses stemming from inaccurate assumptions by an analyst. This is because *i** SR diagrams obviate the need for analyst assumptions pertaining to *actor* intentions and preferences because they depict these aspects directly within the models. Figure 1 presents a sample goal model from [P1].

• **Basic Actor Modeling.** Legal requirements (e.g., contracts, laws) as well as relational considerations (e.g., reputation, goodwill) serve as rules that permit and prohibit the choices that are available to actors and the outcomes that result from them. These factors are implicitly encoded in game theoretic artefacts but cannot be clearly or unambiguously portrayed in such artefacts. This can lead to incomplete models that are vulnerable to inchoate analysis. *i** Strategic Dependency (SD) diagrams can be used to depict social relationships between *actors*. These social relationships among *actors* are portrayed as *dependencies* between those *actors*. *Dependencies* can provide opportunities to *actors* if they collaborate but can also expose those *actors* to vulnerabilities if they conflict. Figure 2 presents sample actor models from [P2, P3].

Advanced Tier: The Advanced Tier shall be comprised of three optional components which are value modeling, sequence and temporal modeling, and complex actor modeling.

• **Optional Component 1: Value Modeling.** Brandenburger and Nalebuff [1] assert that coopetition is predicated on the logic of cooperating to "grow the pie" and competing to "split the pie". This requires the proposed conceptual modeling framework to accommodate the representation of value.

Two aspects of value that must be supported by a conceptual modeling framework of coopetition include value added and added value. Value added refers to incremental value added by an actor in a value chain while added value refers to the increase in value that is attributable to an actor in a strategic relationship. The absence of this capability can inhibit a full understanding of simultaneous cooperation and competition among actors.

In the proposed framework, these requirements will be addressed through the combined use of e3value, *i** SD, and *i** SR diagrams. e3value is a value modeling language that shows the exchange of economic value, benefit, or utility among actors. Figure 3 presents sample actor and value models from [P4].

• **Optional Component 2: Sequential and Temporal Modeling.** Strategic coopetition is a relational construct whose understanding can benefit from sequential (i.e., discrete) and temporal (i.e., continuous) analysis. Sequential and temporal analysis can be used to comprehend the impact of changes in factors that influence coopetition as well as their relationships.

Certain associations, such as the relationship between interdependence and bargaining power or negotiating leverage change over time. As the degree of interdependence changes over time so too will the power and leverage of *actors* in a coopetitive relationship.

While *i**, the principal modeling language in this research project, readily supports static reasoning–it is not optimal for sequential or temporal analysis which is sequence- or time-dependent. *i** will be combined with Game Trees in this framework to overcome their limitations for sequential reasoning. Figure 4 presents sample actor and decision models from [P5, P6].

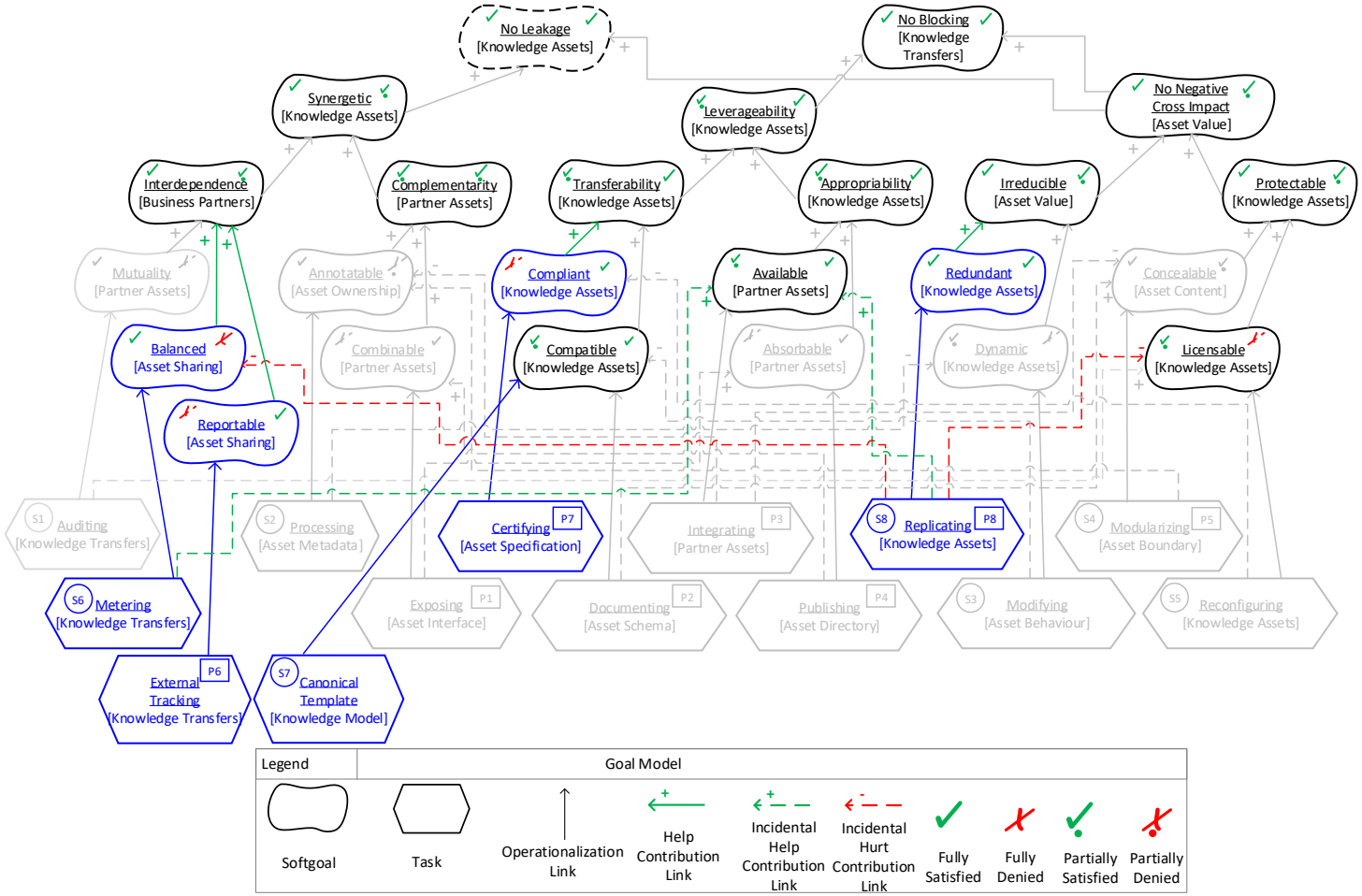

Fig. 1. Goal model of knowledge sharing goals and potential tasks in a coopetitive relationship [Source: P1].

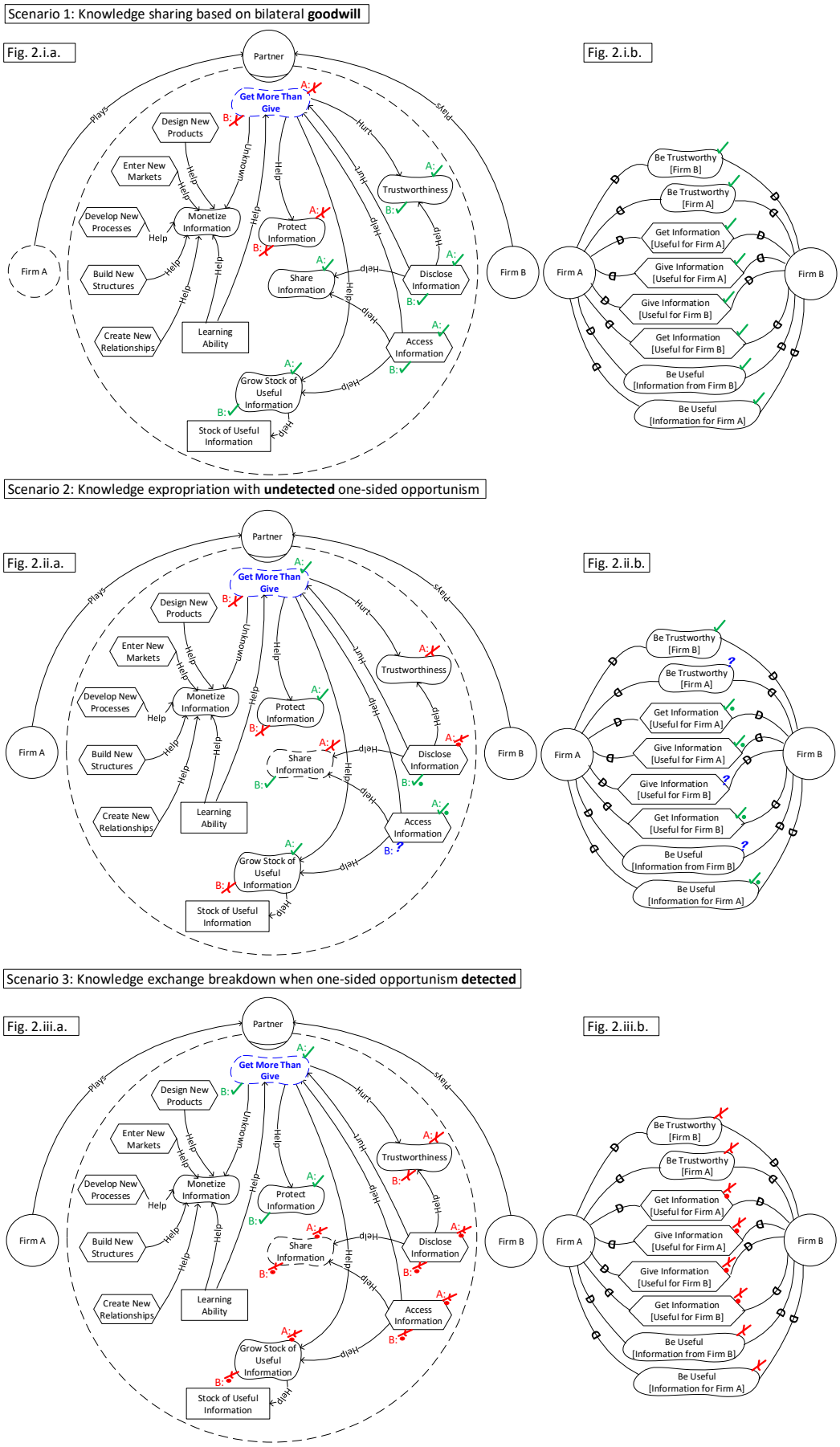

Fig. 2. Basic Actor models of inter-partner learning and knowledge sharing in a coopetitive relationship [Sources: P2, P3].

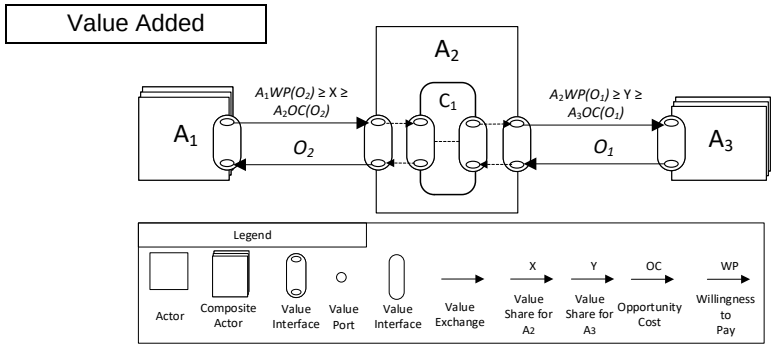

Fig. 3.i.a. e3value diagram of A2's value constellation.

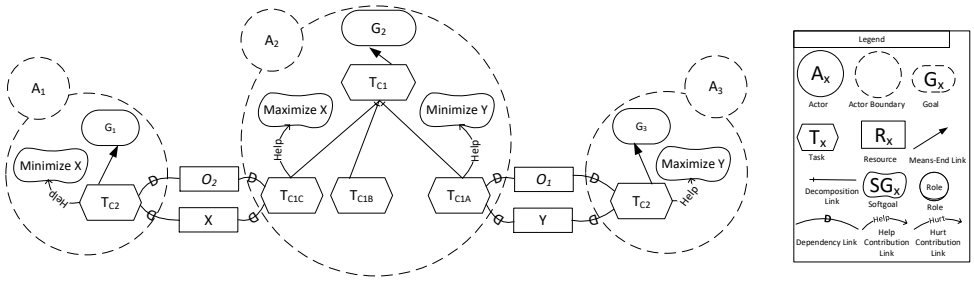

Fig. 3.i.b. i* Strategic Rationale (SR) diagram showing willingness-to-pay and opportunity cost.

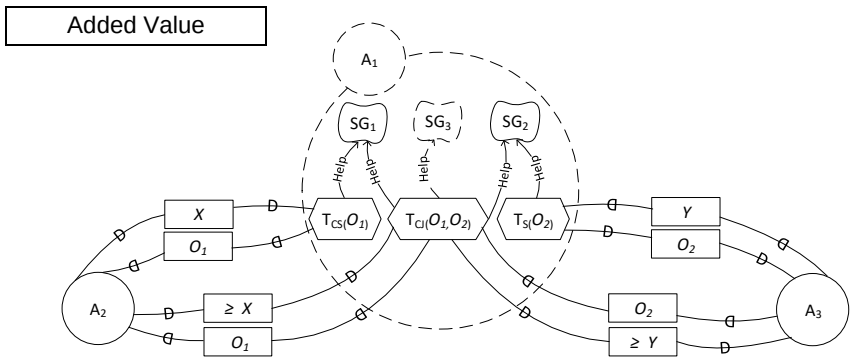

Fig. 3.ii.a. i* SR diagram of A1 with complementarity between A2 and A3.

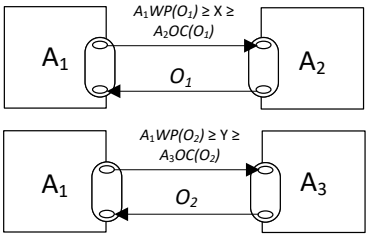

Fig. 3.ii.b. e3value diagram of A1's value constellation with separate usage of O1 and O2.

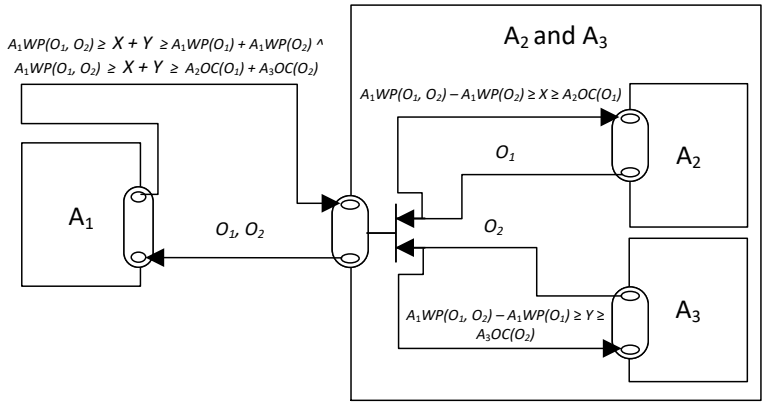

Fig. 3.ii.c. e3value diagram of A1's value constellation with complementarity between A2 and A3.

Fig. 3. Value and Actor models of Value Added and Added Value in a coopetitive relationship [Source: P4].

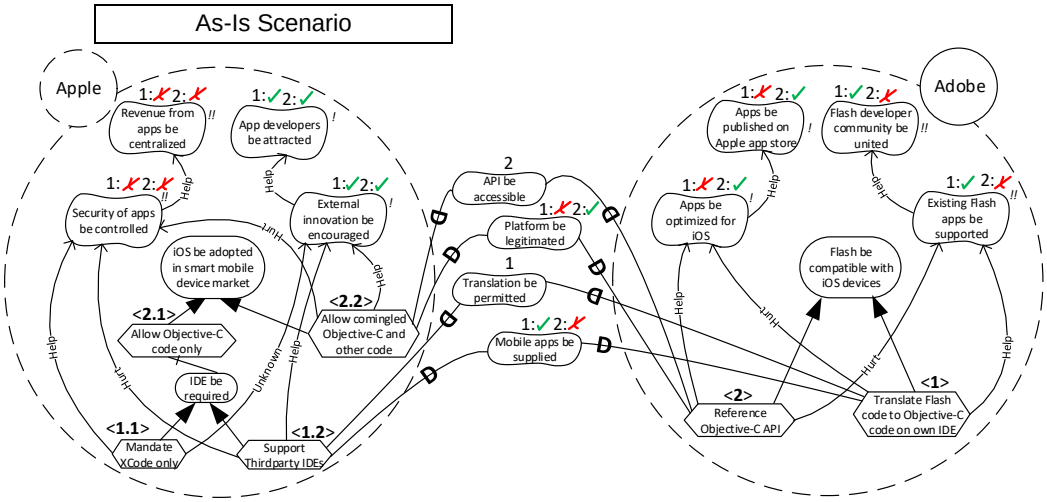

Fig. 4.i.a. i* SR model depicting As-Is actor relationships under coopetition.

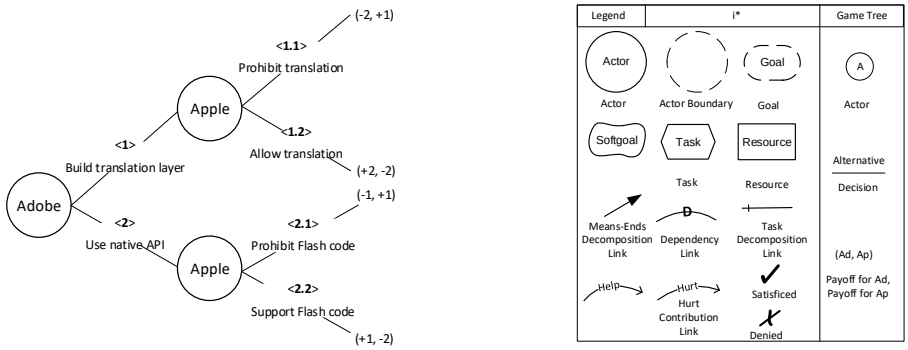

Fig. 4.i.b. Game Tree depicting To-Be decisions and payoffs under coopetition.

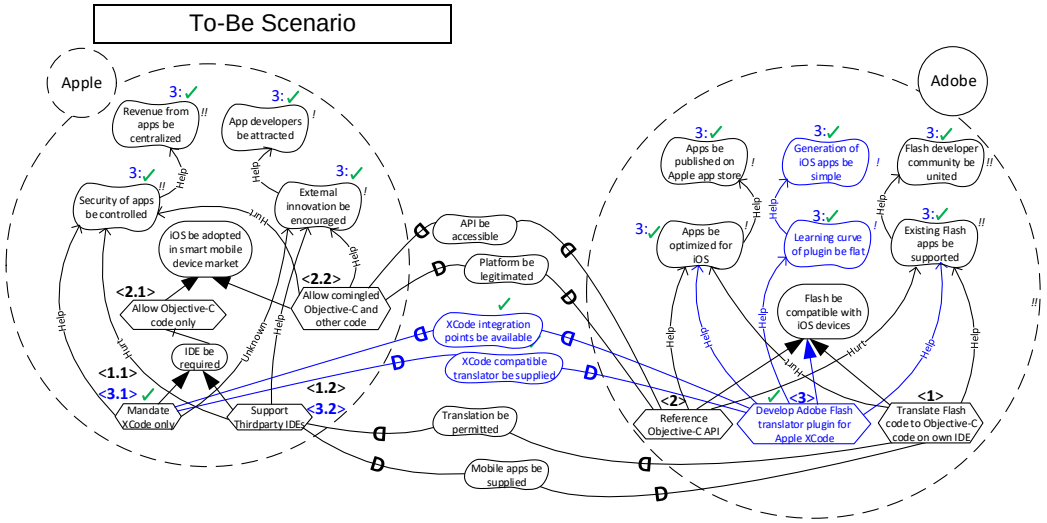

Fig. 4.ii.a. i* SR model depicting To-Be actor relationships under coopetition.

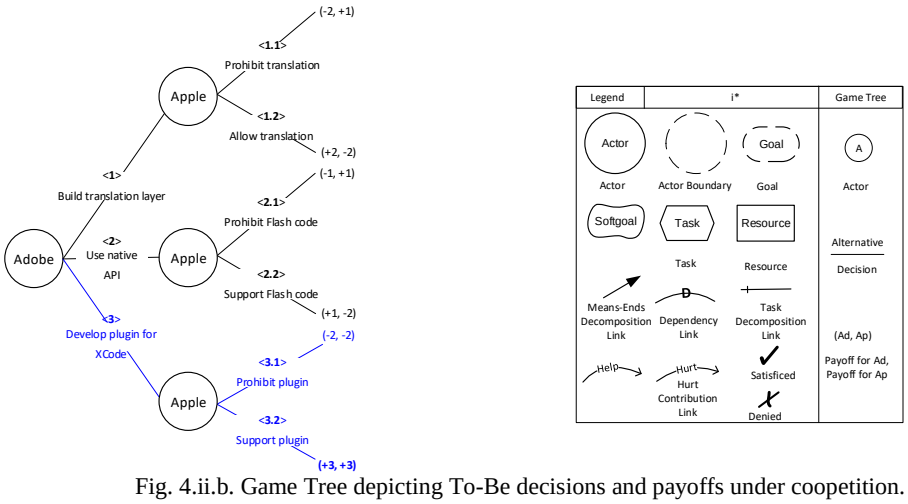

Fig. 4.ii.b. Game Tree depicting To-Be decisions and payoffs under coopetition.

Fig. 4. Actor and Decision models a coopetitive relationship in a dyad [Sources: P5, P6].

• **Optional Component 3: Complex Actor Modeling.** Actors abstractions and their concrete manifestations are relevant for analyzing coopetitive relationships. A coopetitive strategy may unfold differently with respect to abstract and concrete actors. Therefore, analysis of coopetition will benefit from modeling that distinguishes between abstract *actors* (e.g., *roles*, *positions*) and concrete *actors* (e.g., *agents*). *i** Strategic Rationale (SR) diagrams will be used to depict and discern different contributions and impacts of abstract and concrete *actors* on coopetitive strategies.

3. Research Plan

3.1 Remaining Work

The following areas will be the foci for remaining work in this PhD research project:

• **Primary characteristics of coopetition.** The main characteristics that are relevant for expressing and analyzing strategic coopetition between actors have been identified. A comprehensive review of the current scholarly literature on strategic coopetition has been undertaken and its results were presented in [P2]. A follow-up literature review will be performed to update this list with new characteristics if needed.

• **Basic actor and goal modeling.** Coopetition occurs between two or more actors and thus actors constitute the foci of coopetition analysis. In [P2] we outlined a technique for expressing dyadic coopetition. It would be useful to develop this domain further so that it can also be used to articulate network coopetition. Additionally, with respect to goal modeling, the intentional structure of each actor in the dyad in [P2, P3] was symmetrical. Therefore, it would be apposite to model coopetitive relationships with asymmetrical intentional structures. Basic actor and goal models of coopetition are presented in [P1-P3].

• **Value modeling.** This conceptual modeling framework will support the expression and analysis of the notions of complementarity and synergy. The process of coopetition is typically implemented in two steps. First, actors cooperate to collectively generate a value surplus that neither of them can create alone. Second, each actor competes to individually capture the largest share of that surplus value for itself. In [P4] we offered a method for analyzing the structural aspects of this process of coopetition. It would be beneficial to explore this area further to understand the role and impact of bargaining power and negotiating leverage, of actors in coopetitive relationships, on the performance and enactment of collective value creation and individual value appropriation. Actor and value models of coopetition are presented in [P4].

• **Sequential and temporal analysis.** Temporal and sequential analysis can be used to analyze changes that durably impact coopetitive relationships. In [P1, P5, P6] we proposed a method for developing related *i** SR models and Game Trees to represent and reason about sequential decisions and actions under coopetition. It would be advantageous to explore this area further to incorporate time progression and path dependency into the analysis to help support long range planning and forecasting within a coopetitive relationship. Actor and sequential decision models of coopetition are presented in [P1, P5, P6].

• **Complex Actors.** The impact of differences between abstract/concrete actors on simultaneous competition and cooperation is necessary for understanding strategic coopetition. Characteristics of coopetition may unfold differently within coopetitive relationships depending on whether they are related to abstract actors or their concrete manifestations. Similarly, the means for defining and scoping abstract and concrete actors as well as their mappings and transitions require further scrutiny.

3.2 Roadmap for Completion

This plan outlines the main activities that will completed during the remainder of this PhD program. Many of these activities will be performed in parallel.

- Refinement and elaboration of the conceptual modeling framework: The requirements and characteristics that have already been identified in [P2] will be reviewed and updated with reference to academic literature on strategic coopetition. [1 Month]
- Design and development of artefacts for expressing and analyzing strategic coopetition: [2 Months]
  - These artefacts will include constructs, models, methods, and instantiations based on relevant visual and conceptual modeling languages and approaches.
    - ♦ Foundational Tier: Goal Modeling and Basic Actor Modeling.
    - ♦ Advanced Tier: Optional Component 1: Value Modeling
    - ♦ Advanced Tier: Optional Component 2: Sequential and Temporal Modeling
    - ♦ Advanced Tier: Optional Component 3: Complex Actor Modeling
- This conceptual modeling framework will be refined and elaborated using test cases from industry and scholarly publications for early validation. [1 Month]
- Integration and consolidation of the components and artefacts of the conceptual modeling framework: This will yield a cohesive and comprehensive visual and conceptual modeling language that will be purpose built for articulating and evaluating strategic coopetition. [1 Month]
- Validation of this conceptual modeling framework will be performed through modeling and analysis of a case study from the industry. [2 Months]
- The visual and conceptual modeling language for representing and reasoning about strategic coopetition will be reviewed and refined in an analogous manner. [1 Month]
- Compilation of research findings within a final thesis report as well as the submission of this report to the PhD committee for the purposes of review and defense. [4 Months]

3.3 Prospective outline of Doctoral Thesis

A prospective outline of the doctoral thesis is presented in this section. It describes the structure and organization of the research in report form that will be submitted to the PhD committee.

1. Introduction
    a. Background
    b. Problem Statement
    c. Research Objective
    d. Research Method
        i. Design Science Research
        ii. Case Studies
    e. Research Contribution
        i. Originality
        ii. Significance
2. Literature Review and Related Work
    a. Literature Review on Strategic Coopetition
    b. Related Work on Conceptual Modeling of Strategic Relationships
3. Modeling and Analyzing Coopetition – A Basic Framework
    a. Ontology (Concepts and Semantics)
    b. Language (Notations and Syntax Rules)
    c. Analysis Techniques (Procedures and Algorithms)
    d. Method (Construction Steps and Guidelines)
    e. Sample Models (Expressiveness and Analytical Power)
4. Modeling and Analyzing Coopetition – With Value
    a. Ontology (Concepts and Semantics)
    b. Language (Notations and Syntax Rules)
    c. Analysis Techniques (Procedures and Algorithms)
    d. Method (Construction Steps and Guidelines)
    e. Sample Models (Expressiveness and Analytical Power)
5. Modeling and Analyzing Coopetition – With Time
    a. Ontology (Concepts and Semantics)
    b. Language (Notations and Syntax Rules)
    c. Analysis Techniques (Procedures and Algorithms)
    d. Method (Construction Steps and Guidelines)
    e. Sample Models (Expressiveness and Analytical Power)
6. Modeling and Analyzing Coopetition – With Differentiated Actor Abstractions
    a. Ontology (Concepts and Semantics)
    b. Language (Notations and Syntax Rules)
    c. Analysis Techniques (Procedures and Algorithms)
    d. Method (Construction Steps and Guidelines)
    e. Sample Models (Expressiveness and Analytical Power)
7. Validation
    a. Case Study
8. Conclusion and Future Work
9. Bibliography

3.4 Summary

This PhD research project aspires to design and develop a visual and conceptual modeling language for representing and reasoning about strategic coopetition. This framework will allow actors to co-design and co-develop their coopetitive strategies and IS. This will lead to IS-aware coopetitive strategies that will create sustainable coopetitive advantage and enduring differential benefit for the actors. A tight fit between coopetitive strategies and IS will help to justify and rationalize investment in IS by tying IS capabilities to strategic requirements. Similarly, it will yield tighter compatibility and interoperability between coopetitive strategies and IS. This will amplify and magnify the gravity and criticality of IS in the successful evaluation, exploration, and generation of complex coopetitive strategies.

4. References

4.1. Results published in refereed journal and juried conferences

P1. Pant, V., & Yu, E. (2018). Getting to Win-Win in Industrial Collaboration under Coopetition: A Strategic Modeling Approach. In: *17th International Conference on Perspectives in Business Informatics Research (2018)*. Springer, Cham.

P2. Pant, V., & Yu, E. (2018). Modeling Simultaneous Cooperation and Competition Among Enterprises. *Business & Information Systems Engineering* 60.1, 39-54.

P3. Pant, V., & Yu, E. (2016). Coopetition with frenemies: towards modeling of simultaneous cooperation and competition among enterprises. In: *IFIP Working Conference on The Practice of Enterprise Modeling* (pp. 164-178). Springer, Cham.

P4. Pant, V., & Yu, E. (2017). Modeling Strategic Complementarity and Synergistic Value Creation in Coopetitive Relationships. In: *International Conference of Software Business* (pp. 82-98). Springer, Cham.

P5. Pant, V., & Yu, E. (2018). Generating Win-Win Strategies for Software Businesses under Coopetition: A Strategic Modeling Approach. In: *International Conference of Software Business*. Springer, Cham.

P6. Pant, V., & Yu, E. (2017). Understanding strategic moves and reciprocity on Software Ecosystems: A strategic modeling approach. In: *9th International Workshop on Software Ecosystems* (IWSECO 2017).

4.2. Bibliography

1. Brandenburger, A. M., & Nalebuff, B. J. (1996). *Co-opetition*. New York: Doubleday.
2. Raza-Ullah, T., Bengtsson, M., & Kock, S. (2014). The coopetition paradox and tension in coopetition at multiple levels. *Industrial Marketing Management, 43*(2), 189-198.
3. Baglieri, D., Carfì, D., & Dagnino, G. B. (2012, July). Asymmetric R&D alliances and coopetitive games. In: *International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems*, 607-621. Springer Berlin Heidelberg.
4. Kane, G. C. (2015). Enterprise Social Media: Current Capabilities and Future Possibilities. *MIS Quarterly Executive, 14*(1), 1-16.
5. Dixit, A. K., & Nalebuff, B. (2008). *The Art of Strategy: A Game Theorist's Guide To Success In Business & Life.* WW Norton & Company.
6. Hevner, A. R., March, S. T., Park, J., & Ram, S. (2008). Design Science in Information Systems Research. *Management Information Systems Quarterly, 28*(1), 6.
7. Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems, 24*(3), 45-77.
8. March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. *Decision Support Systems, 15*(4), 251-266.
9. Walsham, G. (1995). Interpretive case studies in IS research: nature and method. *European Journal of Information Systems, 4*(2), 74-81.
10. Yin, R. K. (2013). *Case Study Research: Design and Methods*. London: Sage Publications.
11. Carvallo, J.P., Franch, X. (2012) Building strategic enterprise context models with i*: a pattern-based approach. In: *Trends in Enterprise Architecture Research and Practice-Driven Research on Enterprise Transformation*. Springer, Berlin Heidelberg, pp 40-59.
12. Samavi, R., Yu, E., Topaloglou, T. (2008). Applying strategic business modeling to understand disruptive innovation. In: *Proceedings of the 10th International conference on Electronic Commerce*. ACM.
13. Horkoff, J., & Yu, E. (2009, November). Evaluating goal achievement in enterprise modeling–an interactive procedure and experiences. In: *IFIP Working Conference on The Practice of Enterprise Modeling* (pp. 145-160). Springer Berlin Heidelberg.