# Respecting the Deal: Economically Sustainable Management of Open Innovation Among Co-Opeting Companies

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**ABSTRACT**

*Platforms like eBay allow product seekers and providers to meet and exchange goods. On eBay, consumers can return a product if it does not correspond to expectations; eBay is the third-party firm in charge of assuring that the agreement among seekers and providers will be respected. Who provides the same service for what concerns open innovation, where specifications might not be fully defined? This paper describes the business model of an organizational structure to support the elicitation and respect of agreements among agents, who have conflicting interests but that gain from cooperating together. Extending previous studies, the business model takes into account the economic dimensions concerning the needs of knowledge share and mutual control to allow a third-party to sustainably reinforce trust among untrusted partners and to lower their overall relational risk.*

*Keywords:* *Business Management, Business Model, Co-Opetition, Design Science, Information Systems, Open Innovation, Risk Management and Compliance*

## INTRODUCTION

This paper deals with co-opetition in open innovation. Open innovation is innovation done outside the company (Chesbrough, 2003), whereas co-opetition occurs when two competitors cooperate on a specific project. Co-opetition can be defined by means of five components: players, added values, rules, tactics and scope (Brandenburger & Nalebuff, 1997).

Companies trying to align their strategic intents for cooperation usually face problems of coordination. It is important that each partner's promises will be honoured, i.e., that partners are self-committing. If those companies are competing their lack of common knowledge leads to asymmetry of information and that does not allow for complete trust among them. When that happens, the promise done by one partner needs

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to be honoured, i.e., it is self-committing, and hoped to be believed by the other partner, i.e., it is self-signalling (Van Rooy, 2003). A trivial example taken from Urs and Bütler (2007, p. 174) could illustrate this situation: a person bringing wine to a dinner (red or white) with a second person cooking the meal (meat or fish). There are two suitable options exploiting the complementarities of the two assets (red wine-meat and white wine-fish), and players are assumed to be neutral in respect to them. Hence, the first person can propose to eat meat and drink red wine, knowing that if the second person agrees to cook meat that he will have no reason to cheat and to bring white wine. Let us assume that the first person prefers red wine, whereas the second person likes fish. Thus the players' assets are substitutes, meaning that either they drink red wine (and they should eat meat) or they eat fish (and drink white wine). In this case, the first person can propose that they eat meat and drink red wine for dinner and that they eat fish and drink white wine on the following dinner; however, that will work only if the second person believes that the first one will honour the promises (i.e., there will be compliance).

Our contention is that co-opetition works for projects where there is a high risk of failure, which a single company is not ready to stand, and where there is a promise of high potential returns for the company to be satisfied even if it receives only a part of it. According to Wagner and Layton (2007), there are two kinds of risk: unrewarded, which is a cost to be paid in advance to enter the game, and rewarded, which is the promise of potential returns. On the one hand, co-opetition aims at share the unrewarded risk among partners. On the other hand, this form of partnership requires high efforts for coordination that lead to costs of communication among partners and of control against cheating. Such costs are also known as transaction costs and are reduced when there is trust among allied companies. This can be achieved by giving proof of compliance, which it is here defined in a broader sense as the definition of the objectives of the partnership, the assessment of the failure risk and the enforcement of a set of controls.

According to what said so far this study proposes a framework to achieve the best trade-off between trust and control in order to achieve confidence at a minimum cost. A large amount of literature has focused on information technologies automatically negotiating among enterprises; hence, the focus here is on risk management and compliance. A viable tactic should be to define rules that would shape the alliance in a way that does not reward cheating (Laffont & Martimort, 2002). In this sense, Hagel (2002) suggests using the shared platform to shape the information exchanges among companies. Such a platform can be considered as a critical resource for a third-party enterprise in charge of the coordination among co-opeting companies. Thus, our goal is to sketch the business model of such third-party enterprises, answering the following research question:

### Which are the Business Model Components of a Third-Party Enterprise in Charge of Risk Management Among Co-Opeting Companies Performing Open Innovation?

This question is addressed using a design science methodology (Hevner et al., 2004). We follow the guidelines of Gregor and Jones (2007) to develop a conceptual model for risk management among co-opeting agents. A conceptual model is defined by March and Smith (1995) as a representation of how things are, whose concern is utility, not truth. Such model gives the theoretical ground for the set of business model prescriptions for a trusted third-party, which is presented later in two sections of this paper.

Such guidelines have still to be tested extensively, and for this purpose we illustrate an example of such test using second-hand data from the Innocentive case to give a hint of what we expect to obtain. Innocentive is an independent intermediary, which allows companies to list their innovation challenges and to seek for a solution among a crowd of potential solvers.

For example if a drilling company might be looking for an innovative way to drill in special terrain conditions, Innocentive lets the drilling company post its innovation challenge on their website. This way the drilling company can access the knowledge of the thousands of worldwide experts enrolled in the Innocentive website. In recent years Innocentive has been exploring new ways to allow different solvers to gather together for a limited amount of time to solve a challenge. We consider Innocentive a good example to test the representative power of a model to help managing co-opeting agents.

The rest of this paper is organized as follows. We provide a brief introduction to co-opetition as a hybrid business strategy comprising competition and cooperation, providing theoretical frameworks on coordination and control. We introduce design research in information systems as the chosen methodology and the business model ontology (BMO) as the conceptual framework to develop the business model. We describe the proposed business model for a third-party, whereas the next section lists some testable propositions to falsify the underlying theory of our business model. We illustrate how to use our business model pattern using the example of Innocentive. The conclusion of the paper is presented last.

## CO-OPETITION

This section elaborates on co-opetition as an emerging concept in the field of strategy. To obtain insights into this hybrid form of strategy, the existing literature on alliance management is combined with concepts from the risk management and compliance literature.

Adopting a systems perspective, a firm can be viewed as an open system interacting with entities in its environment. In order to maintain its existence in a specific context (i.e., viability), a firm has to regulate, optimize and continuously improve its internal operations and to manage its relationships with the external entities (Beer, 1984). Such interactions appear in two basic ways: cooperation to exchange resources (Hall et al., 1977; Galaskiewicz, 1985) and competition to acquire/maintain customers (Porter, 1998) and resources (Sanchez & Heen, 1997). In various business settings, firms compete and cooperate at the same time to achieve both advantages and viability. This hybrid form of strategy comprising simultaneous cooperation and competition is labelled co-opetition in the strategy literature (Brandenburg & Nalebuff, 1996). In effect, co-opetition is a common attribute of all systems ranging from firms to living species. Evidence from systems theory suggests that any strong association among systems, be it competitive or cooperative, is doomed to depletion (Weinberg & Winberg, 1988). The rest of the section outlines and briefly elaborates on the theoretical insights that can contribute to our understanding of co-opetition.

### Theoretical Frameworks for Co-Opetition

The study of cooperation and competition has been a topic of continuing interest in a variety of disciplines ranging from biology to political science and business strategy (Flake, 2000). Various theoretical frameworks can be employed to shed light on the aspects of this phenomenon, but this paper limits itself to business strategy (Lado et al., 1997). Therefore we ground our statements into game theory, which describes the interaction among agents, transaction cost theory, which suggests the best way to structure such interactions, and resource-based theory, which analyses the gain from pooling agents' resources together.

Evidences from game theory suggest that in the long run cooperation emerges as the evolutionarily stable strategy among competing players (Staffin, 1996). Axelrod (1984) suggests that in the Prisoner's Dilemma game, the players who pursue a co-opetitive strategy gain a higher pay-off as compared to those who play with a competitive or a cooperative strategy. A co-opetition game in open innovation can be described using five components (players, added values, rules, tactics and scope) suggested by Nalebuff and Branderburger (1997), to which

*Table 1. Elements of co-opetition framework*

| Element | Possible Values |
|---|---|
| Players | Customers; suppliers; complementors; competitors |
| Added values | To maximize returns to internal innovation; to incorporate external innovations; to motivate spillovers |
| Rules | Interface design guidelines given by Doz and Hamel (1998) |
| Tactics | four business models proposed by West and Gallagher (2006) |
| Scope | Intra-organizational level |
| Cost | Production cost; transaction cost; dynamic transaction cost |
| Resources | Outsourced capabilities; Retained capabilities |

we add two additional elements, i.e., "cost" and "resources", which we derive from transaction cost theory and resource-based theory.

The seven elements are listed in Table 1 and described in the rest of this paragraph.

Four key role *players* relate to the main company, which can take part in open innovation: customers, suppliers, complementors and competitors (Nalebuff & Branderburger, 1997, p. 30).

On what concerns *added values* West and Gallegher (2006) refer to expectancy theory to find the reasons pushing enterprises to contribute in open source software developments. The assessment of the added values for companies raises two issues, that is, how to calculate such value and how to increase it. Simard and West (2006) propose a set of metrics, whereas West and Gallegher list three major goals of open innovation: to maximize returns to internal innovation, to incorporate external innovations and to motivate spillovers.

The *rules* in this kind of game deal with the risk of lack of compliance. The risk of wrong coordination between companies (West & Gallegher, 2006) is addressed by the design of an interface between companies (Doz & Hamel, 1998).

Referring to *tactics* for open innovation, Doz and Hamel (1998) assess the shift in the kind of relationship between companies, whereas West and Gallagher (2006) describe four business models used by software companies to capitalize their contributions to open sources programs.

On the matter of *scope*, open innovation can be studied at the intra-organizational and firm level as well as at the dyad (i.e., two companies) and inter-organizational level (Vanhaverbeke, 2006). Our work considers a network of companies, which deal with each other. In this sense legal boundaries are hard to be defined, since different business units in the same enterprise could be submitted to different regulations and deal with each other by means of internal service level agreements.

Transaction cost economics (TCE) identifies two types of *costs* associated with the economic exchanges (Williamson, 1999): production cost and transaction cost. Production cost is defined here as the actual cost of the product or the service; transaction cost includes the extra costs associated with an economic exchange that go beyond the production cost. Such costs include the cost of searching and selecting a product or a service as well as the cost of drafting and enforcing a contract. TCE asserts that a firm should acquire a product, a service or a resource externally only when the production and transaction costs are lower than those of producing it internally (Williamson, 1999). Furthermore, it hypothesizes that higher uncertainty, frequency of transactions, and specificity of the assets result in higher risk of opportunism and consequently higher transaction costs associated with the exchange of the good, service or resource (Williamson, 2002).

Based on insights from TCE, co-opetition is a risky business with a higher level of uncertainty than cooperation between non-competitors. This uncertainty leads to higher risk of opportunism, which it is here defined as relational risk that leads to high transaction costs. If two co-opeting companies use a trusted third party to perform the transaction, then the third party will have to manage continuous unilateral interactions with the two companies. Thus, in the long term its main cost would be dynamic transaction costs, defined as "the costs of persuading, negotiating and coordinating with, and teaching other" (Langlois, 1992, p. 124).

On what concerns *resources*, resource-based theory consider a firm as an open system for sustainable value creation and distribution. Derived from resource-based theory the competence-based management (CBM) holds that competition and cooperation between firms occur to attract/retain customers, resources and capabilities. Resources include anything tangible or intangible that could be useful to a firm in developing and realizing products to create economic value in its product markets. Capabilities, on the other hand, are repeatable patterns of action for coordinating resources in processes for value creation. Resources and capabilities can reside both within the boundary of firm (firm-specific) and in the firm's environment (firm-addressable). Thus, a third-party enterprise may rely on resource or capability inputs from entities in their external environment that could be their market competitors to sustain the value creation and distribution processes. In this sense, the reader can refer to the managerial, business and technical core capabilities that an enterprise should have to coordinate a set of competing companies in its supply chain (Joha, 2003; Cox & De Jong, 2005).

## Theoretical Frameworks for Risk Management and Compliance in Co-Opetition

Table 2 presents the elements described in this paragraph, and their link to co-opetition elements. We extend the game theory framework previously presented by defining *relational risk* as "the risk that a partner may fail to honor its commitments" (Das & Teng, 2001, p. 252). As suggested by Das and Teng (2001), the *relational risk* is affected by the *goodwill trust,* i.e., "the expectation that some others in our social relationship have moral obligation and responsibility to demonstrate a special concern for others' interest above their own" (Das & Teng, 2001, p. 255). Control is defined by the combination of three different components. *Behavioral control* "focuses on the process which turns appropriate behavior into desirable output" (Das & Teng, 2001, p. 260). *Output control* is "whether or not the alliances achieve the objectives of the partner firms, given satisfactory cooperation" (Das & Teng, 2001, p. 261). *Social control* "aims at reducing the discrepancies in goal preferences of organizational members through the establishment of common culture and values" (Das & Teng, 2001, p. 262).

To enforce such control firms can use an inter-organizational information system. There are two roles for an inter-organizational information system: *monitoring use* as a supporting activity for social control and *collaborative use* as a supporting element for goodwill trust (Gallivan & Depledge, 2003). This monitoring activity makes the Inter-Organizational System (IOS) a high maintenance system, i.e., a critical resource whose maintenance cost needs to be managed over time. According to the technology adoption model (TAM), the purpose of the IS design is to increase user's *behavioral intention* to use the system, which positively influence the use the system to increase the performance of the alliance. The *use* of the system deserves an additional consideration due to the share of data among co-opeting agents. On the one hand, collaborative use increases the data share and lowers the cost of retaliation if one partner decides to quit the alliance, which Hart and Moore (2007) define as "shading cost." On the other hand, monitoring use increases the chances of quick retaliation if one company tries to disrespect its duties, leading to the agency problem with signalling described by Spence (2002). From TAM, we derive two

*Table 2. Elements of risk management and compliance in co-opetition*

| Element | Link to Co-Opetition Elements |
|---|---|
| Goodwill trust | Players |
| Performance expectancy | Added values |
| Behavioral control | Rules |
| Social control | Rules |
| Output control | Rules |
| Relational risk | Tactics |
| Dynamic transaction costs | Cost |
| Monitoring - collaborative use of IOS | Resources |

determinants positively affecting behavioural intention: *performance expectancy* and *effort expectancy*. Performance expectancy is "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003, p. 447), which we identify as the *alliance performance*; the effort expectancy is defined as "the degree of ease associated with the use of the system" (Venkatesh et al., 2003, p. 450), which we define as the alliance *effort* expectancy. Finally, TAM asserts that the monitoring effort negatively affects the expected performance, which requires a trade-off between too much and too little monitoring.

*Dynamic transaction costs* in our model refer to the monitoring and collaborative uses. A previously mentioned, we refer to (Langlois, 1992) to claim that both uses of the system increase the dynamic transaction cost, which comprises the cost of persuading, negotiating, coordinating with, and teaching co-opeting companies. Such cost increases the required effort, which lowers the performance and the intention to use the system. Hence, the third-party enterprise might decide to externalize part of the required activities.

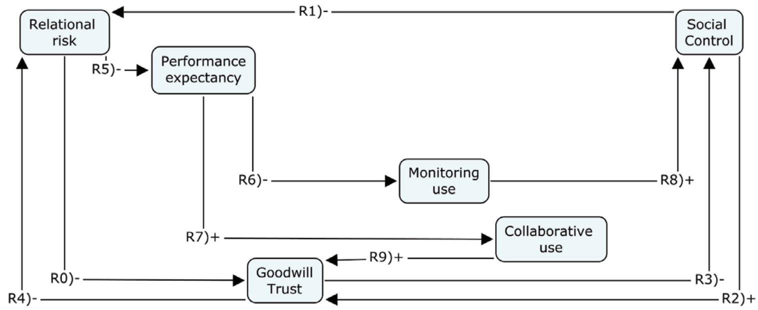
Under the basic assumption that risk, control and trust are correlated, Figure 1 describes how two companies can increase their mutual trust by lowering the risk of cheating and by proving compliance. Each arrow has a name and a sign. A positive sign "+" is used for direct correlation, whereas a negative sign "-" is used for an inverse correlation.

As shown by relationship 0 (R0 in Figure 1), the *relational risk* is affected by the *goodwill trust*. *Social control* reduces relational risk (R1) and increases goodwill trust (R2). Goodwill trust lowers the need for social control (R3) and the perceived relational risk (R4). The expected *alliance performance* has a mediating effect (R5) between relational risk and social control (R6) as well as between relational risk and goodwill trust (R7) (Gallivan & Depledge, 2003). There are two roles for an inter-organizational information system: *monitoring use* (R8) as a supporting activity for social control and *collaborative use* (R9) as a supporting element for goodwill trust.

## Extending the Existing Literature

Co-opetition is a special kind of alliance that deserves additional considerations, which we present here under the shape of research sub-questions. The framework developed by Gallivan and Depledge (2003) applies to the issues surrounding the use of an IOS between firms in an alliance. However, it does not make any distinction between the cases when the firms are competitors (i.e., have a co-opetitive relationship) or non-competitors (i.e., have a collaborative relationship). Taking into account that an alliance between non-competitors precipitates changes in the way that the use of IOS relates

*Figure 1. Relationships among elements of Table 2*




to the performance of the parties, we address this issue as a gap in the IOS literature.

A third-party could make a profit by reducing transaction costs among co-opeting agents. The framework developed by Gallivan and Depledge (2003) identifies two major uses for the IOS: monitoring and collaborative use. Based on the TCE, we claim that the companies can decide whether to internalize or externalize such functions to a third-party as presented in Figure 2. Option A refers to the situation where the IOS is kept in-house by the alliance parties, as described by Golnam et al. (2010). In this case, no third party is involved, and it shall not be treated any further. Option B occurs when the monitoring functions of the IOS is delegated to a third party. In such a case, the third party is mainly an audit company, which monitors the performance of the companies in the alliance. In such a form of alliance, the third-party is not in charge of conducting innovation. Therefore, it shall not be treated any further, since it falls outside the scope of this paper. Option C occurs when collaborative functions such as knowledge sharing between the parties in an alliance are coordinated through a third party.

Option D deals with the involvement of a third party for coordinating the collaborative and monitoring uses of the IOS. This option appears to be unexplored so far. Therefore a research sub-question arises:

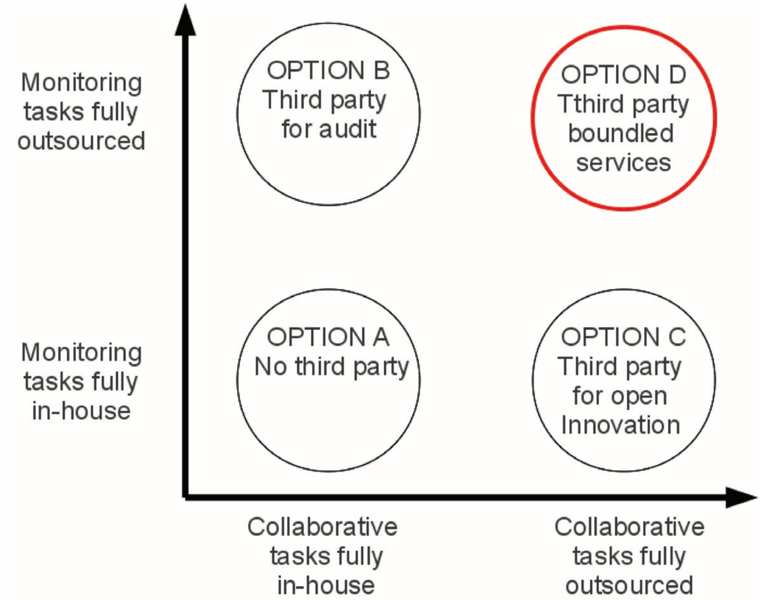
## How to Coordinate the Collaborative and Monitoring Uses of an Inter-Organisational System?

A third party could reduce its monitoring costs by exploiting the potential of its crowds. This form of outsourcing is currently under investigation since Howe (2006) proposed the term "crowdsourcing". In order to be profitable, a third party has to acknowledge that the transaction costs among co-opeting parties are meant to diminish after each interaction. Therefore, a constant reduction of cost is required to assure its existence. For example Mozilla Corporation quality control process is composed of a public process for finding, tracking, and correcting bugs in the code they are developing, and thousands of people are involved (Mendonca & Sutton, 2008). Since we did not find any reference in this sense we derive the following research sub-question:

## How to Crowdsource the Coordination and Monitoring Uses of an Inter-Organisational System?

In conclusion we believe that there is a need to translate theoretical model into a set of useful prescriptions for those, who are involved in the design of the third-party to coordinate co-opeting firms. Thus a third research sub-questions is obtained:

*Figure 2. Externalisation of R and D and monitoring tasks to a third-party enterprise (Option D)*




### Which are the Business Model Components of a Third-Party in Charge of Coordinating Co-Opeting Firms?

In the following section we explain the methodology we use to address our three research sub-questions.

## METHODOLOGY

This section briefly underlines the chosen methodology. It presents the fundamental issues of design research in information system and it introduces the business model ontology used to develop our model.

### Design Science Methodology

The distinguishing attribute of theories for design and action is that they "give explicit prescriptions on how to design and develop an artifact, whether it is a technological product or a managerial intervention" (Gregor & Jones, 2007, p. 313). Therefore we address our three research sub-questions in three steps.

The first research sub-question seeks for an explanation of the dynamics of co-opetition. An information system design theory (ISDT) should define its purpose and scope, i.e., the boundaries of a theory, which in our case is the design of a third-party to coordinate co-opeting firms in open innovation. The second element of an ISDT is the representations of the entities of interest in the theory (i.e., constructs). In addition to that the principles of form and function «define the structure, organization, and functioning of the design product or design method" (Gregor & Jones, 2007, p. 326). Although it is mostly forgotten in most design papers the justificatory knowledge provides an explanation of why an artifact is constructed as it is and why it works. Therefore in the following section we list the elements of our model and we list the causal effects among them, grounding our statements into existing theories.

The second research sub-question concerns the dynamics of such system. According to Gregor and Jones (2007) considerations of artefact mutability describe how flexibility and adaptability may be enabled by feedback loops to refine design. Thus at the end of the following section we propose a loop to make the system economically sustainable.

The third research sub-question call for practical advices to implement and test the proposed model. The principles of implementation concern the means by which the design is brought into being - a process involving agents and actions (Gregor & Jones, 2007, p. 328). Instantiated artefacts are things in the physical world, while a theory is an abstract expression of ideas about the phenomena in the physical world (Gregor & Jones, 2007, p. 328). To define the evaluation strategy of testable propositions, a 2x2 matrix (ex-ante vs. ex-post, naturalistic vs. artificial) is proposed by Pries et al. (2008). Hence, we illustrate with second hand data how a firm can implement and test our proposed model by means of the business model ontology, which is explained in the next paragraph. The second hand data comes from a business case (Lakhani, 2009).

### Business Model Ontology to Develop a Business Model Pattern

According to Osterwalder et al. (2005) a business model ontology (BMO) or canvas can be described by looking at a set of nine building blocks. These building blocks were derived from an in-depth literature review of a large number of previous conceptualizations of business models. In this depiction, the business model of a company is a simplified representation of its business logic viewed from a strategic standpoint (i.e., on top of business process modelling).

As shown in Figure 3 at the centre there is the *value proposition*, which describes which customer's problems are solved and why the offer is more valuable than similar products from competitors. The customers are analysed in the *customer segment*, which is separated into groups to help identify their needs, desires and ambitions. The *distribution channel* illustrates how the customer wants to be reached and by whom he is addressed. In addition, *customer relationships* specify what type of relationship the customer expects and how it is establish and maintained with him. To be able to deliverer the value proposition, the business must have *resources* that they transform through *key activities* into the final product or service.

Most of the time, a business depends on an external *partner network* to provide better quality or a lower price on non-essential components. As any business model would not be complete without financial information, the last two building blocks focus on cost and revenue. The *cost structure* should be aligned to the core ideas of the business model, while the *revenue streams* should mirror the value that the customers are willing to pay and how they will perform the transaction.

By using their business model canvas, Osterwalder and Pigneur (2009) present a set of business model patterns. A business model pattern describes some components of a business model and their relationships as well as how they can be applied to similar situations. As with patterns in other fields, these recurrent solutions for similar problems allow the company to elicitate requirements and ideas for improvements. The following section describes our proposed pattern for third-party enterprises managing co-opeting companies that perform open innovation.

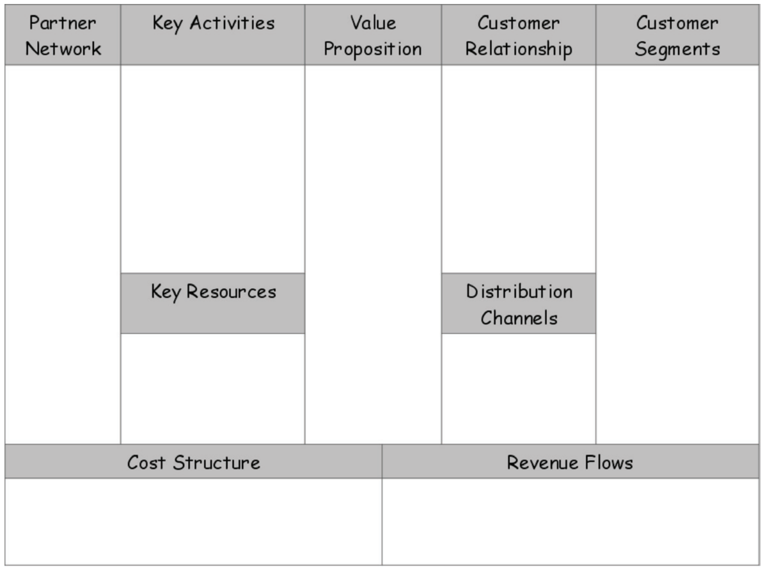
## A BUSINESS MODEL PATTERN FOR CO-OPETITION IN OPEN INNOVATION

This section describes a conceptual model that extends the previous frameworks to give a consistent view of the dynamics of an alliance among co-opeting companies.

### Three Main Loops Derived from the Theory

The system presented in this section has three main functions: monitoring competitors (Figure 4), sharing data for cooperation (Figure 5), and managing the dynamic transaction costs

*Figure 3. The business model ontology*




(Figure 6). We describe in details each of the three figures, by starting with the set of relationships among constructs, which we derive from previous works, and by concluding with the new relationships among constructs, which we propose. As shown in Figure 4 the system supports the creation of formal agreements regarding the innovation alliance by reducing ambiguity among co-opeting companies. Links R1, R5, R6 and R8 in Figure 4 were derived from the existing literature concerning trust, risk and control. From TAM comes a new construct, i.e., the behavioral intention to use the system. The performance expectancy identified as the alliance performance positively affects the intention to use the system, which negatively impacts monitoring use (P1 in Figure 4). Note how the links indicate that P1 has the overall same effect of R6. Therefore, our first set of propositions is the following:

**Proposition 1**: The performance expectancy has a mediating effect between the perceived relational risk and the behavioral intention to use the system.

**Proposition 2**: The behavioral intention to use the system has a mediating effect between the perceived relational risk and the monitoring use of the inter-organizational system.

As shown in Figure 5 the system supports the management of the innovation alliance among co-opeting companies by lowering their knowledge boundaries. Links R4, R5, R7 and R9 were derived from the existing literature concerning trust, risk and control. TAM adds the behavioural intention to use the system. The performance expectancy positively affects the intention to use the system, which positively impact the collaborative use (P3 in Figure 5). Note how the links indicate that P3 has the overall same effect of R7. Therefore, the third proposition is the following:

**Proposition 3**: The collaborative use of the inter-organizational system has a mediating effect between the behavioral intention to use the system and the goodwill trust among co-opeting companies.

*Figure 4. The monitoring use of the IOS to reduce risk among co-opeting agents*

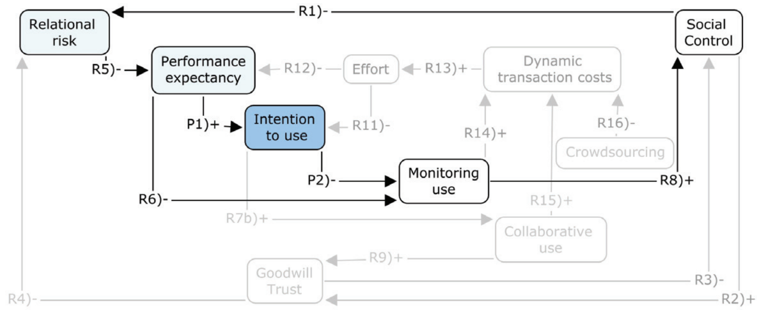



*Figure 5. The collaborative use of the IOS to create value among co-opeting agents*

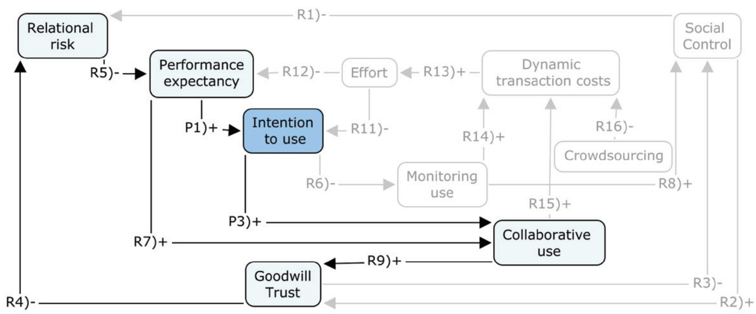
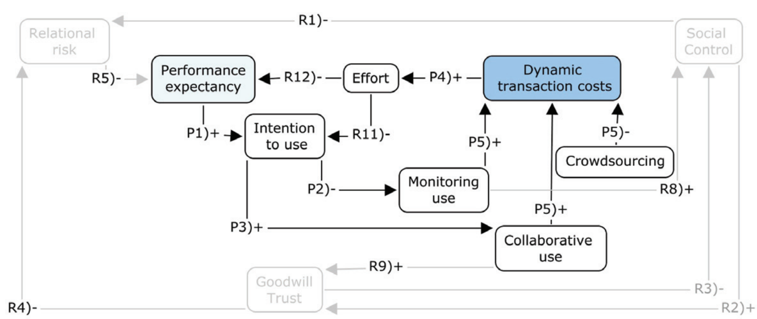



*Figure 6. Crowdsourcing to lower dynamic cost of control*



As shown in Figure 6 to reduce the maintenance cost, co-opeting companies can rely on a third-party enterprise to perform crowdsourcing and to access a wider pool of resources for both R&D and compliance. As previously shown for Figure 5 links R1, R4, R5, R8 and R9 in Figure 6 have been derived in the previous section from the existing literature concerning trust, risk and control. From TAM, come the behavioral intention to use the system and the construct regarding the expected effort. Links R10, R11 and R12 are derived from TAM and have been empirically proven many times in the past. Therefore, the focus here is on the role of the dynamic transaction costs of using the IOS. Such costs increase the expected effort of using the system (P4 in Figure 6). The three links in P5 underline the influence of crowdsourcing to lower dynamic transaction costs and to indirectly increase performance expectancy. Therefore, our final propositions are the following:

**Proposition 4**: There is a direct correlation between the dynamic transaction costs of the alliance and the perceived effort required for using the inter-organizational system.

**Proposition 5**: The dynamic transaction costs of the alliance have a direct correlation with the monitoring use and the collaborative use of the inter-organizational system and an inverse correlation with the implementation of crowdsourcing.

### The Overall Model

We present now the overall picture that includes the three figures previously described. By merging the three loops previously defined, a new conceptual model arises and it extends the theoretical body of knowledge on which it relies. By combining theoretical frameworks of multiple domains, the model presented in Figure 7 gives a more insightful view of a co-opeting alliance and is suitable to support policy, technical and business decisions.

## FROM CONCEPTUAL MODEL TO BUSINESS MODEL PATTERN

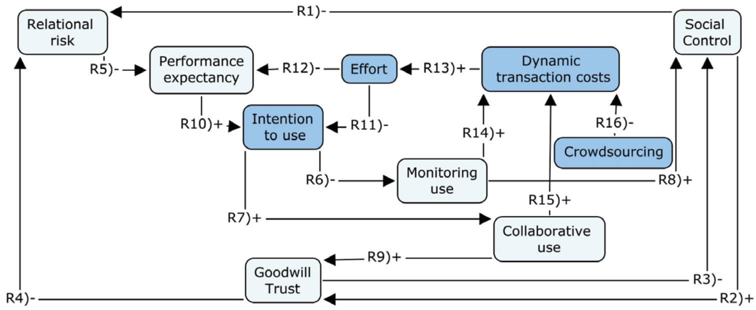
Pries-Heje et al. (2008) proposes a testing methodology for IS design research. In our case, an initial evaluation of our proposition can be performed by collecting expert opinions regarding the positive impact of third-party enterprises on the alliance performance of co-opeting companies. This sort of evaluation would be ex-ante, since the system would not be built yet, and artificial, because it would involve real users of a hypothetical system for real problems (Sun & Kantor, 2006).

As real users (referred here as *problem experts*) are more likely to think in business terms, the rest of the section illustrates how to convert our conceptual model into a set of business model components using business model ontology (BMO).

The intention to use the system and the performance expectancy shown in Table 3 can be tested by a questionnaire for each type of user, identified as a customer segment, using the seven items defined by Venkatesh et al. (2003). We refer to Das and Teng (1999) for the 14 questionnaire items to measure the perceived relational risk.

For the second proposition data from questionnaire is combined with an estimation of the monitoring frequency. To make such an estimate more reliable, we suggest using a scenario-based questionnaire as proposed by Barrett et al. (2006).The test of the third proposition we suggest the approach proposed for the second proposition. To test goodwill trust, we refer to Rempel and Holmes (1986). For the perceived effort in the fourth proposition we suggest using the four items defined by Venkatesh et al. (2003). The dynamic transaction cost can be derived with the same technique used to estimate the number of service requests for collaboration and monitoring. The test proposed for proposition 5 includes the amount of crowdsourcing done to reduce the dynamic transaction costs and can be estimated collect-

*Figure 7. The new conceptual model for risk management among co-opeting agents*




ing expert's opinion by means of scenario-based questionnaires.

Once the business model components are derived, the business model ontology (BMO) supports the implementation of the business model in a company. By managing and enforcing risk management rules at the strategic level this approach allows a company to obtain a consistent solution. Our solution comes as a double-sided business model (Eisenmann et al., 2006) that bases its value proposition on the alignment of different customer segments that gain from the network effect of converging on the same platform. From the three loops, three possible users of the system (i.e., customer segments) are derived: legal agents drafting and implementing agreements for mutual control, business agents seeking new opportunities, and technical agents in charge of containing the IT costs (intended here as total cost of ownership and total cost of failure). Accordingly three value propositions are implemented: relational risk reduction for the legal agent, increase in alliance performance for the business agent and lower dynamic transaction costs for the technical agent. The distribution channel is a centre of excellence in charge of all steps and can take the three shapes presented by Cullen (2008): a best-practices sharing group, a virtual team or a centralized service. The relationship between the business units and the co-opeting agents relies on goodwill trust, which has

*Table 3. Operationalization of our theoretical model using the business model ontology (BMO)*

| Element of our Model | Link to BMO Component | Variable |
|---|---|---|
| Intention to use | Customer Segment | Seven-point Likert scale from Venkatesh et al. (2003) |
| Performance expectancy | Customer Segment | Seven-point Likert scale from Venkatesh et al. (2003) |
| Perceived relational risk | Value Proposition | Seven-point Likert scale from Das and Teng (1999) |
| Monitoring use | Key Activity | # of service requests for monitoring /month |
| Goodwill trust | Relationship | Seven-point Likert scale from Rempel and Holmes (1986) |
| Collaborative use | Key Activity | # of service requests for collaboration /month |
| Perceived Effort | Cost Structure | Seven-point Likert scale from Venkatesh et al. (2003) |
| Dynamic transaction costs | Cost Structure | Cost of negotiation, coordination and training |
| Crowdsourcing | Partners Network | # of services crowdsourced |

been previously defined. The revenue flows include a fee to receive certification of positive behavioral control to be used by the legal agent as a proof of compliance. Another fee to access knowledge concerning best practices is previewed for the business agent, and a fee to access other parties' control results is offered for the technical agent. Social control is achieved by adding access control to the data regarding the outcome of the monitoring and content management activities. To reduce costs, the company externalizes the platform and content development to a crowd of partners and relies on certification entities to reinforce its brand, which is its key resource along with access to the platform. Hence, the cost structure reflects the special nature of a double-sided business model (Figure 8), whose major costs involve the platform development and management as well as the acquisition of solution seekers and providers to gain from network effects.

## HOW TO USE THE BUSINESS MODEL PATTERN: INNOCENTIVE

This section applies our design to an existing and fairly well-known example of open innovation: Innocentive. Spun off in 2000 from Ely Lilly and its new business model incubator e.Lilly, Innocentive is an independent intermediary that allows companies (known as *seekers*) to list their innovation challenges seeking for a solution. The rewards for the scientist solving the challenges (solvers) can reach up to $1,250,000. According to Osterwalder and Pigneur (2009), the Innocentive value proposition lies in aggregating seekers and solvers by means of a platform that allows them to interact. In addition, Innocentive offers to seekers "less risk, more reward" (Innocentive, 2010a), which can be seen as a reduction of relational risk for legal seekers.

In this case, the co-opetitive business agents are seekers and solvers who belong to competing companies. For this purpose, Innocentive assures anonymity among solvers (Lakhani, 2009).The solvers obtain profit from their knowledge; hence, Innocentive allows each solver to sell the intellectual property right without disclosing the know-how that generates it. The legal agent of the seekers profits from the Innocentive consulting service to reduce the relational risk by drafting a good contract that describes the challenge to be solved (Innocentive, 2010b).

Such contract has criteria that define both the quality required for the final outcome (output control) and the process required to achieve the outcome (behavioral control). The consulting service comes together with a training service called ONRAMP. Examples of challenges can be found on Innocentive website or on Lakhani (2009). For technical seekers, Innocentive offers IT cost reduction by hosting the open innovation platform. In this sense, collaborative software called Innocentive@work allows a company to leverage its employees' talent using a secure web portal.

In this case propositions 1, 2, 3 and 4 would find a confirmation as shown in Figure 9. Proposition 5 does not find confirmation, since Innocentive does not crowdsource the quality assessment of the solutions proposed. Lakhani (2009) claims that Innocentive recognizes the need to facilitate exchange among solvers. A suggestion to modify the Innocentive website included limited voting (one for each Solver) to facilitate screening of the solutions. This could be seen as a hint that Innocentive is pondering to crowdsource part of the monitoring effort, a strategic option already shown in our business model pattern.

## CONCLUSION

Our work addresses the management of co-opeting agents performing open innovation. The previous literature has identified two dynamic loops that an alliance should support in order to be successful. Our work extends such a framework by combining control theories, transaction cost economics, resource-based view theory and game theory to obtain the business model

*Figure 8. Business model pattern for co-opeting companies performing open innovation*

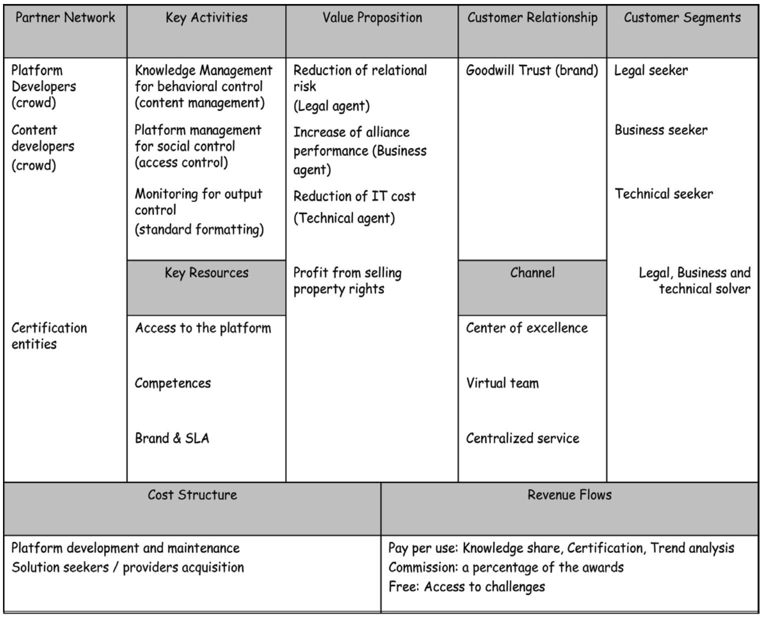
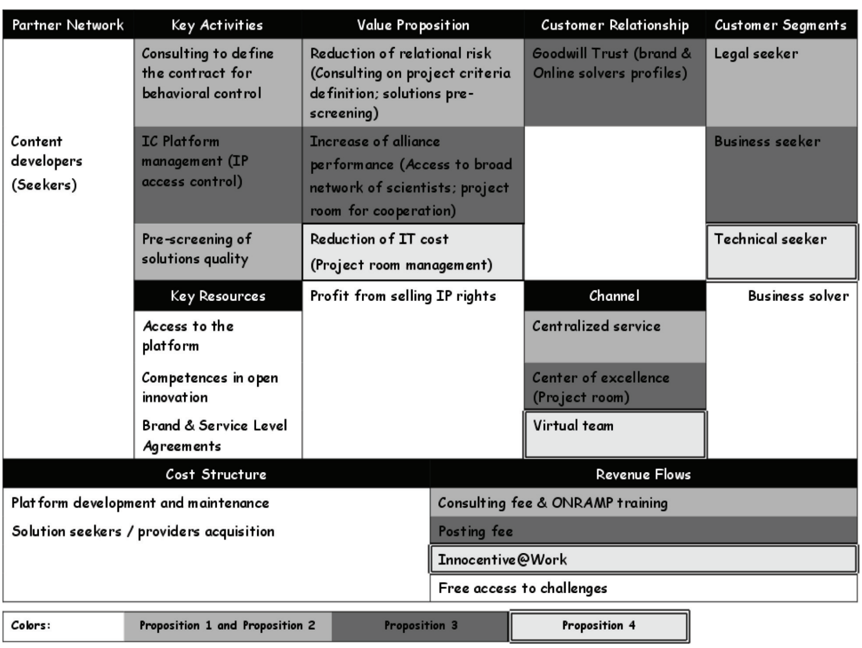



*Figure 9. Innocentive's business model representation gives evidences to support our propositions*



of a third party in charge of risk management in multi-agent contexts of information system regulatory compliance, such as co-opetition in open innovation, in order to achieve sustainable profits. We conclude by answering our three research sub-questions, which we derived by assessing the existing literature on co-opetition and risk management:

### How to Coordinate the Collaborative and Monitoring Uses of an Inter-Organisational System?

We suggest inter-organisational information system (IOS) designers to add features supporting collaborative uses to increase trust among co-opeting agents, whereas monitoring uses of an IOS increase control among co-opeting agents. Such features increase the co-opeting agents' behavioural intention to use the IOS.

### How to Crowdsource the Coordination and Monitoring Uses of an Inter-Organisational System?

We call for a reduction of maintenance cost of an IOS by means of crowdsourcing under the control of a third party. Such reduction makes the system economically sustainable and this reduction in control effort increases the co-opeting agents' behavioural intention to use the IOS.

### Which are the Business Model Components of a Third-Party in Charge of Coordinating Co-Opeting Firms?

We use the business model ontology to derive a business model from the elements of our conceptual model for risk management among co-opeting agents. Such business model is instantiated using the Innocentive case as an illustratory example of how we intend to further test our guidelines.

If our conceptual model is not falsified by the empirical test we briefly sketched, then our contribution will be a framework to achieve compliance among untrusted partners by business model design. From a managerial point of view the contributions of this paper lay in its new ways to obtain a sustainable profit from aligning co-opeting agents involved in open innovation. From an academic point of view, by defining the IT managerial, methodological and technological capabilities and processes, we hope to raise interest of information systems researchers in this direction of investigation, since we believe that such issues fall into the nomological net defined by Benbasat and Zmud (2003).

The theoretical limitations of our claims concern their scope, which focuses on requirements elicitation within an alliance, and its domain of application, which is more likely to work in heavily regulated business fields that rely mostly on intangible assets (e.g., chemistry). In addition to that such claims focus on the individual level of perceptions, leaving aside for the moment the group and the organizational level (Lapointe & Rivard, 2007). That is why, at the theoretical level, we envisage future implementation of our conceptual model using systemic enterprise architecture methodology (Weigmann et al., 2005) instead of the business model ontology to derive technical specifications of the information systems.

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## REFERENCES

Axelrod, R. (1984). *The evolution of cooperation*. New York, NY: Basic Books.

Barrett, M., Garrety, K., & Seberry, J. (2006). *ICT professionals' perceptions of responsibility for breaches of computer security*. Retrieved from http://ro.uow.edu.au/infopapers/383/

Beer, S. (1984). The viable system model: Its provenance, development, methodology and pathology. *The Journal of the Operational Research Society*, *35*(1), 7–25.

Brandenburger, A. M., & Nalebuff, B. J. (1997). *Co-opetition: A revolution mindset that combines competition and cooperation: The game theory strategy that's changing the game of business* (1st ed.). New York, NY: Broadway Business.

Chesbrough, H. W. (2003). The era of open innovation. *MIT Sloan Management Review*, *44*(3), 35–41.

Cox, R., & De Jong, B. (2005). *The right retained team is critical for successful outsourcing*. Stamford, CT: Gartner.

Cullen, A. (2008). *Current practices for IT centres of excellence (CoEs)*. London, UK: Forrester Research.

Das, T. K., & Teng, B. S. (2001). Relational risk and its personal correlates in strategic alliances. *Journal of Business and Psychology*, *15*(3), 449–465. doi:10.1023/A:1007874701367

Doz, Y. L., & Hamel, G. (1998). *Alliance advantage: The art of creating value through partnering*. Boston, MA: Harvard Business School Press.

Eisenmann, T., Parker, G., & Van Alstyne, M. W. (2006). Strategies for two-sided markets. *Harvard Business Review*, *84*(10), 92–101.

Flake, G. W. (2000). *The computational beauty of nature: Computer explorations of fractals, chaos, complex systems, and adaptation*. Cambridge, MA: MIT Press. Retrieved from http://books.google.ch/

Galaskiewicz, J. (1985). Interorganizational relations. *Annual Review of Sociology*, *11*(1), 281–304. doi:10.1146/annurev.so.11.080185.001433

Gallivan, M. J., & Depledge, G. (2003). Trust, control and the role of interorganizational systems in electronic partnerships. *Information Systems Journal*, *13*(2), 159–190. doi:10.1046/j.1365-2575.2003.00146.x

Golnam, A., Sanchez, R., & Weigmann, A. (2010). A systemic approach for modelling and analysis of co-opeting. In *Proceedings of the Fourth Workshop on Coopetition Strategy*. Montpellier, France: EIASM.

Hagel, J. (2002). Leveraged growth: Expanding sales without sacrificing profits. *Harvard Business Review*, *80*(10), 68–79.

Hall, R. H., Clark, J. P., Giordano, P. C., Johnson, P. V., & Van Roekel, M. (1977). Patterns of interorganizational relationships. *Administrative Science Quarterly*, *22*(3), 457–474. doi:10.2307/2392183

Hart, O., & Moore, J. (2008). Contracts as reference points. *The Quarterly Journal of Economics*, *123*(1), 1–48. doi:10.1162/qjec.2008.123.1.1

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *Management Information Systems Quarterly*, *28*(1), 75–106.

Howe, J. (2006). The rise of crowdsourcing. *Wired Magazine Online*. Retrieved from http://www.wired.com/wired/archive/14.06/crowds.html

Innocentive. (2010a). *Challenge-based innovation*. Retrieved from https://www2.innocentive.com/seekers/challenge-based-innovation

Innocentive. (2010b). *How it works*. Retrieved from https://www2.innocentive.com/how-it-works/seekers

Joha, A. (2003). The retained organization after IT outsourcing: The design of its organizational structure. Faculty of technology, policy and management. *Delft University of Technology.* Retrieved from http://api.ning.com/files/gZj3FOxL0ylf1Mqm8gBiHazs-D2Y0Hzts7xKsTMzE695-*WvfaUngabLXIhhi-wXhxZyeWq9dkq9GeVC-fvgA9pb9ZMddM2l-r/The_Retained_Organisation_after_IT_Outsourcing.pdf

Lado, A. A., Boyd, N. G., & Hanlon, S. C. (1997). Competition, cooperation, and the search for economic rents: A syncretic model. *Academy of Management Review*, *22*(1), 110–141.

Laffont, J. J., & Martimort, D. (2002). *The theory of incentives*. Princeton, NJ: Princeton University Press.

Lakhani, K. R. (2009). *InnoCentive.com (A)* (Case No. 9-608-170). Retrieved from http://hbr.org/product/innocentive-com-a/an/608170-PDF-ENG

Lapointe, L., & Rivard, S. (2007). A triple take on information system implementation. *Organization Science*, *18*(1), 89–107. doi:10.1287/orsc.1060.0225

March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. *Decision Support Systems*, *15*(4), 251–266. doi:10.1016/0167-9236(94)00041-2

Mendonca, L. T., & Sutton, R. (2008). Succeeding at open-source innovation: An interview with Mozilla's Mitchell Baker. *The McKinsey Quarterly*. Retrieved from https://www.mckinseyquarterly.com

Osterwalder, A., & Pigneur, Y. (2009). *Business model generation: A handbook for visionaries, game changers, and challengers*. New York, NY: John Wiley & Sons.

Osterwalder, A., Pigneur, Y., & Tucci, C. L. (2005). Clarifying business models: Origins, present, and future of the concept. *Communications of the Association for Information Systems*, *16*(1), 1–25.

Porter, M. E. (1998). *Competitive advantage: Creating and sustaining superior performance*. New York, NY: Free Press.

Rempel, J. K., & Holmes, J. G. (1986). How do I trust thee? *Psychology Today*, *20*(2), 28–34.

Sanchez, R., & Heene, A. (1997). Reinventing strategic management: New theory and practice for competence-based competition. *European Management Journal*, *115*(3), 303–317. doi:10.1016/S0263-2373(97)00010-8

Simard, C., & West, J. (2006). Knowledge networks and geographic locus of innovation. In H. W. Chesbrough, W. Vanhaverbeke, & J. West (Eds.), *Open innovation: Researching a new paradigm*. Oxford, UK: Oxford University Press.

Spence, M. (2002). Signaling in retrospect and the informational structure of markets. *The American Economic Review*, *92*(3), 434–459. doi:10.1257/00028280260136200

Urs, B., & Bütler, M. (2007). *Information economics*. London, UK: Routledge.

Van Rooy, R. (2003). Quality and quantity of information exchange. *Journal of Logic Language and Information*, *12*(4), 423–451. doi:10.1023/A:1025054901745

Vanhaverbeke, W. (2006). The inter-organizational context of open innovation. In H. W. Chesbrough, W. Vanhaverbeke, & J. West (Eds.), *Open innovation: Researching a new paradigm*. Oxford, UK: Oxford University Press.

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User acceptance of information technology: Toward a unified view. *Management Information Systems Quarterly*, *27*(3), 425–478. Retrieved from http://aisel.aisnet.org/misq/vol27/iss3/5.

Wagner, S., & Layton, M. (2007). *The two faces of risk*. Retrieved from http://www.deloitte.com

Weigmann, A., Regev, G., & Loison, B. (2005). Business and IT alignment with SEAM. In *Proceedings of the 1st IEEE International Workshop on Requirements Engineering for Business Need, and IT Alignment*, Paris, France.

Weinberg, G. M., & Weinberg, D. (1988). *General principles of systems design*. New York, NY: Dorset House.

West, J., & Gallagher, S. (2006). Challenges of open innovation: The paradox of firm investment in open-source software. *R & D Management*, *36*(3), 319–331. doi:10.1111/j.1467-9310.2006.00436.x

Williamson, O. E. (1999). Strategy research: Governance and competence perspectives. *Strategic Management Journal*, *20*(12), 1087–1108. doi:10.1002/(SICI)1097-0266(199912)20:12<1087::AID-SMJ71>3.0.CO;2-Z

Williamson, O. E. (2002). The theory of the firm as governance structure: From choice to contract. *The Journal of Economic Perspectives*, *16*(3), 171–195. doi:10.1257/089533002760278776

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