2008

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21st Bled eConference
eCollaboration:
Overcoming Boundaries Through Multi-Channel Interaction
June 15 - 18, 2008; Bled, Slovenia

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Abstract
The organizational practices required by dynamic market demands and increasing competitive markets include the formation of networked businesses. For the participants in a networked business to be able to promptly react to customers' needs, they must set up as cornerstone a well-defined collaborative partnering structure. This paper first describes a framework that assists in the design of networked businesses. Then it discusses some approaches, such as object-oriented modeling, multi-agent modeling, and the use of ontological modeling as tools for designing networked businesses. However, these tools have fundamental shortcomings when dealing with the partnering structure concept. The paper proposes a new multi-method approach for the formalization of such a structure. Using an example, we illustrate that existing approaches for value modeling, roles specification, and responsibilities definition can be used successfully if employed in a unifying way to address this structure concept.

Keywords:
Structure formalization, value modeling, roles specification, networked business.

1 Introduction

Networked businesses are "mix-and-match" collaborative networks of profit-and-loss-responsible business units, or of independent organizations, connected by IT that work together to jointly accomplish tasks, reach common goals and serve customers for a specific period of time (Santana Tapia 2006). The networked business (NB) idea came together with the trend for globalization, the advanced use of IT and the worldwide connectivity provided by the internet to reduce transaction costs (Santana Tapia 2006, p.5-8) and to gain competitive advantage.

* The authors are supported by the Netherlands Organization for Scientific Research (NWO) under contract number 638.003.407 (Value-Based Business-IT Alignment).

The term 'specific period of time', included in our definition of NB, refers to the dynamic behavior of networks. NBs are dynamic and can change from moment to moment (Champy 2002; van Heck and Vervest 2007). Participants need to react to customer needs having well-defined collaborative work structures as basis. Organizations will collaborate while an interesting business opportunity exists. When the business opportunity is over, the NB dissolves while, perhaps, the organizations are active in other NBs or look for new business opportunities.

In recent years some attempts have been made to formalize NBs in different ways (e.g., Faulkner et al. 2004; Gordijn and Akkermans 2003; Gordijn and Tan 2003; Steen et al. 2002; Wegmann et al. 2007; Yu 2006). Although they are well-founded work, those studies concentrate on the combination of information to reach the networks' goals, the relations among the participants, the design of trustworthy control procedures, what makes the networks effective, how to align business and IT, and how to optimize e-business values, leaving behind an important issue: the definition of the structure of the entire NB to rule the network processes.

Partnering structure is a new concept we devised to conceptualize the requirement of such a structure in NBs. As our research is focused on value based settings, we explore the partnering structure concept in that context and focus thereby on how (semi)formal techniques can help to formalize it from a value perspective. This paper is an extension of previous work (Santana Tapia and Zarvic 2007). It presents our approach to design the structure of a NB combining the strength of three techniques: the *e³-value* methodology (Gordijn and Akkermans 2003), the $\mathcal{M}$OISE$^+$ specification (Hübner et al. 2002) and the RAsCI matrix (Dressler 2004).

In the rest of this section, we first elaborate on the partnering structure concept. This serves as background for the rest of the paper, which is organized as follows: Section 2 deals with a framework to design NBs. Section 3 discusses NB modeling approaches. Then, in Section 4, we present our approach using an illustrative example and in Section 5, we assess it. Finally, Section 6 concludes the paper.

1.1 Partnering Structure Concept

Setting up a common goal for business partners is an important issue to consider when working collaboratively. We claim that a NB must be structured in such a way that it increases the chances of success of the common goal. In many NBs, it is typical that the goals of the participants are different but complementary. The way to have mutual gain, even though there could exists a disconnection in goals, is to converge in a common goal and to stress the definition of roles and responsibilities to structure the collaboration.

As noted above, dynamics is an important characteristic in successful NBs. Therefore, networks need a governance process which allows a clear definition of authority and roles among the participants. This is one of the issues to consider when designing a NB (see Section 2). Without such a definition, beyond a certain scale a NB can become too complex for effective control. We define partnering structure as the *cross-organizational work division, organizational structure, and roles and responsibilities formalization that indicate where and how the work gets*

done and who is involved (Santana Tapia et al. 2007b). The partnering structure of a NB is one of the bases of the entire network when achieving collaborative business-IT alignment (see Figure 1). Understanding of both partnering structure and IS architecture is needed to efficiently support the process architecture of the NB. Coordination, then, comes next to manage the dependencies among the collaborative activities (Santana Tapia et al. 2007b).

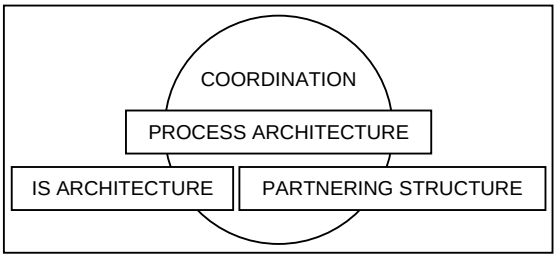

Figure 1: Important topics in a NB context.

The next section presents a framework to design a NB. In this framework, we position the design of partnering structure as one of the steps to design the network.

2 A framework for Designing NBs

The design of a NB covers different topics ranging from the moment when organizations find each other to collaborate, to the definition of appropriated coordination mechanisms. In an early paper (Santana Tapia et al. 2007b), we have presented these different topics using Figure 1. A detailed version of these topics, when achieving collaborative business-IT alignment, is shown in Figure 2. It addresses the four topics introduced in Figure 1 presenting a clear decomposition of the partnering structure concept. Since we are following an organization-centered approach to design a NB (i.e., the organization and structure of a NB must exist *a priori* and the participants ought to follow it), the first five steps of our framework are performed compulsorily before the rest. The framework covers the following steps:

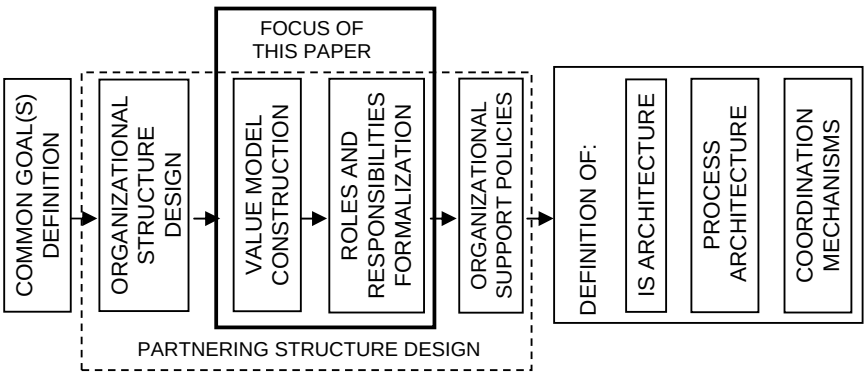

Figure 2: NBs design: a high level view.

Common goal(s) definition. Participants in a NB can be seen as distinct loosely coupled stakeholders with commonly conflicting interests and goals (Damian 2007; van Hooff et al. 2007). However, if they want to collaborate, they need to

formulate a clear-enough common goal(s) toward which they strive together. This goal is not necessarily the goal of all partners. The common goal is an agreement among the customer-faced organization and its direct partners. This common goal might include also other participants in the NB, but not necessarily.

Organizational structure design. Organizational structure forms part of the partnering structure concept we are studying. Once the common goal is established, the structure of the NB needs to be defined. This structure will be the framework for other organizational design decisions and will determine the placement of power and authority in the collaboration. Much has been said about organizational structures for NBs (e.g. Capaldo 2007; Galbraith 1995). So, we will not discuss this concept focusing on the next two steps of our framework.

Value model construction. The value model construction is the first step in settling down the roles and responsibilities of the NB participants. Using a value model, organizations can visualize its current position in the market and identify the creation, distribution and consumption of things of economic value. In addition, as it will be shown in Section 4, a value model can also help to identify the main activities involved in the business opportunity the NB fulfills. A value model helps a NB achieve high functioning by providing a holistic view of its operation in a specific business opportunity. As a result, the work division and roles and responsibilities definition become easier tasks.

Roles and responsibilities formalization. Once the value model has been constructed, responsibilities, governance and the embedded logic within the NB can be established. A participant can play different roles in a network (Galbraith 1995; van Heck and Vervest 2007; van Hooff et al. 2007), from specialist, i.e., an organization who performs one or few activities and provides services (e.g., a supplier of technology within a NB), to network integrator, i.e., a dominant participant who attempts to coordinate the activities performed by everyone in the NB. By analyzing the main activities identified in the value model, it is easier to define who is involved in each activity to establish a governance structure.

Organizational support policies. The next step in our framework is the definition of policies to regulate the entire NB. These are the rules that govern the activities of the network. As participants can deviate from the expected behavior, e.g., they could behave opportunistically, the NB needs instruments to control the behavior of the participants. Such policies help (i) achieve trust and commitments, and (ii) regulate issues as the agreements on information sharing and the setting up of proper incentives and measures for right and wrong behaviors, respectively.

IS architecture definition. In a NB, each participating organization has developed its own IS architecture independently of the other organizations. Each organization has specific capabilities captured in the information systems that support its business processes. When such organizations decide to collaborate, they need to create interfaces between systems that will be useful for the collaborative work. They also need to define which information systems are going to be linked and which ones will be individual-owned but will support the network processes.

Process architecture definition. Processes are the vehicle through which an organization delivers its products or services. They are the structure for action that enables the definition of coordination mechanisms. In a NB context this architecture takes a vital role because participants need to integrate both IT processes and business processes when they have to define and manage the collaborative processes for reaching the common goal(s) and for exchanging information. With such process architecture, they can formalize what processes will be performed in collaboration, and what processes will be owned by each organization (Champy 2002).

Coordination mechanisms definition. In a situation where independent NB participants need to collaborate, they necessarily need to coordinate their activities to manage dependencies. So, coordination mechanisms are unavoidable (Champy 2002; Daneva and Wieringa 2006). We acknowledge the fact that cross-organizational coordination is a very subtle characteristic of a NB and we include it in our framework for designing NBs. This decision rests on the fact that proper coordination mechanisms reduce costs and improve productivity and control (Santana Tapia et al. 2007a).

After having explored the eight steps of our framework for NB design (Figure 2), we will concentrate in the remainder of this paper on steps 3 and 4, namely value model construction and roles and responsibilities formalization respectively. First, in the next section, we discuss several NBs modeling approaches.

3 Approaches for Modeling NBs

In this section, we analyze the advantages and shortcomings of three organization modeling approaches, namely object-oriented modeling, multi-agent representation and ontology approaches, while addressing part of the framework for designing NBs. These approaches form the foundation of the proposed multi-method approach described in the next section.

3.1 Object-oriented Modeling

Object-oriented modeling provides an effective solution to model organizations in a dynamic competitive environment, such as in NBs settings (Peters et al. 1999). The features and advantages of the object-oriented approach provide a proven basis for developing reconfigurable business models (Eriksson and Penker 2000; Marshall 1999).

Object-oriented modeling considers phenomena (i.e., processes and/or activities) as whole entities just as they are in real-life settings. At a high level of abstraction, similar phenomena are grouped based on their characteristics. These groups form classes. All aspects of a particular phenomenon are encapsulated into a class representation. This representation is then a repository of information related to the phenomenon. Object-oriented modeling allows designing several views of a NB. However, despite the obvious advantages, the object-oriented modeling does not support well all the concepts related to NBs. Using this approach, we can model organizational structures by means of classes and object diagrams (e.g., hierarchically nesting organizational units), but it cannot model responsibilities to formalize roles.

3.2 Multi-agent Representation

The multi-agent representation maintains the advantages of the object-oriented modeling but introduces specializations to represent real-life organizational entities. The use of agents to describe NBs allows considering properties that are shared by the participants and properties that differentiate each organization from the other participants. Most important, these properties allow each agent (i.e., a participating organization) to explicitly consider its own goals, plans and actions, the goals, plans and actions of other agents to meet the common goal(s) considering the available resources.

More than 10 years ago, Rajan (1996) began to address the use of agents for NBs. Recently, Dodd and Kumara (2001) discuss the use of multi-agents for supply chains. They propose to change the conventional supply chain model into a complex multi-agent network to manage efficiently the collaborative work. Hübner et al. (2005) also review the use of the multi-agent approach for NBs. They propose a language to represent contracts in the network. Although this work formalizes part of the partnering structure concept, it does not provide a clear distinction between an agent and the role it plays in the NB. As it will be presented in Section 4, this distinction is required to identify function-specific activities that are the start point for the specification of roles.

3.3 Ontology Approaches

An ontology is a framework that provides a shared and common understanding of a domain that can be communicated among different parties (Fensel 2001). An ontology creates a formal representation of a domain. A criticism of traditional organizational models is that they often take individualistic perspectives. They often are single-use models that cannot be shared. Developing a shareable representation of the organization facilitates the design of the organization itself. This is important when different organizations joint to collaborate. A NB ontology assists in having a common understanding of the network to integrate information systems and processes of the participants. *e*^{3}*-value* (Gordijn and Akkermans 2003) and SEAM (Wegmann et al. 2007) are examples of this kind of ontologies.

While NBs bring in additional requirements to organizational issues, the concepts and techniques being developed within these three approaches are useful to model NBs. However, they only represent particular views of the NB, excluding the formalization of its partnering structure. The next section presents a new approach to deal with this formalization.

4 Using Techniques in the NBs Framework

The activities outlined in the NBs framework (see Figure 2) need to be refined with concrete techniques. Using an illustrative example, in this section we present a multi-method approach to design the partnering structure of a NB. We concentrate our work in the value model construction and the roles and responsibilities. We use three well-known techniques: the *e*^{3}*-value* methodology (ontology approach), the $\mathcal{M}$OISE$^+$ specification (multi-agent representation that includes ob-

ject-oriented advantages) and the RAsCI matrix (organizational tool). For detailed descriptions of these techniques, please refer to Gordijn and Akkermans (2003), Hübner et al. (2002) and Dressler (2004), respectively. The rational for using these three specific techniques is based on the following:

- *e³-value* methodology seems to be suitable for analyzing organizations that exchange objects of economic value with other organizations; situation that suits the value based settings where our research is focused.
- $\mathcal{M}$OISE$^+$ specification attempts to join the three organizational dimensions (i.e., functional, structural and deontic) in which commonly multi-agent representations are classified.
- RAsCI matrix is a simple organizational tool that is easily readable by practitioners of organizations that participate in real-life NBs; it simplifies the possible complexity of the two previous (semi)formal techniques.

We use as example the case of Netflix (http://www.netflix.com), an online DVD-rental company who offers an alternate "brick and click" channel to rent DVDs. Customers can get as many DVDs as they want for a flat monthly fee. They can keep the DVDs for as long as they want. When a subscriber, i.e., a customer, returns one or all of them, the next selection on his DVD priority list is mailed out. Standard return dates and late fees do not exist anymore for a Netflix's customer.

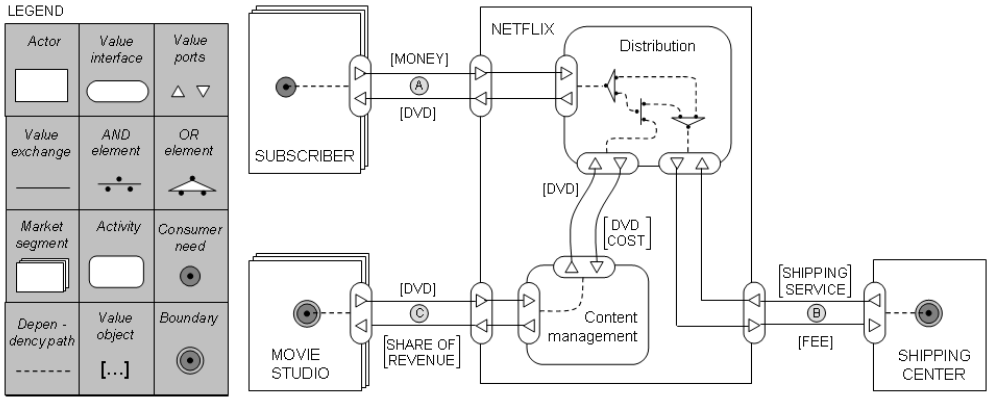

Figure 3: Netflix e³-value model.

4.1 Value Model Construction

To construct a value model, the *e³-value* modeling technique is used. It is an approach to help stakeholders solve the problem of designing a NB. The main objective of a value model is to explore the economic feasibility of new e-business networks, by focusing on the concept of economic value, which is exchanged reciprocally between the participants. Figure 3 presents an illustrative part of the *e³-value* model of Netflix. To respond to the subscribers' needs, Netflix deals with one market segment and one actor, i.e., the movie studios and the shipping center, respectively. Netflix has risk-sharing alliances with movie studios including DreamWorks, Twentieth Century Fox, and the like. The deals give the studios a share of the rental revenues and equity in Netflix's business. In return, 80% DVDs that Netflix gives out come from the studios. To send such DVDs to the subscribers, Netflix outsourced the shipping risk to the U.S. Postal Service.

A service is defined to be "a provider/client interaction that creates and captures value" (IBM 2004; Zarvic et al. 2007). In our research all value object transfers (arrows in *e³-value*) between the participants/actors in a NB are candidates for services, as far as they represent the interactions mentioned in the above definition. However not all value object transfers represent services in the NB. Only the arrows that originate at a provider represent the service itself. The arrows from a client to a provider represent the reciprocal obligation to refund the delivery of the service. Such an arrow reflects the principle of economic reciprocity, on which the *e³-value* ontology is actually built. In recent work O'Sullivan et al. describe a similar concept, namely the "obligation of payment" as a non-functional property of a service (O'Sullivan et al. 2002). However, these authors consider only monetary value objects, such as money, fee, or payment. In *e³-value*, the reciprocal obligation is not limited to monetary value objects, but can be any object of value. For instance, a person might rent a movie only if she provides her personal data to become a subscriber. The personal data represents the reciprocal refund and is not of monetary character in first line, but is valuable for the service provider (Netflix), who can use it for marketing purposes.

Now, for distinguishing which arrow represents a service and which one the reciprocal obligation to refund the service, it is important to identify which function an actor in a NB can have. These functions are not the roles. The identification of functions only helps to find the function-specific activities of each actor. In its simplest form an actor can be either a (service) provider or a (service) client, but an actor can also hold multiple functions, i.e., it can be both, a provider and a client. In the following we describe how to identify functions on the basis of an *e³-value* model. A start stimulus in *e³-value* represents a consumer need, which suggests that actors containing such a concept are clients. In our example the subscriber is therefore a client. All arrows coming to the client represent the service(s), which tells us that Netflix is the provider. Arrows leaving the client represent the refundment. By following the dependency path in Netflix we reach the interaction between the store and the shipping center (interaction B). In this interaction Netflix is the client and the shipping center represents the provider. The arrow coming to Netflix is the service and the arrow leaving Netflix towards the shipping center represents the reciprocal obligation for refundment. The same applies to the movie studios (interaction C). Table 1 shows the functions of the actors in the Netflix case.

Table 1: Actors' functions in the Netflix case

Service Interaction	**Actors involved**	**Provider**	**Client**
DVD *for* money	Subscriber		X
	Netflix	X	
DVD *for* share of rental revenue	Movie studio	X	
	Netflix		X
Shipping service *for* fee	Shipping center	X	
	Netflix		X

After having identified which actor has which function, the assignment of function-specific activities for each interaction is a straightforward task (see Figure 4). We

distinguish here between provider-specific activities which realize the delivery of the value object (service from provider to client), and client-specific activities which request and refund service provision. Such a distinction is useful as far as it limits the activities to be performed by individual actors in the NB. From the $\mathcal{M}$OISE$^+$ point of view, these two kinds of activities are the goals that each participating organization needs to achieve to collaborate achieving the common goal of the NB. Therefore, they are the start point for the specification of roles as shown in turn.

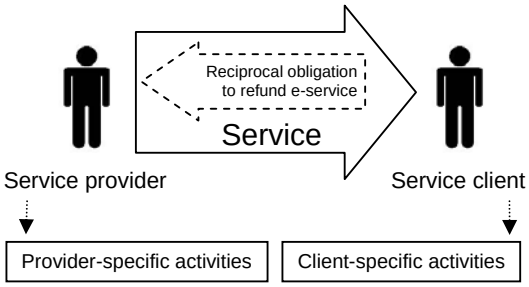

Figure 4: Function-specific activities during the service provision process.

4.2 Roles and Responsibilities Formalization

For the formalization of roles we use $\mathcal{M}$OISE$^+$. Both the market segments and the actors in the *e*^{3}*-value* model are the roles we use for the $\mathcal{M}$OISE$^+$ specifications. When a new actor enters to the NB, such an actor must follow the specific role of the market segment it is entering or of the actor it will be. If that is not the case, the actor can be replaced with a new organization, for instance, when there is a failure in compliance of its actions with respect to its role. Following a customer-centric approach, these specifications show the provider-specific activities of each actor starting from a consumer need and following the dependency path to identify what is required to satisfy such a need. Having this in mind, we get the specifications presented in Table 2.

Table 2: Specifications of roles using $\mathcal{M}$OISE$^+$

Role *DVDrentalCO, i. e., Netflix*	
Activities	• to manage the content acquisition • to distribute the DVDs
Goals	g_1 : *ManageContent* g_2 : *DistributeDVD*
Plans	$p_1(g_1) = a_2(r_1, r_2); a_5; a_3(r_3, r_4); a_4; a_1$ $p_2(g_2) = a_6(r_5); a_7(r_5, r_6)$
Actions	a_1 : *manage relationships with studios* a_2 : *keep abreast of the industry* a_3 : *define SLAs* a_4 : *acquire DVDs* a_5 : *contact movie studios* a_6 *: route DVDs* a_7 : *give packages to shipping centers*
Resources	r_1 : *dailies & trades* r_2 : *Hollywood events* r_3 : *DVD list* r_4 : *companies information* r_5 : *DVDs* r_6 : *customers information*

Role *Movie Studio*	
Activities	• to offer DVDs to Netflix • to provide new releases information
Goals	g_3 : *OfferDVDs* g_4 : *ProvideInfo*
Plans	$p_3(g_3) = a_3(r_3, r_4); a_8(r_5)$ $p_4(g_4) = a_9(r_7)$
Actions	a_8 : *give DVDs to Netflix* a_9 : *send releases information to Netflix*
Resources	r_7 : *releases information*

Role *Shipping Center*	
Activities	• to give shipping service to Netflix
Goals	g_5 : *GiveService*
Plans	$p_5(g_5) = a_3(r_4); a_{10}, a_{11}(r_5, r_6, r_8)$
Actions	a_{10} : *receive DVDs and information* a_{11} : *deliver packages*
Resources	r_8 : *transportation means*

To specify the relations among goals, $\mathcal{M}$OISE$^+$ uses the term "social scheme" (Hübner et al. 2002) which is essentially a goal decomposition tree. Figure 5 presents the social scheme for Netflix.

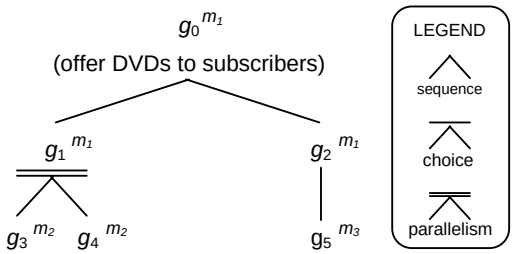

Figure 5: Social scheme for the Netflix case.

In a social scheme, a mission (*m*) is a set of goals that an organization can commit to. A social scheme is represented by a 5-tuple $\langle \mathcal{G}, \mathcal{M}, \mathcal{P}, mo, nm \rangle$ where $\mathcal{G}$ is the set of goals, $\mathcal{M}$ is the set of mission labels, $\mathcal{P}$ is the set of plans that builds the tree structure, $mo: \mathcal{M} \rightarrow \mathbb{P}(\mathcal{G})$ is a function that specifies the mission set of goals, and $nm: \mathcal{M} \rightarrow \mathbb{N} \times \mathbb{N}$ specifies the number (minimum, maximum) of agents that have to commit to each mission, by default, this pair is $(1, \infty)$. The social scheme for Netflix is, finally, specified as:

$\langle \{g_1, g_2, g_3, g_4, g_5\}, \{m_1, m_2, m_3\}, \{\text{“}g_0 = g_1, g_2\text{”}, \text{“}g_1 = g_3 \parallel g_4\text{”}, \text{“}g_2 = g_5\text{”}\}, \{m_1 \mapsto \{g_0, g_1, g_2\}, m_2 \mapsto \{g_3, g_4\}, m_3 \mapsto \{g_5\}\}, \{m_1 \mapsto (1, \infty), m_2 \mapsto (1, \infty), m_3 \mapsto (1, \infty)\}\rangle$

In NBs, lack of trust among the participants can be commonly found (Gordijn and Tan 2003; Hulstijn et al. 2005). For example, the shipping center does not want to ship the DVDs without first receive payment, but Netflix could not want to pay before the DVDs have been shipped. To formalize these trade procedures $\mathcal{M}$OISE$^+$ specifies permissions and obligations of a role on a mission as follows: a permission *per(p, m, tc)* states that an organization playing the role *p* is allowed to commit to the mission *m* in a time constraint *tc*. Furthermore, and obligation *obl (p, m, tc)* states that an organization playing the role *p* ought to commit to *m* in the period *tc*. So, we get:

$\langle \{obl(p_{\text{DVDrentalCO}}, m_1, Any)\}, \{obl(p_{\text{MovieStudio}}, m_2, Any)\}, \{obl(p_{\text{ShippingCenter}}, m_3, Any)\}\rangle$[1]

So far, we know how we can formalize the roles of the participants in a NB. This formalization can tell us who is responsible for what. However, in a NB context, the definition of roles is not enough, as different organizations are involved in different activities in different ways, e.g., one organization needs to be informed about certain activities and another organization supplies only support for their execution. In the following, we present a technique to deal with this situation.

According to our approach, a clear definition of duties needs to be established in order to define the organizational support policies (see Section 2). These duties are what participants in a NB have to do to make the activities happen, e.g., who is going to approve a work, who is going to be informed, who will provide consul-

[1] In the Netflix case, we only can find obligations for the strength of the missions as for the formation of the NB, rigorous SLAs need to be established to respond on time to customers' needs.

tancy, etc. To do this, we use the RAsCI matrix. The RAsCI matrix is not widely used and investigated by the research community. However, it is a well-known method among business practitioners. Researchers involved in NB studies focus more on topics outside the partnering structure concept (see Figure 2), e.g., the study of complex cross-organizational processes and flows in NBs. Establishing the responsibilities in the network is an issue that commonly is overlooked. However, we believe it is important to give a clear insight into the relations of NB participants with respect to the activities to perform. Figure 6 presents the RAsCI matrix for Netflix.

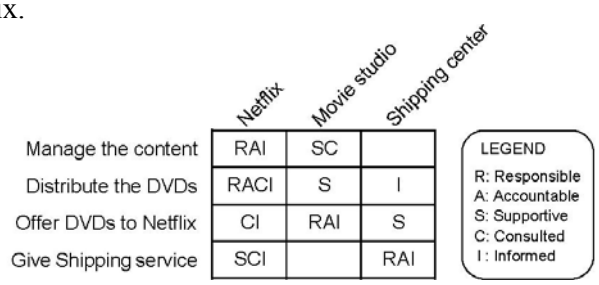

Figure 6: The Netflix RAsCI matrix.

It must be noted that RAsCI is usually used within single enterprises. For our purpose, we apply the RAsCI method on the network level, so that we can actually not talk anymore about 'functions' in this context, but we talk about the participants in the NB, i.e., roles. The RAsCI method helps us to define who is involved in which provider-specific activity in which way.

5 Assessment of the approach

We made a first step towards assessing the main strengths and disadvantages of our approach. We used it to identify some difficulties in our approach and future research activities to confront them.

The *e³-value* methodology. In our framework, *e³-value* is used to define how economic value is created and exchanged within a NB. As *e³-value* combines the IT systems analysis with an economic value perspective from business sciences (Gordijn and Akkermans 2003), using the *e³-value* methodology for value modeling helps to gather information related to the participants in a NB and to make them understand the whole network as a value system. With such information, function-specific activities can be assigned to each participant to manage effectively the required processes responding to customers' needs.
Currently, there exists a community using *e³-value* which may facilitate knowledge transfer, i.e., we may transfer other's work to our NBs framework while making our approach attractive for this community. The main drawback on the use of *e³-value* is that it is often difficult to identify NB boundaries, e.g., an actor might consume also services by other actors and the decision whether to include those actors in the value model or not, can lead to completely different NB designs.

The $\mathcal{M}$OISE$^+$ specification. $\mathcal{M}$OISE$^+$ is an organizational model for multi-agent systems. Multi-agent systems theory is suitable to our approach since a NB context can be seen as an open multi-agent system. By using $\mathcal{M}$OISE$^+$, we express what the role is and which the responsibilities are for each participating organization

who assumes a specific role in the NB. The specification of roles in a NB has a number of advantages. First, it can be used as a meta-model for designing the process architecture of the network, e.g., the activities identified in $\mathcal{M}$OISE$^+$ can be used when creating cross-organizational activity diagrams. Second, it allows a model-based cross-organizational application development for the IS architecture definition, e.g., the $\mathcal{M}$OISE$^+$ specifications can be used as role-based access control model. Third, based on the role specification, corresponding duties can also be specified for each NB participant.
By including the $\mathcal{M}$OISE$^+$ specification in our approach, we are devising a multidisciplinary framework that can also be attractive for the multi-agent systems community.

The RAsCI matrix. We include the RAsCI matrix in our approach because of its popularity among business practitioners (and despite the fact that it is by and large ignored by the research community). As we are interested in the utility of our approach in real-life business settings, we complement all the analysis made by the *e^3-value* methodology and the specifications of $\mathcal{M}$OISE$^+$ with a simple organizational tool that is easily readable by the stakeholders of organizations that participate in real-life NBs. Our position is consistent with Hevner et al. (2004) who state that new approaches need to be comprehensive and useful for the environment to contribute to the knowledge base.

6 Conclusion

In this paper, we have presented a framework for designing NBs reporting the state of affairs of the partnering structure concept included in the framework. We have shown that an integrated approach based on existing techniques for value modeling, roles specification, and responsibilities definition is promising to deal with this issue. These three techniques (*e^3-value*, $\mathcal{M}$OISE$^+$ and RAsCI) have been successfully used in modeling different aspect of organizations that collaborate to achieve a common goal. Complementing each other, they seem to be a good approach for supporting the partnering structure design in NBs.

At this stage, it is too early to conclude under what circumstances this technique-based approach proves its value best. However, we have applied our approach in a real-life case to illustrate its application and initiate its evaluation. Although preliminary, this application of the approach helped us to identify issues for future work:

- Combining the three techniques helps participants to understand better the NB at large. In future work, we aim to find how to provide more integrated support and guidance for applying our approach.
- At the moment, the three techniques are not linked to each other clearly. A formal meta-model describing the relations among them will be required for a more mature version of our approach.

Acknowledgments

Thanks goes out to Maya Daneva for her comments that benefited part of the paper.

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