Formalization of the Partnering Structure for Networked Businesses

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Contents

List of Figures

List of Tables

Abstract

Rapidly changing market demands and increasing competitive pressure cause many businesses implement changes to the way they conduct business. One of these changes is the decision to collaborate with other businesses, forming what we call a 'networked business'. Networked businesses are formed by different organizations working together to reach a common goal. For the participating organizations in a networked business to be able to promptly react to their customers' needs, they must set up as cornerstone a well-defined collaborative partnering structure. In this report we discuss the partnering structure of networked businesses and present a framework for its formalization. Using a case study, 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.

Chapter 1

Introduction

Networked businesses are "mix-and-match" webs of profit-and-loss-responsible business units, or of independent organizations, connected by IT that work together for a unifying purpose for a specific period of time [1]. This concept arises partly from the attempts of geographically dispersed organizations to build formal collaborations to gain a competitive advantage [2]. The most important point of this reasoning is to be able to use external resources without owning them. The networked business (NB) idea came together with the trend for globalization and the advanced use of IT to reduce transaction costs.

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 [3, 4]. Participating organizations need to react to customer needs having well-defined collaborative work structures as basis. Organizations will collaborate during the time that an interesting business opportunity exists. When the business opportunity is over, the NB dissolves while, perhaps, participating 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., [5, 6, 7]). However, those studies concentrate on the combination of information to reach the networks' goals, the relations among the participants, and what makes the networks effective, leaving behind an important issue: the definition of the structure of the entire NB to rule the network processes.

In this report, we present an approach to design the structure of a NB combining the strength of three techniques: the e^3-*value* methodology [6], the $\mathcal{M}$OISE$^+$ specification [8] and the RAsCI matrix [9]. Specifically, we focus our approach on the definition of roles and responsibilities of the participating organizations. The rest of this report is organized as follows: Chapter 2 provides an overview of the partnering structure term. Chapter 3 deals with a framework to design such a structure. Then, in Chapter 4, we present our approach using an illustrative example and in Chapter 5, we assess it. Finally, Chapter 6 concludes the report.

Chapter 2

Partnering structure term

In an earlier work [10], we have stated that partnering structure[1] is an important issue to consider when aligning business and IT in NBs. In this chapter, we present this term emphasizing its nature and impact in collaborative work.

A common goal is an important issue to consider when working collaboratively. We claim that a NB must be structured so that the common goal will succeed. In a NB, one organization can, for instance, have the goal of internationalization and other can desire to gain associated economies of scale whereas a third one may want to take seemingly more passive role as a supplier of technology. In many NBs, it is typical that the goals of participating organizations are different but complementary. The way to have mutual gain, even though there exists a disconnection in goals, is to converge in a common goal and to stress the definition of roles and responsibilities in the collaboration to structure the network.

As noted above, dynamics is an important characteristic in successful NBs. This, together with the inability to determine optimum boundaries in advance, means that networks need a governance process which allows a good definition of authority and roles among the participating organizations. However, even without having a definition of authority, a NB can succeed. In real-life settings, participating organizations have commonly no single governing authority during much of the lifecycle of the NB. And sometimes, even with a single authority, beyond a certain scale a network can become too complex for a centralized control. In this context, the definition of roles and responsibilities is required. This is one of the issues to take into account when designing a NB (see Chapter 3).

We define partnering structure as *the cross-organizational work division, organizational structure, and roles and responsibilities that indicate where and how the work gets done and who is involved*. In [10], we state that the partnering structure of a NB is one of the bases of the entire network (see Fig. 2.1). Understanding of both partnering structure and IS architecture is needed to

[1] This term is taken from the work of Galbraith [11]. It refers to the definition of (i) roles of companies who want to work together as a network, and (ii) work ownership.

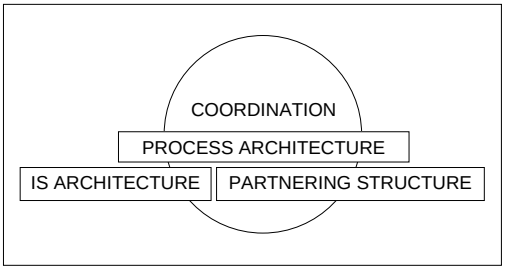

Figure 2.1: Important topics in a NB context.

efficiently support the process architecture of the NB. Organizations involved in collaborative business-IT alignment can (re)design the partnering structure and IS architecture separately, however, they need to understand both in order to create and maintain a solid basis for the processes required to achieve shared and common goals and to exchange information in the NB. Coordination, then, comes next to manage the dependencies among the collaborative activities.

The next chapter presents a framework to design a NB. In this framework, we position the definition of partnering structure as one of the steps to structure the network. Then, in Chapter 4, we show our new approach to define such a partnering structure.

Chapter 3

A framework for NBs

The design of a NB covers different topics ranging from the moment when organizations find each other and decide to collaborate, to the definition of appropriated coordination mechanisms. In an early paper [10], we have presented these different topics using Fig. 2.1. A detailed version of these topics, when achieving collaborative business-IT alignment, is shown in Fig. 3.1. It addresses the four topics introduced in [10] presenting a sequence of activities and a clearer decomposition of the partnering structure term.

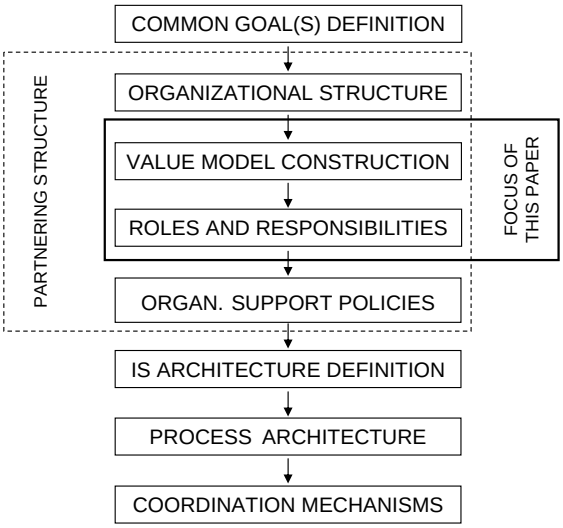

Figure 3.1: NBs design: a high level view.

The framework covers the following steps:

Common goal(s) definition. Participating organizations in a NB can be seen as distinct loosely coupled stakeholders with commonly conflicting interests and

goals [12, 13]. However, if they want to collaborate, they need to formulate a clear-enough common goal toward which they strive together. This common goal is not necessary 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 participating organizations in the NB, but not necessary.

Organizational structure. Organizational structure forms part of the partnering structure term 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. [14, 11]). 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 participating organizations in a NB. 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 Chapter 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. Once the value model has been constructed, responsibilities, governance and the embedded logic within the NB can be established. A participating organization can play different roles in a network [11, 4, 13], from specialist, i.e., an organization who performs one or few activities and provides services to everyone (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 network. By analyzing the main activities identified in the value model, it is easier to define who is involved in each activity. So, a governance structure can also be established to determine who is going to be involved in specific decision making processes [15].

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 participating organizations 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 participating organizations decide to work together, 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 NB.

Process architecture. 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 the process architecture takes a vital role because participating organizations need to integrate both IT processes and business processes when they have to define and manage the collaborative processes for reaching the common goal and for exchanging information. With such process architecture, participating organizations can formalize what processes will be performed in collaboration, and what processes will be owned by each organization [3].

Coordination mechanisms. In a situation where independent participants of a NB need to work together, they necessarily need to coordinate their activities to manage dependencies. So, coordination mechanisms are unavoidable [3, 16]. We acknowledge the fact that cross-organizational coordination is a very subtle characteristic of a NB and we include it in our framework for NBs. As we have stated elsewhere [17], this decision rests on the facts that (i) proper coordination mechanisms reduce costs and improve productivity and control [18], (ii) NBs are enabled by a variety of coordination mechanisms and the choice of a mechanism depends on what participants share in a network and how they share it [16].

After having explored the eight steps of our framework for NB design (Fig. 3.1), we will concentrate in the remainder of this report on steps 3 and 4, namely value model construction and roles and responsibilities respectively.

Chapter 4

Using (semi)formal techniques in the NBs framework

The activities outlined in the NBs framework need to be refined with concrete techniques. Using an illustrative example, in this chapter we present an approach to design the partnering structure of a NB using three well-known techniques: the e^3-*value* methodology [6], the $\mathcal{M}$OISE$^+$ specification [8] and the RAsCI matrix [9]. To make this report self-contained, we will first briefly explain these three techniques. Then, using an example of a NB, we illustrate how our approach can be used in real-life settings.

4.1 The e^3-value methodology

To construct a value model, the e^3-*value* modeling technique will be used. The e^3-*value* methodology is an approach to help stakeholders solve the problem of designing a NB, defined as a set of organizations or business units exchanging objects of economic value with each other. The ontology is well founded and has been expressed as UML classes. Fig. 4.1 shows an educational example of an e^3-*value* model. The e^3-*value* constructs are:

- *Actors* are perceived by their environment as economically independent entities, e.g., organizations or final customers.
- *Market segments* are groups of actors who appraise objects equally.
- *Value objects* are services, goods, money, or even experiences, which are of economic value for at least one actor in the NB. Value objects are exchanged by actors.

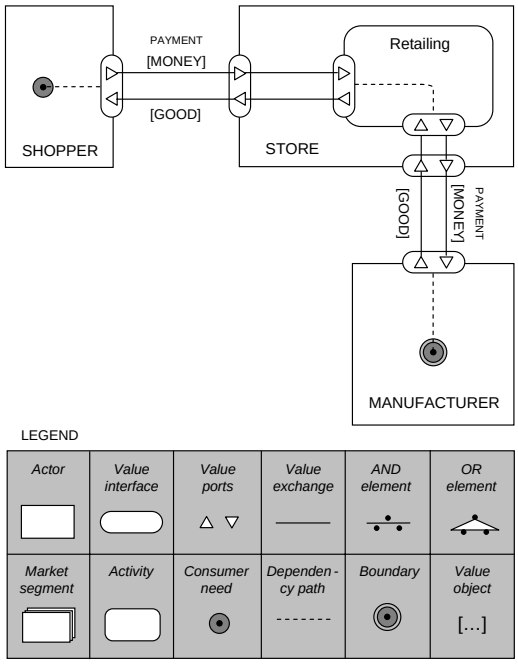

Figure 4.1: Educational e^3-value example.

- *Value ports* are used by actors to provide or request value objects to or from other actors.
- *Value interfaces* group value ports and show economic reciprocity, i.e., actors are only willing to offer objects to someone else, if they receive adequate compensation in return. Either all ports in a value interface each precisely exchange one value object, or none at all.
- *Value exchange* are used to connect two value ports with each other. It represents one or more potential trades of value objects.
- *Value activities* are performed by actors and are assumed to yield profits.
- *Dependency paths* help to reason about the number of value exchanges. A path consists of consumer needs, connections, dependency elements and boundaries. A consumer need is satisfied by exchanging value objects (via one or more interfaces). A connection relates a consumer need to an interface, or relates various interfaces of a same actor. A path can take complex forms using AND/OR dependency elements. A boundary represents that we do not consider any more value exchanges on the path.

4.2 The $\mathcal{M}$oise$^+$ specification

$\mathcal{M}$OISE$^+$ (Model of Organization for multI-agent SystEms plus) is an organizational model for multi-agent systems. Due to comprehensiveness, we combine the functional and deontic specificacions of $\mathcal{M}$OISE$^+$ with the definition of plans as in $\mathcal{M}$OISE [19], i.e., the root of $\mathcal{M}$OISE$^+$. However, as presented in [20], $\mathcal{M}$OISE$^+$ can be used to specify NBs in detail on its own.

The $\mathcal{M}$OISE is structured on three levels: the behaviors that belong to a role (individual level), the interconnections between roles (social level), and the aggregation of roles in groups (collective level). Roles are classes of behaviors or services offered by an agent [19]. We will use the individual level[1] to specify the roles of each participating organization in the NB.

In a NB context, activities involve different organizations. According to the agent viewpoint, each organization (i) should be responsible for a part of the activity, e.g., actions to be executed, resources to be used, information to be shared, etc., (ii) has a limited knowledge of the common goal, and (iii) possesses some skills to plan [21]. Considering this, a *mission*, in the $\mathcal{M}$OISE model, is a set of constraints that each participating organization[2] must take into account to execute its activities. $\mathcal{M}$OISE defines a role ro as a set of missions that the organization, who plays a role in the NB, must carry out:

$$ro = \{m_i \in M,\ i \in \mathbb{N}\} \text{ where } M \text{ is the set of missions.}$$

The parameter m_i, i.e., the mission, defines an allowed behavior for an organization in the NB. It is defined by a quadruple of four sets: goals to achieve (G_i), plans to follow (P_i), actions to execute (A_i), and resources to use (R_i). If an element does not belong to the set m_i, then such an element (goal, plan, action, resource) is not permitted:

$$m_i = \langle s,\ G_i,\ P_i,\ A_i,\ R_i \rangle$$

$\mathcal{M}$OISE also allows the values $\emptyset$ (nothing is allowed) and Any (all is allowed) for each of these sets. The s parameter is the strength of the mission: **O** for an obligation (the organization has no choice, it has to execute the mission), or **P** for a permission (the organization can decide to execute the mission or not). The organization that execute the mission m_i of the role ro, will have to achieve goal G_i, to follow the plan P_i, to execute the action A_i, and to use the resource R_i, even if the organization is capable to define other goals, plans and actions by itself, and to have access to other resources. This limits the organization but formalizes its role in the NB.

We illustrate these notions with an educational example. Suppose a PhD candidate must ask his supervisor for comments on a printed paper before consider it as final version. Using $\mathcal{M}$OISE, we can define the roles presented in Table 4.1.

[1] Detailed information on http://moise.sourceforge.net/

[2] We see a participating organization in a NB as an agent in a multi-agent system. Hereinafter, we refer to these terms undistinctly.

Table 4.1: Educational $\mathcal{M}$**oise**$^+$ example

Role *PhD candidate* mission: $m_1 = \langle \mathbf{O}, \{g_1\}, \{p_1\}, \{a_1, a_2, a_3\}, Any \rangle$	
Activities	• to redact a paper • to comment the paper
Goals	g_1 : *RedactPaper* g_2 : *CommentPaper*
Plans	$p_1(g_1) = a_1(r_1, r_2 \vert r_3);\ a_2;\ a_3(r_4);[g_2]$
Actions	a_1 : *write the paper* a_2 : *print the document* a_3 : *give the paper*
Resources	r_1 : *new results/ideas* r_2 : LaTeX r_3 : WinWord r_4 : *copy of the paper*
Role *Supervisor* mission: $m_2 = \langle \mathbf{P}, \{g_2\}, \{p_2\}, \{a_4, a_5, a_6\}, Any \rangle$	
Activities	• to comment the paper
Goals	g_2 : *CommentPaper*
Plans	$p_2(g_2) = a_4(r_4);\ a_5 \vert a_6$
Actions	a_4 : *read the paper* a_5 : *write language-related comments* a_6 : *write content-related comments*

However, as we will show it in section 4.4 with an illustrative example, our approach incorporates the deontic specifications of $\mathcal{M}$OISE$^+$ since these specifications can be seen as a explicit global plan of the entire NB. Additionally, to specify the relations among goals, $\mathcal{M}$OISE$^+$uses the term "social scheme" [8] which is essentially a goal decomposition tree. In a social scheme, a *mission* 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 $(1, \infty)$.

So far, we know how we can formalize the roles of the participating organizations 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 need to be informed about certain activities and another organization supplies only support for their execution. When deconstructing e^3*-value* models,

actor-value activity assignment matrices are used [22]. However, those matrices just show who could potentially perform an activity in a profitable way, excluding the definition of additional "obligations". The next section presents a technique to deal with this situation.

4.3 The RAsCI method

A clear definition of some duties needs to be established, in order to define the organizational support policies (last step in the partnering structure). These duties are what participating organizations 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 consultancy, 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 term (see Fig. 3.1), 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 this is important to give a clear insight in the relations of participating organizations within a NB with respect to the activities to perform. It is a cross-functional responsibilities definition.

The set up of the matrix is very simple, but gives a fast view of the relationships between the involved role-players for certain activities. The organizations must have added value of their activities towards the product or service they offer (see section 4.4.1). This added value may consist of the following duties:

R *Responsible* - who owns the activity.
A to whom "R" is *Accountable* - who must approve it.
s *Supportive* - who can provide the resources.
C *Consulted* - who has information for performing.
I *Informed* - who must be notified of results.

The efficiency of the activities as one entity is set by the effectiveness of each separate activity and by the relationships with respect to these activities between the organizations involved with them. Fig. 4.2 presents a simple example of this technique. A RAsCI matrix is constructed by following a number of steps. First, all the activities in an organization need to be identified. These activities form the rows of the matrix. Then, all the roles within a company need to be identified. Note that only roles that are directly related to the activities are needed. These roles form the columns of the matrix. Hereafter the relationships of the roles against the activities have to be assigned in the matrix. For instance, the PM assistant is responsible for activities 2 and 5. It should be taken care that each activity has not more than one 'R' assigned. It is also not desirable that an activity has no 'R'. Such a scenario could cause internal problems, because in case of failures no role would feel responsible for it.

	Program Manager	PM Assistant	Board of Directors	CIO	Service Manager
Activity 1	R		A		
Activity 2	A	R		C	S
Activity 3	RA		I	I	
Activity 4	R			C	
Activity 5	A	R			S

Figure 4.2: Educational RAsCI example.

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 'roles' in this context, but we talk about the participants in the NB. The RAsCI method helps us to define who is involved in which activity in which way.

4.4 Illustrative example

We use as example the case of Netflix [23], 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 the 'well-known' late fees do not exist anymore for a Netflix's customer.

4.4.1 Value model construction

Fig. 4.3 presents an illustrative part of the e^3-*value* model of the Netflix case. To respond to the subscribers' needs, Netflix has to deal 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 SKG, Twentieth Century Fox, Universal Studios, Columbia Tri-Star Home Video, and Warner Home Video. 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 sent 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" [24, 25]. In our research all value object transfers between the participants/actors in a NB are candidates for services, as far as they represent

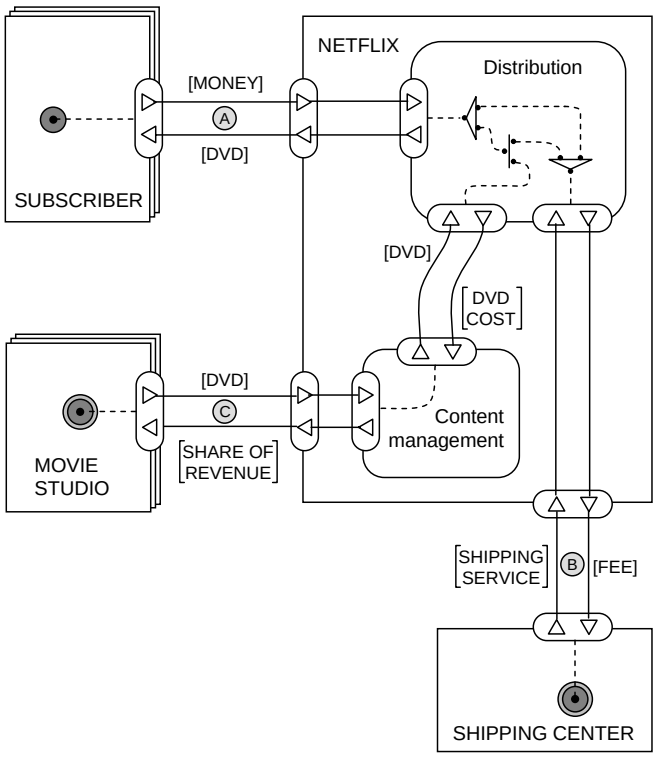

Figure 4.3: Netflix e^3-value model.

the visible interactions mentioned in the above service definition. The value object transfers are usually realized by means of IT-enabled activities. Sometimes also manual activities are conceivable, if the value object is a physical good, which has to be packed and delivered to the client. However not all value object transfers (arrows in e^3-*value*) represent e-services in the NB (which is actually a network of services). Only the arrows that originate at a provider represent the service itself. The arrows from a client to a provider might also represent activities that are realized by means of IT, but they represent the reciprocal obligation to refund the delivery of the e-service. Such an arrow reflects the principle of economic reciprocity, on which the e^3-*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 [26]. However, these authors consider only monetary value objects, such as money, fee, or payment. In e^3-*value*, the reciprocal obligation to refund an e-service 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 registers and provides her personal data to become a subscriber. The personal data represent the reciprocal refund and are not of monetary character in first line, but are valuable for the service

provider (Netflix), who can use these data 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. In its simplest form an actor can be either a (service) provider or a (service) client, but an actor can also hold multiple functions. This means an actor can be both, a provider and a client. In the following we describe how to identify functions on the basis of an e^3-*value* model. A start stimulus in e^3-*value* represents a consumer need, which suggests that actors containing such a concept are clients. In our case study the subscriber is therefore a client. All arrows coming to the client represent the service(s), which tells us that Netflix is the provider in this interaction. Arrows leaving the client represent the refundment. By following the dependency path in Netflix we reach to another 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 4.2 shows the functions of the actors in the Netflix case.

Table 4.2: 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 (service) is a straightforward task (see Fig. 4.4). We distinguish here *provider-specific activities* and *client-specific activities*. Provider-specific activities are those activities that realize the delivery of the value object representing the service from provider to client. Client-specific activities are those activities that (i) request and (ii) refund service provision. Such a distinction is useful as far as it sets limits on the activities to be performed by individual actors in the NB. These two kind 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.

4.4.2 Roles and responsibilities

Both the market segments and the actors in the e^3-*value* model are the roles we use for the $\mathcal{M}$OISE$^+$ specification. When a new actor enters to the NB, such

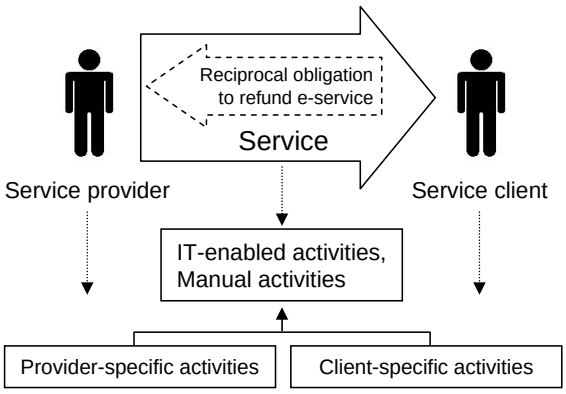

Figure 4.4: Function-specific activities during the service provision process.

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 following specifications:

Role *DVD-rental CO, i.e., Netflix* [3]	
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*

[3]Note that Netflix is the customer-faced actor. However, it is formalized as "DVD-rental CO" to create its role that helps to specify a meta-model role specification for this specific business idea, i.e., the online DVD-rental business.

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*

Fig. 4.5 presents the social scheme for the Netflix case.

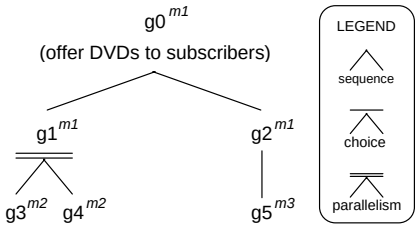

Figure 4.5: Social scheme for the Netflix case.

The social scheme can finally be specified as:

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

$\mathcal{M}$OISE$^+$ also specifies permissions and obligations of a role on a mission as follows: a permission $per(\rho, m, tc)$ states that an organization playing the role ρ is allowed to commit to the mission m in a time constraint tc. Furthermore, and obligation $obl(\rho, m, tc)$ states that an organization playing the role ρ ought to commit to m in the period tc. So, we get:

$\langle\{obl(\rho_{DVDrentalCO}, m_1, Any)\}, \{obl(\rho_{MovieStudio}, m_2, Any)\},$
$\{obl(\rho_{ShippingCenter}, m_3, Any)\}\rangle$[4]

[4]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.

According to our approach, the definition of some duties is the next step before defining the organizational support policies. The RAsCI matrix for the Netflix case is presented in Fig. 4.6.

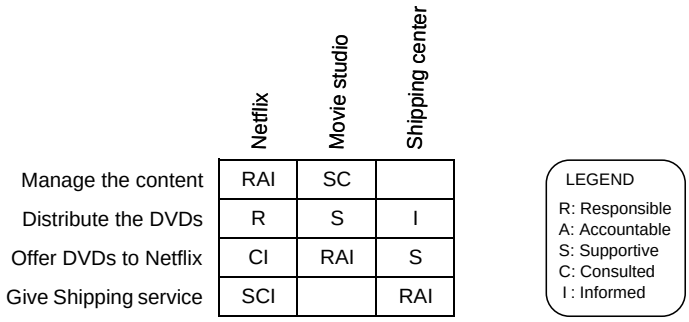

Figure 4.6: Netflix RAsCI matrix.

Netflix is responsible for the management of the content acquisition (g_1). For doing that, the organization needs support and consultancy of the movie studios that provide information concerning the new releases. Internally, the content management department needs to approve the selection and, finally, the acquisition of the DVDs while informing other parties about that. To distribute the DVDs (g_2), the shipping center expects the subscribers' information and DVDs from Netflix. On the other hand, the movie studios are responsible for offering and providing the DVDs ($g_3 + g_4$). It may require the support of the shipping center that is strictly responsible for transporting the DVDs to the subscribers (g_5) with the support and consultancy of Netflix.

Chapter 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 some future research activities to confront them.

The e^3-value methodology: In our framework, *e^3-value* is used to construct a value model of the NB. The *e^3-value* is designed to help define how economic value is created and exchanged within a network of organizations. As *e^3-value* combines the IT systems analysis with an economic value perspective from business sciences [6], using the *e^3-value* methodology for value modeling helps to gather information related to the participating organizations in a NB and to make the participants understand the whole network as a system. With such information, participating organizations can assign function-specific activities to each participating organization to manage effectively the required processes to respond to customers' needs.

Currently, there exists a community using *e^3-value* which may facilitate knowledge transfer, e.g., we may transfer other's work to our NBs framework while making our approach more attractive for this community. The main drawback on the use of *e^3-value* is that it is often difficult to identify system 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 formulizations of a NB.

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, e.g., a NB setting-up process can be considered as a reorganization process within a multi-agent system [20].

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 a kind of role-based access control model [27]. Third, based on the role specification, corresponding duties can also be specified for each participating organization in the NB.

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). We complement all the analysis made by the e^3-*value* methodology and the specifications of $\mathcal{M}$OISE$^+$ with a simple tool that is easily readable by the stakeholders of organizations that participate in real-life NBs. Our position is consistent with Hevner [28] who states that new approaches need to be apprehensible and useful for the environment in order to contribute to the knowledge base.

Chapter 6

Conclusion

In this report, we have presented a framework for NBs reporting the state of affairs of the partnering structure term 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 entities (in our case, organizations) collaborating to achieve a common goal. Complementing each other, they seem to be a good approach for supporting the formalization of the partnering structure in NBs.

Our approach is particularly important for providing a definition of the structure of NBs that rule the network processes and information systems architecture. We apply our approach in a real-life case to initiate its validation. Although preliminary, such an application of the approach helped us to identify issues and ideas for future work:

- Combining the three techniques helps participating organizations to understand better the NB at large. However, it is time consuming to use more than one isolated technique. In our 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.

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