

A CONCEPTUAL FRAMEWORK FOR B2B ELECTRONIC CONTRACTING

Samuil Angelov, Paul Grefen
Computer Science Department
University of Twente
The Netherlands
sangelov@cs.utwente.nl
grefen@cs.utwente.nl

Electronic contracting aims at improving existing business relationship paradigms and at enabling new forms of contractual relationships. To successfully realize these objectives, an integral understanding of the contracting field must be established. In this paper, we propose a conceptual framework for business-to-business contracting support. The framework provides a complete view over the contracting field. It allows positioning research efforts in the domain, analysing them, placing their goals into perspective, and overseeing future research topics and issues. It is the basis for drawing conclusions about basic requirements to contracting systems.

1. INTRODUCTION

Since the very beginning of human history, the problem exists of mutual trust when people exchange values. Contracts between the exchanging sides have been adopted as a solution that guarantees the rights of the participants and increases mutual trust. In business-to-business relationships, contracts form the foundation of a market. “All economic production and exchange processes are organized through contracts. Contracts are the instruments and the means for the organization of exchange relations” (Wigand, 1997). Nowadays, contracting parties require establishment of contracts at lower costs, in a shorter time and without geographical restrictions. Electronic contracting aims at using information technologies for improving the values of these indicators and at extending the opportunities to the contracting parties. A number of new opportunities are revealed by the introduction of electronic contracting. Micro-contracting, for example, can be introduced, analogously to micro-payments and micro-transactions (Chaffey, 2002). Micro-contracting becomes affordable, as costs and time decrease to reasonable values for small transactions. In this paper, we present a contracting framework that provides a general view over the contracting field. Most other approaches deal with specific aspects or are based on specific contexts. This framework allows us to observe basic requirements on contracting systems, analyse existing approaches for electronic contracting and define new research issues in this field. Being a conceptual framework, it can be mapped to any project in this domain and used for its analysis.

To illustrate the benefits from the presented framework, we describe two projects in this domain and we position them in the framework. The framework helps us identify the context of each of these projects, their goals and issues related to the projects. We use it also to identify future research issues and to position our future research work in it. It assists in providing a clear view of the goals of our research work. The structuring and description of the contracting concepts in the framework, gives a possibility for establishing a common terminology and improving the mutual understanding among domain researchers.

The content of this paper is organised as follows. In Section 2, the proposed framework is presented at a high level of abstraction. Section 3 gives detailed views on the discussed concepts. In Sections 4 and 5, we use the described framework to position current research efforts in it and to identify future research issues.

2. GENERAL VIEW

The central concept in the framework we propose is the contract concept. There are many definitions for contracts. In this paper we use the following definition: “A contract is a legally enforceable agreement in which two or more parties commit to certain obligations in return for certain rights” (Reinecke, 1989). This definition gives us an idea for four groups of contracting concepts that can be modelled. The participation of “two or more parties” leads us to a “Who” concept. An agreement that is “legally enforceable” shows that there is a context for every contract i.e. a “Where” concept. The “obligations in return for certain rights” relates to a “What” concept. And finally, the parties’ commitment illustrates the existence of a “How” concept. There are certain relations between these groups of concepts (see Figure 1). These relations show the tight coupling between them and the complexity of the contracting relations. Contracting models should take into consideration these relations and the consequences that follow from them.

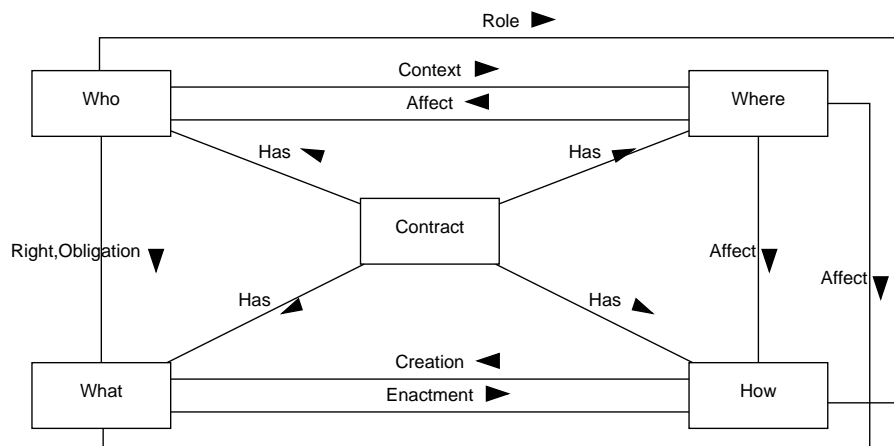


Figure 1 - General view

The next section provides an elaboration of each of the four groups of concepts.

3. DETAILED VIEW

In this section, the four groups of concepts that we have identified in the previous section are elaborated. To simplify the complex structures, most of the relations between the four groups of concept outlined in Figure 1 are not repeated at the detail level. In the last subsection, we illustrate that further specialization and refinement of this elaboration is possible.

3.1 Who

The “Who” concept aggregates actors that participate in the contracting processes. We identify the party, mediator and auxiliary implementor concepts (see Figure 2).

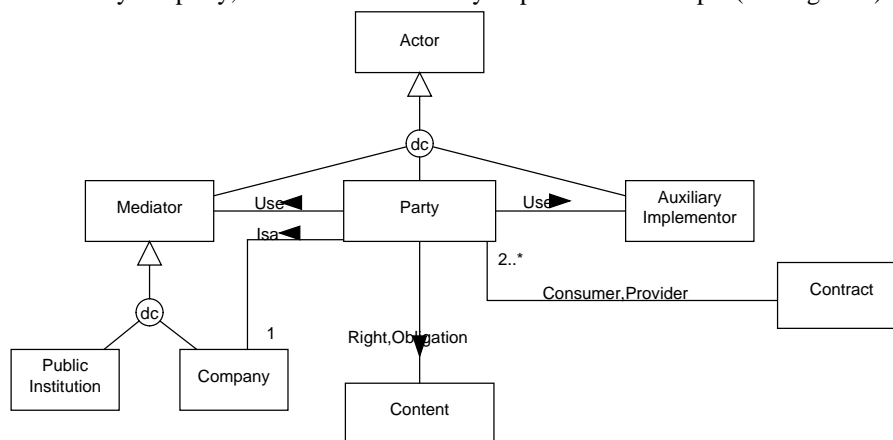


Figure 2 - Detail view of Who

In business-to-business relations, two or more companies that want to exchange values create a contract, describing their mutual rights and obligations. The companies that participate in the established contract and exchange values are called parties. A contract has at least two parties. The parties can be a value provider, a value consumer or both. Throughout the contract life cycle, a party can use other actors (mediators or auxiliary implementors) that will facilitate the contract establishment or enactment. A mediator is a company or a public institution that facilitates the contract establishment and contract enactment. As the lack of trust is a major problem in business-to-business relationships, Trusted Third Parties (TTP) performing trust management, are mediators of high importance (Keen, 2000).

During contract execution, parties perform processes in accordance with the negotiated contract terms. It is often the case that a party outsources part of the processes to be executed to an auxiliary implementor (Grefen, 2000).

3.2 Where

Every contract is established and enacted in a certain context. As shown in Figure 1, the contract context affects the contract content, processes and actors. However, only part of the contract context is reflected in the contract content. Many conditions

can affect the contracting process. In this paper we depict three context dimensions, i.e., legal, geographical and business (see Figure 3), which we consider as basic. Many other circumstances (e.g. social, political) can be present during the contracting process. For reasons of brevity, we do not discuss them.

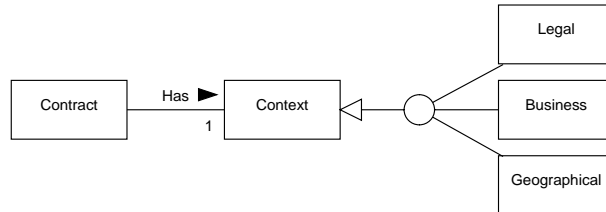


Figure 3 - Detail view of Where

In cross-border business-to-business contracting, parties can choose the law that will govern their contract (ITC, 2000). Parties can also specify in the contract the jurisdiction that will handle the situation in case of dispute. These and other legal issues position every contract in a certain legal context. Geographical factors affect contracting as well. For example, huge geographical distances delay communication. Further on, each country has its own national specifics that can affect the contracting process. Even for national contracts the geographical situation is important. The geographical context of contracts can affect the contract content, its representation, contracting processes, etc. The business context can affect any of the four main groups of concepts. For example, in business scenarios, parties often have many contract relations. It is often the case that one contract depends on the existence and execution of another (Angelov, 2001a). A contract management system should implement this extended vision on contracting, reflecting contract dependencies.

3.3 What

The contract content has a core part, describing the exchanged values and an optional part, which is a set of provisions (see Figure 4).

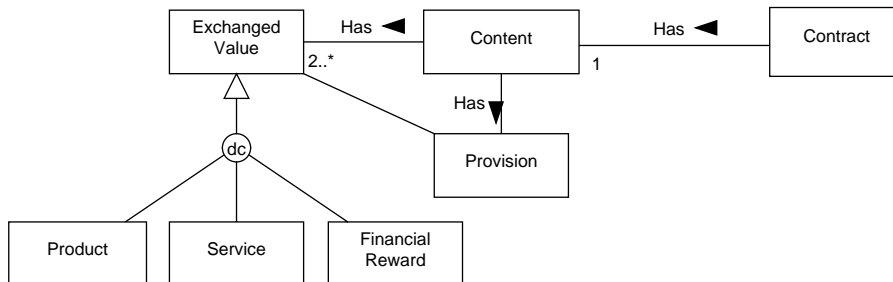


Figure 4 - Detail view of What

The exchanged value between the parties can be a product, a service, and in the case of non-barter contracts a financial reward. When a product is the exchanged value, a product specification including the product properties is required. If the exchanged value is a service, the contract contains a service description and the processes that will be performed by the service provider (see section 3.5). Thus, the

contract contains a specification of one or more processes. According to (Daskalopulu, 1998), the accompanying provisions might be descriptive, prescriptive, procedural, algebraic, etc.

Certainly, the contract contains information that is required for its establishment e.g. contracting parties, their addresses, etc. This information, however, is standard and is out of the scope of this paper.

3.4 How

Concepts related to the “How” aspects of contracting (see Figure 5) are most challenging for researchers. They provide possibilities for automation of the contracting process, and thus for increasing its efficiency. Next, we briefly describe these concepts and relations. We start with the contract representation and standards in this domain, proceed with contracting phases, and end with the contract structure.

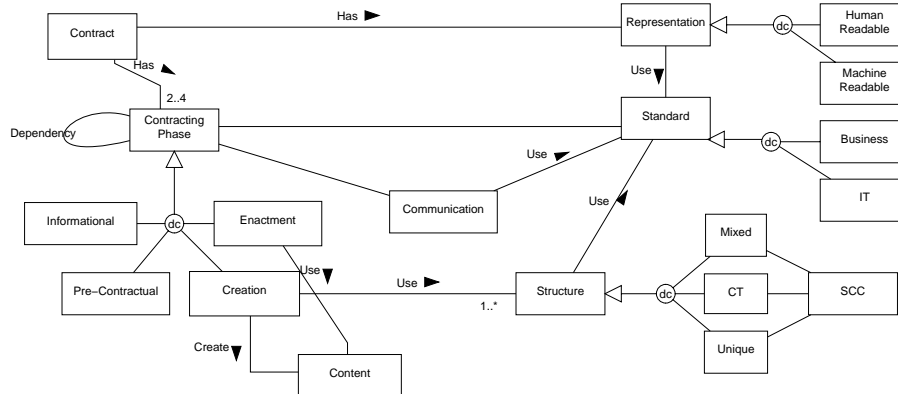


Figure 5 - Detail view of How

The efforts in the direction of electronic contracting have shown that besides the human-readable representation of contracts, a machine-readable representation is also necessary. This representation structures the document and allows its automated processing. Depending on the used technology, there can be different machine-readable representations, e.g. XML based. To achieve interoperability between the parties and processes to be sped up, standards are set. Standards for paper contracts (ECE, 1993) aim at facilitating the contract creation, especially in international context. The use of information technologies in contracting requires standardization in new areas. IT standards allow interoperability between parties to be achieved (ebXML, 2001). The contracting process consists of several phases. In the standard situation, it is composed of four phases: informational, pre-contractual, creation, and enactment phase (see Figure 5). The business context, however, can change the contracting process, e.g., when there were previous contracting relations or the level of trust is high, the informational and pre-contractual phase can be skipped or sped up. Details on each of these phases are provided in (Angelov, 2001b). As the contracting process involves several parties, who agree on one common goal and its subsequent achievement, communication between parties plays an important role in all contracting phases. Contract content results from the contract creation phase and

is used in the enactment phase. For the creation of a contract offer a party can use partially or completely predefined contract structure, i.e., Contract Templates (CT). Parties can also start contracting by using a template that is further on elaborated and extended for the specific situation. In all scenarios, parties can use Standard Contract Clauses (SCC) that speed up contract creation. In the next subsection, we elaborate the enactment and service concepts. We use this elaboration in Sections 4 and 5.

3.5 Processes in detail

In this section, we investigate the enactment and service concepts at a level of detail below 3.1 – 3.4 (see Figure 6). At this level of abstraction, we identify the process concept that is common for the “What” and “How” groups of concepts. A description of the process concept and its relations to the other concepts follows.

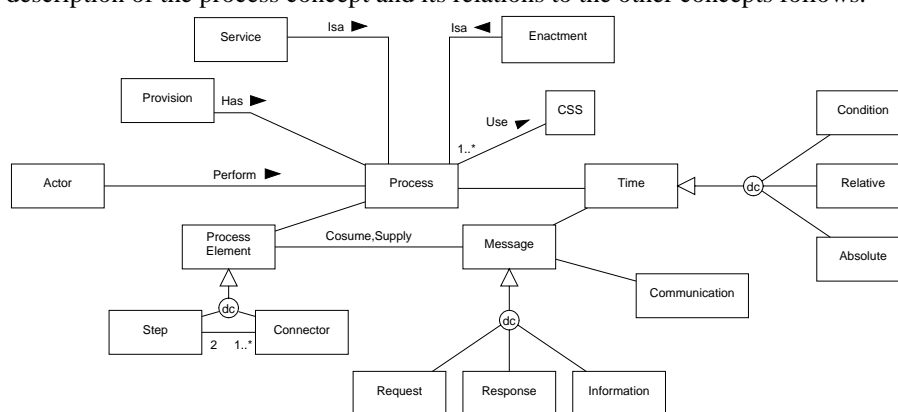


Figure 6 - Processes in detail

The enactment phase is a set of one or more processes, negotiated and specified in the contract content. If the exchanged value is a service, the contract content will contain a description of the processes to be performed for the service delivery. Provisions can also define processes to be executed or procedures to be followed. During contract enactment, these processes are performed by the contracting parties or by an auxiliary implementor. Usually, many processes accompany the contract enactment phase. From the contracting perspective, however, only an external view of the processes performed by a contract actor is manifested (Grefen, 2001). The level of the external process specification depends on the contracting parties. The complexity of contract enactment requires an adequate IT support. Processes can use cooperation support services (CSS), e.g., contract monitoring for their advanced execution. These services introduce possibilities for improved contract enactment and for decreased contract management efforts. Each process is a collection of process elements, i.e., a step and a connector between two steps (WMC, 1999). Processes start and end in a certain time point, according to the negotiated terms. The time point can be fixed (absolute or relative) or condition dependent (conditional). Through out the process execution, requests, corresponding responses, and informational messages are exchanged. As messages serve process elements to exchange information, they are bound also to time constraints.

In the next two sections, we use the proposed framework to analyse research efforts in this field and to define new research areas.

4. CURRENT RESEARCH EFFORTS

Information technologies can be best used for improvement of the “How” issues of contracting and logically research efforts concentrate on them. Advanced research projects, however, should take into consideration the whole contracting framework, with its full complexity and abundance of relations between concepts. In this section, a research project and a standardization process are taken as examples, and are positioned and analysed from the perspective of the described framework. More information on current projects and standardization processes is provided in (Angelov, 2001b).

CrossFlow project. In the CrossFlow project, workflow service outsourcing within a service consumer/provider paradigm is considered (Grefen, 2000). Contracting of standard services in vertical markets and their enactment is the business context. Three contracting phases are discussed, i.e., informational, creation and enactment phases. The project concentrates on the contract enactment processes. The contract is created on the base of a Contract Template, reflecting the vertical market paradigm implied in the project. The contract representation is machine-readable with an optional human-readable section (Koetsier, 2000). In the contract content, the exchanged service and the processes that are to be performed for the successful contract fulfilment are specified. Any additional provisions might be part of the optional human-readable section. CrossFlow is one of the few projects that focus on the cooperation support services that facilitate the contract enactment. Positioned in this way in the framework, we can observe that the project does not pay attention to the legal and geographical contract context, to the second exchanged value (presumably a financial reward), and to the contract provisions. These aspects are omitted for reasons of simplicity.

ebXML. ebXML (ebXML, 2001) supports all phases of the contracting cycle. It does not, however, pay specific attention to the pre-contractual and enactment phases, as this is out of its scope. In the informational phase the parties produce a contract offer (called CPP). The electronic contract (CPA) is established in the contractual phase. In ebXML, a registry and a repository are provided. They facilitate the information and the creation phase by storing parties’ profiles, data and process definitions, contract templates, etc. Under specification and standardization are many common business processes that should enable parties to use them directly in their contracting relations. ebXML has also a messaging service that handles the communication between the parties. ebXML requires business processes description to have both human-readable and machine-readable representation. Concluding, ebXML issues IT and business standards that set a framework for the contracting phases. ebXML provides a standard for business process specification, aiming to achieve interoperability between parties. It depicts several business scenarios, illustrating different business contexts that can take place. It is, however, not concerned with the enactment phase. From the framework perspective, it can be noticed that this leads to omitting examining the execution of the specified processes and the accompanying cooperation supporting services.

5. FUTURE RESEARCH WORK AND CONCLUSIONS

Identifying solutions for electronic contracting as a substitution for paper contracting is only one of the research perspectives. The new opportunities that are revealed by the implementation of the information technologies should be investigated. It is interesting, how contracting can be improved regarding not only efficiency aspects, but by extending its functionalities as well. We see the solution to this in the structuring of the contract content, extending it with additional information, and subsequent automation of the contract enactment. The automation of the contract enactment provides opportunities for the elaboration of support services (CSS) that introduce new possibilities for contracting parties. Contract screening and tracking are examples of such services. These services are still to be investigated and specified. Their requirements over the contracting process and the contracting content must be also researched. The goal of our future research is modelling the contracting processes and contract content and defining contract enactment architecture with flexible cooperation support services. Mapping between the enactment architecture and the contracting processes is to be researched.

In this paper, we have described a business-to-business contracting framework and have used it for some basic reasoning on the requirements on contracting systems. The framework is used to position in it research activities in this area. These activities are commented from the framework perspective. The framework allows observing what research areas exist and how they are situated in the overall picture of the contracting process. This work gives a broad view over the contracting area and can be used as a reference in any subsequent work.

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