

E-contracting: Towards electronic collaboration processes in contract management

Jan W. Schemm, Christine Legner, Hubert Österle
Institute for Information Management
University of St. Gallen
Müller-Friedberg-Str. 8
9000 St. Gallen
{jan.schemm, christine.legner, hubert.oesterle}@unisg.ch

Abstract: E-contracting implies pre-order electronic interaction between customers and suppliers engaging in business transactions. This paper examines electronic contracting from an interorganizational perspective. It derives a collaboration process architecture for contracting in retail and industrial companies and outlines key design decisions concerning a process-supporting system architecture. A case from the retail industry illustrates major problems with paper-based contracting processes currently practiced by most companies and emphasizes the usefulness and applicability of the developed framework in industrial practice. Finally, we present a research agenda towards a holistic framework providing support for retail and industry companies in deploying e-contracting solutions.

1 Introduction

Electronic collaboration enters new areas. External integration is relatively widespread in high-volume operational processes such as supply chain management and order fulfillment, with a high penetration of EDI or XML-based data exchange. It becomes increasingly popular for less structured, document-oriented business processes where paper-based interactions are slow and error prone. Given that a typical Fortune 1000 company is estimated to continuously manage up to 40'000 active contracts [Mi04a], this applies to contract management. The increasing number of contractual relationships due to outsourcing underlines the need for IT-supported interorganizational contract management processes.

Electronic contract management promises benefits through reducing contract cycle times, increasing employee productivity, and reducing financial and legal risks. By providing better transaction transparency it also ensures compliance to new regulations such as the Sarbanes-Oxley Act [Co03; Mi04a]. Until now, packaged enterprise software provides only limited support for contract-related tasks [Go01], and a recent survey indicates that most e-contracting implementations rely on company specific software development [Ia04]. This explains why major vendors of ERP and SCM systems such as SAP AG, Oracle, Ariba, or Commerce One are recently enhancing their products by adding contracting functions. Additionally, niche players (e.g. diCarta, I-many, Nextance or Upside) are emerging on a market that is projected to grow rapidly in the next years [Ky02; Dr04].

This paper examines electronic contracting from an interorganizational perspective. Applying the concept of business networking, which has been proven useful in other domains [Al04; Oe04], it encourages a holistic e-contracting framework covering business as well as technical aspects. Starting with the analysis of collaboration processes in contractual business relationships, it derives the key decisions for designing the supporting information system. The case of a large European retailer demonstrates the application of the e-contracting framework in a real-world scenario.

The paper is structured as follows. Section 2 defines electronic contract management and provides an overview of related research. Section 3 derives a collaboration process architecture for contracting in industry and retail companies, and outlines key decisions concerning IS design for e-contracting. Considering the example of a large European retail company, section 4 illustrates pain points in actual contracting as well as process and system design on the way towards a comprehensive e-contracting solution. Finally, section 5 summarizes the key results and provides a short outlook on topics for future research.

2 Contract management

2.1 Definition

Every business transaction crossing organizational boundaries directly or indirectly leads to a contract closed between the involved parties [Me99]. The contract legally defines the individual rights and obligations regarding the values to be exchanged in the following business transaction. Fig. 1 illustrates typical contractual relationships in the case of an industrial company.

Contract management (or *contracting*) can be defined as the development and maintenance of business agreements in a structured manner [Te05]. More precisely, it denotes the process of managing contractual agreements over their entire life-cycle, ranging from negotiation over creation and fulfillment to termination, with the objective to maximize the performance and minimize the risk associated with the corresponding business transactions [Lu03; Mi04a]. The term *electronic contract management* or *e-contracting* refers to a contracting process which is at least partially supported by information technology and relies on an electronic representation of the contract [Me04b; AG04].

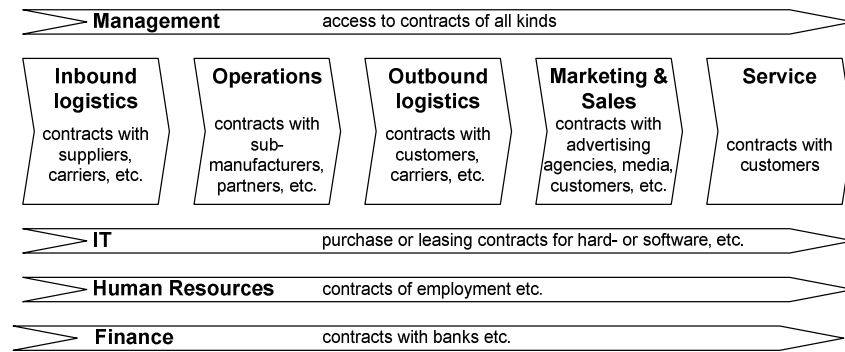


Fig. 1. Contracts along the value chain of a company [Kp02]

2.2 Related research

Existing e-contracting publications cover various topics comprising technical, legal, and business or organizational issues¹:

- **Contract modelling and automation.** The major line of technology-focussed research addresses the machine-interpretable representation of electronic contracts and the thereby facilitated automation of contract processing. [DS97] provides a classification of contract content and derives requirements on contract representations from the perspective of logic-based tools supporting the phases of contract formation and performance. [GHM00] analogously analyses typical elements of B2B contracts, subsequently derives a data model for contracts, and explores an XML-based approach for encoding and managing electronic contracts. [GSS00] presents the notion of a secure contracting container, which in addition integrates workflow logic and communication protocols in one information object based on XML, digital signatures and Java technology. [KGV00] follows a similar research direction and presents a contract model and language that support the automated handling of the contracted business transactions utilizing workflow management systems. An additional area of research aims at providing guidelines for the implementation of electronic contracting systems by providing generic frameworks for e-contracting [BS02; Lu03; Mi04b].
- **Legal conditions.** This stream of research mainly comprises publications dealing with legal requirements concerning e.g. contract formation, validity of contracts and evidentiary issues in different legislations [SB02]. [GSG00] analyses the legal phases of a contracting process and derives requirements for electronic contracting. A major line of publications such as e.g. [BC02; Fr04; HN02] examines recent legislation on digital signatures.
- **Reference models.** Business-related e-contracting research provides conceptual models that aim at structuring the problem domain from a business viewpoint. [AG03] outlines the *4W framework*, that allows a unified view on various aspects (Who, Where, What, How) of e-contracting. [Ru00; RSS99] customizes a reference model for electronic markets to the e-contracting domain. Supplementing the conceptual models, [AG04] analyses business benefits of e-contracting related to different contracting types or paradigms (micro-, just-in-time-, precision-, enactment-, and management-contracting).

The sketched survey of research reveals that organizational issues and contracting-related processes are sparsely covered in publications on e-contracting. Although business processes constitute the key design element connecting business objectives and IT systems in e-business transformations, their description is limited to a high-level partition in different phases in existing literature (c.f. e.g. [AG02]). Detailed process activities, their sequence and organizational allocation as well as the related flows of physical goods and information are neither provided by existing e-contracting frameworks nor by process-oriented business reference models such as [BS04; Me04a; Sc94]. This lack of research seems to reflect the relatively low dissemination of e-contracting solutions in practice and hampers a process-based derivation of requirements and the design of appropriate e-contracting solutions.

3 Contract management - an interorganizational perspective

The interdependencies between technological and process innovations [CS96] require e-contracting to be examined from an interorganizational perspective. Based on the reference framework of business networking [OFA01], we aim at deriving a holistic architecture covering both, the business process and the information system layer.

3.1 Collaboration process architecture

Since contracts form the foundation of a business relationship between different legal entities, the contracting process in its nature requires interaction between several internal organizational units and external business partners. Consequently, it has to be considered a collaboration process [AI04; Oe04]. Collaboration processes constitute the logical extension of business processes in an interorganizational context and can be interpreted as the coupling of company-internal processes via coordinating mechanisms.

Fig. 2 illustrates a high level view on the process architecture for a generic contracting process using the notation of a process context diagram [Oe95]. Based on widely accepted reference models for industrial and retail companies [BS04; Sc94; Me04a],

¹ For a comprehensive overview, c.f. [AG03].

the context diagram illustrates the major output relations between the collaborative contracting process and the internal processes on the supplier and the customer side. Additionally, it presents a process decomposition, further detailing the process architecture by subdividing the contracting process in several independently executable sequences, i.e. cohesive micro-processes [Im97]. The illustrated micro-process separation reflects the process outputs and provides a vertical structuring of the contracting process loosely resembling the phases along the contract lifecycle [Lu03; GSG00; AG02]. For reasons of a succinct description, we exemplarily describe the process architecture in detail from a customer's (supply-side) perspective only.

The collaborative micro-process *Information* forms the starting point of the contracting process. The regular interactions with existing and potential suppliers comprise the exchange of supplier profiles including company as well as goods and services information [BBZ02].

Based on the actual demand and offering provided by the purchasing and sales processes respectively, the micro-process *Quotation Management* (also referred to as *RFx process* or *Tendering* [Kn03]) handles the formulation and exchange of several pre-contractual documents such as requests for quotations, quotations, and letters of intent. Additionally, the process narrows down the number of quotations to a magnitude manageable by the following negotiation process.

The *Negotiation* process further refines the conditions of quotations handed over by quotation management. Depending on the nature of the contract aimed at, an agreement might not be obtained by simply accepting a specific quotation, but potentially requires additional negotiation and refinement cycles. The output of this micro-process is a final agreement supported by both parties, which forms the basis for the following formal contract creation.

The major output of the *Creation* process is the legally binding contract document itself, i.e. the signed agreement between customer and supplier. This document is distributed to several organizational units, e.g. to the purchasing department using it as basis for monitoring the adherence to contract conditions and evaluating supplier performance, or to disposition for allowing the placements of orders based on the contract. The creation process also initiates the transfer of contract-related master data, e.g. supplier and product master data, to purchasing.

The *Monitoring* micro-process controls the status of active contracts and verifies the compliance of the actual orders to the contracted agreements. Goods receipt slips and invoices are transferred in order to clarify potential anomalies and to incorporate them in the contract assessment, which constitutes one input for supplier evaluation. Depending on various monitoring results, the process might produce a change request regarding a contract which is handled by the following *Change Management* process or it might indicate a contract termination further processed by the micro-process *Termination*.

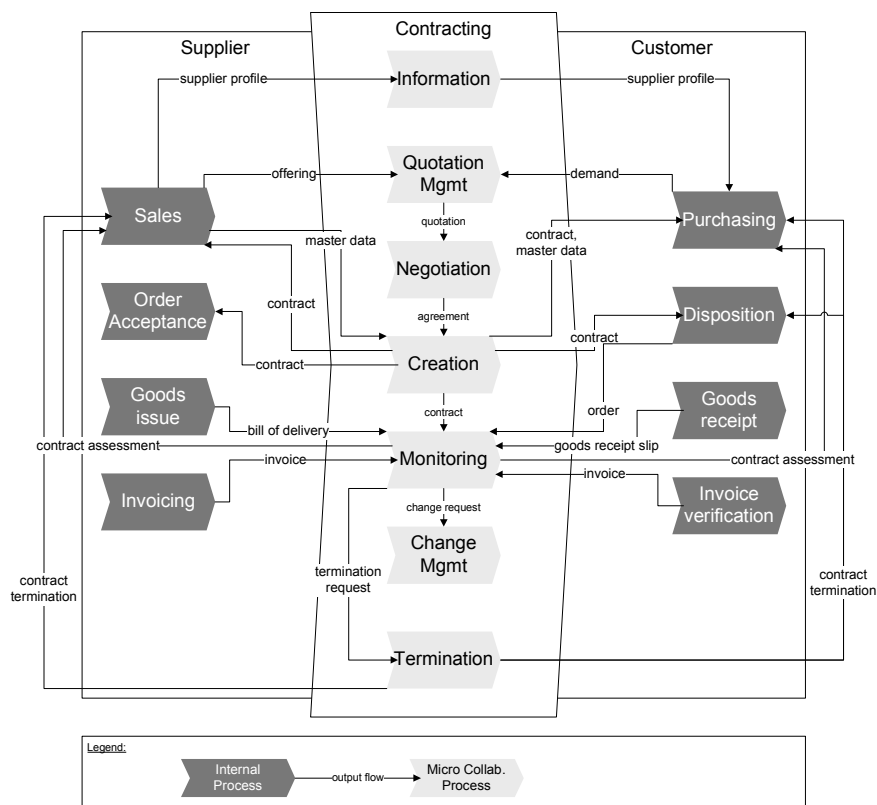


Fig. 2. Process context diagram and process decomposition for contracting

3.3 Key design decisions for the supporting system architecture

Major decisions when planning the IT-support for a specific process include the design or choice of appropriate data structures and functions [Oe95]. In addition to the questions of contract representation (data design) and the choice of a contracting system (function design), the collaborative contracting process requires the integration of external systems as well as the compliance with existing legislation. Table 1 summarizes the four key design decisions regarding the implementation of a process-supporting application for e-contracting in a morphological box.

The first major design decision concerns the digital representation of contracts (c.f. section 2). The representation as a semi-structured file (e.g. as MS Word or PDF format) does not allow for electronic processing of the information contained in the contract document, whereas structured contract representations allow the automated access to the different elements of a contract. Structured contract representations can be further classified in proprietary representations and representations adhering to certain standards such as e.g. LegalXML or ContractML [Bu03; Oa05].

Design Decision	Alternatives			
Contract representation	Semi-structured	Structured, proprietary format		Structured, standard format
Contracting System	Contract Management System	Records Management System	ERP System	Business Networking System
Integration	EDI / Web Services	ERP linkage	Portal	E-Mail
Signature	Electronic Signature		Digital Signature	

Table 1. Key design decisions and corresponding alternatives

The second major design decision concerns the contracting system, i.e. the application storing the electronic contract information and providing functionality for electronic contracting. The first intuitive option is to use one of the recently emerging Contract Management System (CMS), which specialize on supporting the whole contracting process [Dr04]. An alternative is to utilize a Records Management System (RMS). This class of systems has its roots in document management software and focuses on supporting the management of documents throughout their lifecycle [Be03]. RMS are usually deployed in areas with high regulatory restrictions and typically provide functions for document archiving, management of retention periods, document access tracking, etc. [Be05]. Since most companies have ERP systems in place and use it for basic contract information, another option is to use these systems and to expand their functions through custom programming. Additionally, Business Networking System (BNS), that evolved from ERP systems (therefore also referred to as ERP II [We03]) and provide additional functions especially supporting collaboration with business partners [AF00; DB04], could be used. Systems for Supplier Relationship Management (SRM) as one example for BNS usually contain some contracting-related functions [RK02; Gr04].

The third major design dimension concerns the appropriate form of interorganisational system linkage to allow external integration. EDI / Web Services, ERP linkage and portal constitute the currently most cited options for establishing interorganisational 1:n system linkages and are expected to maintain that significant role in the future [DW05]. E-Mail was added as an alternative for a relatively low-cost electronic document exchange.

The fourth major design decision addresses the question of how to authenticate and sign an electronic contract (c.f. section 2). Electronic signatures include methods such as digitized images of paper signatures, typed notations at the bottom of E-Mails, the acceptance of conditions via mouse-click on a website, etc. [Fr04]. In most jurisdictions this option suffices to achieve a legally binding electronic contract formation for the most common type of business agreements [SB02]. As an alternative, the electronic contract can be signed using so-called digital signatures, i.e. qualified electronic signatures based on public key cryptography [Sc96].

4 Case: E-contracting in the retail industry

4.1 Company background and business network

The corporation *R* is a large European retailer. With its roughly 80,000 employees, *R* produced a turnover of about EUR 11 billion in 2004 and operates more than 600 retail stores. The company is characterized by a mainly decentral organization, with a central unit *RS* providing shared services within the group. Central functions include a category management which decides on the assortment as well as a purchasing unit which concludes contracts with the corporations' suppliers.

Fig. 3 shows the relevant organizational units and the corresponding flows of information, goods and payments, following the intuitive notation proposed by [Al04; Ho95]. The diagram solely covers the most frequent process variant which is based on stock-keeping in distribution centres (i.e. the retailer manages its own inventory and delivers the retail store from stock). Other process variants such as vendor managed inventory (VMI) or direct-to-store scenarios are not illustrated here.

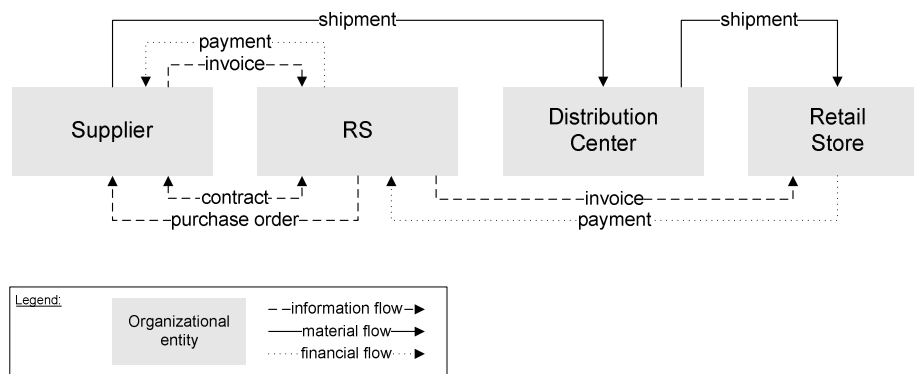


Fig. 3. Simplified business network of R

In the illustrated scenario, the goods are shipped to central distribution centres and from there forwarded to the retail stores. On the supplier-side R relies on various suppliers including some entities belonging to the same group.

Contracting merely plays a major role in the non-food assortments, since long-term contracts provide no effective means of governing the fast changing interactions in the food business. In 2004, R managed around 15'000 active contracts with roughly 1'800 suppliers mainly from Europe and Asia. Contracts mainly include quantity contracts, value contracts and master agreements.

4.2 Actual contracting process

Whereas a process architecture as generally defined in section 3.2 defines the content and output of a process (i.e. its effectiveness), the process flow details how the predefined output is produced (i.e. its efficiency). Fig. 4 illustrates the actual contracting process flow at RS on a macro-level, using the activity diagram notation defined in [Oe95; Im97]. It shows the various manual or IT-supported activities (nodes), their temporal dependencies (edges) and processors in form of organizational units (vertical boxes or swimlanes). Additionally, the affiliation of different activity sequences to the contracting micro-processes defined in section 3.2 is indicated.

In the case of R, activities start with the definition of an assortment describing products, product variants, packaging units etc. This activity is jointly carried out by the product management and category management units of RS and the sales side of the supplier. It relies mainly on personal communication via meetings, phone calls, emails, etc.

After agreeing on the assortment, the supplier creates a quotation and submits it via email, fax or mail to RS. The quotation is assessed by the product management. If it is not acceptable, the points at issue are communicated to the supplier. Further quotations are exchanged in a manual quotation management and negotiation process until finally a quotation is acceptable.

In this case, contract creation starts by performing a calculation for the assortment in RS' ERP-system. To this purpose, supplier and product master data has to be manually entered in the ERP-system before creating the contract. The contract document is then printed, doubly signed by product management and category management and submitted via mail to the supplier.

The supplier signs the contract and transfers it back via mail to RS. After receiving the signed contract as paper document, the corresponding contract in the ERP-system is released, allowing disposition to place purchase orders referring to the contract. In case of suppliers electronically linked to RS' ERP-system, RS electronically submits the contract data via EDI to the supplier. Depending on the contract, it is optionally distributed via E-Mail, Fax or mail to 3rd parties, which rely on the information contained in the contract for their operations. Examples include certification authorities (e.g. quality labels) and local offices of RS which handle the on-site coordination of suppliers e.g. in the Far East.

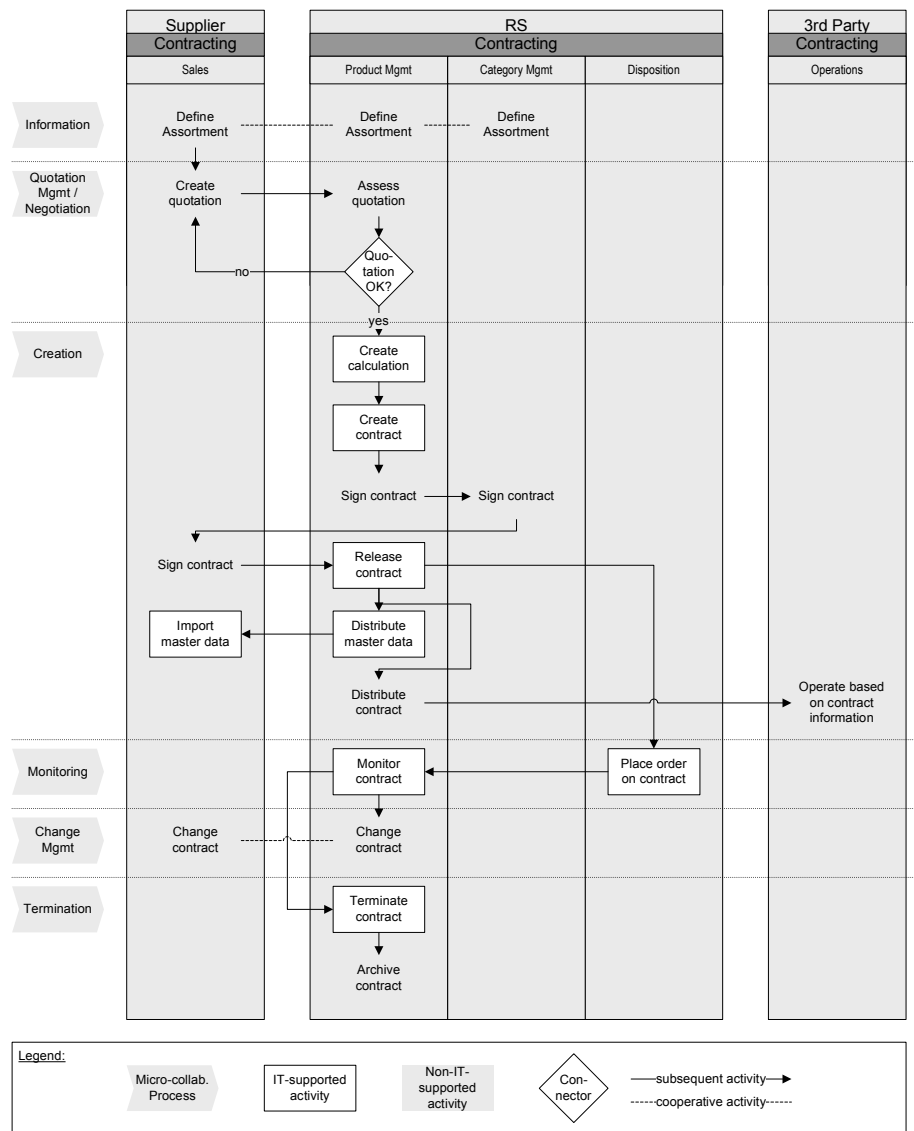


Fig. 4. Actual contracting process at RS

The monitoring of contracts is supported by some custom-programmed transactions in the ERP-system, which allow e.g. the listing of contracts based on defined criteria (e.g. relating to certain suppliers / articles, or overdrawn contracts). In case of contract changes, the desired modifications are bilaterally agreed upon and implemented in the involved systems without restarting another contract creation and signature cycle.

Finally, when the contract reaches its defined end (in terms of either time, value or quantity), the contract is manually terminated in the ERP-system and the paper form is centrally archived.

4.2 Business pain and process vision

The analysis of the current contracting process revealed several pain points resulting from paper-based contract processing:

- **Costly contract creation.** The creation of the contract is one of the most labour-intensive and therefore costly activities within the whole contracting process, because the relevant master data contained in the accepted quotation has to be entered manually in the ERP-system.
- **Cycle times.** Due to the slow transmission of paper, the cycle time of the whole approval process - starting with the first signature and ending with the incoming contract at RS - is roughly 2-4 weeks. This delay causes problems in the subsequent internal processes which depend on the outputs of contracting. As a consequence disposition agents create workarounds and place orders before the signed contract has been returned by the supplier.
- **Postal charges.** The paper-based submission of contracts via mail causes postal charges of roughly EUR 100'000 per year.
- **Frequency of contract changes.** Contrary to the objective of contracts to formally stabilize a business relation, contracts are quite often subject to change: RS estimates roughly 20-30% of all supplier contracts to be modified during their lifecycle due to changes in assortment, prices, or packaging units. The whole process of contract change management is currently not comprehensively defined and supported. Contract changes are usually agreed upon with the supplier on an informal basis and often are not formally approved (i.e. signed). As a result, the internal electronic representations of contracts at the supplier and customer side are diverging from the legally binding paper versions over time. In case of

misunderstandings these errors are carried forward through all following sourcing and distribution processes leading to consecutive errors (e.g. price discrepancies in goods receipt or wrong invoices). The underlying errors are difficult to trace back and costly to correct.

- **Contract monitoring.** The employees of RS are able to monitor the active contracts using the custom-programmed transactions mentioned above, but a complementary pro-active alerting e.g. in case of approaching contract limits is currently not implemented. Consequently orders are placed on invalid or expired contracts.

Based on this analysis, a process vision for electronic contracting with suppliers was developed. The key principles driving the future process implementation are:

- to completely replace paper-based contract documents with legally binding electronic representations,
- to provide continuous IT-support for all contracting activities throughout the creation, monitoring, change, and termination of a contract, and
- to exchange all contract-related information with all suppliers electronically.

Due to the identified main business pains, RS decided to focus on improving the micro-processes creation, monitoring, change management, and termination, in a first step. Based on the generic process success factors time, quality and costs, RS defined a set of key success factors for the future e-contracting process along with related quantifiable performance indicators, summarized in Table 2.

Reduction in overall cycle-time is the major success factor for e-contracting at RS. Measures to be employed include the elapsed time between contract creation and submission as well as between submission and contract release. Quality-related success factors concern the coverage of e-contracting and the elimination of parallel processes as well as error reduction and traceability of contract changes due to electronic exchange of contract data. The cost dimension is dominated by the objectives of reducing the costs for contract submission, which is mainly reflected in the reduction of postal charges.

	Key Success Factors	Performance indicators
Time	Reduced cycle time	Time between contract creation and submission to supplier
		Time between submission to supplier and contract release
	High process automation	% of IT-supported activities
Quality	Elimination of parallel processes	% of suppliers participating in e-contracting
		% of orders released without signed contracts
	Real-time access to contract information and status	% of contracts represented electronically
	Low rate of errors	Number of faulty deliveries due to wrong contract data
		Number of faulty invoices due to wrong contract data
		Number of orders placed on invalid or expired contracts
Cost	Traceable contract changes	Number of changed contracts without signatures of all involved roles
	Low costs for contract submission / distribution to business partners	Average postal charges per contract submission

Table 2. Key success factors and related performance indicators for e-contracting at RS

4.3 Key requirements and IS design decisions

After designing the future contracting process, functional as well as integration requirements for appropriate IS-support were derived. Table 3 provides an overview of the key requirements which are not supported by RS' current systems and would need to be addressed by an e-contracting application.

	Requirement	Description
Integration requirements	External Integration	integration of all external roles (suppliers, 3 rd parties) involved in the contracting process
	Internal Integration	integration with the existing internal applications, e.g. the ERP system
Functional requirements	Status Management / Versioning	contract version control and status management covering the whole contract lifecycle
	Archiving	archiving of electronic contracts
	Workflow	workflow-support for the major activity sequences in the process
	Contract conclusion	legally valid contract conclusion

Table 3. Additional integration and functional requirements for e-contracting

The requirements were used to evaluate the different system design options introduced in section 3.3 in order to narrow down the large number of potential realization combinations to a manageable set of scenarios. The assessment process was led by the e-contracting project manager and consisted of several workshops, involving the core project team as well as various internal roles (e.g. security, supply chain support, IT support etc.) and selected software vendors. Table 4 summarizes the resulting evaluation of the different design options in reference to the six main functional requirements for an e-contracting application. In case of combinations that are not reasonably rateable, such as e.g. the support of archiving through EDI, the corresponding cell in the matrix is empty.

Requirements Design option		External Integration	Internal Integration	Status Mgmt / Versioning	Archiving	Workflow	Contract formation
Contract Representation	Semi-structured	--	--				
	Structured proprietary	-	++				
	Structured standard	++	-				
Integration	EDI / Web Services	-	+				
	ERP Linkage	-	++				
	Portal	++	+				
	E-Mail	+	-				
Contracting System	CMS		-	++	+	++	
	RMS		-	+	++	+	
	ERP		++	-	-	+	
	BNS		+	++	-	++	
Signature	Digital signature						++
	Electronic signature						+
Legend: functional requirements are (++) well supported (+) supported (0) neutral (-) weakly supported (--) not supported							

Table 4. Evaluation of functional support offered by the different design options

- **Contract representation.** As indicated in section 4.2, RS already creates and stores the supplier contracts in its ERP system. RS decided to use this structured proprietary contract representation because it is already integrated in RS' internal backend systems.
- **Integration.** Although ERP Linkage as well as EDI and Web Services would be comparably easy to integrate internally, RS ruled out these options due to their restrictions regarding external integration. Both options presume a comparably high implementation effort for external roles, which makes them ill-suitable especially for the small suppliers of RS. The alternatives Portal and E-Mail on the other hand are easily deployable at suppliers and 3rd parties, assuming they do have a standard internet access. E-Mail has the major disadvantage that it is not suited for providing a transparent access to all contracting-relevant information and is comparably hard to integrate with internal backend system, leaving the portal-based approach as RS' option of choice.
- **Contracting System.** Dedicated contract management systems provide an above average support for the functional requirements on e-contracting. RS nonetheless ruled out this option since current CMS are relatively highly-priced [Dr04] and this best-of-breed approach would inevitably lead to far higher internal integration efforts than a single-vendor approach [LHW01]. The potentially high internal integration effort additionally disqualified the RMS option. The usage of the ERP system as a well as a dedicated BNS both constitute viable options that need to be further evaluated. Compared with ERP systems, BNS usually provide better contracting support by means of pre-defined workflows and escalation routines as well as implemented contract versioning and status management. On the other hand, employing a BNS causes an additional system with higher acquisition and maintenance costs and an additional integration effort concerning the existing ERP system.
- **Signature.** Since the contracts used by RS do not need to satisfy special formal requirements to be legally valid in most jurisdictions [SB02], some kind of simple electronic signature would be sufficient to guarantee a legally valid contract formation in the case of RS. The usage of a digital signature is nonetheless preferred, since RS has strong security-policies governing the access to company-internal resources or information. Additionally, RS has a public key infrastructure already in place and recently started initiatives to support the dissemination of digital certificates among its suppliers in parallel projects.

The evaluation sketched above led to the three different implementation scenarios illustrated in Table 5, which will be assessed in more detail during the future course of the project.

Scenario		Scenario 1	Scenario 2	Scenario 3
Contract representation	Structured proprietary	X	X	X
Integration	Portal	X	X	
	E-Mail			X
Contracting System	ERP		X	X
	BNS	X		
Signature	Digital signature	X	X	X

Table 5. Preliminary e-contracting implementation scenarios at RS

5 Conclusion and outlook

5.1 Electronic collaboration processes in contract management

Contracting denotes a collaboration process executed prior to most exchanges of values between customers and suppliers in business networks. Compared with other collaboration processes such as order management, integrated IT-support for the comparably unstructured and document-oriented contracting process is rarely encountered in industrial practice today. The case of the retailer R illustrates key problems that companies running paper-based contracting processes are facing today: high costs due to labour-intensive activities, long process cycle-times, costly errors in downstream processes, and intransparent, error-prone contract handling potentially leading to legal liabilities.

E-contracting aims at disposing these problems by providing continuous IS-support for the whole contract lifecycle. Following the paradigm of business networking, we presented a collaboration process architecture for contracting covering seven micro-processes, i.e. information, quotation management, negotiation, creation, monitoring, change management and termination. The collaboration process architecture is supplemented by key design decisions regarding the supporting system architecture, i.e. contract representation, signature, contracting system and integration. The application of this preliminary framework in the case of R delivered valuable support in process analysis, process vision and design as well as the subsequent IT scenario evaluation.

5.2 A research agenda for E-contracting

This research provided an initial overview of e-contracting from an interorganizational perspective and raises a number of issues worthwhile researching in the future:

- First, the introduced process architecture has to be further detailed and validated. Future research needs to analyze e-contracting processes based on their achievements in terms of measurable performance indicators. The impact of industry specifics and different contracting types has to be evaluated in order to identify the areas most suited for the deployment of e-contracting. The quotation management process e.g. is expected to have a far higher potential for IS-support in the automotive and high-tech industry than in the illustrated example of a retail company.
- Second, the introduced process architecture should be further enhanced and extended in order to cover the specifics of service contracts.
- Third, the technological dimension of integration will play a major role in successful e-contracting applications. Service-oriented architectures and web service standards will have a significant impact on interorganisational integration in the coming years. For this reason, future research should develop e-contracting architectures incorporating service-oriented concepts.
- Fourth, legal considerations have to be taken into further account. Issues such as the global dissemination of digital signatures as a way to support legally enforceable contract conclusion or the localization of contracts to country-specific aspects play a major role for contracting in today's global value chains.

We encourage further case study research of successful e-contracting examples which could serve as a basis for future empirical research, e.g. on success factors, adoption of implementation approaches, architectural aspects, metrics, and procedure models.

References

- [AF00] Alt, R.; Fleisch, E.: Business Networking Systems - Characteristics and Lessons Learned. In: International Journal of Electronic Commerce, 5 (2000) 2, S. 7-27.
- [AG02] Angelov, S.; Grefen, P.: Support for B2B E-contracting - The Process Perspective. In: Marík, V.; Camarinha-Matos, V. L. M.; Afsarmanesh, H. (Hrsg.): 5th IFIP International Conference on Information Technology for Balanced Automation Systems in Manufacturing and Services, BASYS' 02. Cancun, Mexiko 2002, S. 87-96
- [AG03] Angelov, S.; Grefen, P.: B2B eContract Handling - A Survey of Projects, Papers and Standards. Telematica Instituut, 2003.
- [AG03] Angelov, S.; Grefen, P.: The 4W framework for B2B e-contracting. In: International Journal of Networking and Virtual Organizations, 2 (2003) 1, S. 78-97.
- [AG04] Angelov, S.; Grefen, P.: The Business Case for B2B E-Contracting. 6th International Conference on Electronic Commerce, ICEC'04. Delft, The Netherlands 2004, S. 25-27
- [Al04] Alt, R.: Überbetriebliches Prozessmanagement - Gestaltungsmodelle und Technologien zur Realisierung integrierter Prozessportale. Universität St. Gallen, St. Gallen, 2004.
- [BBZ02] Buchwalter, J.; Brenner, W.; Zarnekow, R.: Referenzprozesse für elektronische Ausschreibungen aus Sicht des industriellen Einkaufs. In: Wirtschaftsinformatik, 44 (2002) 4, S. 345 - 353.
- [BC02] Berenstein, G. L.; Campbell, C. E.: Electronic Contracting: The Current State of the Law and Best Practices. In: Intellectual Property & Technology Law Journal, 14 (2002) 9, S. 1-11.
- [Be03] Bell, T.: ERM and IDM Markets Converge in DoD 5015.2 Standard. 2003.
- [Be05] Becker, J. et al.: SAP Records Management. Galileo Press, Bonn, 2005.
- [BS02] Boulmakoul, A.; Salle, M.: Integrated Contract Management. 2002.
- [BS04] Becker, J.; Schütte, R.: Handelsinformationssysteme. Redline Wirtschaft, Frankfurt am Main, 2004.
- [Bu03] Burgwinkel, D. J.: eCH-Contract Markup Language.
<http://verdi.unisg.ch/org/idt/echweb.nsf/0/F91642D3E20FBD5DC1256DB20022C4B8?OpenDocument&lang=de>, Abruf am 30.09.2005.
- [Co03] Coaton, A.: Contract management: control value and minimise risks. Pricewaterhouse Coopers, 2003.
- [CS96] Clark, T. H.; Stoddard, D. B.: Interorganizational Business Process Redesign: Merging Technological and Process Innovation. In: Journal of Management Information Systems, 13 (1996) 2, S. 9-29.
- [DB04] Davenport, T. H.; Brooks, J. D.: Enterprise systems and the supply chain. In: Journal of Enterprise Information Management, 17 (2004) 1, S. 8-19.
- [Dr04] Drobik, A. et al.: Hype Cycle for Supply Chain Management. Gartner Group, 2004.
- [DS97] Daskalopulu, A.; Sergot, M. J.: The Representation of Legal Contracts. In: AI & Society, 11 (1997) 1 & 2, S. 6-17.
- [DW05] Daniel, E. M.; White, A.: The future of inter-organisational system linkages: findings of an international Delphi study. In: European Journal of Information Systems, 14 (2005) 2, S. 188-203.
- [Fr04] Freeman, E. H.: Digital Signatures and Electronic Contracts. In: Information Systems Security, 13 (2004) 2, S. 8-12.
- [GHM00] Goodchild, A.; Herring, C.; Milosevic, Z.: Business Contracts for B2B. In: Ludwig, H.; Hoffner, Y.; Bussler, C.; Bichler, M. (Hrsg.): 2000
- [Go01] Goldman Sachs: Time to manage those contracts! 2001.
- [Gr04] Große-Wilde, J.: SRM - Supplier-Relationship-Management. In: Wirtschaftsinformatik, 46 (2004) 1, S. 61 - 63.
- [GSG00] Gisler, M.; Stanoevska-Slabeva, K.; Greunz, M.: Legal Aspects of Electronic Contracts. In: Ludwig, H.; Hoffner, Y.; Bussler, C.; Bichler, M. (Hrsg.): Conference on Advanced Information Systems Engineering (CAiSE) 2000. Stockholm 2000
- [GSS00] Greunz, M.; Schopp, B.; Stanoevska-Slabeva, K.: Supporting Market Transactions through XML Contracting Container. Sixth Americas Conference on Information Systems (AMCISS 2000). Long Beach, CA 2000
- [HN02] Hurewitz, B. J.; Nadon, B.: Electronic Signature Standards Create Contracting Options. In: Journal of Internet Law, 6 (2002) 3, S. 20-22.
- [Ho95] Holland, C. P.: Cooperative Supply Chain Management: The impact of interorganizational information systems. In: Journal of Strategic Information Systems, (1995) 2, S. 117.
- [Ia04] IACCM: Electronic Contracting Survey Report. 2004.
- [Im97] IMG: PROMET BPR: Method for Business Process Redesign, Release 2.0. IMG AG, St. Gallen, 1997.
- [KGV00] Koetsier, M.; Grefen, P.; Vonk, J.: Contracts for Cross-Organizational Workflow Management. First International Conference on Electronic Commerce and Web Technologies. 2000, S. 110 - 121
- [Kn03] Knudsen, D.: Aligning corporate strategy, procurement strategy and e-procurement tools. In: International Journal of Physical Distribution & Logistics Management, 33 (2003) 8, S. 720-734.
- [Kp02] KPMG: Vertragsmanagement 2002. Kpmg Consulting AG, 2002.
- [Ky02] Kyte, A.: Contract Life Cycle Management: A \$20 Billion Market. 2002.
- [LHW01] Light, B.; Holland, C. P.; Wills, K.: ERP and best of breed: a comparative analysis. In: Business Process Management Journal, 7 (2001) 3, S. 216-224.
- [Lu03] Ludwig, H.: A Conceptual Framework for Building E-Contracting Infrastructure. In: Corchuelo, R.; Wrembel, R.; Ruiz-Cortez, A. (Hrsg.): Technologies Supporting Business Solutions. Nova Publishing, New York, 2003.
- [Me04a] Mertens, P.: Integrierte Informationsverarbeitung 1: Operative Systeme in der Industrie. Bd. 1, 14. Aufl., Gabler, Wiesbaden, 2004.
- [Me04b] Merz, M.: XML-Based E-Contracting. In: de Jesus Mendes, M.; Suomi, R.; Passos, C. (Hrsg.): The Third IFIP Conference on E-Commerce, E-Business, E-Government (I3E 2003). São Paulo, Brazil 2004, S. 333-344
- [Me99] Merz, M. et al.: Electronic Contracting im Internet. In: Steinmetz, R. (Hrsg.): ITG/GI-Fachtagung. Darmstadt 1999, S. 314-325
- [Mi04a] Minahan, T. A.: Best Practices in Contract Management. Aberdeen Group, 2004.
- [Mi04b] Milosevic, Z. et al.: Inter-Organisational Collaborations Supported by E-Contracts. In: Lamersdorf, W.; Tschammer, V.; Amarger, S. (Hrsg.): 4th International Conference on E-Commerce, E-Business, E-Government (I3E 2004). Toulouse, France 2004, S. 413-429
- [Oa05] OASIS: LegalXML eContracts Technical Committee. <http://www.oasis-open.org/committees/legalxml-econtracts/>, Abruf am 30.09.05.
- [Oe04] Österle, H.: The Networked Enterprise. In: Kagermann, H. (Hrsg.): Realtime - A Tribute to Hasso Plattner. Wiley, Indianapolis, 2004, S. 151-172.

- [Oe95] Österle, H.: Business in the Information Age - Heading for new Processes. Springer, Berlin, 1995.
- [OFA01] Österle, H.; Fleisch, E.; Alt, R.: Business Networking - Shaping Collaboration Between Enterprises. 2. Aufl., Springer, Berlin, 2001.
- [RK02] Riemer, K.; Klein, S.: Supplier Relationship Management. In: HMD - Praxis der Wirtschaftsinformatik, 228 (2002) 39, S. 5-22.
- [RSS99] Runge, A.; Schopp, B.; Stanoevska-Slabeva, K.: The Management of Business Transactions through Electronic Contracts. 10th International Workshop on Database and Expert Systems Applications. 1999, S. 824-831
- [Ru00] Runge, A.: Die Rolle des Electronic Contracting im elektronischen Handel - Eine aus betriebswirtschaftlicher Perspektive vorgenommene vertragstheoretische Analyse am Beispiel der amerikanischen Versicherungsbranche. Universität St. Gallen, St. Gallen, 2000.
- [SB02] Spindler, G.; Börner, F. (Hrsg.): E-Commerce Law in Europe and the USA. Springer, Berlin, 2002.
- [Sc94] Scheer, A.-W.: Business Process Engineering - Reference Models for Industrial Enterprises. 2. Aufl., Springer, Berlin, 1994.
- [Sc96] Schneier, B.: Applied Cryptography. 2. Aufl., John Wiley & Sons, 1996.
- [Te05] Tech Encyclopedia: Contract Management. http://www.tech-encyclopedia.com/term/contract_management, Abruf am 13.09.2005.
- [We03] Weston, F. C.: ERP II: The extended enterprise system. In: Business Horizons, 46 (2003) 6, S. 49-55.