The Materiality of Contract in Relation to ICT: Lessons from a Biography of Contract Management Software

Carolyn Paris
London School of Economics
C.Paris@lse.ac.uk

Abstract
This paper explores the materiality of contract in relation to ICT as illuminated by a biography of contract management software. Lessons learned are: that contracting is situated, entangled and dynamic and resists abstract, closed and static approaches to automation; the importance of material dimensions of contracting such as data practices (including data definition and extraction, data entry, data quality assurance, and the construction and integration of databases), scale in relation to cost, and industry; that while some contracts are suitable for algorithmic reduction, some are not, and the contract document is likely to remain important in relation to the latter; and that algorithmic reduction of contract does not necessarily generate synthesizing organizational contracting knowledge – an “enterprise view” of contract – but potentially confounds it. This study suggests as a basis for further research a theorization of contract as a technology of connectedness, in a relationship of potential convergence, complementarity and substitution with ICT.

1. Introduction

Contract is ever more important to organizations, as they shift away from the aggregation and control of physical resources toward the collection of and mastery over relationships and intangible rights [24]. This is evidenced in phenomena such as outsourcing and cloud computing [26] or supply chain management [31]. Contracting has been identified as a key knowledge competency for organizations [2], grounded in document-based practices [48], but its relationship with ICT (information and communications technology) has not been expressly theorized. In this paper I explore contract in relation to ICT, as illuminated in a “biography” of a packaged software product – contract management software (CMS). Market expectations for CMS were high, but the market for the software failed to develop as expected. In this paper I relate this failure to meet market expectations to the materiality of contract.

In sections 2 and 3, I discuss perspectives on materiality and on contracting in organizations. Section 4 describes the biography of software approach as it was applied in this study, and a biography of CMS is outlined in section 5. In section 6 I discuss the biography of CMS as it sheds light on the materiality of contract in relation to ICT. In section 7 I note several implications for practice and for research, concluding in section 8.

2. Perspectives on materiality

Many scholars in different disciplines are exploring the notion of materiality, and, unsurprisingly, different perspectives have emerged. With respect to technology, work and organizations, Leonardi [27] has put forward a definition of materiality as “the arrangement of an artefact’s physical and/or digital materials into particular forms that endure across differences in place and time and are important to users”. He and others [e.g. 43] have considered the notion of affordances – the possibilities of action as associated with technical objects [34]. Some have equated materiality with tangibility [16]. These views are consistent with a pre-discursive atomistic ontology of things, with attributes, standing separate in relation to the social.

A contrasting view has been articulated in the notion of sociomateriality [38, 39]. In this view, “the social and material are constitutively entangled in everyday life”; this constitutive entanglement, for example in work and organizations, is embodied in practice [37, p. 1437 (emphasis in original)]. The sociomateriality perspective is associated with Barad’s [3] agential realism, which posits a relational ontology where material-discursive practices embody the entanglement of matter and meaning, and objects are inductively inferred and relationally constituted by way of their agential characteristics as observed in phenomena. Such observations are enacted relationally...
3. Perspectives on contracting in organizations

Contracting in organizations has been theorized in a number of different ways, some of which are highly abstract. For example contract as legal construct – an agreement between two or more parties enforceable by law – is largely devoid of content and context [40]. Transaction cost economics conceives of contract as “bilateral private ordering”, characterized along a governance dimension from markets to hierarchies, with the cost of contracting an element of transaction costs [50]. In law and in transaction cost economics, contract-as-construct is deliberated decontextualized in service of abstract schemas.

Other perspectives recontextualize contract by emphasizing the knowledge aspect of contracting. Inter-organizational contracting knowledge has been studied in outsourcing [20] and supply chain management [31] and in terms of inter-firm governance and control [8]. However, while contracting has been identified as a key knowledge competency for organizations [2] and many organizational information systems programs and initiatives touch on contracting knowledge (e.g. knowledge management [1], business intelligence [15], management control systems [14], and management support systems [12]), contracting generally is not supported by an organizing technology inside the organization. In particular, the most definitive organizational knowledge technology, financial accounting, does not generally address contract rights and obligations per se [22]. The failure of organizational information systems to generate useful knowledge about contract rights, obligations and risks leading up to and since the financial crisis demonstrates that synthesizing contracting knowledge – an “enterprise view” of contract – is missing. For example, compare the 2007 and 2008 AIG annual reports, or consider the case of the “London whale” [36]. In those instances, ICT-enabled contracts were linked with organizational opacity, or lack of organizational awareness, regarding the associated risks.

Yet other perspectives recontextualize contract with a focus on situated practice. For example, theories of relational contract [30] characterize some contracts as embedded in an ongoing relationship. Bernstein [5, 6] has described contracting practice as enacted in a contracting community, with several in-depth empirical studies that contrast contracting as understood and carried out by business people to the (intentionally) de-contextualized legal abstraction.

In the case of diamond merchants, she found an industry
that had opted out of the background legal system and in effect created a system of private law. In that system, contracts became binding with a handshake accompanied by the words “mazel u broche”, though Bernstein noted that younger traders had started to memorialize contracts in a writing, with a further shift toward an ICT-based contractual regime as the trading community extended beyond its traditionally Jewish base to include people of multiple ethnicities in many parts of the world.

In many contracting communities and practices, the contract document is central. Mark Suchman [48] has theorized the contract document as a social artifact. For any particular contracting situation, members of the contracting community develop standard terms and conditions that feature technology dynamics such as innovation, stabilization, diffusion, and path dependence. As practice stabilizes, these standard terms and conditions come to be embodied in a template for a document shared within the contracting community. Contracting organizations use this template for their contract documents, making adjustments in the language and inserting the particular transaction terms as appropriate. In these contracting contexts, the contract document organizes the process of reaching agreement, memorializes the agreement in a written record, and is the touchstone for contract performance and enforcement. It can also be reckoned the foundation of organizational contracting knowledge. Nevertheless, and notwithstanding the centrality of the contract document in many contracting practices, it is important to note that many contract terms may be implicit [9], and the contract document may substantially diverge from the reality of contract performance, representing only how the parties would wish their agreement to be interpreted in an “end-game” scenario where the relationship has broken down [5, 28].

Although none of the above perspectives has theorized a relationship between contracting and ICT (Suchman [48] perhaps points in this direction with his notion of the contract document as a social and technological artifact), contracting would seem to be a promising candidate for automation. As early as 1987, Malone et al. [32], applying transaction cost economics, hypothesized that ICT would promote market transactions relative to hierarchical modes of governance (the electronic markets hypothesis, see also [35]); that is, that through cost reduction ICT would enable and promote contracting. Indeed the financial industry (see [25]) exemplifies the move to ICT-supported contracting, with an apparent seamless flow of agreed terms from the transaction process into operational and financial databases, directly generating a form of organizational contracting knowledge.

Electronic contracting of this type can be characterized as increasingly decontextualized and disembodied, exemplified by high frequency trading [45]. However, Mithas et al. [35], in a study of electronic reverse auctions, concluded that six dimensions of “contractibility” (quality, supplier technological investments, information exchange, responsiveness, trust, and flexibility) affect the willingness to participate in reverse auctions, identifying aspects of contracting that are not accounted for by transaction cost economics or the electronic markets hypothesis, and contracting contexts that are not suited to a purely calculative electronic market.

To summarize thus far, contract as a legal and economic construct is decontextualized – one might say de-materialized – to serve in abstract schemas. However, other perspectives mentioned – contracting as knowledge competency, relational contracting and considering the contract document as social and technological artifact – take account of contract as enacted in practice. While the relationship of ICT to contracting has not been expressly theorized, some research as well as real world developments point in the direction of increasing contract automation, that is, to an evolution in contracting practice. This forms the background to the biography of contract management software, which promised to support contracting as an organizational competence along both process and knowledge dimensions. How it failed to do so reveals much about the materiality of contract.

4. The biography of software approach as applied in this study

In this study, I follow the biography of software approach developed by Pollock and Williams [41] in their study of ERP. The biography of software approach entails a longitudinal study that may involve multiple data sources, at different levels, and multiple methods to trace “the evolution of a technology … and how it is shaped by its specific historical context across multiple social locales” [41, p. 80]. As such, the biography of software approach provides a way to study “complex technologies which are instantiated at multiple sites” [41, p. 81]. It thus accommodates a relational or associational logic centered on the biographical subject, as effectively expressed in the following description of multi-sited fieldwork in material culture studies:

This sort of fieldwork requires ethnographers to work in and across multiple field sites, to follow people (e.g., scientists and traders), images (e.g., Rambo and Pokemon), and commodities of all kinds (e.g., coffee and flowers) as they move from
place to place and/or from node to node within a network of production and distribution. … “Multi-sited research is designed around chains, paths, threads, conjunctions, or juxtapositions of locations in which the ethnographer establishes some form of literal presence, with an explicit posited logic of association or connection among sites that in fact defines the argument of the ethnography” [18, p. 286, citing 33, p. 105, (emphasis in original)]

To trace the “life” of CMS, this study of contract management software involved multiple data sources covering the period from 2000-2012. The process of data collection and analysis was inductive and iterative, informed by grounded theory methodology [21, 42] and shaped by principles of corpus construction [4]. I became familiar with CMS initially in 2002-2003 through a series of interviews and a visit to a customer reference site where CMS was being developed by the vendor in a joint effort with the customer. Revisiting CMS in 2008-2009, after the shortfall in adoption was becoming apparent, I carried out detailed coding of vendor selling materials and compared the results to interviewee comments on CMS regarding the anticipated benefits of CMS as well as reasons for non-adoption and problems in implementation. I also compared the successful implementation of CMS at a second customer reference site to the anticipated benefits of CMS.

Interview data suggested possible associations between CMS adoption and types of contracting, and I designed a survey to test these hypotheses. In 2010 this survey was sent to members of a professional association, the International Association for Contract and Commercial Management (IACCM). I analyzed survey data using the statistical software SPSS, and the results confirmed certain associations.

Archival research focused on three key technology research firms (Gartner Inc., Forrester Research Inc. and Aberdeen Group), the IACCM, and five focus vendors. The focus vendors were selected on the basis that (1) all five were mentioned as leading firms in the 2008 Forrester Wave for contract management software, (2) they have been active since the inception of the market, (3) as of 2009 they were still active in the market, and (4) historical information was publicly available. From the survey, I “harvested” a final group of interviews from informed and non-aligned observers of the CMS market. Of a total 53 interviews, including interviews at the site visits, 7 were with representatives of the five focus vendors (including founders of two of the vendors), 9 with representatives of other software companies, 18 with customers of the five focus vendors, and 19 with others (non-customer contracting organizations, IACCM staff, independent consultants and an analyst at one of the technology research firms).

Interview and archival data traced the arc of expectations for CMS, with variously placed industry participants providing their perspectives and analyst and IACCM archival material in effect providing a running account of market views and developments. Vendor archival materials, which included SEC filings for the three focus vendors that were public companies as well as press releases for all five focus vendors, described vendor origins, market positioning, strategic acquisitions, and key events, as well as, for the public companies, detailed information about products and financial results, including sales and marketing expenditures. All of this material was combined to construct the biography, a brief version of which follows.

5. A biography of contract management software

5.1. An arc of expectations

Starting about 2000-2001, software vendors began to market contract management software as an organizing technology for contract. CMS was positioned to fill the gap between CRM (customer relationship management) and ERP (enterprise resource planning) systems, linking knowledge about counterparties with contract terms and transactional data, and providing an organizing technology for the contracting process and contract documents.

Contract management software provided workflow, automated document assembly, and a document repository, together with alerts, reporting and analytics capabilities, and was designed to support the entire contract lifecycle, from bidding through drafting, negotiation and execution of the contract document, to performance and renewal. Bidding, negotiation and approvals would take place within the workflow application. Then a contract document would be generated, based on the key terms agreed. The finalized contract would be filed in an electronic document repository, with the key contract terms as document metadata (structured data about the contract, tagged to the document). These key terms could then be used to feed other internal and possibly external (counterparty) information systems. CMS was particularly targeted at reducing the horizontal fragmentation of contracting across the lifecycle, with sales, legal, compliance and operations groups sequentially involved through a series of handoffs, as well as the internal vertical fragmentation of contracting by type of contract or business unit.

1538
This model of the automated contract lifecycle across the enterprise is continuous, closed and tightly coupled, with a single flow of key datapoints, generating “visibility” into contracting. For example, important dates (e.g. automatic renewal dates) could be automatically calendared for action; volume discounts and rebates could be monitored. In principle, the organization could match buy-side against sell-side (e.g. to manage warranties) or the “flowdowns” from main contracts to subcontracts, map contract terms across its portfolio of contracts, spot trends or potential risks, and manage the overall relationship with counterparties.

In sum, CMS promised to automate the contract lifecycle across the enterprise, joining up fragmented processes and providing “visibility” into contracting. Not identified with a particular industry, CMS was supposed to work for all types of contracts and for all types of businesses. This was a compelling idea. Interviews indicated that vendors, analysts, customers and would-be customers were generally consistent in their views of the benefits that CMS might offer, and survey data did not point to any major misalignment in vendor and customer priorities. The anticipated benefits most commonly mentioned by interviewees were process efficiency, centralized control, the ability to find contract documents, improved reporting capability, improved compliance capability, amendments tracking, improved contracting knowledge (e.g. a “dashboard” of selling opportunities or contracting trends), document exchange and negotiation with counterparties, data integration, and data-based contracting process improvements (e.g. responding to renewal alerts, managing volume discounts and rebates)

In 2002, Gartner predicted that contract management would be a $20 billion software and services market by 2007 [19]. The concept attracted large amounts of investor funding and benefited from millions of dollars in sales and marketing expenditures. However, CMS revenues have fallen well short of $1 billion [see 17, 23]. Yet CMS has been successfully adopted by many customers, and did not fail in a technical sense. Instead, the case of CMS is about a failure to meet market expectations.

5.2 How CMS failed to deliver on its promise

Interview, site visit and survey data pointed to a number of difficulties that CMS encountered when organizations considered the product or went about implementing it and which might have contributed to the shortfall in adoption and market growth. These fall into three categories as against what CMS promised to deliver.

First, CMS promised to automate the contract lifecycle across the enterprise, joining up fragmented processes. However, process fragmentation persisted, with functional or operational fragmentation across the contract lifecycle still in evidence. There were offline processes, with no continuous data flow. For example, in the successful implementation at the second customer reference site, the sales department did not work with CMS. Instead, sales staff handed contract terms to the contract management group to produce a contract document using CMS but worked directly with the operational department to organize delivery of customer services using a separate form, not part of the contract or in CMS. In addition, notable in this organization but in many others as well was the continued fragmentation of contracting by type of contract or business unit, reflected in localized or even multiple implementations of CMS within the organization. In particular there was a marked split between buy-side and sell-side in terms of preferred CMS solutions, with higher CMS adoption on the buy-side. In sum, contracting across the enterprise remained discontinuous and fragmented.

Second, CMS assumed improved contracting knowledge (“visibility”) would be an outcome of automating the contract lifecycle across the enterprise. But CMS was not particularly successful in producing organizational contracting knowledge, for a number of reasons. The first was the persistent fragmentation of contracting, already noted, which CMS did not resolve. Customers also experienced a number of practical problems with the contracts repository in terms of completeness, access and searchability, and had difficulty in defining and extracting structured data. In fact, the challenge of reconciling data requirements across multiple contract types and business units was itself a reason to limit the scope of a CMS implementation, the number of datapoints collected or both. Data entry and data quality assurance required the dedication of expert resources. In many instances, data integration was limited, and users generally did not look to CMS to produce organizational contracting knowledge. For example, in the second customer reference site implementation, relatively few datapoints were captured in discrete data fields, and there was no data integration. In that implementation, the system produced alerts for contract renewals, but the business sponsor did not expect CMS to produce much more in terms of contracting knowledge, ceding that ground to business intelligence initiatives. To summarize, CMS encountered many practical problems in its project to generate detailed, multi-purpose structured data as representational of contracts across the enterprise – and the associated “visibility” into contracting.
Third, though CMS was supposed to work for all types of contracts, and for all types of businesses, in any industry, in fact it did not work equally well for all contracting environments. CMS was associated with large organizations, and with the buy-side. Most of all, CMS was associated with contracting scale (volume and standardization) and with contracting that could be reduced to structured data. In other words, CMS seemed to work best for those contracts that are “algorithmic” – reducible to mechanistic operations using structured data – at a scale where the cost of advanced, data-rich features could be justified.

Problematically for both vendors and customers, contract data and contracting knowledge were domain-specific, even customer-specific. Investment in a specialized data infrastructure, for example for a particular industry, did not generalize to the next, and customers noticed hard-coding carried over from one contracting context to another where it did not fit. Facing these difficulties, in many instances CMS was implemented on a reduced basis as a contracts repository, with limited structured data tagging – essentially a special purpose, indexed document repository. Analysts and vendors putting the most positive light on this phenomenon characterized adoption against a “maturity model”, where a contracts repository was a first step toward advanced data extraction and integration, with associated analytics capabilities.

To summarize, CMS encountered a number of difficulties in putting its model of contracting into practice and a biography of CMS points to a mismatch or product and market level “misfit”, to adopt a term used with respect to ERP implementations [46]. This was eventually reflected in analyst coverage. The 2002 Gartner prediction of the $20 billion market was a high water mark of expectations for CMS, and laid out a vision for CMS as a route to cost reduction, more flexible supplier relationships and improved risk management. It also emphasized the importance of better contracting knowledge (e.g. the information necessary to respond to events impacting contract obligations, such as political unrest, major currency fluctuations, changes in law, mergers and acquisitions, counterparty bankruptcy, changes in ISO standards, supplier price increases and allegations of IP violations by suppliers). In 2006, Forrester issued a Forrester Wave for CMS (or Contract Lifecycle Management software, as they called it), and in 2007 Gartner issued a MarketScope report for CMS, indicating that in their view CMS as a software category was coherent but still at an early stage of development.

However, after a second MarketScope was issued in 2008, the lead Gartner analyst for CMS wrote in a blog that she had been led astray by vendor rhetoric about the “contract lifecycle” – that in lots of cases, the “contract lifecycle” involved nothing more than getting a signature and putting the document in a filing cabinet [51]. Gartner retired the category after 2008. Though Forrester issued Forrester Waves for CMS in 2008 and 2011, by 2011 both Forrester and Gartner had charted the breakdown of the CMS category, for example between a document-centric “überfiling cabinet” implementation versus data-centric specialized process support, or according to industry. One long-time observer of the CMS market suggested that the breakdown of the CMS category could be traced to the tensions inherent in its origins, and indeed the biography of CMS is reframed when the vendor histories are taken into account.

5.3 Reframing the biography: vendor histories

We begin with a look at the five focus vendors around 2000-2001. Vendor 1 had developed specialty software designed to help pharmaceutical companies comply with data-driven rebate and discount provisions and Medicare and Medicaid regulations. In advance of its IPO, it generalized this specialty as “contract management”, tapping into a move, for example as exemplified by the founding of the IACCM in 1999 by large telecoms and IT companies, to promote “contract management” as an important organizational function and competence. Vendor 2, starting with an e-billing capability before 2000, rapidly evolved to a CMS offering focused on documents-handling processes associated to a contracts document repository and database. Vendor 3 owned a configuration, pricing and quoting (CPQ) engine designed for internet-based selling of products that came with lots of “options” (e.g. cars, computers) and positioned for e-commerce as it was expected to develop circa 2000-2001. Vendors 4 and 5 were also in the e-commerce space, providing the professionalized procurement functions of large companies with data-driven sourcing capabilities. Briefly summarizing, Vendor 1 started with an industry specialization, Vendor 2, with a documents focus, was agnostic as to buy-side or sell-side, Vendor 3’s specialty was on the sell-side, and Vendors 4 and 5 served the buy-side.

Significantly, four of the five vendors started with contract-related offerings that were data-centric and computational. While Vendors 1 and 2 took up the “contract management” banner early on, Vendor 3 acquired CMS capability in 2005, after its initial business model based on CPQ was overtaken by ERP offerings and its attempt to merge with Vendor 1 had failed. Vendors 4 and 5 began offering a CMS capability in 2004 and 2006, respectively, as a complement to their buy-side e-commerce products.
By 2006, Vendor 1 had repositioned in the healthcare industry, it was bought by new owners in 2009, and by 2012 had rebranded with a new name and a reformulated offering of which contract management was only a constituent part. By 2012, after changes in ownership, Vendors 2, 4 and 5 had been absorbed into e-procurement, though Vendor 4 had also built out a substantial supplier network (e-procurement platform). As of 2012, Vendor 3 continued to offer CPQ and contract management, but on a low revenue base. To summarize, the vendors were very different from one another in their origins, in their positioning relative to CMS, and in the paths they eventually took in the search for profitability.

6. Discussion

As noted above, the biography of CMS points to a mismatch or product and market level “misfit” between CMS and contracting practice. We can say that CMS embodied a particular concept of contracting, what Swanson and Ramiller might call an “organizing vision” – “a focal community idea for the application of information technology in organizations” [49, p. 460].

This vision serves key functions in interpretation, legitimation, and the organization and mobilization of economic roles and exchanges. The development and influence of an organizing vision is determined by a variety of institutional forces. Among these forces, the community’s discourse serves as the developmental engine. Other factors – business commerce, the IS practitioners’ world view, the motivating business problem, the core technology, and material processes of adoption and diffusion – provide the discourse with its content, structure, motivation and direction. [49, p. 458].

The organizing vision of CMS was that contract management is a matter of process automation and that structured data provides “visibility” into contracting, or organizational contracting knowledge. This organizing vision – another decontextualized abstraction of contract – corresponded to computer capabilities but not to contracting practices across the board. Specifically it corresponded to the original data-centric and computational capabilities of four of the five focus vendors, working to a model of e-commerce centered on algorithmic contracting, as well as to the contracting practices of their early customers. All five of the focus vendors targeted large company customers whose contracting volume could support substantial investment in ICT-enabled contracting, and two had an industry-agnostic buy-side focus that supported the growing professionalism and rationalization of procurement in the e-commerce context. Thus the algorithmic orientation of CMS is not too surprising, nor is the association to large companies and to the buy-side. CMS embodied not only a particular conceptualization of contracting (the “organizing vision”) but the original capabilities of the vendors as well as the contracting practices of the early customers, enacting an effective historicity or entanglement across time.

At the general level toward understanding information, documents and work in organizations, CMS can be viewed as another instance of business process re-engineering [11] around standardized cross-enterprise processes and a unitary database, combined with the further idea that documents that seem largely formulaic can be easily and safely reduced to structured data, which in turn constitute or generate “knowledge”. That these assumptions proved problematic in enactment is consistent with what is known about the limits of routinization [47, 52], the problems and risks associated with extracting structured data from unstructured data such as documents [12], and the difference between data and effective knowledge [10, 13, 15]. Even so, the biography of CMS draws attention to the cost and practical difficulties of defining, extracting, checking and managing structured data, particularly in cross-functional implementations. These costs and difficulties generally come to rest with the user, not the vendor, of packaged software.

The biography of CMS also sheds light specifically on the materiality of contract in relation to ICT. As illuminated by the biography of CMS, contracting is very different from an abstraction as enshrined in legal doctrine, theorized in transaction cost economics, or imagined or envisioned by CMS. Instead, the experience of CMS in confronting the materiality of contract weights heavily toward the situatedness and entanglement of contracting as a practice. Within the organization, process overflows and functional or operational fragmentation across the lifecycle of a particular contract evidence the dynamic and complexly entangled nature of contracting. Contract literally will not stay within the bounds of programmatic routinization but is instead itself a technology around which diverse communications, perspectives, commitments and activities are organized, both within the organization and in a shared space between contracting parties. As described by Winograd and Flores:

In fulfilling an organization’s external commitments, its personnel are involved in a network of conversations. This network includes
requests and promises to fulfill commitments, reports on the conditions of fulfillment of commitments, reports on external circumstances, declarations of new policies, and so on. The organization encounters requests and other external contingencies that it can deal with by making commitments that can be fulfilled by the activation of certain special networks of recurrent conversations, where only certain details of the content of the conversations differ, not their general structure. [52, p. 158] (emphasis in original)

From this perspective, “fragmentation” of contracting inside in organization is likely to be at least partially adaptive, not a problem awaiting a technological fix: As buy-side or sell-side contracting units engage with counterparties according to contracting community practice [5, 6, 48] and mobilize internal resources accordingly, standardization of contracting practices across the organization may not be feasible, or even desirable. Thus we should expect fragmentation by type of contract or business unit to persist.

That contracting generally resists reduction to structured data is evidence of the continuing relevance, indeed centrality in some contexts, of the contract document and the unique power of natural language in relation to the definition and fulfillment of commitments. It would also evidence the persistence of relational contracting [30] and implicit dimensions of contract [9], or perhaps the presence in some contexts of “non-contractibility” as modeled by Mithas et al. [35] when they concluded that not all contracts are suited to disembodied or decontextualized algorithmic reduction.

However, not all contracting resists algorithmic reduction. That CMS enjoyed the greatest adoption in large companies managing high volumes of standard contracts suggests that algorithmic reduction of contract will likely be domain-specific and located where volume and cost considerations support the associated data infrastructure development and maintenance. In such a context, there is a re-placement of the standard contract terms and conditions as well as the transaction-specific contract terms to the ICT infrastructure. The contract document may be de-emphasized and even become irrelevant, and the record of the contract may be in a sense “distributed” across multiple ICT and documentary platforms and practices. To make sense of this interpenetration and substitutability, we might theorize contract as a technology of connectedness in a relationship of potential convergence, complementarity and substitution with ICT as a basis for further research.

The migration of some contracting to electronic environments, as anticipated by Malone et al. [32], is consistent with what we can observe for example in supplier networks of the type built by Vendor 4, industry platforms as in the financial industry [25] or the vendor and customer portals of large and powerful organizations (e.g. the Tennessee Valley Authority supplier portal). We can speculate that as contracting moves outside and away from organizations toward networks, platforms and portals, internal fragmentation of contracting practices may increase. One implication is that synthesizing organizational contracting knowledge – the “enterprise view” of contract” – already identified as generally lacking and difficult to achieve, may move further out of reach. That is, ICT may make it easier to transact, but that does not necessarily mean that it will be easier for management to understand (and disclose) the associated contract rights, obligations and risks.

7. Implications for practice and research

A key implication of this study for practitioners and researchers is that abstract “organizing visions” can obfuscate the materiality of practice, with negative consequences for technology design, investment, research and procurement. In particular, such abstractions may disregard the weighty materiality of contextualized data and data practices. In addition, material parameters such as scale, cost and industry-specialization – critical factors in the biography of CMS – merit more explicit attention in information systems and organizations research.

8. Conclusion: the materiality of contract

To summarize the lessons of the biography of CMS with respect to the materiality of contract in relation to ICT, contracting is situated, entangled and dynamic, and resists abstract, closed and static approaches to automation. Material – even mundane – dimensions of contracting such as data practices (data definition and extraction, data entry, data quality assurance, and the construction and integration of databases), scale in relation to cost, and industry should not be abstracted out of scope in design, investment, research or procurement. Some contracts are suitable for algorithmic reduction (generally based on scale, that is volume and standardization), but some are not; the contract document is likely to remain important in relation to the latter but less so with respect to the former, where there is a re-location of contracting practices and the record of contract to the ICT infrastructure. This suggests a theorization of contract
as a technology of connectedness in a relationship of potential convergence, complementarity and substitution with ICT as a basis for further research. Lastly, I note that algorithmic reduction and replacement of contract does not necessarily generate synthesizing organizational contracting knowledge – an “enterprise view” of contract – but potentially confounds it. This remains an important but unresolved question.

9. References