The London School of Economics and Political Science

Information Technology, Contract and Knowledge in the Networked Economy: A Biography of Packaged Software for Contract Management

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To my father Clifford Eugene Carter (1925-2011)

Declaration

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I warrant that this authorization does not, to the best of my belief, infringe the rights of any third party.

I declare that my thesis consists of 99,546 words (including footnotes, but excluding references and appendices).

Certain portions of the dissertation were included in ISIG (Information Systems and Innovation Group) Early Stage Working Paper "Transactionalizing Technologies versus Performing Contracts: From ERP to Credit Default Swaps at AIG", Susan Scott and Carolyn Paris, May 2009, http://eprints.lse.ac.uk/26701/1/ES02.pdf; in "The Place of Contract in Organizational Awareness: Deconstructing Process, Market and Connectedness", Carolyn Paris and Susan Scott, First International Workshop for Design and Engineering, Lisbon, Portugal, December 11-12, 2009; or in "Applying the Biography of Software Methodology to the Making of a Software Market: The Case of Contract Management Software", a paper presented by Carolyn Paris at the Society for the Social Studies of Science Annual Meeting, Tokyo, August 25-29, 2010. The dissertation incorporates research carried out in 2007-2008 for my dissertation to meet the requirements of the MSc (ISOR) at the Information Systems and Innovation Group at the LSE, as well as data collected from 2002-2003, all as described in Chapter 4. Jonny Potton provided assistance in formatting and Jonathan Paris provided assistance in proofreading.

Signed:…………………………………………………Date:………………………………….

Abstract

In this research I investigate the intersection of information and communication technology (ICT), contract and knowledge in the networked economy as illuminated by the "life" of contract management software (CMS). The failure of CMS to fulfill market expectations provides the motivating question for this study. Based on interview, survey and archival data, I construct a "biography" of CMS from a market perspective informed by the theory of commoditization as well as studies of markets from economic sociology. From the latter, I draw upon the theory of performativity in markets to identify in the failure of CMS a series of breakdowns in performative assumptions and operations normally at work in the making of a packaged software market, ranging from a failure in classification performativity to a detachment of marketized criteria, in the form of analyst ratings, from the underlying software product and vendors. This catalog of breakdown indicates that packaged software production implicates multiple levels of commoditization, including financialized meta-commodities and marketized criteria, in a dynamic I theorize as substitution of performance. I explore the implications of my findings for packaged software and for process commodities more generally, suggesting, *inter alia*, that process commoditization may revolve around contract and information exchange rather than product definition. I go on to propose an open theorization of contract as a technology of connectedness, in a relationship of potential convergence, complementarity and substitution with ICT, interpenetrating and performative. My contributions are to information systems and organizations research on the topics of packaged software and the relationship of ICT, contract and organizational knowledge; and to economic sociology on the topics of performativity in markets and product qualification in process commoditization.

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List of Terms and Acronyms Used

buy-side – a firm's function and activities as a buyer of goods and services

CLM – contract lifecycle management, used by Forrester as its term for contract management software

commoditization, or commodification – in the first meaning as used herein, commoditization refers to the process of making a thing (a good or service) into a commodity, or thing for exchange; in a second meaning, commoditization refers to a product becoming undifferentiated or generic, and widely available, and thus competing on price alone

contract lifecycle – the notion that a particular contract goes through phases from pre-contract through negotiation, execution, performance and finally retirement or expiry

CPQ – the name used for Selectica's configuration, pricing and quoting software

CRM – customer relationship management systems

data discreteness – a term introduced here to refer to how easily and completely a contract (or other document) can be reduced to structured data (without significant loss of meaning)

demo – a term commonly used to refer to a software demonstration to prospective customers

distributed contract – a term introduced used here to refer to a contract the terms of which are constituted and made of record across multiple ICT and other tangible or intangible modalities

distributed organization – a term used here to refer to an organization that contracts out many corporate functions and activities

ECM – enterprise content management systems

EMH or the electronic markets hypothesis – the hypothesis that ICT promotes market coordination relative to hierarchical coordination

e-procurement, e-purchasing and e-sourcing – generally, corporate procurement over the internet

ERP – enterprise resource planning systems, such as SAP or Oracle

goodwill – the portion of the purchase price for a business that cannot be allocated to particular assets and therefore is booked as an asset (goodwill) on the acquiring firm's balance sheet

hard coding – in reference to software (or a software demo), refers to features or data that could or should be variable or optional but instead are pre-specified and fixed in the software

IACCM – International Association for Contract and Commercial Management

IP – intellectual property

IPO – initial public offering, that is, when a firm offers its shares to the public for the first time

metadata – with respect to any document or other file, structured data, codes or tags associated with the document or file

NASDAQ – the American stock market on which many technology companies are listed

networked economy – a digitally connected economy trading products that are to an increasing degree intangible

process commoditization – as used here, the conversion of organizational processes into products, following a program of functional simplification and closure, or decontextualization

pure-play – with respect to a software vendor, means that it offers or specializes in a particular type of software

repository – as used here, a library of digital documents

RFQ, RFP, RFI, RFX – requests for quotations, proposals, information or generally, all referring to a firm going to market with a specification for something that it wants to buy

ROI – return on investment, a key measure used to determine the advisability of a particular investment or expenditure

SaaS – software-as-a-service, referring to software delivery in the form of subscription access to the vendor’s server, which hosts the software

SEC – the Securities and Exchange Commission, the United States securities regulatory agency

sell-side – a firm’s function and activities as a buyer of goods and services

SRM – seller relationship management systems

structured data – refers to data that is in a fixed format for entry into a database or spreadsheet where it can be queried, manipulated, calculated or generally become the subject of computer operations; compare the unstructured data in the form of a natural language document

STS – science and technology studies, also here referring to concepts such as the social construction of technology or the social shaping of technology

TCE or transaction cost economics – a theory of firm formation and governance associated with Coase and Williamson which at its core hypothesizes an efficiency-optimizing function that minimizes the sum of production costs and transaction costs

template – with respect to contracts or other documents, a standard form of document that can be completed by filling in blanks, selecting among options or otherwise revising for a particular use

vertical – used here in two ways, to refer to a particular industry, or to refer to a form of business organization which incorporates multiple stages in the entire chain of production, e.g. from raw materials to ultimate consumers

webinar – a presentation made over the internet, usually incorporating some level of interactivity

workflow – refers to the use of ICT to route work (e.g. to obtain approvals for a contract)

Chapter 1 Introduction

1.1 Research background: ICT, contract and knowledge in the networked economy

Recent developments in information and communication technology (ICT), in particular the internet, have changed the way we do business, and the business that we do. We live in a digitally connected economy trading products that are to an increasing degree intangible (Asprey and Ceruzzi 2008; Castells 2010) – what I call in this dissertation the "networked economy". While the financial markets are in the vanguard, (see Bátiz-Lazo et al. 2011; Chiasson and Davidson 2005; Knorr Cetina and Grimpe 2008; Lepinay 2007a, 2007b; Zaloom 2006; Zuboff 1988), ICT has also transformed the travel industry, retail commerce, the media industry and the IT industry itself (see Asprey and Ceruzzi 2008). In the networked economy, it makes more sense to "buy" than to "make" (Ciborra 2007), and organizations become digitized, distributed, even "virtual" (the "crisis of the vertical corporation model"; Castells 2010, p. 178). Supply chain management, outsourcing and cloud computing evidence this de-composition and re-configuration of organizational resources, capabilities and boundaries characteristic of the networked economy.

One way of understanding how ICT is changing the way we do business is through transaction cost economics (TCE), a theory of firm formation and governance associated with Coase (1937) and Williamson (e.g. 1979, 2010) which at its core hypothesizes an efficiency-optimizing function that minimizes the sum of production costs and transaction costs – including the cost of contracting. Malone et al. (1987) hypothesized that as ICT makes contracting more efficient, market transactions would increase relative to hierarchical governance inside vertical organizations. This is the so-called electronic markets hypothesis (EMH) (see Mithas et al. 2008).

For examples of how ICT is changing the business that we do, we can look to its role in the generation of new markets in intangible products (Ciborra 2007; Shapiro and Varian 1999; Teece 1998), such as financial products (Lepinay 2007a, 2007b; Stearns 2011), services or "process commodities" (Barrett and Davidson 2008; Davenport 2005; Zysman 2006) and software (Campbell-Kelly and Garcia-Swartz 2007; Ceccagnoli et al. 2012; Sawyer 2000, 2001). The packaged software industry embodies the logic of buy instead of make, or buy-versus-build (Brooks 1987), and indeed most organizations today buy, rather than build, much of their software (Vitari and Ravarini 2009; see also Howcroft and Light 2006, 2010; Strong and Volkoff 2010; Xu and Brinkkemper 2007).

The generative effects of ICT on the economy, through the enabling of markets and the creation of new markets, are now largely taken for granted. Less well understood are the associated implications for organizational knowledge, that is, how the organization understands itself and its situation in relation to actions it might take (cf. Clark et al. 2007; D'Adderio 2004; Nonaka 1994; Weick 1995). Knowledge has been identified as key in firm formation (Nonaka and von Krogh 2009) and in inter-organizational economic relations and structures, such as industrial clusters (Arikan 2009), production communities (cf. Lee and Cole 2003 regarding Linux kernel development), supply chain relationships (Fayard 2012; He et al. 2011; Malhotra et al. 2005; Subramani 2004), and outsourcing and offshoring (Cha et al. 2008; Dibbern et al. 2008; Gefen and Carmel 2008; Leonardi and Bailey 2008). The increase in contracting predicted by EMH puts a premium on contracting as an organizational competence – perhaps *the* residual organizational competence – and on organizational contracting knowledge; Argyres and Mayer (2007) identify contracting competence as a differentiating capability for organizations. Nonaka (1994) implicitly describes one aspect of contracting knowledge as a key element in organizational knowledge creation:

> It should be noted that the process of organizational knowledge creation is a never-ending, circular process that is not confined to the organization but includes many interfaces with the environment. At the same time, the environment is a continual source of stimulation to knowledge creation within the organization. For example, Hayek (1945) pointed out that the essential function of market competition is to discover and mobilize knowledge "on-the-spot," i.e., the implicit, context-specific knowledge held by market participants.
>
> In the case of business organizations, one aspect of the relationship between knowledge creation and the environment is illustrated by reactions to the product by customers, competitors, and suppliers. For example, many dimensions of customer needs take the form of tacit knowledge that an individual customer or other market participants cannot articulate by themselves. A product works as a trigger to articulate the tacit knowledge. Customers and other market participants give meaning to the product by their bodily actions of purchasing, adapting, using, or not purchasing. This mobilization of tacit knowledge of customers and market will be reflected to the organization, and a new process of organizational knowledge creation is again initiated. (Nonaka 1994, pp. 27)

However, research points to gaps in organizational contracting knowledge (Håkansson and Lind 2004), and financial crises and scandals over the last fifteen years (Enron, Long-Term Capital Management, the ongoing financial crisis with origins in 2007-2008, the 2010 "flash crash", the collapse of MF Global, and a major trading loss at JP Morgan in 2012)[1] suggest that, at least in the financial arena, where ICT has arguably had the biggest impact on markets, organizations do not understand their contracts. This lack of understanding seems to extend to counterparties,

[1] See Counterparty Risk Management Policy Group III (2008); Murphy (2012); O'Malia (2012); Powers et al. (2002); MacKenzie (2006b); Rajan et al. (2010); Staffs of the Securities Exchange Commission and the Commodity Futures Trading Commission (2010); cf. Butler (2010).

investors and regulators, and the failure to understand and manage contractual commitments can have systemic consequences. The indications are that the relationship of ICT, contract and knowledge in the networked economy can be characterized as evolving, perhaps undertheorized, and, in some circumstances, problematic.

1.2 The motivating question: what happened to contract management software?

In this dissertation I explore the relationship of ICT, contract and knowledge in the networked economy by examining the "life" of a packaged software product – contract management software (CMS) – that promised to support contracting as an organizational competence along both process and knowledge dimensions. CMS was introduced toward the end of the dot.com era, around 2000-2001, and in 2002, Gartner, a technology research firm, predicted that contract management would be a $20 billion software and services market by 2007 (Gartner Inc. 2002[2]). Instead, CMS revenues have fallen well short of $1 billion (IACCM 2007, Forrester Research Inc. 2011a). This gap between market expectations and market performance provides the motivating question and point of departure for this dissertation: "What happened to contract management software?"

In 2002, the prospects for CMS were promising. A few years earlier, in 1999, global information technology (IT) and telecommunications companies had established a professional organization for contract managers, the International Association for Contract and Commercial Management (IACCM), signalling recognition of the growing importance of contracting for these major industries. The IACCM was committed to establishing contract management as a core organizational function and professional discipline, and strongly supported the use of automation tools for contract management. Typical contracting processes in organizations were fragmented and inefficient, and in many organizations it was difficult even to locate contract documents. By 2001, several packaged software vendors had identified contract management as an opportunity.

Contract management software bridged the gap between enterprise resource planning (ERP) systems and customer relationship management (CRM) systems. While ERP systems managed the structured data for sales and purchases (e.g. delivery of goods), and CRM systems provided a place to store information about customers, neither ERP nor CRM provided an organizing technology for the contracting process, contract documents, and contract information. CMS filled this need. Automating the contract lifecycle across the enterprise, CMS promised efficiency and control in contracting, but also "visibility" into contracting – i.e. organizational contracting knowledge.

[2] All Gartner Inc. research is referenced for historical perspective and may not reflect current conditions.

Contract management software provided workflow, automated document assembly, and a contracts repository, together with alerts, reporting and analytics capabilities, and was designed to support the entire contract lifecycle. 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 serving as document metadata (structured data about the contract, tagged to the document). These key terms could then be used to feed other IT systems internally and possibly external (counterparty) systems as well. CMS modelled contracting as a closed and continuous production function, joining up fragmented processes and generating structured data that would flow through to transactional databases and analytics applications. With its design based on the generic contract lifecycle, CMS would work for all types of contracts, and for all types of businesses, in any industry.

CMS seemed like an appropriate packaged software solution to the contract management problem. The concept attracted large amounts of investor funding and benefited from millions of dollars in research and development and sales and marketing expenditures. 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 expectations (Pollock and Williams 2010; cf. Lyytinen and Hirschheim 1987) – specifically the failure to meet *market* expectations. In this dissertation I refer to this as the "market failure" of CMS or as the failure of CMS as a packaged software product or market.

To understand what happened to CMS, I first consider whether there was a "generic" failure in making a packaged software market – not specific to contract, contracting or contract management. In this regard, the case of CMS can be expected to contribute to our understanding of packaged software from a market perspective (cf. Sawyer 2001). Second I consider how the failure of CMS was related to contract, taking the case of CMS as an opportunity to study the nexus between ICT, contract and knowledge.

1.3 The research questions; overview of the thesis

To summarize, my research questions are:

> (1) How can we account for the failure of CMS from a market perspective on packaged software? What are the implications for packaged software?
>
> (2) To what extent did the market failure relate to contract? What are the implications for ICT, contract and knowledge in the networked economy?

As noted above, most organizations buy rather than build much of their software, but the phenomenon of packaged software has not received a proportionate amount of attention in IS research literature (Light and Sawyer 2007; Sawyer 2000, 2001). In particular, while Sawyer (2001) called for a market-based perspective on information systems development, a market perspective on packaged software and its implications for organizations is still underdeveloped.

Pollock and Williams's (2009a) biography of software approach provides a framework for studying a packaged software from a market perspective. Their study of a successful packaged software product – ERP – suggests that a successful packaged software market requires the mobilization of a knowledge network in support of an "organizing vision" (Swanson and Ramiller 1997) together with the successful execution of a strategy of "generification" – reconciling the diverse needs of users toward development of a standardized software product. The data indicates that in the case of CMS, an active knowledge network was enlisted in support of a coherent and compelling organizational vision – automating the contract lifecycle across the enterprise – but that generification failed.

In this dissertation I go beyond that conclusion to investigate how and why generification failed, and more generally how and why market creation failed. To do this I extend my analytical and empirical frame to incorporate, on the one hand, the vendors and the analyst firms and, on the other, contracting in relation to CMS, within a broader market perspective drawing upon the theory of commoditization (Appadurai 1986a; Kopytoff 1986) and on studies of markets from economic sociology (e.g. Callon 1998a; Cochoy 2010; Lepinay 2007a, 2007b; MacKenzie and Millo 2003). The theory of commoditization identifies the role of classification in bringing products to market and hypothesizes a knowledge network at work in extended or remote production, where producers are separated from consumers. From the studies of markets two additional notions are particularly relevant here – product qualification and performativity in markets. Product qualification refers to the processes by which products are defined, described, given attributes and stabilized (Callon 2010; Callon et al. 2002; Lepinay 2007b; Muniesa et al. 2007; cf. Caliskan and Callon 2010; Pollock and Williams 2009b), with classification (see generally Bowker and Star 1999) an important element (Sjögren and Helgesson 2007; cf. Pollock and Williams 2010, 2011).

The theory of performativity in markets (Callon 1998b; MacKenzie and Millo 2003; MacKenzie et al. 2007a) originally identified economic models as performative (following linguistic philosopher J. L. Austin) because they do not "describe an existing external 'economy', but [bring] that economy into being: economics performs the economy, creating the phenomena it describes" (MacKenzie and Millo 2003, p. 108; see also MacKenzie et al. 2007b, p. 4), but has since been applied to other agencies of commerce, such as marketing (Cochoy 1998, 2010).

Austin’s theory of performativity entailed a notion of “misfire” (Austin 1962), when a performative statement failed to have its intended effect, which corresponds to Callon’s “overflowing” of a frame (Callon 1998c) or to a notion of “breakdown” (Butler 2010; Callon 2010). In this dissertation I develop the notion of breakdown – the failure of expectations associated with a performative assumption or operation – as an analytical device for the study of market failure.

Using these concepts and working with a variety of data sources – interviews, a site visit, survey data and archival material – dating from 2000 to 2011, I first develop a biography of CMS as an organizing technology for contract. Next I develop an alternative biography of CMS as a commodity. Extending the analytical and empirical frame in this second step to include the analysts and vendors within the process of commoditization both disrupts and informs the biography of CMS an organizing technology for contract, toward offering a fuller explanation.

An analysis of the evidence of breakdown in the biography of CMS reveals performative assumptions and operations relating to both packaged software and the relationship of ICT, contract and knowledge – assumptions that were not valid and operations that did not work in the case of CMS. This analysis traces the logic of commoditization in packaged software markets, encompassing vendor firms and their investors as well as software and its users. My analysis challenges prevailing conceptualizations of packaged software and process commoditization (the conversion of organizational processes into products, following a program of decontextualization). Relating the findings of this study to trends in ICT-enabled contracting and other aspects of contracting in the networked economy, I identify issues that make organizational contracting knowledge a more difficult problem than research to date would suggest and set an agenda for further research regarding the relationship of ICT, contract and knowledge based on an open and underspecified theorization of contract as a technology of connectedness, in a relationship of potential convergence, complementarity and substitution with ICT.

This study engages with the theory of performativity in several ways. First, it takes seriously the idea that breakdown – a failure of a performative operation to work as expected or intended – is revelatory (Butler 2010; MacKenzie 2004), and I use a table of breakdown to organize and present evidence of breakdown across multiple interacting levels of commoditization. This study also supports, in principle, an analytic decomposition of “performativity” as suggested by MacKenzie (2004, 2006a), but raises some questions about his proposed schemas. In particular I argue that Austin’s (1962) original insight into the strong performative effect of expressions that on execution have rule-based mechanistic or deterministic material outcomes is relevant to the theorization of contract as a technology of connectedness and to other phenomena characteristic of the networked economy.

1.4 Outline of the dissertation

In Chapter 2, I review research literature that informs a market perspective on packaged software. In section 2.1, I describe how packaged software is generally defined and understood in relation to custom software, the business model for packaged software, and the problems of standardization and procurement. Existing research tends to analyse packaged software failure in terms of either loss of value due to commoditization (when a product becomes undifferentiated or generic, and widely available) or organizational misfit, the subject of many so-called implementation studies of ERP. In section 2.2, I explain how the biography of software approach developed by Pollock and Williams (2009a) provides a better framework for this study because it accommodates a market perspective on packaged software failure, and I develop a preliminary hypothesis that the failure of CMS might be traced to the lack of a knowledge network in support of an organizing vision or to a failure in generification. Toward developing the market perspective on this case of market failure, in section 2.3 I develop a theoretical complement to the biography of software approach by calling on the theory of commoditization and studies of markets from economic sociology, in particular developing the notion of breakdown as an analytical device for understanding market failure. Section 2.4 summarizes this research literature toward forming a market perspective on packaged software.

In Chapter 3, I survey research literature on ICT, contract and knowledge, which is often framed in relation to transaction cost economics and its governance dimension (markets and hierarchies). In section 3.1, I briefly describe transaction cost economics, its theory of contract, and the electronic markets hypothesis, and I relate EMH to the digital transformation of the organization as described by Kallinikos (2006) and to recent developments in contracting. I go on to note that TCE has been qualified and questioned over the years, and, in section 3.2, I briefly survey alternative (non-TCE) theories of contract. In section 3.3, I survey empirical studies of ICT, contract and knowledge. From this survey I conclude in section 3.4 that knowledge has been identified as a key element of contracting, but has been explored mostly in terms of its inter-organizational dimension, not from the perspective of the organization’s need for synthesizing contracting knowlege. Indeed, research indicates that organizational contracting knowledge is not well-supported by financial accounting or other any other organizing technology for contract. This frames the opportunity and the challenge for CMS.

In the chapter on methodology (Chapter 4), I first explain why and how I am adopting Barad’s (2003, 2007) agential realism as my epistemological and ontological orientation (section 4.1), relating her notion of posthumanist performativity to performativity in markets and to breakdown. In section 4.2, I go on to explain my use of the biography of software approach as methodology, positioning it in relation to other approaches and explaining how I apply it as a historical account informed by grounded theory and shaped by principles of corpus construction. Also in section 4.2, I discuss CMS as a biographical subject and how, taking up a second-level subject-object analytical framework, CMS as subject relates to “regions” of contract. In section 4.3, I describe my research design, provide a history of the study, and describe in detail the sources of data and methods of data collection. In section 4.4, I summarize my methodology and relate it to the presentation of data in Chapters 5 and 6 and the analysis in Chapter 7.

In Chapters 5 and 6, I present my empirical material as I develop a biography of CMS in two stages or at two levels – first as an organizing technology for contract and second as a commodity – which I draw upon sequentially to build a table cataloguing evidence of breakdown for analysis. In Chapter 5, I present interview (including site visit) data, survey data, and archival material (vendor selling material and material from the IACCM archives) toward developing a biography CMS as an organizing technology for contract. In section 5.1, I explain why CMS seemed promising, by describing predecessor technologies, the founding of the IACCM and the idea of contract management and CMS as an organizing technology for contract management. In section 5.2, I describe the reference customer site visit I made in 2009, where I saw the benefits of CMS in use. In section 5.3, I describe the role of the IACCM in the biography of CMS. In section 5.4, I present evidence of breakdown from the data. I summarize this empirical material in section 5.5 with a brief biography of CMS as an organizing technology for contract and an initial table of breakdown.

In Chapter 6, applying a market perspective that incorporates archival data relating to analysts and vendor firms, I construct a second superceding biography of CMS as commodity, and extend the table of breakdown. In section 6.1, I describe the analysts and their role in the biography of CMS. Section 6.2 sets out brief histories of five focus vendors, ending with a discussion of marketing by the vendors. In section 6.3, I discuss the further evidence of breakdown from the analyst and vendor material with a summary table presenting the evidence of breakdown from all of the data presented in Chapters 5 and 6. In section 6.4, I recast the biography of CMS, this time as a commodity.

In Chapter 7, I present my analysis. I first discuss, in section 7.1, the preliminary hypothesis that the failure of CMS might be traced to the lack of a knowledge network in support of an organizing vision or to a failure in generification. I then present a detailed analysis of the table of breakdown brought forward from Chapters 5 and 6 against the research literature on commoditization and markets (sections 7.2 and 7.3). In section 7.4, I draw these discussions together toward in an explanation of how CMS failed from a market perspective on packaged software, and the extent to which the failure related to contract, concluding that section and the chapter with a retrospective on CMS.

In Chapter 8, I draw out the implications of this study. In section 8.1, I argue that this study challenges the business model for packaged software and spell out the implications of the logic of commoditization at work in packaged software production. In section 8.2, I generalize the findings of this study to question how we understand product qualification for process commodities. In section 8.3, I turn more generally to the implications of this study for ICT, contract and knowledge in the networked economy, beginning with some observations regarding the location of contracting knowledge and practice. I go on to respecify the problem of organizational contracting knowledge in light of this study and propose a research agenda around the theorization of contract as a technology of connectedness. In section 8.4, I draw together several of the implications of this study for practice, and, in section 8.5, I conclude with a discussion of the implications of this study regarding performativity, both as theory and as relevant to understanding the networked economy.

In Chapter 9, I summarize my findings, my analysis and the implications (sections 9.1, 9.2 and 9.3). I also outline my contribution, which is in three areas (section 9.4): to IS and organizations research on the topics of packaged software and the relationship of ICT, contract and organizational knowledge; to economic sociology on the topics of performativity in markets and product qualification; and to the theory of performativity on the topics of breakdown (or overflowing or misfire), the analytical decomposition of the notion of performativity, and the relevance of Austin’s original notion of performativity to the theorization of contract as a technology of connectedness. In section 9.5, I note limitations of this study, and, in section 9.6, I identify several areas for further research suggested by this study: toward the development of a taxonomy, analytical framework and vocabulary for software design, procurement and investment that reduces the dependence on “organizing visions” and product categories; regarding the problem of organizational contracting knowledge in light of the evolving relationship between ICT and contract; and tracing the interpenetration of ICT and contract and their conjoint performativity toward new understandings of ICT, contract and knowledge in the networked economy.

Chapter 2 Literature review: packaged software from a market perspective

In this chapter, I review literature relating to to the first research question: "How can we account for the failure of CMS from a market perspective on packaged software? What are the implications for packaged software?" I begin, in section 2.1.1, with a definition of packaged software and by describing how packaged software is generally understood in relation to custom software – in particular how the logic of scale provides the rationale for the packaged software industry and the buy-versus-build procurement model. Next (section 2.1.2) I relate the logic of scale to the business model for packaged software as an information good and describe the threat of loss of value due to commoditization (when a product becomes undifferentiated or generic, and widely available, and thus competes on price alone). The logic of scale sets up the core design problem for packaged software, the problem of standardization, which can be resolved through a number of different strategies (section 2.1.3). The problem of standardization also sets up an ongoing tension between vendors and customers, manifest in implementation (section 2.1.3) and procurement (section 2.1.4). I conclude (in section 2.1.5) that packaged software is an important phenomenon but the market perspective is lacking; in particular, existing research tends to analyse packaged software failure in two ways: as a general phenomenon of commoditization (with the meaning above) or as organizational misfit, which has been the subject of many so-called implementation studies of ERP. Neither of these approaches promises a complete explanation for the failure of CMS.

In section 2.2, I explain how the biography of software approach developed by Pollock and Williams (2009a) provides a better framework for this study. In section 2.2.1, I describe how the biography of software approach lifts the analysis out of the particular organizational setting, foregrounds the processes of packaged software production, and thus accommodates a market perspective on packaged software. Also in that section, I draw out three key concepts from Pollock and Williams's biography of ERP: the knowledge network, the organizing vision (from Swanson and Ramiller 1997), and their concept of generification. In section 2.2.2, I relate their biography of ERP to technology histories associated with science and technology studies (STS) and the three key concepts to comparable concepts from other studies of technology production. I conclude in section 2.2.3 with a preliminary hypothesis, based on my reading of this research, that the failure of CMS might be traced to the lack of a knowledge network in support of an organizing vision or to a failure in generification.

In section 2.3, I develop a theoretical complement to the biography of software approach by calling on the theory of commoditization, meaning here the process by which things become objects of exchange (Appadurai 1986a; Kopytoff 1986), and studies of markets from economic sociology (e.g. Callon 1998a). In section 2.3.1, I summarize key ideas from the theory of commoditization as relevant to this study, classification in commoditization and the role of knowledge networks in extended or remote production being of particular relevance here. The theme of classification in commoditization has been further developed as an element of product qualification (the processes by which products are defined, described, given attributes and stabilized) in studies of markets from economic sociology, as I describe in section 2.3.2. In section 2.3.3, I discuss performativity in markets as explored in that literature, and, in section 2.3.4, I develop the notion of "breakdown" in performativity as an analytical device for understanding market failure. In section 2.4 I draw this research together to derive four key themes regarding packaged software from a market perspective: the knowledge network, the organizing vision and generification as factors in successful market creation, and breakdown as an analytical tool for understanding market failure.

2.1 How packaged software is understood

According to Campbell-Kelly (2007), it was in the 1980s that software research turned away from a focus on software languages to consider the software industry, which was becoming an increasingly important phenomenon. In 1987, Fred Brooks, author of *The Mythical Man-Month* (Brooks 1995 [1975]), wrote about off-the-shelf software as providing "the most radical possible solution for constructing software … not to construct it at all" (Brooks 1987, p. 16). As Brooks saw it, buying packaged software would always be cheaper than building custom software, and today, most organizational software is bought, not custom-designed (Pollock and Williams 2009a, pp. 60-61; Vitari and Ravarini 2009; see also Howcroft and Light 2006, 2010; Strong and Volkoff 2010; Xu and Brinkkemper 2007). In light of the importance of packaged software to organizations, it is notable that in 2000 when a group of prominent scholars convened to draw up a list of software research topics, they did not include application software (Campbell-Kelly 2007), and packaged software, with the exception of ERP, has continued to receive proportionately little research attention (Light and Sawyer 2007). Furthermore, despite Sawyer's (2001) calling for a market-based perspective on IS development, research on packaged software has for the most part remained centered around the organizational setting.

2.1.1 A definition of packaged software; packaged software as compared to custom software

Vitari and Ravarini (2009) define packaged software as:

> … commercially available software, where the user has no free access to the source code and no rights to redistribute. It is typically licensed onto the mass market as a tradable, ready-made, off-the-shelf pre-built product, whose eventual customization is controlled by the vendor. (p. 250)

In this formulation, the defining feature of packaged software is its ownership by vendors, who sell licenses to use it. Apart from its commercial terms of sale and use, packaged software is often understood in relation to custom software, compared in terms of scale, the skills required of IT user organizations, the method of development, and the measures of success (Table 2.1). The key benefit of packaged software is the expertise of the developers as scaled against the IT capabilities of individual organizations, resulting in better and more cost-effective IT deployments for the organizations (Brooks 1987; Light and Sawyer 2007); that is, the rationale for packaged software is the economy of scale and the assumed lower costs that will motivate firms to buy software rather than build it in-house. To adapt to the buy-instead-of-build model, IT user organizations shift away from bespoke software projects developed against requirements expressed in specifications (e.g. using the "waterfall" method or some variant; see Boehm 1988; Sawyer 2001) to procurement based on requirements expressed in a request for proposals (or the like, sometimes generically referred to as RFX) (Sawyer 2001). Whereas for custom software there is direct interaction between users and in-house developers, for packaged software the relationship between users and developers is abstracted and remote, mediated through a network of analysts, resellers, consultants and system integrators working across multiple channels (Keil and Carmel 1995; Sawyer 2001), with intermediaries "co-dependent" on vendors and user organizations for their business (Howcroft and Light 2010). Lastly, while the measures of success for custom software are user acceptance and user satisfaction, for packaged software, success is measured in terms of profitability and market share (Chiasson and Green 2007; Sawyer 2000). Thus Ó Raian (2010), in his study of software developers, writes about "the missing customer and the ever-present market".

Comparing custom software to packaged software	*Custom software*	*Packaged software*
Scale	Localized, no scale benefits	Benefits of scale and concentrated expertise
Skills required of user organizations	Requirements specification and software engineering	Procurement skills, including RFX and contract management
Method of development	Close interaction between developer and user	Mediated interactions involving analysts, resellers, consultants and system integrators across multiple channels
Measures of success	User acceptance and user satisfaction	Profitability and market share

Table 2.1 Comparing custom software to packaged software (cf. Keil and Carmel 1995; Sawyer 2000, 2001)

2.1.2 How the logic of scale shapes the business model for packaged software; the threat of commoditization

Because the packaged software industry is based on the logic of scale – concentrating development time and expertise in a standardized product that serves the needs of multiple users – packaged software is sometimes considered an “information good”, as defined by Shapiro and Varian (1999, p. 3). For information goods (a piece of recorded music, as an example), the marginal cost of production approaches zero and profit margins are correspondingly high, and this model has been applied to software (see Gallaugher and Wang 2002; Pollock and Williams 2009a, p. 20; Teece 1998; Xu and Brinkkemper 2007). Two further aspects of this model are the possibility of increasing returns due to “network effects” (positive feedback arising from positive network externalities) and the characterization of information goods as “experience goods” (Shapiro and Varian 1999). “Network effects” in this context refers to the dynamic of increasing returns if the particular packaged software product requires or benefits from interoperability across users (Arthur 1989, 1994; Katz and Shapiro 1985; Shapiro and Varian 1999; cf. David 1985); the more users, the more valuable the tangible or virtual network defined by interoperability. Teece (1998) posits increasing returns as characteristic of knowledge-based industries, in contrast to the diminishing returns associated with the industrial production of manufactured goods. For “experience goods”, whose value cannot be understood unless they are “experienced”, Shapiro and Varian (1999, p. 5-6) argue that branding and reputation become proxies for understanding the product based on prior experience. This dynamic has been discussed by Pollock and Williams (2009b) in relation to the role of analyst firms in the packaged software market as “the commodification of networked reputation” or “the commodification of community knowledge”.

To achieve scale and capture possible network effects, packaged software firms seek rapid growth of market share, through “first mover advantage” (Shapiro and Varian 1999, pp. 29-32). Kirsch and Goldfarb (2008) link the idea of first mover advantage – that competitive advantage goes to the first to exploit a digital commerce opportunity – to the predominance in the dot.com era of what they call the “get big fast” strategy. The emphasis was on growth, even in the absence of revenues. But growth is not enough. Information goods are subject to the risk that competing products might be made available more cheaply or even for free. This is the threat of “commoditization” (Shapiro and Varian 1999, pp. 23-24), meaning here a product becoming undifferentiated or generic, and widely available, and thus competing on price alone. Haigh’s (2008) history of web and e-mail technologies demonstrates the sometimes elusive character of profits in software production. As Haigh concluded: “nobody got rich selling Internet e-mail programs” (p. 118).

The challenge for packaged software firms is well illustrated by Vitari and Ravarini’s (2009) study of content management software (packaged software to manage web content) over the period 2002-2007. They counted software functionalities, including the offering of services, as against prices, and observed an increase in functionality, including the development of service offerings, and a reduction in price over time. The increase in functionality corresponded to an expansion to support other activities such as e-commerce, knowledge management and document management, “blurring even further the already fuzzy boundaries between these different types of applications”. Vitari and Ravarini found that, over time, the content management software applications faced increasing competition not only from internal software development but from open source software, which also added functionality over time. The authors conclude that packaged software vendors, confronted with the “general expected trend of declining cost-to-performance ratio over time of IT assets”, including software, had moved to a differentiation strategy based on service offerings (Cusumano et al. 2007; see also Campbell-Kelly and Garcia-Swartz 2007). Overall, they found their study was consistent with “the shift towards commoditization (Carr 2003) and services in the IT industry (Rai and Sambamurthy 2006)” and the development of open source software – although they pointed out that in 2002, when they started their study, these trends were not apparent to them.

To summarize, the business model for packaged software levers the logic of scale. Properly executed, the business model generates high market share for a high margin information good, with possible increasing returns from network effects. So understood, the principle risk for packaged software is the threat of commoditization. However, this view elides the central problem for packaged software production – the problem of standardization.

2.1.3 The logic of scale and the problem of standardization

The logic of scale for packaged software sets up the problem of standardization in packaged software production: how to reconcile particular user requirement with the need to standardize a product. This problem can be resolved in a number of ways. For example, users can adjust to the requirements imposed by standard software. Brooks (1987) observed that initially there was a lot of resistance to packaged software for payroll, inventory and accounts receivable, as businesses claimed that their needs were unique. Over time this resistance faded. Brooks attributed this to the ubiquity of cheap computing: Companies that bought low-cost computers could not justify expensive custom programming, and simply adapted their processes to match packaged software requirements.

At the same time, developers can work with their software to eliminate particularized aspects and make it more generic, in other words to decontextualize it. In Chiasson and Green (2007), the authors were involved in a project which they characterize as an exemplar for packaged software development. The project was to take a specific piece of software developed for breast cancer healthcare planning and turn it into a more generic application. This project advanced through several stages, including reduction of linear pre-scripting of user interactions, rationalization of the database, and, finally, stripping out the data components tied to the specific healthcare domain. The project team ended up with software that could be used for any healthcare planning context and indeed for any planning context, by using configuration options to drop user-specific content into the framework provided by the software.

In another approach to decontextualization, developers can design their software so that user-specific requirements are localized through configuration (pre-enabled user options), modular construction (variable bundling of basic elements depending on user needs), and a layered, hierarchical architecture, which together create openness, optionality and flexibility (Pollock and Williams 2009a). Hanseth and Lyytinen (2009) define a hierarchy consisting of (1) IT capabilities, (2) applications, (3) platforms and (4) information infrastructures (such as the internet or industry-wide EDI networks). In this hierarchy:

> *Applications* consist of suites of IT capabilities. They are developed to meet a set of specified user needs within a select set of communities. … An application is *a priori* determined by choice of design context, user groups and functional goals. … Therefore, most proposed design theories address the design of applications by promoting ways of

> generating effectively a closure in the included IT capabilities as to meet user's needs … .
>
> *Platforms* differ from applications due to their heterogenous and growing user base, that is their design context is not fixed due to the constant generification of included IT capabilities ([Pollock and Williams 2009a]). (Hanseth and Lyytinen 2009, pp. 2, 4)

Platforms, such as Microsoft Office, Windows, or ERP or CRM packages, provide a "(semi)-closed, and highly complex suite of IT capabilities, which, thanks to the original architecting, can be extended" (Hanseth and Lyytinen 2009, p. 4). For comparison to Hanseth and Lyytinen's hierarchy, Adomavicius et al. (2008), in an "ecosystem view" of the IT landscape, classify information technologies under three categories: products and applications, components, and infrastructure. An alternative cut is proposed by Matthiassen and Sorensen (2008). They envision organizational IT as consisting of a portfolio of information services supported by infrastructure (citing *inter alia* Broadbent and Weill 1997), and distinguish between systems (how IT artefacts are designed and intended to be used) and services (the everyday, possibly idiosyncratic actual use of IT artefacts). This carries an echo of Brooks's suggestion that "the single most powerful software-productivity strategy for many organizations today is to equip the computer-naïve workers who are on the firing line with personal computers and good generalized writing, drawing, file and spreadsheet programs and then to turn them loose" (Brooks 1987, p. 17). In all of these strategies for IS design, the problem of standardization is managed by sterilizing core IT, i.e. isolating it from particularizing interferences.

Still, there are limits to packaged software-imposed standardization. These generate problems in implementation and can require costly customizations. Lucas et al. (1988) drew early attention to the problems in implementing packaged software, and the many studies of ERP implementation or "misfit" continue this theme. Strong and Volkoff (2010), following and expanding on work by Soh (Soh et al. 2000; Soh et al. 2003; Soh and Sia 2004), analyse enterprise systems in terms of organization-enterprise system fit, noting that:

> Packaged software raises important theoretical issues associated with its definitional characteristic, namely that it is designed to fit generic rather than specific requirements, and hence is likely to be an imperfect fit in any particular instance. … According to one source, "The standard software customization rule of thumb states that 80 percent of the software application package should fit the organization as it, and only 20 percent of the software application should be customized" (Foster 2001, p. 4), and according to another, "it has been estimated that in the best case, integrated enterprise systems only address about 70% of the needs of the average organization" (Markus 2000, p. 20). (Strong and Volkoff 2010, pp. 731-732)

To summarize, there are four basic strategies for resolving the problem of standardization for packaged software, set out in Table 2.2. The second and third are premised on decontextualization, that is the stripping out of features particularized to a specific setting.

<u>Resolving the problem of standardization for packaged software</u>
User organizations adapt to the packaged software
Packaged software developers make their product more generic
Particularity is localized and isolated while the core is sterilized and protected from particularizing interferences: e.g. configuration, modularity, layered architecture, underspecified and fluid use of generic IT
Customization

Table 2.2 Resolving the problem of standardization for packaged software

The problem of standardization in packaged software has been framed as an ongoing conflict between vendors and customers:

> [O]ne important implication of our study is that packaged software design and consumption is about competing and complementary objectives between vendors and consumers. Vendors attempt to develop software with as much generality as possible, to capture a wider market share … . They hope their software is 'far' enough away from specific organisational uses so that it can be shaped by many users, but not too far that it requires substantial resources to shape it to support specific practices. On the other hand, customers are (or should be) motivated to search for specific software systems that support their current or future practices. Where the two interests cross, customers are left with the choice of generic software that is hopefully less expensive to purchase and shape than starting-from-scratch. (Chiasson and Green 2007, pp. 551-552)

2.1.4 The problem of procurement

Unsurprisingly in this context, characterized by some level of vendor-customer conflict of interest, IT user organizations can find it hard to make good decisions about packaged software procurement, and the need for further research and guidance in this area has been recognized (see Chiasson and Green 2007; Howcroft and Light 2006; Pollock and Williams 2009a, pp. 60-61, 2009b). Howcroft and Light (2010) adopt a social shaping of technology approach to critique the functionalist literature (e.g. Keil and Tiwana 2006) for suggesting that packaged software procurement is rational and follows a linear path from understanding user requirements to evaluation and then final selection. Appan and Browne (2012) have identified a general "misinformation effect" in the requirements elicitation process (not in the context of packaged software procurement), where users tend to recall misinformation provided by analysts rather than their own beliefs and knowledge. These observations suggest that packaged software procurement is not as straightforward as repurposing the requirements-based “waterfall” of custom software development in requirements-based RFX practice. For example, Pollock and Williams (2009b, 2010), note that user organizations need to take into account not only the various attributes of the technologies but the viability of vendors, and whether they will invest in their products.

Howcroft and Light (2010) also question whether packaged software is really standardized:

> Packaged software products are often conceptualized as standardized commodities, yet the more critical literature suggests they are in constant development, always provisional (Pozzebon and Pinsonneault 2005), and should be viewed in more fluid terms, as a “biography” that evolves across multiple cycles of development (Pollock and Cornford 2004). … It is difficult to query the claims being made by vendors and consultants, since they sell packages with the promise of transferring exemplary business practices – best practices – (Wagner et al. 2006) that are embedded within the technology. (p. 127)

Adomavicius et al. (2008) observe the difficulty of “making sense of technology trends in the information technology landscape”:

> The sheer number of available technologies and the complex set of relationships among them make IT landscape analysis extremely challenging. Most IT-consuming firms rely on third parties and suppliers for strategic recommendation on IT investments, which can lead to biased and generic advice. (p. 779)

The problem of procurement is further complicated by new product delivery formats, such as software as a service (SaaS) (Campbell-Kelly and Garcia-Swartz 2008), cloud computing (Armbrust et al. 2010; Willcocks et al. 2012) and IT outsourcing (e.g. Lacity et al. 2009; Lacity et al. 2010; Lacity and Willcocks 2012) that may present existential, or at least definitional, challenges to the packaged software concept. Campbell-Kelly and Garcia Swartz (2008, p. 220) argue that “the current incarnation of the SaaS concept and the computer utility represents a new attempt to shift the locus of software, and potentially computing power, outside the corporation” – to the servers of hosting companies, to the servers of on-demand software providers (such as salesforce.com) or “the network (in the case of Web services that involve the interfacing of many Web service providers)”. SaaS threatens to upset many accepted product and service categories:

> If a software-as-a-service company is an enterprise that writes, hosts and deploys software over the Internet, then what is an online bank? It too is software driven – users store financial data and make transactions in a way not dissimilar, for example, to Web-based software. To take a less provocative example, consider eBay, which is very much a software creation. In a technical sense, eBay is a software platform – it publishes its

> Application Program Interfaces, and hundreds of firms exist by offering software and Web-service complements. (Campbell-Kelly 2007, pp. 50-51)

This theme of definitional fluidity is generalized in the dynamic of digital convergence and its correlates – device, network and market convergence – which entails the “interconnection, overlapping, contestation, and reconfiguration of physical and logical socio-technical infrastructures” and “non-linear interactions across layers” (Tilson et al. 2010). In the context of digital convergence, the notion of “packaged software” – what it is, where it is located, its interactions with and dependencies on other software and on hardware, rights to ownership and use – becomes somewhat fluid, inchoate and indeterminate.

2.1.5 Summary: how packaged software is understood

Packaged software has long been identified as an important phenomenon for organizational IS, but is still relatively under-researched. Looking at Table 2.1, we can observe uneven progress toward understanding packaged software from a market perspective. The rationale of scale for packaged software has been generally accepted, though the problem of standardization problem in the form of organizational misfit has been studied extensively (e.g Strong and Volkoff 2010). Procurement remains a subject marked for further research (e.g. Chiasson and Green 2007; Howcroft and Light 2006; Pollock and Williams 2009a). Pollock and Williams (2009a, 2009b, 2010, 2011) and Howcroft and Light (2010) have illuminated the mediated interactions that shape packaged software production. Less understood is what it means when profitability and market share, not user satisfaction, are the measures of success (Chiasson and Green 2007; Ó Raian 2010; Sawyer 2000).

The failure of packaged software has been framed as a loss of value due to “commoditization” (where the product becomes generic and widely available) or as organizational misfit. Neither of these promises a complete explanation for the failure of CMS. A general tendency to commoditization does not explain why some packaged software products (e.g. ERP) are more successful than others (e.g. CMS). Likewise, localized instances of misfit (as in the case of ERP) do not necessarily accumulate to failure at the product and market level. In a sense, the first explanation might be seen as pitched at too high a level of generality, and the second as pitched too low. In the next section I discuss an alternative approach that locates the analysis at the level of the product and market and thus accommodates a market perspective.

2.2 Pollock and Williams's biography of software as a framework for this study

2.2.1 Rationale; key concepts: the knowledge network, the organizing vision and generification

In their study of ERP, *The Biography of the Enterprise-Wide System, or How SAP Conquered the World*, Pollock and Williams (2009a) develop a "biography of software" approach that subsumes the problems of standardization and procurement into an integrated view of packaged software production. By lifting the analysis out of the specific organizational context (e.g. implementation or procurement), the software itself and the processes of its production are foregrounded; the technological artefact is no longer taken for granted (cf. Orlikowski and Iacono 2001), nor its production treated as "design from nowhere" (Suchman 2002).

The integrated end-to-end perspective on technology production is exemplified by Pollock and Williams's concept of the supplier-user nexus, the "various interfaces between suppliers and users which constitute nexuses in which competing requirements are presented and worked out" (2009a, p. 88). The supplier-user nexus solves the problem of distance between users and developers. It includes intermediaries such as resellers, consultants and analysts, as well as customers as references and demonstrator sites – "webs of knowledge and influence from the vendors as they seek to manage and sustain their existing user base and expand their markets" (p. 92). Extending this line of research, Pollock and Williams (2009b, 2010, 2011) have followed their biography of ERP with studies of the role of industry analysts, such as Gartner, who create categories for software products and produce market research ranking software products and vendors, thus shaping the IT marketplace.

In this dissertation I refer to the suppler-user nexus as the "knowledge network" (see Pollock and Williams 2009a, p. 91). This knowledge network works in part by promulgating "supply-side rhetoric", in the form of advertising, supplier literature and software demonstrations (Pollock and Williams 2009a, pp. 91-93). Supply-side rhetoric associates software with business programs, or "organizing visions" (Swanson and Ramiller 1997), that link a technology, its name and a managerial best practice (Pollock and Williams 2009a, pp. 119, 125-127), in ways that are sometimes "opportunistic and ephemeral" (p. 125). Swanson and Ramiller's (1997) "organizing vision" is "a focal community idea for the application of information technology in organizations" (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. (Swanson and Ramiller 1997, p. 458) (emphasis added)

While marking the importance of supply-side rhetoric in shaping expectations according to organizing visions, Pollock and Williams also emphasize the characteristics of the software product as it evolves over time. As Pollock and Williams see it, in early development, packaged software is unstable and development may follow tactical lines, from one set of customer requirements to the next, as designers try to find sufficient commonality across multiple organizations to justify development and support of the software product. They have examined how this process occurs by considering the totality of design and development, the procurement decision and implementation, and found that customer interests and needs are reconciled with supplier interests through an ongoing process of "generification" – strategic extension of adoption first within and then across industry verticals by decontextualizing the product, making it more generic and localizing particularity (cf. Chiasson and Green 2007). In the case of ERP, qualities of ERP that enabled it to "travel" included configurability, modular construction, and open design (enabling integration and special-purpose add-on capabilities). Generification resolves the problem of standardization through a strategic process of selective or negotiated decontextualization, as user organizations try to get the most out of the software package and the supplier gathers requirements for a transportable product usable in new organizations and new domains. By theorizing generification and tracing its processes in detail, Pollock and Williams have made a major contribution to our understanding of how the problem of standardization is resolved in the packaged software industry.

To summarize then, the biography of software approach foregrounds the packaged software product and its production. It thus accommodates a market perspective. From their study of ERP, Pollock and Williams identified as key to packaged software success a knowledge network activated around an organizing vision, but more substantively a process of generification that organizes product design toward reconciliation of user needs with the vendor interest in standardization. In the next section I relate the biography of software approach and these key concepts to other studies of technology production.

2.2.2 Relating the biography of software approach and key concepts to other studies of technology production

Despite their critique of some recent studies in STS, Pollock and Williams retain the "STS perspective as [their] core analytical commitment" (Pollock and Williams 2009a, p. 114), and their biography of ERP might be said to follow in the tradition of technology histories associated with STS (e.g. Bijker 1992, 1995; Hughes 1983; Noble 1984, 1999). An exemplary technology history is *Structuring the Information Age* (2005) by Joanne Yates,[3] a history of automation in the life insurance industry. It began with the mechanical tabulating machine, originally invented for the 1890 US census by Herman Hollerith, a Columbia University-educated engineer, who adapted the punched card technology used in the Jacquard loom to tabulate census responses. Because the census was a once-in-a-decade event, Hollerith looked for other potential customers for his technology. The life insurance industry was in its infancy but growing fast, and there was a constant shortage of (mostly female) clerks to manage the policy and payments records. The life insurance companies became big customers for the tabulating machine, and the two industries grew up together.

> Because the life insurance industry was a major user of tabulating equipment, its firms and associations interacted extensively with vendors to shape the technology, in particular seeking printing capability in addition to sorting, counting and adding capability. For example, a few firms hired an inventor to create customized equipment; several firms and associations stated their needs directly to the two primary vendors (Herman Hollerith, whose firm became IBM, and James Powers, whose firm became Remington Rand); and some firms exerted market power by switching from one vendor to the other as each added new capabilities. (Yates 2005, p. 6)

Yates describes how competing vendors sought to increase their market share, and how insurance industry associations facilitated the sharing of knowledge among industry participants and interactions with the vendors. This resonates with Pollock and Williams's biography of ERP in its focus on technology production as a joint, interactive and iterative process involving vendors, customers and intermediaries such as industry associations.

The knowledge network described by Pollock and Williams as the supplier-user nexus bears some relationship to as the "relevant social group" of STS (Bijker 1992) – the persons and organizations that recognize or validate a new technology – and comparable knowledge networks have been identified in other research. Swan and Newell (1995) have described the role of professional associations in the diffusion of production and inventory control systems. Mark Suchman et al. (2000) have theorized the role of law firms within the "institutional ecology" of Silicon Valley, and Kenney and Florida (2000) and Ferrary and Granovetter (2009) have analysed the part played by venture capital firms.

Swanson and Ramiller's (1997) theorization of the organizing vision, cited by Pollock and Williams (2009a), is consistent with findings of other researchers. According to Newell et al. (2000) the key in diffusion is not a particular technological artefact but instead the "spread of the knowledge and ideas underpinning the technology". Mark Suchman et al. (2001), in a study

[3] Campbell-Kelly (2007) also singled out Yates's *Structuring the Information Age* as a model of a holistic industry history, but speculated that it was too early to write such a history about software. In particular, he noted that we have only begun to study applications.

of Silicon Valley, argue that entrepreneurs need to establish a “cognitively viable enterprise” and build a cognitive framework, whereby “‘imaginary’ niches may become self-fulfilling prophecies” (p. 351). This involves “construct[ing] a mental map of underexploited opportunities, generat[ing] a coherent model for organizing around those opportunities, and communicat[ing] a legitimating account of the endeavor to potential stakeholders. Together, maps, models and accounts make up a cognitive framework” (p. 351). In the authors’ view, entrepreneurship is “a product of underinstitutionalized cognitive models, not of under-exploited economic niches”. In a different domain, Preda (2007) traces the history of financial chartism, or technical analysis, and how it became a commodity sold to brokerage houses. He notes that “the success of technical analysis depends less on its capacity to calculate value, than on its capacity to shape cognitive agendas” (p. 41).

Generification might be characterized as a particular set of strategies and processes related to what is called stabilization and closure in STS. In the initial stages, a new technology may be immature or unstable. But “[i]nterpretive flexibility does not continue forever. ‘Closure’ and stabilization occur, such that some artefacts appear to have fewer problems and become increasingly the dominant form of the technology” (Kline and Pinch 1999, pp. 113-114). Significantly, closure can occur through redefinition of the problem (Pinch and Bijker 1987, pp. 44-46). Misa (1992) discusses the processes of closure, whereby “hardness” was brought to a contested field, in the development of “steel”, and Pozzebon et al. (2006) theorize the dynamic of “rhetorical closure” mutually constructed by suppliers, consultants and managers around IT “fashions”. But generification also incorporates a notion which de Laet and Mol (2000) describe as the “fluidity” of a technological artefact – that is, its ”technological appropriateness” across multiple diverse settings. They locate the “fluidity” of a bush pump in the technology itself and attribute this “fluidity” to its joint design by an individual engineer and the African villages for which it was designed. In these terms, generification refers to the processes by which packaged software is made “fluid”.

2.2.3 A preliminary hypothesis

What, then, does it take to make a packaged software market? As I read Pollock and Williams, and consistent with other research on technology production, we should look for a knowledge network that mediates between and includes developers and users. This knowledge network works in part by sharing and validating an “organizing vision” that through the mobilization of expectations animates and directs the work of the knowledge network toward successful product development and adoption. However, vendors also need to execute a generification strategy that, starting with a working instance of software, generalizes or decontextualizes it so that other user organizations can successfully adopt it. Generification resolves the problem of standardization and creates a “fluid” product. Based on this research, we can hypothesize that when these factors are missing a packaged software product might fail. That is, it is a preliminary hypothesis for this study that the failure of CMS might be traced to the lack of a knowledge network in support of an organizing vision or to a failure in generification.

2.3 Developing the market perspective: the theory of commoditization and studies of markets from economic sociology

Pollock and Williams take the view that “the biographies approach is not ‘hard-wired’ to a specific theoretical perspective” (Pollock and Williams 2009a, p. 111). While acknowledging the attraction of “analytical purism” (p. 112), the authors argue that it carries a risk of over-simplifying reductionism; at the same time they do not reject theory but view it as needed “to provide critical insight” (p. 113). That is, they view theory as a tool for understanding, with “methods and concepts deployed according to the issue and phenomena in hand” (p. 114). They survey various possible theoretical framings for the biography of software, such as Koch (2003; “mass production communities”), and Kaniadakis (2006; “an agora of technological change”). However, to develop a market-based perspective on packaged software for this case of market failure, I am adopting another theory to which Pollock and Williams link their work, the theory of commoditization (Appadurai 1986a; Kopytoff 1986).

The theory of commoditization, as taken forward in studies of markets from economic sociology, provides a generalized conceptual frame for the knowledge network, the organizing vision, and generification. In addition, the studies of markets provide valuable insights into how products are brought to market, and useful points of comparison and corroboration for my findings, suggesting their generalizability is not necessarily limited to the software domain (an example being the implications of this study for process commoditization, discussed in section 8.2). However, it is important to note that my selection of commoditization and the studies of markets as a theoretical frame for this study was not a priori but instead emerged in the course of investigation following the grounded theory approach as described in Chapter 4. While I started with a research orientation more toward a “design science” approach (“What was wrong with CMS?”), the first round of data collection as reported in Chapter 5 indicated that, as there were so many (relatively unsurprising) things “wrong” with CMS, the real puzzle lay elsewhere: “Why were market expectations for CMS so high?” In other words, the data called for reframing as a story about market making, not software engineering, though with implications for how we understand packaged software, as discussed in section 8.1. The theory of commoditization together with the studies of markets provide a more natural theoretical home for this story. This brings me to the last point in favour of the theory of commoditization as a complement to the biography of software approach for this study: The foundational writings of Kopytoff (1986) and Appadurai (1986a), economic anthropologists whose work is now associated with the area of anthropology called material culture studies (e.g. Miller 1998, 2005; Tilley et al. 2006), are the source of the notion that commodities have a social life, and that a commodity has a biography. The commoditization perspective thus directly supports the biography of software approach, as further discussed in Chapter 4.

2.3.1 Key concepts from the theory of commoditization: classification as an element of commoditization and knowledge networks in extended or remote production

In this section I briefly summarize several key concepts from the theory of commoditization as relevant to this study. The first is classification in commoditization, and the second is the notion of a knowledge network at work in extended or remote production (i.e. where producers are separated from consumers, as in the case of packaged software production).

"Commoditization" as used in this dissertation has two meanings. The first refers to the process by which things become commodities.[4] In this dissertation, commoditization has this first meaning, unless otherwise indicated. The second meaning refers to a product becoming undifferentiated or generic, and widely available, thus competing on price alone, as discussed in section 2.1.2.[5]

The key insight of the commoditization theorists is that commodities – things for exchange – "must be not only produced materially as things, but also culturally marked as being a certain kind of thing" (Kopytoff 1986, p. 64). That is, bringing things to market entails more than their physical production, and these associated cultural processes are important to our understanding of products and markets. Kopytoff then goes on to note, obliquely, the role of classification in commoditization: "Culture achieves order by carving out, through discrimination and classification, distinct areas of homogeneity within the overall heterogeneity" (Kopytoff 1986, p. 70). That is, commoditization depends in marking a thing as available for trade, usually by associating it with a class of things (an "area of homogeneity") marked as available for trade. This work of classification is identified here as a foundation of commoditization, and other research, discussed in the next section, supports this observation.

Kopytoff goes on to explain that heterogeneous commodities can be traded against each other either in barter or by reference to an "exchange technology" that translates value equivalence;

[4] The term "commodification" is also used in the literature. E.g. Carvalho and Rodrigues (2008, p. 268) define commodification to mean "the process by which an object (in the widest sense of the term, meaning a thing, an idea, a creature, etc.) comes to be provided through, and/or represented in terms of, a market transaction". In other words, commoditization and commodification mean the same thing; I use the first term.

[5] In a third meaning from neoclassical economics, commodities refers to a subclass of primary goods (see Appadurai 1986a, p. 7), e.g. traded on commodities exchanges or the subject of commodity options.

money being an exchange technology that has promoted extensive commoditization (Kopytoff 1986, p. 72). Kopytoff hypothesizes that "the exchange function of every economy appears to have a built-in force that drives the exchange system toward the greatest degree of commoditization that the exchange technology permits" (p. 87). In Kopytoff's argument, commoditization in turn affects values: "If worth is given a price, the going market price will become the measure of worth" (p. 88). And yet we can observe significant mismatches between the exchange value (price at market) of some things and the intrinsic, non-monetized value placed on them by society or by an individual. Particularly in extended or remote production, exchange or market value may substantially diverge from intrinsic worth.

Appadurai (1986a) provides a second insight important to this study: Because of the distance between producers and consumers in extended or remote production, "[c]ommodities represent very complex social forms and distributions of knowledge" (Appadurai 1986a, p. 41), first in the production of the commodity, and second in its consumption. "If we regard some commodities as having 'life histories' or 'careers' in a meaningful sense, then it becomes useful to look at the distribution of knowledge at various points in their careers" (p. 41). If there are gaps in knowledge (for example between the grower of a commodity agricultural product and the ultimate market and consumer), this is usually taken to result in the relative deprivation of the commodity producer (pp. 42-43). But as Appadurai acknowledges (p. 54), the "detachment, indifference, or ignorance of participants as regards all but a single aspect of the economic trajectory of the commodity" is characteristic of extended production.

> Instead of tracing a line from acts of guilty consumption to the hidden truth of exploited producers, some geographers have taken up anthropological preoccupations with symbols and meanings in order to emphasize the strategic interests and partial knowledges with which particular actors encounter and construct a commodity at different moments in its circulation. (Foster 2006, p. 286)

Citing Geertz's (1979) study of a Moroccan bazaar, Appadurai (1986a, p. 43) writes that that "bazaar-style information searches are likely to characterize any exchange setting where the quality and the appropriate valuation of goods are not standardized". There are discontinuities in knowledge – problems regarding authenticity and lack of expertise. Knowledge is fragmented. In such a setting, informational entrepots develop. "[A]s commodities travel greater distances (institutional, spatial, temporal), knowledge about them tends to become partial, contradictory and differentiated" (Appadurai 1986a, p. 56). Spooner (1986) describes the commoditization of Oriental rugs, where processes of authentication are critical, as featuring specialized "mythologies" (Appadurai 1986a, p. 48) for participants at each point in an extended chain of production. "The carpet business involves not just the supply of carpets as in the case of other commodities, but also the supply of information about them" (Spooner 1986, p. 198).

The "distributions of knowledge" associated with particular commodities generate markets in criteria and derivative meta-commodities. This process is traced by Appadurai (1986a) with respect to commodities futures trading, where he observes that "the moment of prices becomes an autonomous substitute for the flow of commodities themselves", involving a "double degree of removal from the social relations of production and exchange" (p. 50). He describes "an agonistic, obsessive and romantic ethos" at work in these "tournaments of value" whose "concern with commodities is purely *informational* and *semiotic* and is divorced from consumption" – commodities as signs (citing Baudrillard 1981) which can yield profit if "manipulated properly" (pp. 50-51):

> In complex capitalistic societies, it is not only the case that knowledge is segmented (even fragmented) as between producers, distributors, speculators, and consumers … . The fact is that knowledge *about* commodities is also itself increasingly commoditized. … [A] *traffic in criteria* concerning things develops. (Appadurai 1986a, p. 54) (emphasis in original)

From the perspective of commoditization, demand is thus contingent, and produced. Appadurai (1986a, p. 55) writes that the "best example of the relationship between knowledge and control of demand is provided by advertising in contemporary capitalist societies." The end of advertising is the fetishism of the consumer – an example of double inversion as object is reflexively defined by and defines the subject (Appadurai 1986a, p. 56). We can compare the targeted audiences of these fetishized images of an ideal or transformed consumer with cargo cults – social movements in Pacific Island communities that developed mythologies associated with Western goods – where there was "an attempt to ritually replicate what were perceived as the social modalities of European life" (Appadurai 1986a, p. 52): "Cargo beliefs are an extreme example of the theories that are likely to proliferate when consumers are kept completely ignorant of the conditions of production and distribution of commodities and are unable to gain access to them freely" (p. 53). But as Tilley (2006, p. 68) remarks, "[a]lmost all the things surrounding us in consumer societies are bought ready-made and their conditions of production are concealed from the consumer". Perhaps cargo cult-like attitudes and dependencies on marketized criteria are difficult to avoid in a "buy instead of make" economy.

Table 2.3 summarizes these key concepts from the theory of commoditization. In relation to this study, the first point below locates the problem of standardization of packaged software within a broader context of classification in commoditization – that is, standardization as marking out an "area of homogeneity" – and ties it to "product qualification", a concept I discuss in the next section. In addition, the idea here that knowledge is distributed and fragmented in extended or remote production, giving rise to a knowledge network and the potential for markets in criteria and derivative meta-commodities, gives context to the problem of procurement of packaged software and the role of intermediaries such as analysts in packaged software markets. These are themes I develop in the biography of CMS, and I will argue that they help explain the failure of CMS.

<u>Theory of commoditization key concepts</u>
Commoditization begins by marking out a group of things as homogeneous (in some sense standardized) and available for trade – i.e. classification
Economies tend to the maximum amount of commoditization that exchange technologies will permit
Values are contingent; market values may diverge from intrinsic value
Commodities represent complex distributions of knowledge; knowledge in extended or remote production is fragmented – "partial, contradictory and differentiated"
Distributions of knowledge generate markets in criteria and derived meta-commodities
Demand is contingent, and produced

Table 2.3 Theory of commoditization key concepts

2.3.2 Classification in product qualification

More recent studies of markets from economic sociology[6] can be said to apply the commoditization perspective (see Callon 1998b; Carvalho and Rodrigues 2008) across a range of empirical settings. These studies, by attending to the artefacts and practices that make up real markets, show how products, markets and demand are co-created:

[6] Pollock and Williams (2009b, 2010) distinguish between economic sociology, associated with Callon, and the sociology of finance, associated with Mackenzie. For purposes of this dissertation I refer to both of these as economic sociology. In the more general turn to materiality, Pinch and Swedberg (2008) claim that materiality brings together themes from STS and economic sociology, while STS and economic sociology complement material cultural studies (starting with Appadurai 1986a and exemplified by Miller 1998, 2005). Pinch and Swedberg argue that even if technology is an integral part of the economy, it is the profit motive that drives economic development (p. 12). They also observe that while information technologies may appear to be "non-material", "in reality this type of technology permits new forms of entanglements between people and objects and can crucially change the material circumstances whereby exchange of goods and knowledge and where things and ideas circulate" (p. 12).

> The organized market cannot be reduced to a mere system of trade and transaction. It is also, above all, a process in which agents who design and produce goods enter into a competition to capture a demand which they help to (re)define. (Callon 1998b, p. 42)

In this account, bringing products to market entails "product qualification". That is, the product must be defined, described, given attributes, and stabilized through processes that are variously located in the workings of a knowledge network. "[T]he qualities of goods and services are the output of complex operations of qualification, of framing and reframing, of attachment and detachment" (Muniesa et al. 2007, p. 5). Callon et al. (2002) theorize this in terms of an "economy of qualities", locating the qualification of goods "at the heart of economic competition and the organization of markets" through the "co-construction of supply and demand". "[E]conomic agents, that is, the firm, but also the spokespersons of intermediaries and consumers, are explicitly defined as being involved in the strategic management of product qualification" (pp. 200-201). In the authors' argument, the model of a market as a function of supply and demand makes invisible a complex collective effort that unfolds over time:

> The design of new products, their iterative qualification and then their (successful) commodification imply cooperation between multifarious agents and institutions (research organizations, financial operators, venture capital, firms, administrations, consultants, professional associations, lead users, etc.). This collective investigation, which places learning processes in the foreground, implies complex, changing and evolving partnerships necessitating specific modalities of intellectual property and contractual arrangements. … This exploration applies both to goods (and their qualification, Callon et al. 2002) and to the agents; it can be analysed as a process of co-production of supply and demand. (Callon 2010, p. 166)

Lepinay (2007b), in a detailed account of what is required to bring a financial product to market, argues that for products to circulate they must have a stable, homogeneous ontological status, guaranteed by a standard. Similarly, Caliskan and Callon (2010) say that "pacifying" a product – standardizing it and fixing its qualities – is a necessary step in its "marketization". In Kopytoff's (1986) conception of the "biography" of a commodity, it travels, is initially alien but is adopted or adapted locally, and bears traces of its past history. But for Thomas (1991) commoditization involves detachment of an object from its history – "the alienation of a thing is its dissociation from producers, former users, or prior contexts" (Thomas 1991, p. 39); applying this insight, Pollock and Williams observe that vendors try to "manage" the biographies of their products in order to "detach" the software from its origins and history (Pollock and Williams 2009a, pp. 117-118) – decontextualization again, in a slightly different sense to mean the erasure of prior context.

Poon's (2007) history of consumer credit scoring describes what could be called product qualification of an information good, adopting Callon's definition as "non-rival (able to be used simultaneously by multiple actors), non-appropriable (costly to own), and universal (widely generalizable)" (Callon 2002, p. 292, cited by Poon 2007, p. 302), qualities that Callon, writing about knowledge, calls "The Holy Grails of modern economics". Consumer credit scoring was originally carried out on a contract basis for particular clients. The industrialization of consumer credit scoring occurred after a retired executive suggested that what had previously been a custom service for particular companies "could be packaged as a solution [and] sold over and over again" (Poon 2007, p. 292). This conversion of a particularized service into a standardized product exemplifies product qualification: standardization, stabilization and decontextualization.

Kopytoff (1986) implicitly invoked classification as related to some degree or element of standardization when he spoke of carving out "areas of homogeneity", and this process of carving out groups of similar things, or sorting into categories – classification – has been noted in several studies of markets from economic sociology. Sjögren and Helgesson (2007) investigated how the qualities of an exchanged good (in their case, medicines) are settled. The authors describe this in terms of "classification tools, standardization bodies, consumer organizations, advertising agencies, and so on". "The performance of markets is observable through the classification or qualification work implied by the establishment of similarities and differences among objects to be exchanged (cf. [Callon et al. 2002]). Classification work, that is the work that must be done to qualify goods and agents, generally relies on a diversity of logics" (Sjögren and Helgesson 2007, p. 215), including devices such as standards and labels in which the logics are materialized as well as the relevant actors such as regulators and analysts. Preda (2007, p. 40), in his analysis of financial chartism (technical analysis of stocks), noted that stock analysts have historically been relied upon to confer legitimacy on securities brought to market by classifying them according to accepted categories. Millo (2007, pp. 197-198), in a study of index-based derivatives, characterizes classification in product qualification as emergent and potentially competitive, as different constituencies promote their respective visions of the product and its qualities. These authors explicitly relate the process of product qualification to a definitive work on classification, Bowker and Star (1999).

Pollock and Williams (2010), in writing on the work of technology analyst firms such as Gartner as "promissory organizations", also focus on classification:

> We see classification as a powerful way for industry analysts to shape innovation: they name technologies in a way that anticipates their trajectory of development, the particular shape they will take, the new players who will enter the market, and the demand for the technology, and so on. An important reason for our view of classification as a form of promissory work is that attempts to classify the characteristics of new technology markets often "fail", as markets do not always emerge in the way anticipated. Technological classifications are similar to the "organizing visions" identified by Swanson and Ramiller (1997), in the sense that they are subject to varying levels of support and momentum. However, when classifications are successful, they often become something of an "infrastructure" (resources that sink into the

> background and only become visible when they break down (Bowker and Star, 1999). (Pollock and Williams 2010, p. 533)

In Pollock and Williams's interpretation, classifications or categories created by Gartner constitute infrastructural knowledge in the IT marketplace, "promissory work made durable", directly involved in the creation of expectations and the shaping of material realizations in accordance with those expectations. Pollock and Williams (2011) argue that, through "categorization work", Gartner strongly influences, though does not ultimately determine, the shape of IT markets, as evidenced in Gartner's involvement in the trajectories of ERP and CRM.

> We show how they make regular (but not always successful) "naming interventions" within the IT domain and how they attempt to regulate the boundaries that they and others have created through episodes of "categorisation work". (Pollock and Williams 2011, p. 194)

In these studies, Pollock and Williams bring together research on organizing visions and product categories (Pollock and Williams 2011), and in this dissertation I take the view, which I develop further in Chapter 7, that for packaged software the product category is the market correlate of the organizing vision, i.e. a reification and location for material enactment in support of the organizing vision. Product qualification and, in particular, classification as an element of product qualification become relevant in this study when I analyse the workings of the knowledge network around the organizing vision and the role of generification in the biography of CMS, where a market did not "emerge in the way anticipated".

2.3.3 Performativity in markets

In addition to drawing attention to the processes of product qualification, economic sociologists have developed the notion of performativity in markets. Callon (1998a, 1998b) is credited with introducing the notion of performativity into the study of markets (Cochoy et al. 2010; Mirowski and Nik-Khah 2008; Preda 2007). Callon's original idea was that "economics does not describe an existing external 'economy', but brings that economy into being: economics performs the economy, creating the phenomena it describes" (MacKenzie and Millo 2003, p. 108; see also MacKenzie et al. 2007b, p. 4). MacKenzie and Millo (2003) applied the performativity thesis in analysing the Black-Scholes option pricing formula, a model of valuation that became embedded in market practices and products.[7]

Performativity was first conceived by J. L. Austin (1962) as a characteristic of certain types of utterances or speech acts which (put simply) do not purport to describe reality (thus having a

[7] MacKenzie's earlier study of ballistic missile accuracy, *Inventing Accuracy* (1990), is probably an extremely strong case for the general performativity thesis.

quality of being either true or false, in the logician's sense) but perform an action or create a reality. In his examples – a marriage ceremony, writing a will, making a bet or making a contract – words *do* something, and in this regard are, in his coined word, "performative" as opposed to "constative" (or descriptive). In *How to Do Things With Words*, Austin (1962) proceeds to examine his notion of the performative and to self-critically break it down. In the end he develops a theory of speech acts in which most utterances (or locutions, in his terminology) have a mix of performative and constative content and affect, and indeed all, or nearly all utterances are "illocutionary", in that the speaker has some sort of performative intent – to undertake a commitment, to adjudicate, to influence, to inform and so forth. An illocution might achieve its intended result or instead, in the absence of "conditions of felicity", it might "misfire". At the end of Austin's analysis, having rather thoroughly dismantled his original distinction between performative and constative, he goes on to preserve performativity as a special theory within a more general theory of speech acts.

As MacKenzie et al. (2007b) and Cochoy et al. (2010) point out, it is Judith Butler who took the notion of performativity to a broader audience with her work on gender categories. Over time, Butler's concept of performativity has evolved. In *Gender Trouble* (1990), Butler constructs a critique of the assumption of a pre-discursive gender in part by developing a notion that the gendered body is performative, in that words, acts and gestures (as in a theatrical performance) produce the effect of pre-discursive identity. If the root of Butler's "performativity" was in the nature of theatrical performance, Butler's concept was arguably in a complex relationship of discontinuity with Austin's more technical formulation. In subsequent writings, Butler clarified this issue. In *Bodies That Matter* (1993), performativity was said by Butler to refer to "reiterative and citational practice by which discourse produces the effects it names" (p. xii). Butler asked (p. 176) whether there was a difference between performing gender (as in the theatre) and the performative use of discourse (statements that create what they purport to describe) – i.e. whether these were two different senses of performativity – but she resolved this by reference to her concept of citationality. Dispensing somewhat with the history and the nuances, Du Gay (2010) summarizes Butler's version of performativity as pointing toward the contingent nature of categories that are reiterated in social performances – what I refer to in this dissertation as classification performativity.

Read in this way, Butler's version of performativity is related to, but not precisely the same as, Austin's original concept. Their common ground would be the idea that statements (may) bring about what they purport to describe and thus are material in effect or bound up with materiality. But the context and emphasis is different. Austin began by looking at words – such as a contract – that by their expression, in the right circumstances, do things according to a rule or other conventional understanding – in the case of a contract, creating a binding obligation with certain consequences following if not performed. This sort of performativity is overt, in that it makes an express reference to law or other convention. Butler, exploring the nature of gender in terms of performance in the production of identity, is dealing with a different sort of effect, in which citationality is hidden in order to endow the speaker with more power (Butler 1993, p. xxi) or to produce an effect of a priori existence of the constructed effect.

Juxtaposing the two versions of performativity, it is easy to see that they might be distinguished, and, working within the domain of economics, MacKenzie has put forward an analytic decomposition of "performativity". In 2004, MacKenzie distinguished between "generic" performativity, "according to which markets and other economic relations are not to be taken as given, but as performed by economic practices; and 'Austinian' performativity, in which economics brings into being the relationships it describes" (MacKenzie 2004, p. 303). The former MacKenzie characterizes as a "weak claim" but "empirically important", whereas the second is stronger but may be "relatively rare" (and, as noted by Butler (2010), often depends upon some sort of background legal or quasi-legal structure). MacKenzie subsequently refined his analysis (MacKenzie 2006a). In the new model, "generic" performativity occurs when economic tools and models are used in the economy, "effective" performativity is a subset of generic performativity where there is an effect of this practical use on economic processes. Within effective performativity, there are two sub-categories: "Barnesian" performativity (from Barnes 1988), where "an aspect of economics is used in economic practice, its use has effects, and among those effects is to alter economic processes so as to make them more like their depiction by economics" (MacKenzie 2006a, p. 41) and counterperformativity, where "the use of an aspect of economics alter[s] economic processes so that they conform less well to their depiction by economics" (MacKenzie 2006a, p. 50). MacKenzie adopted "Barnesian" over "Austinian" to emphasize that the performativity he was describing was not purely a matter of linguistics, and noted that the "conditions of felicity" for illocutionary (including performative) acts are material in nature. I note that both Barnesian performativity and counterperformativity, which together make up only a subset of "effective" performativity, describe positive and negative feedback loops, respectively.

In an interesting reading of MacKenzie (2004), Butler (2010) generalized and recast somewhat his originally distinction, taking his generic performativity to mean that social categories are not natural or given but instead repetitively performed or enacted by human and non-human agents (i.e. classification performativity), and "Austinian" performativity to refer to those instances where the speaking of words create a fact, as in Austin's original examples. In other words, Butler seems to be roughly equating MacKenzie's (2004) generic performativity to her version, or at least her version as understood by others as something like classification performativity, as distinct from Austin's original notion. I note this analytic decomposition of "performativity" because it is a word often used – and I will use it here – yet its precise meaning is somewhat unclear. In this dissertation I hope, by working through various performative assumptions and operations at work in the biography of CMS, to shed some further light on this issue. For example, the positive feedback loops that MacKenzie identified with Barnesian performativity are directly and intentionally enlisted in marketing, as described in the next paragraph.

Returning now to performativity in markets, while Callon's original thesis related to economics and economic models, he also locates performativity in other agencies of commerce such as accounting and marketing (Callon 1998b, p. 27; 2007, pp. 332-333, 336; see MacKenzie 2006a; Skærbæck and Tryggestad 2010; cf. Mirowski and Nik-Khah 2008, pp. 98-99), and Cochoy (1998) has characterized marketing as "performative knowledge and know-how for capitalism". In a demonstration of this performative dimension of the economy, Cochoy (2010) describes how a trade publication, *The Progressive Grocer*, transformed the business of small grocers in America between 1929 and 1946. This magazine, he argues, constituted:

> …a new kind of text, distinct from economic theories and managerial textbooks. Instead of just putting words into its pages in the hope that they would ultimately shape the external reality, *Progressive Grocer* relies on a language that mixes what is said and what it does, signs and artifacts, reports of actual practices and dreamed states of commerce. (Cochoy 2010, p. 299)

The Progressive Grocer was intended to bring new marketing ideas to small grocers – and not incidentally to create a market for itself. A cartoon from the magazine – showing a grocer reading a book called "How to Build Displays that Sell" – illustrates a promise that merchandising know-how could delegate the act of selling to material things, namely the selling displays. Cochoy argues that a trade press journal like *The Progressive Grocer* is "precisely oriented at doing things with words, at building displays that sell" (p. 303), and describes various communications tools employed, including scale models, testimonies and photo novels (captioned photographs that tell a story). That is, in this case, performativity is an intentional strategy, or model, for turning imaginings and expectations into products and markets, and the belief in its efficacy as a model is itself performative.

Pollock and Williams have noted a somewhat different type of performativity in the effect on the IT marketplace of Gartner's Magic Quadrant, a two-by-two matrix that "compares and sorts vendors according to a number of more or less intangible properties (such as vendor 'competence' and 'vision')" (Pollock and Williams 2009b). As they see it, while the Magic Quadrant purports to describe the relative positions of products and vendors, reflecting back to the market "networked reputation" or "community knowledge", the Magic Quadrant and its associated category, also created by Gartner as described in the preceding section, in fact have a role in shaping the IT marketplace. Pollock and Williams (2010) characterize Gartner and other analyst firms as “promissory organizations”, setting expectations that have a constitutive or performative role in technology markets. In other words, Pollock and Williams have located performativity in the analyst role in technology markets, incorporating classification performativity in relation to product categories. Here too, performativity links expectations and realizations, a theme highly relevant to the case of CMS.

2.3.4 Breakdown of performative operations as a lens on market failure

But while performativity is powerful, it is not all-powerful. From the beginning, the theory of performativity has addressed the situation where the intended effect of a performative statement failed to occur. In Austin’s parlance, this was called a misfire, and it occurred when the “conditions of felicity” for performative effectiveness were not present – for example, a contract might be signed but be invalid in the jurisdiction of performance. Callon has equated “misfire” to his notion of “overflowing” of a “frame” (Callon 2010, p. 164). Callon hypothesized his version of a performative statement or model as a “frame”, with an emphasis on classification and a link to product qualification:

> Framing is an operation used to define agents (an individual or a group of person) who are clearly distinct and dissociated from one another. It also allows for the definition of objects, goods and merchandise which are perfectly identifiable and can be separated not only from other goods, but also from the actors involved, for example in their conception, production, circulation or use. It is owing to this framing that the market can exist and that distinct agents and distinct goods can be brought into play. (Callon 1998b, p. 17)

“Overflowing” occurs when a modelled phenomenon escapes the boundaries of its framing model and is attributable to the residual and latent attachments from within the frame to what it excludes, “the omnipresence of connections with the outside world” (Callon 1998b, 1998c). This overflowing is “irrepressible and productive” (Callon 1998c, p. 250); for example, in e-commerce, Licoppe (2008) observes, there is a regular “overflowing of the electronic transaction frame”. D’Adderio (2008) invokes performativity, framing and overflowing, in her analysis of artefacts and distributed agencies in an “engineering freeze” process at an automotive manufacturer. She considers at one extreme of performativity the “framing view”, “prescription” or act by fiat, and illustrates this by reference to the operation of computer code.

> At the other extreme, there is the full *demise, rejection or disuse* of a model or tool. This case corresponds to the ‘overflowing view’: the influence of the model is so weak that it is bypassed, worked around or outright rejected and therefore is not enacted in practice. One way to explain the demise of a tool of course is that individual agents have made the conscious choice to reject the model. Performativity theory, however,

> while not denying this possibility, affords us a more interesting explanation: *the model as statement has not been able to put into motion a world in which it can function*. (D'Adderio 2008, p. 776) (emphasis added)

In *Bodies That Matter*, Butler characterized performativity, based on citationality, as a kind of "construction", but said that the limits of this constructivism were exposed at the boundary (Butler 1993, p. 5). In 2010, she suggested that "performative breakdown" – "when the effects of a performative operation fail to work" (Butler 2010, p. 150) – both reveals the performative operation and delineates the outer boundaries of its efficacy, marking an important limitation on an otherwise unlimited and "sovereign" performativity. Her example is the recent financial crisis as a breakdown of performativity in financial markets, a performativity that:

> … seek[s] to derive endless possibilities from limited resources. ... The ideal of a speculation that can only increase possibilities for profit but never break down in the face of an external limit is surely one that has produced some financial catastrophes in recent months. The present recession in some ways highlights this failure at the heart of financial performativity. (Butler 2010, p. 153)

MacKenzie (2004) provides another example in the stock market crash of 1987, which "made the performed nature of economic relations evident by disrupting the performance". MacKenzie's (2006a) counterperformativity (characterized as a type of overflowing by Callon 2007, p. 323) might be said to be a particularly eloquent case of breakdown, as it reveals an assumption of the performative program, that, by virtue of the performative enactment, is made false.

In her consideration of the breakdown of performativity, Butler posits a real world that asserts itself by setting outer limits on human instrumental performativity, bringing things literally back down to earth. In this study I take up the suggestion that breakdown is revealing to develop it as an analytical device. For this purpose, I define breakdown as the the failure of expectations associated with a performative assumption or operation, and develop my biography of CMS around the evidence of breakdown toward identifying the performative assumptions and operations normally at work in the making of a packaged software market that did not work in this case. In Chapter 4, I develop this further, setting up a table of breakdown to organize my findings (in Chapters 5 and 6) and my analysis (in Chapter 7).

2.4 Summary: developing a market perspective on packaged software

Packaged software is an important phenomenon but has been under-researched. In particular, researchers have not explored packaged software, or the failure of packaged software, from a market perspective. Existing research tends to analyse packaged software failure as either a general phenomenon of "commoditization" (where a product becomes generic and widely available) or an instance of organizational misfit, which has been the subject of many so-called implementation studies of ERP. Neither of these approaches brings a market perspective to the understanding of why one packaged software product might succeed while another one might fail, and thus neither promises a complete explanation for the failure of CMS. I have instead adopted Pollock and Williams's (2009a) biography of software approach in order to accommodate a market perspective. According to Pollock and Williams, and consistent with other studies of technology production, making a packaged software market requires a knowledge network in support of an organizing vision, together with a successful program of generification. Pollock and Williams's biography of ERP by negative implication suggests that CMS may have failed because of a failure in mobilizing a knowledge network around an organizing vision or because of a failure in generification.

Pollock and Williams do not insist on the adoption of a particular theory for a biography of software, but they advocate the use of theory, appropriate for the inquiry at hand, to provide critical insight. For this study, I am looking to the theory of commoditization and studies of markets from economic sociology to complement the biography of software approach, in order to develop the market perspective on packaged software, to support the generalization of my findings and analysis, and for their contribution of key ideas relevant to this study: the workings of a knowledge network in extended or remote production; product qualification, in particular classification, in the creation of products and markets; and performativity in markets. The literature on performativity suggests breakdown of performativity as an analytical device for this study of market failure, a suggestion I take up again in Chapter 4.

Chapter 3 Literature review: ICT, contract and knowledge in the networked economy

In this chapter, I survey literature relating to the second research question: "To what extent did the market failure relate to contract? What are the implications for ICT, contract and knowledge in the networked economy?" There are several streams of empirical research regarding ICT, contract and knowledge, though not under that name, in IS and organizations studies and in the critical accounting literature, which I discuss in section 3.3. Because a significant amount of that research takes transaction cost economics (TCE) as a touchstone, I begin, in section 3.1, with a discussion of TCE, and, to further set the stage for the research review in section 3.3, in section 3.2 I briefly survey alternative theories of contract.

In section 3.1.1, I briefly describe transaction cost economics and its theory of contract, in particular its model of two principal contrasting modes of governance or coordination (markets and hierarchies). Following the logic of TCE, the electronic markets hypothesis (EMH) assumes that ICT promotes contracting, and a corresponding de-verticalization (section 3.1.2). I relate this concept to the ongoing digital transformation of the organization described by Kallinikos (2006) (section 3.1.3) and to recent developments in contracting (section 3.1.4). Notwithstanding TCE's significant influence, and many developments that seem consistent with TCE, over time TCE has been qualified by its proponents in order to address potential anomalies, and questions have been raised about its completeness and explanatory power (section 3.1.5). In section 3.2, I briefly discuss alternative theories of contract (contract as legal construct (section 3.2.1); relational contract (section 3.2.2); contract as social and technological artefact (section 3.2.3); contracting as a knowledge competence (section 3.2.4); and networks as connected contracts (section 3.2.5)), summing up in section 3.2.6.

In section 3.3, I describe empirical studies of ICT, contract and knowledge, first revisiting the electronic markets hypothesis (EMH) through empirical studies of ICT-supported contracting and IT contracting (section 3.3.1), then reviewing research regarding ICT as related to governance (markets and hierarchies) (section 3.3.2), and lastly specifying the problem of organizational contracting knowledge by reference to the literature (section 3.3.3). This literature review indicates that knowledge is an important aspect of contracting and documents the extensive use of ICT in relation to inter-organizational knowledge, but points to the lack of an organizing technology for contract inside the firm – framing the opportunity and the challenge for CMS.

3.1 Transaction cost economics and its theory of contract as related to this study

The empirical research regarding ICT, contract and knowledge discussed in section 3.3 is often framed in reference to transaction cost economics (TCE), in some cases rationalizing the research findings under TCE constructs and in other cases arguing that TCE does not provide a sufficient explanatory framework for the findings (cf. Lacity et al. 2011). To set the stage for a review of this research, in this section I briefly summarize key aspects of transaction cost economics as related to this study, specifically noting its theory of contract and the electronic markets hypothesis (EMH) (Malone et al. 1987; Mithas et al. 2008). I will return to EMH in my analysis of CMS and its organizing vision in Chapter 7.

3.1.1 Transaction cost economics and its theory of contract

Transaction cost economics (Coase 1937, 1960, 1988; Williamson 1979, 1988, 1991, 2005a, 2005b, 2010) is a theory of the firm according to which transaction costs, including the cost of contracting, determine or strongly influence whether a production activity is inside or outside the firm. That is, the boundary of a firm is determined by an efficiency-optimizing function that minimizes the sum of production costs and transaction costs (Anderson et al. 2000; Madhok 2002; Williamson 1979), with the transaction the basic unit of analysis (Williamson 1991). Put another way, transaction costs are a constraint on contracting, which would otherwise always locate production with the lowest cost provider, and firms arise where contracting is not efficient.

Hart (1995) has proposed as a complement to TCE the notion of "incomplete contract", the idea that contracts are always to some degree incomplete because transaction costs make it impossible to provide in advance for all conceivable eventualities (see also Williamson 1988).

> The basic idea is that firms arise in situations where people cannot write good contracts and where the allocation of power or control is therefore important. … In an ideal world, … [we] would write a binding contract that laid down each person's obligations in every conceivable eventuality and imposed large penalties if anybody failed to live up to them. [in a footnote: In an even more ideal world, we would not need a contract at all, since we could simply trust each other and rely on everyone behaving fairly]. (Hart 1995, p. 1)

TCE is not only a theory of the firm, it is a theory of contract. In TCE, contract is considered "bilateral private ordering" (Williamson 2005b), and Callon cites Coase for the idea that bilateral contract can be used as a device for sorting out any issues, provided property rights are clear and transaction costs are nil. "Negotiation and the drawing up of contracts: these are the methods of co-ordination that [Coase] holds up as the ultimate foundation stones of civilization." (Callon 1998c, p. 265) Contracts are classified according to a model of governance in which "[t]ransaction costs are economized by assigning transactions (which differ in their attributes) to governance structures (the adaptive capacities and associated costs of which differ) in a discriminating way" (Williamson 1988, pp. 164-165). In TCE there are two principal contrasting modes of governance: markets (inter-firm transactions governed by contract and coordinated through the price mechanism mediating supply and demand) and hierarchies (intra-firm governance coordinated through managerial control, incorporating norms, standards, goals, measurements and reports) (Caglio and Ditillo 2008; Williamson 1979, 1991). From this view on contract, we might expect contract-related ICT to vary according to contract governance type. Indeed this has been the subject of study, as further discussed in section 3.3, and, in Chapter 4, I develop a hypothesis that adoption of CMS was associated with market contracting.

3.1.2 The electronic markets hypothesis

Contract also figures in TCE as a cost variable in TCE's efficiency-optimizing function. If contracting costs go down because of ICT, TCE predicts that contracting, relative to hierarchical governance within the firm, should go up. This leads to de-verticalization, i.e. activities once performed within an organization due to transaction costs are instead contracted out to lower cost providers. This was spelled out by Malone et al. (1987), who predicted that "by reducing the costs of coordination, information technology will lead to an overall shift toward proportionately more use of markets – rather than hierarchies – to coordinate economic activity" (p. 484), referring back by analogy to the growth of markets that followed on development of an earlier information technology, telegraphy.

This is the "electronic markets hypothesis" (EMH) (Mithas et al. 2008), and it can be simplistically stated as an assumption that ICT promotes contracting.[8] This assumption is evident in other speculations about the impact of ICT on the economy. For example, in his 2003 book *The New Financial Order*, Robert Shiller envisioned a "smart computer network" that would keep track of [individuals'] contracts "so that the system ensures that contracts do not conflict with one another. … [such a network] will make possible more effective and more extensive contracts" (Shiller 2003, p. 81). Ciborra (2007), in part commenting on Shiller's book, describes "contract-enabling" "grid technologies", where "buy" crowds out "make", and risk is optimally dispersed in a more perfect market. Van Heck and Vervest's (2007) "smart network" is an ICT platform that supports the rapid formation of networks for trading of goods and services, including goods and services that are relatively complex and bundled.

[8] On this point, perhaps Kopytoff (1986) would be in accord: if ICT can be considered an exchange technology or as supporting the creation of exchange technologies, then ICT can be expected to promote commoditization.

3.1.3 Relating the electronic markets hypothesis to the digital transformation of the organization

An ICT-enabled networked economy offering complex goods and services is directly reciprocal to ICT-propelled developments taking place inside organizations, as described by Kallinikos (2006). He observes the transformation of organizational operations into "computational objects" and the construction of a "computational rendition of reality" (pp. 2, 6), generating a kind of digitized version of the organization. This transformation occurs through a program of functional simplification and closure (Kallinikos 2005, 2006 p. 22, citing systems theorist Niklas Luhmann 1993). Functional simplification demarcates an "operational domain within which the complexity of the world is reconstructed as a simplified set of causal or instrumental relations", becoming "inspectable and controllable" (Kallinikos 2005). Next, the principle of closure is applied to set boundaries that serve as a "protective cocoon…around the selected causal sequences or processes to safeguard undesired interference and ensure their recurrent unfolding" (Kallinikos 2005). As processes within organizations become more defined, bounded and enclosed (encapsulated, in the terminology of object-oriented design (Gamma et al. 1994, p. 11; cf. Langois 2006), lifted out of and stripped of relational context, they become transportable, remotely operable, and replicable. The resulting well-defined and circumscribed activities can be re-placed outside the organization.

A related phenomenon is the general shift, described in Kallinikos (2006), in the form and function of the firm, away from the aggregation and control of physical resources toward the collection of and mastery over relationships and intangible rights. The disaggregated or disembodied organization described by Kallinikos can perhaps be thought of a "distributed organization".[9] Other researchers have considered this phenomenon in terms of an "algorithmic service transformation":

> [This] is the digital or algorithmic transformation. Service activities themselves are changed when they can be converted into formalizable, codifiable, computable processes with clearly defined rules for their execution. This is an algorithmic service transformation facilitated by IT tools. Much of the service innovation then is around the adoption and effective implementation of IT tools. Certainly business processes from finance and accounting through to customer support and CRM are altered when they can be treated as matters of information and data management. Routine and manual functions are automated, and fundamental reorganization of activities is enabled. Likewise, sensors and sensor-based networks change many personal services. Then, as service activities are conducted by and with IT tools, the worker skills required change

[9] This is not necessarily a new phenomenon. Wendling (2009, p. 185) quotes Marx's observations on Babbage regarding the ability of the machine to promote the division of labour, including over long distances: "the spinner can live in England while the weaver resides in the East Indies…. Thanks to the application of machinery and steam, the division of labour was able to assume such dimensions that large-scale industry, detached from the national soil, depends entirely on the world market, on international exchange, and on an international division of labour."

> as well. And of course, as information moves, many activities that were previously tightly linked to particular places can be moved. (Zysman 2006, p. 48)

The program of functional simplification and closure, or “algorithmic service transformation”, whereby processes are codified and become transportable, is premised on decontextualization in yet a third slightly different sense, meaning removal and re-location from a specific time and place. I will revert to this emerging theme of decontextualization in Chapter 8.

3.1.4 Relating the electronic markets hypothesis to recent developments in contracting

Recent developments in contracting seem consistent with the idea that that ICT promotes contracting and a corresponding de-verticalization. For example, supply chain management more tightly binds suppliers into the buyer’s production processes while reducing the buyer’s need to invest in buffer inventories. Associated with “lean” or “just-in-time” production (see Teubner and Collins 2011), it is the subject of numerous operations and information systems research studies (e.g. He et al. 2011; Hüner et al. 2011; Malhotra et al. 2005; Nissen and Sengupta 2006; Rai et al. 2006; Subramani 2004), and just one expression of a general focus on upstream costs and procurement strategies. For example, in a reverse auction, suppliers bid against a set of specifications provided by the buyer (Amelinckx et al. 2007; Bellosta et al. 2011; Charki et al. 2011; Gatticker et al. 2006; Gumussoy and Calisir 2009; Hawkins et al. 2009; Mithas et al. 2008; Ray et al. 2011). In outsourcing, an outside supplier contracts to perform business processes formerly carried on within the organization (Lacity and Willcocks 2012; Willcocks et al. 2011; Willcocks and Lacity 2006). Customer relations, human resources, logistics, “business processes” generally, and even, in a step in regression toward total virtualization, procurement (cf. Lacity et al. 2006 on indirect procurement) can be outsourced. IT outsourcing has been particularly important as an industry and as a subject of IS research (e.g. Gefen et al. 2008; Goo et al. 2009; Lacity et al. 2009; Lacity et al. 2010; Lacity and Willcocks 2012; Levina and Ross 2003). (A related phenomenon, offshoring, means moving activities to a foreign (usually lower labour cost) location, but still within the organization (Leonardi and Bailey 2008; Levina and Vaast 2008; Olsson et al. 2008; Ramasubbu et al. 2008; Vlaar et al. 2008).) In cloud computing, an organization’s computer operations and data stores are relocated to an outside supplier, relying on the internet or other telecommunication network for access (Armbrust et al. 2010; Willcocks et al. 2012). Software-as-a-Service (SaaS) or software on-demand are other models that shift computing capabilities outside the organization (Campbell-Kelly and Garcia Swartz 2008).

Service innovation (e.g. Chesbrough and Spohrer 2006; Grönroos and Ravald 2011; Maglio and Spoher 2008; Zysman 2006) is a more general formulation of the proposition that the networked economy enables the re-placement of organizational activities, in this case cast as services.

Barrett and Davidson (2008) describe the development of the global service economy, and Vargo and Lusch (2004, 2008) say that new paradigms are needed for understanding trade in services – revolving around relationships and value creation – as fundamentally different from trade in goods. As stated by Maglio and Spohrer:

> Service is the application of competences for the benefit of another (Vargo and Lusch 2004). Service depends on division of labor and effective co-creation of value, leading to complementary specialization and comparative advantage among participants (Normann 2001). Before the development of globe-spanning trade and technology networks, service was usually performed in close contact with a client. Today, the more knowledge-intensive and customized the service, the more it depends on client participation and input, whether through clients providing labor, property, or information via organizational or technological value chains (Sampson and Froehle 2006). Following this logic, we define service systems as value-co-creation configurations of people, technology, value propositions connecting internal and external service systems, and shared information (e.g., language, laws, measures, and methods; Spohrer et al. 2007). The smallest service system centers on an individual as he or she interacts with others, *and the largest service system comprises the global economy*. Cities, city departments, businesses, business departments, nations, and government agencies are all service systems. *Every service system is both a provider and client of service that is connected by value propositions in value chains, value networks, or value-creating systems* … . (Maglio and Spohrer 2008, p.18, emphasis added)

Using different vocabulary and combining several of these models, Davenport has described "the coming commoditization of processes":

> [A] new world is coming, and it will lead to dramatic changes in the shape and structure of corporations. A broad set of process standards will soon make it easy to determine whether a business capability can be improved by outsourcing it. Such standards will also help businesses compare service providers and evaluate the costs versus the benefits of outsourcing. Eventually these costs and benefits will be so visible to buyers that outsourced processes will become a commodity, and prices will drop significantly. The low costs and low risk of outsourcing will accelerate the flow of jobs offshore, force companies to reassess their strategies, and change the basis of competition. These changes are already happening in some process domains, and there are many indications that they will spread across virtually all performed processes. (Davenport 2005, p. 102)

Adopting but slightly modifying Davenport's terminology, I use "process commoditization" to refer to the conversion of organizational processes into products, following a program of functional simplification and closure, or decontextualization. An example, already discussed, from the pre-digital era is the evolution of consumer credit underwriting to an outsourced service and then an information good in the form of consumer credit scores (Poon 2007).

Together these contracting models cover a broad range of organizational activities, and there are significant differences among them. What these concepts share is a logic of "buy" over "make" in the networked economy, consistent with TCE and EMH.

3.1.5 Transaction cost economics: qualifications and criticisms

Transaction cost economics has been very influential (Coase 1988; Lacity et al. 2011; Lacity and Willcocks 1995; Williamson 2005a, 2010). It seems to be reflected in speculations about the impact of ICT on the economy (as discussed in sections 3.1.2 and 3.1.3) and borne out by recent developments in contracting (as discussed in section 3.1.4). As a model, its performativity is evidenced in the buy-versus-build analytical framework for procurement (a kind of "material mediator"; cf. MacKenzie 2006a).

Nevertheless, both Coase and Williamson have acknowledged that there are many contractual relationships that cannot be accounted for by the basic efficiency-optimizing function of TCE, and TCE has been qualified in several important respects over time. Coase characterized long-term contracts where the buyer is in control as effectively firms (Coase 1937), a theme he returned to in a discussion of long-term contracting in the US auto industry (Coase 1988). Williamson has identified various dimensions of transactions that might require hierarchical governance, including uncertainty, frequency, asset specificity, contract incompleteness, and "outlier disturbances" (Williamson 1979, 2010). Of these, the concept of asset specificity constitutes a major qualification to the efficiency-optimizing function central to TCE.[10] Over time, asset specificity seems to have become a broad concept: it can take "physical, human, site specific, dedicated, brand name capital, and episodic (or temporal) forms", and where there is high asset specificity and contract incompleteness, there will be a pressure toward "unified ownership and coordinated adaptations as implemented by hierarchies" (Williamson 2010, p. 220).

As another qualification, Williamson has acknowledged that there is an intermediate or "hybrid" mode of governance between markets and hierarchies, and this is now accepted as part of the TCE framework (Williamson 1979, 1991, 2010).[11] To compare, Richardson (1972) proposed three modes of governance: market, direction (corresponding to hierarchy), and coordination, noting the multiple entanglements he had observed among firms, including joint ventures, technical agreements, subcontracts, trading in conjunction with production planning, "reliance" (such as Marks & Spencer's relationship with suppliers), and technology pooling or transfer. In his view, the multiplicity of such arrangements suggested an alternative theory of the firm based

[10] Asset specificity is a characteristic of a transaction for goods or services that are valuable to the buyer but not to others. For example, the purchase of a specialized machine that can be used in one factory but not in any other factory features high asset specificity.

[11] If hierarchical governance is by definition internal to the firm, then contracts might be either market or hybrid, in terms of the governance dimension; if hierarchy is a mode of governance, whether internal or external to the firm, contracts might be hierarchical, market or hybrid, in terms of the governance dimension. (Usage of the term hierarchy varies on this point.) In this dissertation I consider contract as potentially falling into any of the three types of governance.

on the notion of “complementariness”, taking into account scale economies, capabilities and knowledge as relevant factors. Richardson reconciled his analysis to Coase (1937) by saying that it could be characterized as an elaboration on “costs”, but he also cautioned that, in his view, a theory of the firm should not try to do too much. And there have been many questions raised about TCE’s completeness and explanatory power.[12]

> Even Williamson [1988] recognized the limitations inhering in TCE, concluding that ‘‘few economists would insist on an unrelieved efficiency theory of economic organization,’’ and called for an enlarged perspective to fully grasp organizational design issues. (Covaleski et al. 2003, p. 421)

Coase has acknowledged that TCE seems to focus on the buy-side only (a point I will come back to in Chapter 7):

> [T]he way in which I presented my ideas has, I believe, led to or encouraged an undue emphasis on the role of the firm as purchaser of the services of factors of production and on the choice of the contractual arrangements which it makes with them. As a consequence of this concentration on the firm as a purchaser of the inputs it uses, economists have tended to neglect the main activity of a firm, running a business. (Coase 1988, p. 38)

Granovetter (1985) challenged Williamson directly on a number of grounds. He questioned TCE’s simplifying model of an atomistic firm engaging in a-historic, anonymous transactions, which does not account for many observable business phenomena such as trade associations, interlocking directorates, relational contracting (see section 3.2.2), repeat purchasing, “Japanese” business practices, or sub-contracting, which he characterizes as a quasi-firm. He also asked who or what was the agent of the TCE efficiency optimization function – was it an inherent self-executing function of the economy, or instead executed by intelligent agents located in firms or proto-firms? Granovetter (1995) later noted that firms aggregate themselves into “business groups” and noted “the curious conjunction of empirical importance and analytical invisibility of business groups”.

To summarize, from the beginning Coase noted that TCE did not account for long-term contracts, and asset specificity constitutes a major elaboration of the TCE explanatory framework. A “hybrid” mode of governance (between markets and hierarchies) has been identified, and some have raised more fundamental questions about the assumptions underlying

[12] In a footnote, Fischer (1977, p. 322) noted that TCE has been criticized as being tautological, by virtue of the potentially expandable notion of costs. “Transaction costs have a well-deserved bad name as a theoretical device, because solutions to problems involving transaction costs are often sensitive to the assumed form of the costs, and because there is a suspicion that almost anything can be rationalized by invoking suitably specified transaction costs.” Williamson (1988) considered this concern mitigated by assigning transactions, according to their attributes, to governance structures “in a discriminating way”. Perhaps the perceived limitations of TCE might be seen as a function of its origin, where Coase proposed transaction costs as an important corrective qualification to price as the (sole) organizing mechanism of the economy; i.e. transaction costs are the costs of using the price mechanism.

TCE and the TCE program, with possible negative implications for EMH and for TCE's somewhat abstracted and unidimensional theory of contract. Before going on to consider research on the subject of ICT, contract and knowledge in section 3.3, I survey alternative theories of contract that are not so narrowly derived from or attached to an economic theory, starting with the foundational theory of contract as legal construct.

3.2 Alternative theories of contract

3.2.1 Contract as legal construct

Contract as legal construct refers to an agreement, enforceable under law, involving mutual commitments among two or more parties (legal entities, including organizations and persons). "The factor which distinguishes contractual from other legal obligations is that they are based on the agreement of the contracting parties." (Peel 2011, p. 1) The Restatement (Second) of Contracts defines a contract as "a promise or a set of promises for the breach of which the law gives a remedy, or the performance of which the law in some way recognizes as a duty." (American Law Institute, 1981, section 1)

The purpose of contract as legal construct is to put the weight of legal recognition and enforcement behind private agreements when the parties to those agreements intend to be bound. Subject to limitations related to the public interest, to prohibitions against fraud or other improprieties associated with the making of a purported contract, and to other exceptions and qualifications that have developed over time (Peel 2011, pp. 1-7), the law does not prescribe, proscribe or set limits on the terms of contract that persons, natural or legal, can enter into. That is, contract is deliberately emptied of content and abstracted in order to provide maximum freedom of contract.

Enforceability of contract in the event of breach generally follows one of three routes (see generally Collins 2003, chapters 16 and 17): the award of damages, making the injured party whole for losses incurred as a result of the breach; compulsory or specific performance, in which the party in breach is ordered to perform according to the terms of the contract; and enforcement against security or collateral provided to support performance. The third type of enforcement action has been particularly implicated in the recent financial crisis; an example is discussed in section 3.3.3.

3.2.2 Relational contract

Of course enforcement of contract is only a single dimension of contract as enacted in commerce. It is relatively rare in the course of business to take a contractual dispute to court for enforcement or interpretation. Trade is nearly always undertaken within a non-abstract, relational context, and a number of scholars have explored this aspect of contract. The notion of "relational contract" is based on the premise that every transaction is embedded in a relationship, and that effective analysis of any transaction requires consideration of the relational elements (Macneil 1985; 2003).[13] As Campbell and Collins (2003, p. 25) say, "implicit dimensions of contract" concern "the presence of trust, implicit understandings and shared conventions established by trade practice". Macauley (2003) notes that it can even be the case that the "the paper deal will not reflect the real deal: a writing can be inconsistent with the actual expectations of the parties" (p. 51). Bernstein (1992, 1996), in studies of diamond merchants and grain traders, has documented the significant gap between contracting as practiced on the one hand and both contract documents and contract as understood in law on the other.[14] In focusing on the relationality of contract, these scholars distinguish between the abstraction of the legal concept of contract and the practice of contract within a contracting community. In so doing, they de-emphasize the centrality of the contract document.

3.2.3 Contract as social and technological artefact

Mark Suchman (2003), in his study of contracting in Silicon Valley, provides a third perspective where the contract document takes a leading role. Suchman takes the position that studies of contract have focused on "contract-as-doctrine" or "contract-as-relation", but generally neglect "contract-as-artifact". From his study of business lawyers working on transactions, he observes that contract documentation practices feature technology dynamics such as innovation, stabilization, diffusion, and path dependence, transcending any particular transaction. He argues that these contracts are social artefacts which work as "dynamic components of macro-technical

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[13] Hugh Collins writes: "In … relational contracts, one will find some or all of the following features: governance mechanisms to manage adaptations, dispute resolution mechanisms, heightened duties of co-operation such as duties to perform in good faith, ongoing duties of disclosure of information, including technical and confidential knowledge, ongoing monitoring of performance including frequent meetings to assess progress, complex allocations of risk between the parties, and incentive systems that redistribute the residual profit between the parties." (Teubner and Collins 2001, p. 8)

[14] Bernstein (1992, 1996) carried out 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 become 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. She further described a shift toward an IT-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 her study of grain and feed merchants, Bernstein distinguished between relationship-preserving and end-game norms (citing Macauley 1963) and found that "even when [relationship-preserving norms] are clear and well-developed, they may be quite different from the terms of transactors' written contracts, which contain the norms that transactors would want a third-party neutral to apply in a situation where they were unable to cooperatively resolve a dispute and viewed their relationship as being at an end-game stage" (Bernstein 1996, p. 1796). In this contracting community, the contract document served as a kind of precautionary risk technology (see Suchman 2003, p. 107), part of transacting business but only a part.

industrial regimes, rather than isolated products of microtechnical engineering decisions" (Suchman 2003, p. 125), and he resists the characterization of lawyers as "transaction cost engineers".

3.2.4 Contracting as a knowledge competence

The resource-based or knowledge-based theory of the firm puts a premium on a firm's routines and knowledge (Alavi and Leidner 2001; Nonaka 1994; Nonaka and von Krogh 2009). From this perspective, contracting is a knowledge practice for mobilizing extra-organizational resources toward organizational goals, particularly important in turbulent environments (Madhok 2002, pp. 542-543). Argyres and Mayer (2007), incorporating both transaction cost and knowledge perspectives, characterize contracting competence as a differentiating capability for organizations, and Vanneste and Puranam (2010) trace the process of learning in complex contracting. As noted in Chapter 1, Nonaka (1994) suggests that contracting should directly provide product and market knowledge in the form of customer reactions to products: "Customers and other market participants give meaning to the product by their bodily actions of purchasing, adapting, using, or not purchasing." In sum, research indicates that contracting is both a key knowledge competence for organizations and a source of organizational knowledge.

3.2.5 Networks as connected contracts

In *Networks as Connected Contracts*, Teubner and Collins (2011) address the phenomenon of business groups that for many purposes operate as unit and yet preserve corporate separateness under law (cf. Granovetter 1995). The coordinating, indeed constitutive, mechanism for these groups is bilateral contract. Teubner proposes that such groups (just-in-time supply chains and franchising systems are his principal examples) be treated as "business networks" under the law, subject to a new set of rules and remedies in order to, among other things, establish liability of the group as a whole vis-à-vis third parties. Collins's example is the selling of defective financial products through brokers and other intermediaries. Teubner and Collins suggest that our current legal framework for contract is inadequate to address issues of respect of risk, accountability and responsibility associated with business networks.

3.2.6 Summary of theories of contract

There are many different theories of contract, and this section briefly notes several of them (see Table 3.1). Like “packaged software”, “contract” proves a rather fluid concept, or more precisely, inchoate or indeterminate in the absence of a particular lens of understanding. Not all of the theories noted here are consistent with TCE and EMH, and none of them address the evolving relationship of ICT and contract and the associated implications for organizational contracting knowledge. However, Suchman’s (2003) reframing of contract as social and technological artefact is suggestive, as is Teubner and Collins’s (2011) analysis, which locates contract in a network setting where it has effects beyond “bilateral private ordering”. With a broader perspective on contract informed by these different theories, I next turn to empirical studies of ICT, contract and knowledge.

Theories of contract	***Description and comment***
Transaction cost economics	Contract is “bilateral private ordering” and can be characterized along a dimension of governance, from markets to hierarchies.The cost of contracting is an element of transaction costs and is therefore a variable in TCE’s efficiency-optimizing function.
Contract as legal construct	Contract is a legally enforceable agreement. In general, the law does not prescribe or limit the terms of contract.
Relational contract; implicit dimensions of contract; trading community norms	Contract is embedded in a relationship and cannot be understood without taking the relationship into account. Much of contract is defined by the contracting community and may be implicit. The contract document may diverge from the reality of contract performance.
Contract as social artefact and technology	The contract document is a social artefact and technology defined by a contracting community and features technology dynamics that transcend the transaction.
Contract as knowledge competence	Contracting competence is a differentiating capability for organizations and contracting is a source of organizational knowledge.
Networks as connected contracts	Contracts are used to create “business networks” for which current legal frameworks are inadequate in respect of risk, accountability and responsibility.

Table 3.1 Theories of contract

3.3 Empirical studies of ICT, contract and knowledge

3.3.1 Revisiting the electronic markets hypothesis: empirical studies of ICT-supported contracting and IT contracting

The TCE-based electronic markets hypothesis predicts that the development of ICT will promote a shift toward market coordination because transaction costs will go down (Malone et al. 1987). But Malone et al. also predicted closer coordination through “electronic hierarchies”. In their version of the distinction between markets and hierarchies, where there is a single supplier of a good to one or more buyers, the relationship between each buyer and the supplier is “primarily hierarchical”, because the buyers are not going to market to select from multiple suppliers (cf. Coase’s (1937) characterization of long-term contracts controlled by the buyer as effectively firms).

Malone et al. identified two effects of ICT on coordination: an electronic brokerage effect and an electronic integration effect. The electronic brokerage effect arises in computer-based markets that enable buyers to compare the offerings of many suppliers very quickly. The electronic integration effect occurs when buyers and sellers use IT “to create joint, interpenetrating processes at the interface between value-added stages”. While the authors observed that IT would make both markets and hierarchies more efficient, they predicted a shift toward markets, as a result of decreased costs of coordination but also because ICT has a more subtle effect in reducing both effective asset specificity (through flexible manufacturing) and the complexity of handling detailed product specifications.

They relate this argument to then recent growth in airline bookings made by travel agents using American Airlines’s electronic reservations system (which listed flights of other airlines, after American’s) and to increasing procurement of components from outside vendors by IBM, Xerox and General Electric (characterizing both of these somewhat dissimilar developments as evidence of the shift to electronic markets because they involve buyers selecting from multiple sellers). They say that electronic markets “may develop either from a nonelectronic market or from an electronic hierarchy spanning firm boundaries”, and model an evolution of electronic markets from markets biased toward a particular supplier, to unbiased markets, to personalized markets. Alongside, they model an evolution of electronic hierarchies from separate databases and processes, to linked databases and processes, to shared databases and processes. In one example they give, from the automotive industry, they suggest that once standard forms and processes have been established, electronic hierarchies evolve into electronic markets.

The electronic markets hypothesis in Malone et al. (1987) was a forward-looking analysis formulated with reference to historical analogy and by using the logic of TCE and the TCE market-versus-hierarchy governance distinction to explain ongoing developments in certain industries as a function of ICT. However, with the benefit of twenty-five years’ hindsight, one can see that the authors emphasized the knowledge sharing in some contractual relationships when they identified the electronic integration effect and predicted an evolution toward shared databases and processes.

Mithas et al. (2008) challenged the electronic markets hypothesis, concluding that six dimensions of "non-contractibility" (quality, supplier technological investments, information exchange, responsiveness, trust, and flexibility) affect the willingness to participate in reverse auctions. "Non-contractibility" refers to "difficult-to-specify investments that a firm may need to make in the future in order to sustain a set of existing transactions or to initiate a new set of exchanges with the same partner (Bakos and Brynjolfsson [1993])" (Mithas et al. 2008, p. 707). Non-contractibility thus moves the unit of analysis away from the discrete transaction toward the longer term and the larger relationship. Mithas et al. argue that non-contractibility is thus a different phenomenon from asset specificity or even uncertainty.

They ran a survey to correlate dimensions of contractibility to the expressed willingness to use a reverse auction and found that those who took a relational view of contracting said they were less willing to use a reverse auction. They also found that reverse auctions were more likely to be used by larger companies, probably because of cost (either hiring someone to run the auction or using reverse auction packaged software). Most significantly, they found that buyers avoid reverse auctions for specialized goods or for relationships involving substantial non-contractible commitments. From their analysis they argue that non-contractibility may be more important than asset specificity "particularly when buyers need unspecified exchange support from suppliers that will evolve over time":

> Growth of the service sector further underscores non-contractibility, because information technologies and flexible manufacturing technologies are progressively causing a decline in asset specificity … [O]ur results are informative regarding assessment of the electronic markets hypothesis if we view Internet-enabled reverse auctions as an arm's-length governance mechanism that allows firms to locate efficient suppliers and award contracts primarily based on price. The EMH suggested that information technology would lead to greater use of arm's-length relationships. While this prediction was based on the role of asset specificity in exchange relationships, our results suggest the importance of recognizing non-contractible factors and lend support to Hess and Kemerer's (1994) and Choudhury et al.'s (1998) observations that argue for complementing TCE logic. … we sympathize with the argument that non-contractibility reflects an extension of the transaction cost argument. *However, even if one takes an expansive view of transaction cost theory, the non-contractible aspect is frequently under-emphasized despite the fact that it may often have the biggest impact on sourcing choices in cases such as our reverse auctions context.* (Mithas et al. 2008, p. 718) (emphasis added)

Pollock and Williams (2009a) observe that "[t]he most profound criticism of TCE concerns its exclusive attention to reducing transaction costs and its consequent failure to address processes of inter-organizational learning" (p. 68), and other researchers have identified knowledge, information exchange and other factors not readily accounted for in TCE's efficiency-optimizing function at work in contractual arrangements and relationships. Writing about supply chains, Malhotra et al. (2005) note that "[t]he need for continual value innovation is driving supply chains to evolve from a pure transactional focus to leveraging inter-organizational partnerships for sharing information and, ultimately, market knowledge creation." Frances and Garnsey (1996), in a study of the grocery industry in the UK, "showed that control mechanisms supported by information technology tightened inter-firm linkages, reduced costs throughout the system, and made UK supermarkets gain influence on suppliers through positive feedback effects" (Caglio and Ditillo 2008, p. 877-878). Caglio and Ditillo (2008) also reported that:

> Cuganesan and Lee (2006) analysed the impact of information technology on extant controls in both the inter-organizational and intra-organizational relationships that co-existed in a procurement network. Contrary to the limited number of studies that have described information technology as unproblematically reinforcing dominant interests, Cuganesan and Lee showed that suppliers were not merely passive agents of information technology, but that they used it to their own ends and to increase the stability of procurement relationships, consequences that were unintended by the buyers, who introduced the technology in the first place. While information technology does not contain any inherent properties or effects, these latter are shaped by the actions of purposive organizational participants who build, promulgate and/or use this technology. *The authors concluded that information technology gave both buyers and suppliers an increased ability to act upon each other through a dialectic of accounting control.* (Caglio and Ditillo 2008, p. 878) (emphasis added)

Subramani (2004) concluded from a review of how suppliers benefit from using a supply chain management system that transaction cost and resource based views of the firm are complementary. Fayard (2012, p. 169) et al. "conclude that the resources of internal electronic integration, external electronic integration, internal cost management, and absorptive capacity play significant direct and indirect roles in the development of an inter-organizational cost management (IOCM) resource".

Dibbern et al. (2008), in a study of software development and maintenance projects outsourced to India, concluded that:

> the client incurs post-contractual extra costs for four types of activities: (1) requirements specification and design, (2) knowledge transfer, (3) control, and (4) coordination. In projects that require a high level of client-specific knowledge about idiosyncratic business processes and software systems, these extra costs were found to be substantially higher than in projects where more general knowledge was needed. *Notably, these costs most often arose independently from the threat of opportunistic behavior, challenging the predominant TCE logic of market failure.* Rather, the client extra costs were particularly high in client-specific projects because the effort for managing the consequences of the knowledge asymmetries between client and vendor was particularly high in these projects. *Prior experiences of the vendor with related client projects were found to reduce the level of extra costs but could not fully offset the increase in extra costs in highly client-specific projects.* (p. 333) (emphasis added)

Similarly Gefen and Carmel (2008) found:

> In a world that is flat, where all clients and providers can easily transact with one another, offshoring represents the proposition that information technology providers from low-wage nations can now underbid providers from high-wage nations and win contracts. We examined a particularly flat "world" – an online programming marketplace – and found that this profound tilt to low-wage nations is overstated. … *the strongest determinant of the winning bid is client loyalty: the client gives very strong preference to a provider with whom there has been a previous relationship, regardless of whether the provider is offshore or domestic.* (p. 367) (emphasis added)

Gefen et al. (2008) hypothesize that business familiarity mitigates risk in software development contracts, applying theories of trust and incomplete contract, and Cha et al. (2008) have emphasized the role of knowledge in offshore production.

Lacity and Willcocks (1995) give critical consideration to TCE as an explanation for the outsourcing phenomenon, noting that TCE expressly addresses the sourcing decision, that outsourcing is often premised on cost savings (consistent with TCE), that practitioners use TCE-influenced terminology to justify outsourcing (e.g. a "commoditized" good or service referring to low asset specificity), and that TCE had received a good deal of academic attention. In their reading, Williamson proposed TCE to explain why firms produce many goods and services internally, given the economies of scale for specialized production assumed by economic theory. That is, production costs are assumed to be lower for outsourcing, while transaction costs are higher. Lacity and Willcocks explain how Williamson reasons from this, taking into account transaction characteristics of frequency, asset specificity, uncertainty and "information impactedness" (uncertainty coupled with the threat of opportunism), and additional factors, such as the number of suppliers, to predict when outsourcing will not be efficient relative to internal production. Testing this prediction against outsourcing decisions and outcomes, the related contracts and cost savings, Lacity and Willcocks reported a very high percentage (87.5%) of anomalies. They then engaged in an exercise of first explaining the anomalies under TCE "by appealing to exceptions or by re-interpreting transaction cost theory language", and speculated that the IT domain tends to generate exceptions to TCE due to rapid change and high uncertainty, penetration of IT to all business functions, high switching costs, and an "exceptional condition of information impactedness" due to customer inexperience.

Lacity and Willcocks go on to take up a contrary interpretation of the data, which throws into question many of the assumptions that underlie TCE: that decision makers act according to economic efficiency, in accordance with organizational goals, and using information to make rationally bounded decisions; that the market always provides cheaper production costs due to economies of scale; and that the transaction is the appropriate unit of analysis. In terms of economies of scale, Lacity and Willcocks break down the costs of various IT capabilities and show that the cost advantage may fall to outsourcing vendors or internally, depending on the type of cost and the scale of the internal capability. For example, only outside providers have to cover marketing costs or a return to shareholders (e.g. a minimum 15% gross margin), and they have a cost disadvantage as well in terms of business expertise. Lacity and Willcocks conclude their analysis by critiquing TCE in two respects: the language ambiguity that enables the qualifications and exceptions to TCE's efficiency-optimizing function to cover essentially all anomalies (citing Fischer 1977); and the transaction as the unit of analysis – as too large (one might say indiscriminating) in the case of IT outsourcing to cover the multiple activities within the portfolio of an IT department.

Lacity et al. (2011) return to TCE as a theory of decision-making and its applicability to IT outsourcing, noting that TCE provides a strong theoretical base for analysing build-versus-buy decisions. They agree with Karimi-Alaghehband et al. (2011) that applying TCE to IT outsourcing has yielded mixed results, but do not agree that "ITO researchers need to apply TCE more faithfully". Instead, testing IT outsourcing decisions and outcomes against TCE logic, they reach the conclusions that "we may be asking too much of TCE" and argue that IT outsourcing needs its own endogenous theory.

In sum, the research literature strongly indicates that TCE and the EMH provide only a partial explanation of ICT-supported contracting and IT contracting. Knowledge – whether knowledge about the counterparty based on prior experience, detailed product specifications, or the ongoing sharing of information between counterparties through linked or shared databases – is an essential part of contracting.

3.3.2 ICT as related to governance (markets and hierarchies)

Another stream of research comes to similar conclusions by exploring the relationship between ICT and the TCE governance dimension from markets to hierarchies. To introduce that research literature, I note again that "hybrid" contracting is part of the TCE governance dimension, falling between market and hierarchy. The EMH predicts a "move to the market", but Koch and Schultze (2011) argue that instead there is a "move to the middle", toward hybrid contracting:

> Over the years, research on the implications of information technology on network governance structures has explored the 'move to the market' and the 'move to the middle' hypotheses. The middle is a space in which the logic and modalities of markets and hierarchies are intermingled. *There is increasing evidence that most network relations reflect mixed-mode or hybrid logic.* (Koch and Schultze 2011, p. 123) (emphasis added)

To ground this idea of a "move to the middle", consider the notion of "IT-based cocreation of value" (Grover and Kohli 2012), the phenomenon of firms collectively levering IT investments.

Grover and Kohli take a relational view of the firm and then ask how IT can enable, expand or create value in each of four “layers”: relationship-specific assets, knowledge-sharing routines, complementary resources and capabilities, and effective governance. With respect to governance they note the electronic brokerage or integration capabilities of IT (an echo of Malone et al. 1987), and cite as an example the governance capabilities that Amazon offers to its small and specialty retailer partners. They also note that the four layers are not distinct but instead interdependent and may create path dependencies. Their examples include logistics (Rai et al. 2012), software platforms and their associated “ecosystems” (Ceccagnoli et al. 2012), and the relationship between an ERP vendor and its various implementation and training partners. All of these arrangements and relationships require ongoing coordination and deep ICT-based inter-locking between contract counterparties.

This would be consistent with the conclusions of Caglio and Ditillo, who surveyed studies of inter-organizational control and found generally that hierarchical or hybrid governance requires “a continuous exchange of very detailed information concerning the technical and economic aspects of the activities performed and the use of resources” (Caglio and Ditillo 2008, p. 868).

> In summary, the need for information in the hierarchical and the relationship [hybrid] modes is crucial for the quality of the coordination of the activities. In both of these cases, the degree to which efficiency is created is highly dependent on the information available to the decision-makers. This is not the case for the market situation. (Håkansson and Lind 2004, p. 54)

According to Håkansson and Lind (2004) and Boland et al. (2008), hybrid governance models pose a challenge to traditional management information systems approaches. Boland et al. conclude that:

> Taking an enterprise and decomposing it into operating units for the purpose of creating a management control system is fundamentally different from bringing separate enterprises together in a temporary assemblage and designing a management control system for them. The first sequence is a movement from a hierarchy to a market (creating market elements within a pre-existing organization) and the second sequence is a movement from market to hierarchy (creating an organization among pre-existing market elements). This difference in sequence is all-important, and we find that a system-theoretic approach to the problems of decomposition versus synthesis is helpful in framing our discussion of it. Simply put, the logic of breaking a system down into component parts (decomposition) is distinct from the logic of putting parts together to form a whole (synthesis), even though, at the end, a similar mix of market and hierarchy may appear to be in place. (Boland et al. 2008, p. 900)

In summary, research indicates that non-market contracting (hybrid or hierarchical) requires integrative ICT between counterparties, or “lateral processing of information” (Hopwood 1996), and indeed as suggested by Malone et al. (1987) in their notion of the “electronic integration effect”. This locates contracting knowledge and practice as an inter-organizational enactment, not localized inside the boundary of the organization but instead constituted in "temporary assemblages" with their own separate management control systems. However, the implications of these "temporary assemblages" for the production of the organization's synthesizing organizational contracting knowledge, for example as reflected in its financial accounting system, are not spelled out.

3.3.3 Specifying the problem of organizational contracting knowledge

To summarize thus far, empirical research clearly shows that knowledge is an essential aspect of contracting and indicates that hybrid and hierarchical contracting requires integrative inter-organizational ICT to support knowledge sharing between contract counterparties. What the research does not address is obliquely suggested by Boland et al. (2008) in the excerpt quoted above. That excerpt theorizes the shift away from a centralized organizational management control system based on the decomposition of the organization into business units toward the formation of multiple quasi-organizational management control systems arising from contracts. What the authors do not consider are the consequences of this phenomenon for synthesizing organizational knowledge. The formation of multiple, temporary quasi-organizations at the boundary of the contracting organization may exert a centrifugal, dis-integrating or fragmenting effect on organizational knowledge: If the organization is broken down not into internal business units but instead through multiple integrations with contracting counterparties, how is the organization put back together again to "form a whole"?

For example, if a company is a supplier participating in several online trading platforms and selling directly to large companies, each of which dictates its own data standards and associated contracting practices, and if the same company uses a cloud vendor for customer relationship management and sales and outsources its logistics and after-service, it would appear to be rather difficult to extract from these disparate systems the minimum amount necessary to support cost accounting and financial reporting, quite challenging to develop information systems for senior management strategic decision-making, and a quixotic task to build an enterprise information system that captures the contract lifecycle. Yet it seems that just such a business model constructed around essential and mutual ICT-based dependencies is implied in the "IT-based cocreation of value".

Looked at from this perspective, the presumed generative effects of ICT on the economy encouraging the proliferation of such quasi-organizations might be expected to raise serious questions for organizational knowledge. In this section I first consider what we know about ICT and organizational knowledge generally, and then go on to consider the problem of organizational contracting knowledge.

The general problem of organizational knowledge and its relationship to ICT has been studied under a number of different names, including knowledge management (Alavi and Leidner 2001), business intelligence (Elbashir 2011), management control systems for knowledge integration (Ditillo 2004), management support systems (including decision support systems, executive information systems, knowledge management systems and business intelligence) (Clark et al. 2007), and intellectual capital statements (Mouritsen et al. 2001). Enterprise risk management (Arena et al. 2010), enterprise resource planning (ERP) (Chapman 2005; Chapman and Kihn 2009; Dechow and Mouritsen 2005), accounting (Hall 2010) and packaged software generally (D'Adderio 2004) have all been linked to organizational knowledge production. Some authors (e.g. Teece 1998) have suggested that ICT rather unproblematically corresponds to increased knowledge.[15] Alavi and Leidner (2001) suggest a direct, positive relationship between ICT and knowledge management, where knowledge management is conceived of principally (and narrowly) as sharing knowledge:

> Advanced information technologies (e.g., the Internet, intranets, extranets, browsers, data warehouses, data mining techniques, and software agents) can be used to systematize, enhance, and expedite large-scale intra- and inter-firm knowledge management. (Alavi and Leidner 2001, p. 101)

Other research suggests however that it is unlikely to be so simple. Winograd and Flores (1986) quite some time ago described the relative ineffectiveness of computer technology in dealing with complex problems and unstructured data, and converting unstructured data into structured data is a perennial issue for information systems and organizational knowledge production, with "up to 80 percent of an organization's process documents and data … in nonstandardized and semi-structured form (Negash 2004)" (Clark et al. 2007). Other authors (Chapman and Kihn 2009; Dechow and Mouritsen 2005; Elbashir 2011) note that converting structured data (such as that contained in ERP systems) into knowledge is less than straightforward. D'Adderio (2004) has critiqued the assumption that organizational knowledge is a matter of codification, and argued for a shift to understanding organizational knowledge as process.

[15] "The new information technology is also dramatically assisting in the sharing of information. Learning and experience can be much more readily captured and shared. Knowledge learned in the organization can be catalogued and transferred to other applications within and across organizations and geographies. Rich exchange can take place inside the organization, obviating some of the need for formal structures. Network computing, supported by an advanced communications infrastructure, can thus facilitate collaborative entrepreneuralism by stripping out barriers to communication. It challenges existing organization boundaries, divisions, and hierarchies and permits formal organization to be more specialized and responsive. Interorganizationally, networked organizations have blurred and shifting boundaries, and they function in conjunction with other organizations. The networked organization may be highly 'virtual,' integrating a temporary network of suppliers and customers that emerge around specific opportunities in fast-changing markets. Recurrent reorganization becomes the norm, not the exception." (Teece 1998, p. 60)

In addition, organizational knowledge is understood to be situated and thus multiple (Nonaka and van Krogh 2009).

> Frontline employees and lower managers are immersed in the day-to-day details of particular technologies, products, and markets. No one is more expert in the realities of a company's business than they are. But, while these employees and lower managers are deluged with highly specific information, they often find it extremely difficult to turn that information into useful knowledge. For one thing, signals from the marketplace can be vague and ambiguous. For another, employees and lower managers can become so caught up in their own narrow perspective, that they lose sight of the broader context. Moveover, even when they try to develop meaningful ideas and insights, it can still be difficult to communicate the importance of that information to others. People do not just passively receive new knowledge; they actively interpret it to fit their own situation and perspectives. Thus, what makes sense in one context can change or even lose its meaning when communicated to people in a different context. (Nonaka 1994, p. 30)

Researchers (e.g. Carlile 2002; Karsten et al. 2001) have studied boundary objects (Star 1989; Star and Griesemer 1989) that reconcile knowledge across disparate work domains, but sharing and creating organizational knowledge across different "communities of knowing" (Boland and Tenkasi 1995), "epistemic communities" (D'Adderio 2004, p. 17, citing *inter alia* Knorr Cetina 1999), or "communities of practice" (Lave and Wenger 1991) is a perennial problem. Howard-Grenville and Carlile (2006) have pointed out that "knowledge regimes" may be fundamentally incompatible, and D'Adderio (2004) emphasizes the diversity of knowledge inside the organization – a diversity that is not easily or even productively resolved through ICT. These studies suggest that we should not assume that ICT unproblematically and straightforwardly produces organizational knowledge.

I turn now to the question of ICT and organizational *contracting* knowledge. Contracting might in theory generate the most significant knowledge for organizations, as obliquely implied by Nonaka (1994). However, the relationship of ICT to organizational contracting knowledge per se does not appear to have been the subject of focused research, though business intelligence, management control systems, enterprise risk management and indeed customer relationship management, supply chain management, and supplier or vendor relationship management all bear upon different dimensions or types of contracting knowledge.

Probably the most widespread and generalized technology for organizational contracting knowledge, even if not characterized as such, is financial accounting (cf. Hall 2010; Miller et al. 2008; Skærbæck and Tryggestad 2010). It is hard to overstate the importance of financial accounting, which not only informs the market about an organization but informs the organization about itself. As internal operations are to an increasing degree replaced with contractual arrangements – in the "move to the middle" said to be characteristic of network relations – it is fair to ask how well financial accounts reflect the contractual commitments an organization has made and the contractual commitments made to it. Håkansson and Lind (2004) argue that traditional accounting systems do not work for the network because they are based on a model which posits relations with the outside world as *ipso facto* “market” transactions, i.e. reducible to realized or realizable price or value, and, to the extent they are not, does not really account for them:[16]

> The boundary of the company divides the world in accordance with the two coordination modes, which are also matched by the need for information. On one side of the boundary is the hierarchy, with a need for very detailed information. On the other side is the market with a lesser need for in-depth information. When relationships [the hybrid mode] need to be taken into consideration, this clear image is shattered. In the relationship case, there is neither a clear boundary, nor do we have any matching internal coordination form. Thus, relationships must be a problem from an accounting point of view, given that accountancy has been developed in accordance with the hierarchy-market dichotomy. There must be a need to change accounting when used in a network situation. (Håkansson and Lind 2004, p. 54)

Taking a somewhat different view that emphasizes the growing importance of intangible assets, Gröjer (2001) reached a similar conclusion:

> One of today’s challenges concerning financial accounting classifications is to cope with an organizational world that seems to become more immaterial than material, where resources in different immaterial forms act as the key production factors. In an accounting context, this development is reflected in concepts such as immaterial assets, intangibles, hybrid and intellectual capital. Allied concepts, including virtual organisations, relation marketing, value stars, human resource costing and accounting, enablers and performance drivers, are in themselves a starting point for accounting classifications. They express a need for altering the accounting boundaries or for acting as a demarcation for reclassification. One way to improve the accounting art is to use new organisational paradigms for accounting classifications. The accounting backbone is about classification and reclassification, i.e. to arrange something in a particular order. The accounting art of [portraying] organisations is currently under dramatic challenge. (pp. 695-696)

The inadequacy of financial accounting as a source of organizational contracting knowledge was demonstrated in the case of Enron, where management entered into various contracts with affiliated parties that generated accounting revenues but no cash, that effectively converted loans to Enron into revenues, or that were so dependent on the price of Enron’s own stock and its credit rating that when these deteriorated the company collapsed in a cash crisis (Powers et al. 2002). In essence, these contracts shifted entirely speculative future revenues into the present, while creating undisclosed risks and liabilities. Because these contracts were so essential to Enron’s reported revenues, their key terms, the nature of the counterparties, and the associated risks and liabilities merited substantial disclosure within the organization and to the

[16] Kyte and Gilbert of Gartner wrote that information systems track transactions, not the underlying contract (Gartner Inc. 2003b; see footnote 2). This observation was made in support of contract management software. See also Figure 5.3.

outside world; instead, the contracts were used to hide Enron's failing business model and deteriorating financial condition.

Although the Enron case involved fraud, the obscurity surrounding key contracts is not limited to cases of fraud. Another example, from the recent credit crisis, is the now well-known case of AIG.[17] In that case too, like Enron, AIG reported revenues on contracts but did not understand, or disclose, the associated risks and liabilities.

In brief, AIG issued credit default swaps (CDSs) effectively guaranteeing various collateralized debt obligations (CDOs).[18] AIG's credit default swaps were relied upon by major financial institutions in making investments that might otherwise have been considered imprudent or that they would not have been able to make under relevant capital requirements, and indeed the UK Financial Services Authority (FSA) had observed a sectoral transfer of credit risk from the banking sector to the insurance sector (Financial Services Authority 2004, pp. 55-56) in part through credit default swaps. However, notwithstanding significant concentration of the credit default swap market (the ten largest global banks and broker-dealers accounting for 70%), the rating agency Fitch had "concluded that the growth of the market is a positive development, as it assists the diversification of credit risk and results in improved liquidity in underlying credit markets" (Financial Services Authority 2004, p. 55). There seems to have been an idea on the part of proponents that credit default swaps would disperse risk, presumably in a kind of engineering sense, as a net or grid absorbs and disperses a physical impact – comparable to the optimized efficient risk-dispersion outlined by Shiller (2003) and Ciborra (2007).

In 2007, AIG reported that the "likelihood of any payment obligation by [AIG] under each transaction is *remote, even in severe recessionary market scenarios*" **(**AIG 2007 Annual Report, pp. 121-122) (emphasis added). The premium AIG earned, even if it was very low, was more than its funding cost, which was 0. An AIG executive is reported to have said: "The models suggested that the risk was so remote that the fees were almost free money" (O'Harrow and

[17] The discussion that follows is, except as noted, based on reviews of SEC filings by AIG for 2007 and 2008.

[18] Under a credit default swap, one party agrees to pay the other party if a payment default occurs on reference debt, by paying the amount of the reference debt or by purchasing the reference debt. CDOs are a type of securitized financial instrument, consisting of a bundle of other debt obligations, including prior securitizations. Securitization is a financial technology which uses statistical models applied to an aggregation of debt instruments (contracts to pay money) to structure a tiered package of derived securities, representing horizontally layered, as opposed to vertically defined, rights to payments from the obligors. From the outset there was some confusion about the nature of credit default swaps. An interest rate or currency swap on a "notional amount" of $100 of underlying debt involves variations that are usually a small percentage of the notional amount. A credit default swap, on the other hand, stands behind the entire amount of the debt and acts more like a guarantee. Comparing a credit default swap to insurance, with that term's prudential overtones, would be misleading to the extent it implies the sort of regulatory oversight common in the insurance industry. Efforts in the late 1990s to gain regulatory oversight over the credit default swap market were defeated (O'Harrow and Dennis 2008).

Dennis 2008). However, over the course of 2007 and 2008, AIG was forced to book losses on its credit default swaps because the market value of the underlying CDOs was deteriorating. By September 2008, AIG was facing a liquidity crisis (i.e. inadequate cash) due to collateral calls (demands to put up cash to back its obligations) triggered under the CDS terms by the continued degradation of the underlying CDOs and AIG ratings downgrades. The US federal government determined that a collapse of AIG threatened unacceptable systemic risk and rescued AIG with emergency financial assistance: AIG was a critical point of failure in a small and tightly interdependent contracting network.

The FSA had noted potential problems in valuing credit default swaps of the type issued by AIG: "The market in portfolio trades is still new and relatively illiquid, so banks usually rely on models to re-value and risk manage the transactions on a day-to-day basis. Valuing and risk-managing complex and illiquid structures like the portfolio trades described above presents challenges for even the largest and most sophisticated of banks." (Financial Services Authority 2004, p. 55). To assign a value to its CDS book, AIG used a modified version of the BET (binomial expansion technique) model originally developed by a rating agency in 1996 to generate expected loss estimates for CDO tranches. The BET model generated values, but not on the basis of knowledge of the "real" underlying assets that AIG had guaranteed. Instead, the model implied default probabilities and cash flows from price estimates on the individual securities comprising the portfolio of a CDO. AIG obtained prices from CDO collateral managers where these prices were available, but for 2008 CDO collateral managers provided these prices for only 61.2% of the underlying securities. For the rest, AIG derived the price based on a "matrix pricing" technique by comparison to similar securities.

Though questions might be raised about AIG's reliance on the BET model for valuation, there is no indication that AIG considered the collateral requirements of the credit default swaps; it was these collateral requirements that precipitated the liquidity crisis. These key contract terms were not disclosed in AIG's financial statements until they presented acute threats to liquidity, and there is no other standard "internal coordination form" for contracting that would have necessarily brought them to the attention of senior management. In addition, with counterparty identities undisclosed, the exposures to AIG that other financial institutions were accumulating remained hidden until they were forced to be revealed in the course of the government bailout.

To summarize, then, the literature indicates that knowledge is an essential aspect of contracting. However, research has focussed almost exclusively on understanding the inter-organizational dimension of contracting knowledge. Synthesizing organizational contracting knowledge is obliquely and partially addressed under numerous organizational knowledge initiatives (business intelligence, risk management, customer relationship management and so forth), but the most widespread and generalized knowledge technology for contract is financial accounting. Research, and indeed recent events, point to the inadequacy of financial accounting systems, and the lack of any other "internal coordination form", or organizing technology, for contracting, and thus to a significant gap in synthesizing organizational contracting knowledge.

3.4 Summary: ICT, contract and knowledge in the networked economy

Research on ICT, contract and knowledge is often framed in reference to transaction cost economics, which hypothesizes an overall efficiency-optimizing function that minimizes the sum of production costs and transaction costs, including the costs of contracting. It follows from TCE that as transaction costs go down as a result of the "electronic communication effect" (Malone et al. 1987), there will be a "move to the market", and away from intra-firm, hierarchical governance. This "electronic markets hypothesis" is implicit in assumptions that the networked economy will be "contract-enabling". However, empirical studies indicate not only that knowledge is an essential aspect of contracting but that hybrid or hierarchical contracting requires integrative inter-organizational ICT to support knowledge sharing between contract counterparties. This locates contracting knowledge and practice as an inter-organizational enactment, not inside the boundary of the organization, but the implications for the production of organizational contracting knowledge have not been addressed. According to the research and observable in recent events, organizational contracting knowledge is not well supported by financial accounting or by any other organizing technology for contract. This frames the opportunity and the challenge for contract management software.

Chapter 4 Methodology

In this chapter, I outline the methodology for the study. Noting that research on technology tends to be shaped by and express an implicit if not explicit conceptual position (Orlikowski 2010), I begin the chapter with a discussion of how Barad's (2003, 2007) agential realism informs this study (section 4.1). In section 4.1.1, I briefly introduce agential realism as I understand it, and, in section 4.1.2, I relate Barad's notion of apparatus to technology and apply this idea to an empirical example from the research literature. In section 4.1.3 I explain why agential realism is relevant to IS research generally and more particularly to this study. Lastly, in section 4.1.4, I relate agential realism to the earlier discussion of performativity in markets and breakdown.

In section 4.2, I turn to the biography of software as methodology for this study, beginning with how it is positioned in relation to other approaches (section 4.2.1). I go on to discuss how my application of the biography of software approach is informed by grounded theory and shaped by principles of corpus construction (section 4.2.2). In section 4.2.3, I discuss CMS as biographical subject and a second-level subject-object analytical framework in which the adoption of CMS maps out "regions" of contract.

In section 4.3, I describe my overall research design as it evolved over the history of the project (section 4.3.1) and then my various data sources and methods of data collection (interviews, including the site visit (section 4.3.2); the survey (section 4.3.3); and archival research (section 4.3.4)). In section 4.4, I summarize how I have adapted and extended the biography of software approach for this study, explain my use of a table of breakdown to organize and analyse the data, and relate the presentation of data in Chapters 5 and 6 and the analysis in Chapter 7 to the overall research design and history of the project as discussed in section 4.3.1.

4.1. Epistemological and ontological stance: Barad's agential realism

4.1.1 Barad's agential realism

For this study I am adopting Barad's (2003, 2007) agential realism as my "onto-epistem-ological" (Barad 2007, p. 185) framework. Barad's project involves a particular way of seeing the world, with implications for inquiry (the project of knowledge) and for ethics. In developing agential realism, Barad works from her characterization of the essential nature of matter as understood by experimental physics. She particularly draws upon Niels Bohr's notions of indeterminacy and complementarity (defined below) and of theories as embodied practices; upon Butler's version of performativity in terms of the specific materialization of bodies as produced by repetition of regulatory practices (and as against representationalism); and upon

Foucault's concept of discursive practices as material conditions that define meaningful statements and thus produce subjects and objects.

For Barad the ontological primitive is the "phenomenon", which is not only understood through but effectively (as I read Barad) *probed* and *organized* by its constituent "apparatus", producing knowledge; "the boundary between an object of observation and the agencies of observation is indeterminate in the absence of a specific physical arrangement of the apparatus" (Barad 2007, p. 114). Barad anchors this notion by reference to the physics experiments that, depending on the setup of the laboratory apparatus as well as the larger material context of the experiment, variously determine light to be either a wave or a particle. From this she argues that matter is essentially indeterminate in the absence of a particular constituent apparatus that co-creates determinacy. Given a particular apparatus, "certain properties become determinate, while others are specifically excluded" (Barad 2007, p. 19), with the excluded properties not only unknown but indeterminate. There is a relationship of mutual exclusivity (or trade-off) between what is determined or determinable and what remains indeterminate ("complementarity"). As an example, she explores the apparently paradoxical nature of light (as both wave and particle), and she explains how the paradox is an outcome of our mutually exclusive classical concepts of wave and particle. In her account, these two concepts have been embodied in mutually exclusive experimental conditions, which, in testing a phenomenon that is apparently the same except for the experimental conditions, yield two mutually exclusive results. Thus measurement practices are an ineliminable part of the results obtained, but in a more profound sense than is implied by the notion of "uncertainty" – the idea that the experimental conditions inevitably disturb an otherwise determinate phenomenon.

For Barad, then, following Bohr, the basic unit of what is real in any experiment is the phenomenon consisting of the entire experiment, and objectivity is established through the replicability of observed "marks on bodies" (or observed outcomes) in repeated experiments. Objectivity is not about premeasurement properties of independent objects (observation-independence). Instead objects are within phenomena, where phenomena are the ontologically inseparability of objects and apparatuses. "[T]here's an important sense in which Bohr's framework offers a proto-performative account of the production of bodies" (Barad 2007, p. 129).

This is not the same as saying that the natural world is a social construct; for Barad, the real world is very much real, even if a matter of probabilistic materialization, and constraints rather than deterministic outcomes. But neither is the world "out there" vis-à-vis neutral (external) human observers who merely reflect or represent what they "see"; "seeing" is not the passive receipt of information from the outside world but at the physical level a material engagement with the world (e.g. microscopes, STM (scanning tunnelling microscopes) technology, sonograms). Barad thus rejects representationalism – a notion that the world is comprised of observation-independent objects with attributes, which humans go about knowing and naming. For Barad the semantic and ontic questions are merged in materialized phenomena; to characterize the problems in knowing as "merely" epistemological, it may be inferred, enshrines representationalist assumptions of an atomistic, deterministic ontology.

Generalizing her analysis of the quantum physics experiments, Barad proposes agential realism as her conception of the real. In this conception, the basic unit of reality is the phenomenon, consisting of "intra-acting" agencies, which are not a priori existing as ontological units but are defined relationally through agential intra-actions resulting in observed "marks on bodies" (outcomes). The reproducibility that defines objectivity entails some kind of causal structure and thus agency, from which objects may be (provisionally) inferred. What "marks on bodies" will be observed depends on the apparatus, with apparatus generalized from the laboratory setup to mean a type of phenomenon which is a specific material configuration of the world creating the conditions of possibility for determinate boundaries and properties of objects and meanings of embodied concepts within a phenomenon of which it is a constituent part. An apparatus, embodying a particular concept to the exclusion of others, is also a type of "material-discursive practice", producing subjects and objects and creating the condition for the possibility of objectivity.

Barad concludes that, within agential realism, meaning is made possible through specific material practices, knowing is a material engagement with the world involving differential responsiveness, and ethical responsibility is defined as accountability for marks on bodies (observed outcomes), and for the constitutive effect of exclusions. In her view, because it unsettles "nature's presumed fixity", agential realism opens up the "possibilities for change" (Barad 2007, p. 64). For Barad, neither knowing (differential responsiveness) nor ethical responsibility (accountability for marks on bodies) is limited to humans. And material agency has direct implications for human agency: Barad argues for ethical transitivity, meaning that humans are responsible for the material agency of their non-human creations. Following Barad would mean the end of "design from nowhere" (Suchman 2002).

As a thought experiment for working with Barad's notion of phenomenon, consider the airspace over Manhattan. This can be constitutive of multiple overlapping and non-mutually exclusive phenomena, theoretically without limit. Such phenomena might include or involve: the channelling of light from the sun; the channeling of artificial light into the night sky; air pollution; air rights under real estate law; an air traffic control sector with flight paths; large scale and localized air currents; multiple and (literally) layered living and working habitats; a site of human activity over time; areas of reflective heat produced by different roofing materials; or the flight paths of migrating birds, which sometimes crash into reflective glass towers. These phenomena are materially co-existing and overlapping, but structured (not constructed), organized and understood through distinct material-discursive practices, each an "apparatus" (physical analysis of light; physical analysis of particles and chemicals; law and commerce; air traffic control systems; measurement of air movement at different heights and at different times; three-dimensional social mapping; historical, anthropological and archaeological artefacts, records and accounts; satellite heat maps; and the flight of migrating birds).[19] Depending on the particular apparatus, certain things will become meaningful; others will be excluded.

4.1.2 The notion of apparatus as related to technology

Barad does not equate apparatus with technology, and I believe that for her project such a reading would be an inappropriate limitation. Apparatus as a material-discursive practice that "helps to constitute phenomena through producing knowledge about them" is a formula that is useful, one might say powerful, partly because of its lineage (with reference to Butler and Foucault) but in large part due to its abstract quality and resistance to enlistment in particular agendas. However, the converse does not hold, and it can, I believe, be appropriate and productive to consider technology as apparatus.

Furthermore I argue that it can be appropriate and productive to consider a particular technology as an apparatus and, as such, a subject of study. Barad emphasizes that each particular phenomenon and any constituent apparatus are uniquely occurring, and that, in particular, the boundaries of the apparatus are variable and may be broadly drawn – incorporating, in the case of a laboratory experiment, the laboratory conditions and laboratory personnel. However, I draw out an implication in Barad's work to the effect that if observations produced through an apparatus are reproducible, and thus the foundation of objectivity, it is meaningful to discuss an apparatus (for example, a certain configuration of laboratory equipment, a bush pump, a packaged software product) as such and as related to multiple phenomena of which it may hypothetically form a constituent part. This can help us make sense of technologies that appear in many (potentially partial) instantiations, that may be dispersed, that are rapidly changing, and that may be intangible, such as the travel website TripAdvisor (Scott and Orlikowski 2012).

To give another example, I apply the concept of apparatus in a reading of Mol and Law's (1994) study of anemia. Observing that anemia's physical existence either within the body or geographically may be difficult to locate, they use this example to construct a model of social

[19] Regarding New York City rooftops and heat, see Lynch (2012), Rosenberg (2012), and NASA Earth Observatory (2012). Regarding the effects for migrating birds of light from man-made structures and reflective glass on tall buildings, see Doty (2010) and Foderaro (2011).

topological spaces, including regions, networks and fluid spaces, by analogy to mathematics, where topology "articulates *different rules for localizing* in a *variety of coordinate systems*" (p. 643, emphasis in original). Regions are clusters, having distinct boundaries and defined by certain similarities within the cluster, differences along other dimensions being suppressed (here there is an echo of "complementarity"). In networks, comprised of elements and the relations between them, distance is a function of the relation between the elements. Networks can cross boundaries between regions. Fluid spaces are characterized by unstable boundaries, and relations that retain continuity of existence even as they transform. Mol and Law identify two notional "regions" of anemia – "the Netherlands" and "Africa" – corresponding to markedly differential presentations of anemia. Because "it transforms itself from one arrangement into another without discontinuity" (p. 664), "anemia" is described as "fluid".[20]

Of interest in my analysis is that each of the two regions of anemia is marked out by the use of a particular diagnostic apparatus within the localized phenomena of the clinical setting: Laboratory analysis of blood samples using precision instruments corresponds to the region where anemia tends to be mild and relatively rare ("the Netherlands"); the "clinical gaze" as diagnostic apparatus corresponds to a region where anemia tends to be severe and widespread ("Africa"). Laboratory analysis and the clinical gaze differ in how they define what matters – in Barad's sense, making certain things determinate and excluding certain other things. Where anemia is severe and widespread, the network of precision instruments, lab technicians and laboratories breaks down, and the clinical gaze takes over.

As noted in section 2.2.1, "fluidity" is used in a somewhat different sense by de Laet and Mol (2000) in their analysis of a bush pump that has been widely adopted in Africa. They call the bush pump a "fluid" technology,"technologically appropriate" across many diverse settings. Turning back to my reading of Mol and Law (1994), we can say that the technological appropriateness of each diagnostic apparatus (laboratory analysis or clinical gaze) marks the boundary of a corresponding region of anemia; the boundary of each region of anemia in turn marks the limits of the "fluidity" of the corresponding apparatus. In this sense the apparatus (laboratory analysis or clinical gaze) not only diagnoses anemia but maps a region of anemia, and the boundary of each region is in turn marked by the breakdown of its corresponding apparatus.

By working through this example I have drawn an explicit link between Barad's notion of apparatus – as a material-discursive practice that probes and organizes the phenomenon of which it is a constituent part – and technology. The breakdown of technological

[20] Per Mol and Law a "mutable mobile", in contrast to Latour's (1986, 1987, pp. 226-227) "immutable mobile".

appropriateness, or the limits or lack of "fluidity", of a particular technology reveals characteristics of the phenomenon of which it is a constituent part, mapping out "regions" within the phenomenon.[21]

Reading Mol and Law's (1994) account of anemia or de Laet and Mol's (2000) account of the "fluid" bush pump from the agential realist perspective, we have arguably achieved three advantages. First, Barad's framework relates multiple instantiations of a particular technology (apparatuses in relation to localized phenomena) to a larger, but non-aggregated, more abstract phenomenon in which the technology is a constitutive, and performative, material-discursive practice. As noted above, this is a particularly useful in attempting to understand a technology – such as a packaged software product – as likely to be both dynamic and dispersed. Second, we have considered the breakdown of a particular apparatus as revealing, a point I take forward in sections 4.1.4 and 4.2.3. Third, following Barad's model, localized and more tangible phenomena and larger or intangible abstract phenomena can be valid, and concurrently valid, but are never ontologically definitive or preclusive. This points to the multiplicity of ontological possibility – a theme that becomes relevant in the biography of CMS.

4.1.3 Agential realism as relevant to IS research and to this study

In the preceding section, I set out Barad's agential realism as a frame for the study of technology generally, in particular working with her notion of apparatus. In this section I explain why I believe agential realism is a good fit for information systems research, and for this study.

First I point out that an information system, such as a financial accounting system, or an IT artefact, such as an enterprise software package, is well characterized as a material-discursive practice, in that an information system or an IT artefact produces meaning through a specific material configuration and thus embodies the inseparability of matter and meaning. The nature of meaning, practices for making meaning, and the conditions for possibility of intelligibility (Barad 2007) – these are or should be the principal subjects for information systems. The blurring of epistemology and ontology as advocated by Barad is less arguable and more materialized in information systems than perhaps in other domains, as it is well understood that

[21] This analytical framework ties Barad's project to the themes of technological appropriateness and breakdown as related to materiality. For example, Eglash (2006), writing on technology as material culture, cites Akrich's (2002) account of the attempted implementation of a French-designed electrical generator in Costa Rica. Her account of the failed technology transfer takes specific account of the material attributes of the technological artefact. Eglash takes to task a purely semiotic analysis of technology and cites with favor Haraway's (1997) characterization of technology as a "material-semiotic hybrid".

information systems do not (only) reflect (represent) the world, do not (only) produce knowledge of the world, but actively produce the world (cf. Borgmann 1992).

Second, an information system or IT artefact can be understood as an apparatus that probes and organizes the phenomenon of which it is a constituent part. The reduction of information through classification systems and for manipulation by computers involves a particular type of filtering (or "grating"; Barad 2007, p. 30), leaving some information behind (exclusion) but also creating both meaning and material consequences. For example, I would argue that the entity-relational database, fundamental to today's information systems, can be directly associated with the representationalist ontological assumptions that Barad critiques, where the world is comprised of discrete objects or entities with fixed attributes. These notions as embodied in a database constitute "regulatory practices produc[ing] a specific materialization of bodies" (Barad 2007, p. 63, citing Butler 1993), for example as evidenced in credit scoring or no-fly lists.

Third, as drawn out in section 4.1.2 above, we can study an information system or IT artefact, as material-discursive practice or apparatus, across multiple instances (or phenomena). This is revealing of both the artefact and the larger phenomenon of which it is a constituent part, particularly at the points of breakdown. That is, we have on the one hand a particular information system or IT artefact as material-discursive practice or apparatus, sorting, partitioning and organizing the phenomena of which it is a part and producing knowledge. But Barad is not a constructionist, and believes in the materiality of a world ex-humans (and their non-human creations). Thus material agency within a phenomenon is not granted exclusively to the apparatus, but instead is located in observable intra-actions and then potentially attributable to various objects. For Barad, matter is active in the ongoing materialization of the world. In information systems, such material agency can be observed in technology dynamics such as path dependence and network effects, but also, as I discuss further in section 4.1.4, at points of breakdown. Thus Enron's collapse revealed the breakdown of its defective financial accounting system as against the materiality of its inability to produce cash revenues from its ongoing business operations.

Lastly, the multiplicity of ontological possibility entailed by agential realism enables an active engagement with the phenomenon of digital convergence (Tilson et al. 2010). Indeed it is an apt description of the most characteristic feature of digital convergence: the fluid, inchoate or indeterminate nature of "interconnection, overlapping, contestation, and reconfiguration of physical and logical socio-technical infrastructures" and "non-linear interactions across layers" (Tilson et al. 2010). In digital convergence, material artefacts and their associated attributes take on a kind of ontological indeterminacy, a fluid or inchoate quality. It becomes harder to say exactly what something is: when is a computer a television; when is a mobile phone a camera; when does a search engine become a "data mart"; when is a social media platform a bank; when is a movie a video game and vice versa; and so forth. Agential realism (reflecting its origin in the example from experimental physics) does not break down in the face of inchoate or indeterminate phenomena whose constitutive objects are not tangible, self-evident, or pre-determined. Instead it works backwards from "marks on bodies"; objects are defined by what they do, as measured by a particular apparatus or embodied practice of understanding. That this process of definition is always provisional and subject to the emergence of new, overtaking phenomena does not mean that it is a futile, moment-by-moment exercise. Instead we are engaged with (and within) a phenomenon as it unfolds "in a process of materialization that stabilizes over time to produce the effect of boundary, fixity and surface we call matter" (Butler 1993, p. 9; cited at Barad 2007, p. 64).

To summarize, I argue that Barad's agential realism works well for IS research because information systems and IT artefacts can be meaningfully understood as material-discursive practices and apparatuses (with the implications noted above), across multiple instances, with the points of breakdown of particular interest. It is also a good fit to IS research, and in other areas, where the phenomena being investigated – in this case, packaged software and contract – are essentially indeterminate or inchoate, subject to various characterizations and revealing different aspects depending on the practical or theoretical lens applied. Such phenomena are likely to be "fluid", here used to mean something that stays the same even as it changes (Mol and Law 1994), or (perhaps more concretely) to refer to a multiplicity of things that are the same at some level, yet not the same (like anemia). Following Barad, such phenomena can be made determinate only in relation to something else, i.e. when measured against a particular apparatus of understanding. In my study I am applying the lens (or apparatus) of commoditization to CMS, and (as described in section 4.2.3) the lens (or apparatus) of CMS to contract. I expect that my "readings" of CMS and of contract will reflect these choices.

4.1.4 Agential realism, performativity in markets, and breakdown

It remains to be said how Butler's version of performativity relates to performativity in markets and my use of breakdown in this dissertation, as discussed in Chapter 2. First, I have noted that there has been a question raised from time to time (e.g. by Mol 1992, pp. 34-44, in respect of Butler 1990) as to whether the theory of performativity overstates the power of discourse (statements, models) in relation to matter, e.g. material bodies. Put in the alternative, what is the status of matter and material agency in relation to performativity? Barad offers a resolution with her concept of material-discursive practices, by locating performativity in the intra-actions within phenomena, and most fundamentally in her assertion that meaning and matter are not separable. She argues for a "posthumanist" performativity, not limited to statements, or to humans and their creations, linguistic or otherwise. Barad's invocation of performativity is principally a rejection of representationalism, but she goes on to say that humans are not the only ones engaged in performative enactments. In fact, in a move not dissimilar to Butler's challenge to gender categories, she questions "the practices through which these differential boundaries [between human and non-human] are enacted" (Barad 2007, p. 66), and emphasizes that matter plays an active role in the materialization of the world.

This is an all-encompassing notion of performativity that takes us quite some distance away from Austin, and may not be entirely easy to reconcile with MacKenzie's schemas of performativity in the economy. Toward finding a common ground, I suggest that performativity is invoked when things that are normally considered ideational and intangible (statements, models, theories, assumptions (whether consciously held or not)) and having an apparently representationalist relationship to the world seem instead to have a material consequence, or to manifest in some sort of material embodiment, that is in some way surprising or otherwise noteworthy – evidencing, in Barad's formulation, the inseparability of meaning and matter. Sometimes performativity involves a kind of feedback loop that may be hidden, as in the production of gender categories as described by Butler, or instead intentionally initiated toward creating a cycle of primed expectations and materialized realizations, as in the case of marketing (Cochoy 1998, 2010). Gartner's Magic Quadrant (Pollock and Williams 2009b, 2010, 2011) and the Black-Scholes option pricing model (MacKenzie and Millo 2003) present more complex cases in terms of visibility and intentionality. On the other hand, Austin's performativity, taking contract as an example, is completely visible, intentional, and (assuming "conditions of felicity") effective, but does not involve any sort of feedback loop. These aspects of performativity are (as obliquely suggested by MacKenzie's schemas) relative and variable, and Barad is making the more general point about the materiality of meaning, and vice versa.

It is not my intention to attempt to reconcile the various versions of performativity. However, I would argue that Barad's all-encompassing performativity does slightly reposition the notion of breakdown in a useful way and brings into the fold various observations that have been made about instances of breakdown, such as:

> [T]he model as statement has not been able to put into motion a world in which it can function. (D'Adderio 2008, p. 776)
>
> Barnesian performativity is not arbitrary self-fulfilling prophecy. (MacKenzie 2006a, p. 51)
>
> [P]erformativity leaves open the possibility of events that might refute, or even happen independently of, what humans believe or think. (Callon 2007, p. 323)

As I read Barad, she would locate a performative operation that is intended or expected to bring about a certain materialization as a material-discursive practice or apparatus within a larger phenomenon where the intended or expected materialization may or may not occur. While Austin addressed this in terms of background law or some other technical requirement for performative effectiveness, Barad (2007, p. 64) notes that "the constitutive outside marks the limit to discourse". When such a limit is encountered, it prompts an interrogation of the concepts embodied in the apparatus or other material-discursive practice and a consideration of what is excluded and what is included by those concepts as so embodied. An analysis based on breakdown begins with evidence of failed expectations and works backward to identify the agents.

To illustrate, suppose a database characterizes all sea creatures as either fish or shellfish, using an image recognition technology.[22] The operation of the database is to sort all sea creatures and its assumption is that all sea creatures are either fish or shellfish. In Barad's terms, the database is an apparatus or material-discursive practice constitutive of a phenomenon that might be called sea creature sorting. To dramatize the example, take the case that all fish are eligible to be eaten, while shellfish are protected. Once the database is up and running, the consequences for sea creatures are undoubtedly material. When a dolphin appears, depending on the parameters built into the image recognition technology, it might be miscategorized (let us say, as a fish), it might be identified as an anomaly requiring adjustment of the database, or it might not be recognized at all. In any of those cases, there is a breakdown; the "constitutive outside" in the material form of the dolphin resisted the classification performativity of the database and its image recognition technology. The breakdown in one way or another is generative (cf. Callon 1998c) in that it produces a materialization and a meaning, among other things revealing assumptions embodied in the database (that all sea creatures are either fish or shellfish) and the image recognition technology. If the database and its image recognition technology are adjusted to take account of a third category of sea creatures, we might characterize the breakdown as corrective.

To conclude, I mark "performativity" as having multiple meanings, and enlisted toward different aims. One might ask whether there is much integrity remaining in the concept or purpose in its use; I will return to this subject in Section 8.5. Holding this question open, I nonetheless take the view that tracing breakdown – the failure of expectation – is a productive way to organize and analyse the data in this study, as further discussed in this chapter and illustrated in chapters that follow.

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[22] See Elias (2012) regarding the use of advanced imaging technology in airline passenger screening.

4.2 The biography of software approach as methodology for this study

4.2.1. In relation to other approaches

Pollock and Williams note that it can be a challenge to shape a methodology to track “the evolution of a technology … and how it is shaped by its specific historical context across multiple social locales” (Pollock and Williams 2009a, p. 80) or “complex technologies which are instantiated at multiple sites” (Pollock and Williams 2009a, p. 81). As I outlined in sections 4.1.2 and 4.1.3, Barad’s perspective supports this sort of inquiry but does not, of course, address the methodological implications. As Pollock and Williams (2009a) point out, several common methodological approaches are clearly inadequate for developing an understanding the evolution of a packaged software product. Information systems development, software engineering and requirements engineering studies tend to take as their subject more or less self-contained custom applications internal to an organization. “Before-and-after” snapshot studies which purport to demonstrate the technological success of new software products from a managerial perspective are too often aligned with the rhetoric of technology supply. Implementation studies that focus on breakdowns and failures, or that identify “success factors”, present a more sceptical view, but the time frames for observation may be truncated and research site selection may reflect some sort of bias (managerial or otherwise) or be a function of opportunistic access. A more fundamental concern is whether elements of the broader picture, in particular the nature and dynamics of technology supply, are missing altogether. Pollock and Williams observe that organizational and management studies tend to “blackbox the supplier and technology”, and tend to treat the vendor as “other”, whereas what is required is a more nuanced view of an “extensive network of technical, organizational and social arrangements whereby some (material, institutional) elements are difficult for local actors to change” (Pollock and Williams 2009a, p. 89).

The biography of software approach is intended to address these shortcomings. Pollock and Williams characterize their approach as a “strategic ethnography” (Pollock and Williams 2009a, p. 112), a “‘variable research geometry’ that can be applied to diverse issues and in differing contexts, depending in particular upon what issue(s) are being addressed and which entities are being tracked” (Pollock and Williams 2009a, pp. 109-110). It is likely to involve multiple sources at multiple levels, and multiple methods, as appropriate to the research question.

The biography of software approach diverges from the positivist and quantitative methodologies that have had a dominant position in IS research in the United States (Walsham 2012). However, Walsham (whose own research is interpretivist) argues that the other approaches, including not only interpretive but also design science and other action-oriented approaches, can usefully complement positivist methodologies, and advocates methodological pluralism. Land (2010) has called for more historical studies in IS research, citing Pollock and Williams (2009a) as an exemplar, and Swanson and Ramiller's (1997) "organizing vision" as implying an "overtly historical approach". The biography of software approach would clearly be responsive to these comments.

4.2.2 A historical account informed by grounded theory and shaped by principles of corpus construction

While Pollock and Williams describe their approach as a "strategic ethnography", I suggest that the overarching methodology entails construction of a historical account. Precedents discussed in Chapter 2 (e.g. Cochoy 2010; Lepinay 2007a; Noble 1984, 1999; Poon 2007; Yates 2005) provide useful guidance. Both STS and studies of markets from economic sociology have an established tradition of technology histories – of telling the stories of technological artefacts, or of organizational or societal transformation associated with technology. MacKenzie and Wajcman (1985, pp. 10-14) cite Thomas Hughes's technology histories, and Bijker and Law (1992) note that, while Bowker's account of a particular Schlumberger technology is influenced by actor-network theory, his background is history.[23] In *Inventing Accuracy: An Historical Sociology of Nuclear Missile Guidance* (1990), Donald MacKenzie describes how improvements in missile accuracy were determined to be desirable, were designed and constructed, and then in various ways were evaluated. MacKenzie emphasized the need for a historical perspective because the relevant time frame exceeded the time constraints of a case study; "the weapons systems case study freezes time" (MacKenzie 1990, p. 8).

It remains to say how a biography of software can be "strategic" in Pollock and Williams's sense. In this respect, my biography of CMS is informed by grounded theory methodology (Glaser and Strauss 1967; Urquhart et al. 2010). Urquhart et al. have called for more use of grounded theory in IS research, in particular for theory development, and there are recent examples from relevant research literature (Beunza and Garud 2007; D'Adderio 2008; Levina and Vaast 2008; Pollock and Williams 2011; Pozzebon et al. 2011; Strong and Volkoff 2010). Pozzebon et al. (2011) note that grounded theory is linked to inductive theorizing and to "theoretical sensitivity. Sensitivity is the 'ability to pick up on subtle nuances and cues in the

[23] "Bowker argues that the company successfully mobilized a series of resources to build a version of natural and social reality within which its methods secured success. As a part of this strategy, the company Whiggishly *claimed* that its geophysical techniques were, indeed, the product of an unfolding scientific and technical logic. … In short, the *pretence* of a natural trajectory and the concealment of contingency behind legal and organizational barriers were central ploys in the process of *creating* a successful technology. Bowker's story suggests that the *idea* that technology may be seen as the appliance of science is a powerful form of rhetoric but, at least in the case of Schlumberger, rather far from the truth." (Bijker and Law 1992, pp. 17-18, emphasis in original)

data that infer or point to meaning' (Corbin & Strauss, 2008 p.19)". The authors discuss inductive theorizing from cues (or clues?) to support creativity, but I suggest it is a productive approach generally for research questions that present in the form of a mystery, without a theoretical frame already established, or a pre-conceived hypothesis. These questions, like the research questions here, require a search for an explanation, *rerum cognoscere causas*, and thus an inductive approach.

> A longitudinal case study employing grounded theory procedures is appropriate for studying Org–ES fit [(the failure of CMS)] because it facilitates the emergence of theoretical concepts directly related to the phenomena being observed (i.e., misfits [breakdowns]), while simultaneously considering the context in which those phenomena are embedded (i.e., the organization and its new ES [the packaged software marketplace]). (Strong and Volkoff (2010, p. 734)

However, except in one stage of the research (as discussed in section 4.3.1), I did not code text at a detailed level. Some consider detailed coding the foundation of or even equivalent to grounded theory, and so I say that this study is "informed" by grounded theory (perhaps "semi-grounded"; Thompson and Walsham 2004). As informed by grounded theory, research design was based on the (iterative, provisional) sorting of data into themes or categories, the "constant comparison" of data and the theory under development, and the construction of a narrative or history that pulls the data and the theory together (Pozzebon et al. 2011; Urquhart et al 2010). The process was non-linear (Pozzebon et al. 2011). In my study the iterative loop of "constant comparison" encompassed not only data and "theory under development" but also the research literature (cf. Strong and Volkoff 2010), alongside a cycle of corpus construction around extension of the analytical frame and data collection to a point of saturation (Bauer and Aarts 2000). That is, as the data was collected, I compared emerging themes with research literature, looked for novel or intriguing "leads" or "clues", and identified missing pieces of the puzzle, before planning the next step (section 4.3.1). In managing this process against what was feasible in terms of access, I characterize the overall research design as "strategic" in Pollock and Williams's sense.

4.2.3 CMS as biographical subject; CMS and regions of contract

It could be argued that "biography" with the associated anthropomorphism is a rhetorical and conceptual tool of convenience: Callon (1987) makes the case for the study of technology as a tool for sociological analysis without resort to anthropomorphism. But a biography is a particularly compelling form for a story about expectations and realizations.

> In doing a biography of a thing, one would ask questions similar to those one asks about people: What, sociologically, are the biographical possibilities inherent in its "status" and in the period and culture, and how are these possibilities realized? Where does the

> thing come from and who made it? What has been its career so far, and what do people consider to be an ideal career for such things? What are the recognized "ages" or periods in the thing's "life," and what are the cultural markets for them? How does the thing change with age, and what happens to it when it reaches the end of its usefulness? (Kopytoff 1986, pp. 66-67)

I offer two additional arguments in favor of "biography" as used in material culture studies. The first is the (provisional) reification-without-specification of the biographical subject to create a focus of inquiry. The second takes advantage of the two-level subject-object analytical structure: As the anthropomorphized biographical subject, software can "take a view on", act on, and reveal its various associated objects.

Vitari and Ravarini (2009) observe that "defining the subject can often be a challenge in the software arena", and in Chapter 2 I suggested that "packaged software" is somewhat fluid, inchoate or indeterminate. It could be differentially "located" in a variety of "coordinate systems", to use Mol and Law's (1994) terminology. To deal with the definitional problem for their study, Vitari and Ravarini construct a definition of "content management sytems", combining a definition of packaged software (section 2.1.1) with a description of a task or process (content management). Here the material culture studies perspective offers an alternative approach: We can locate and identify a thing (otherwise unspecified) by the life it leads. That is, the biographical subject is the thing that transcends local instantiations, travels through time and space, is named and recognized as as such, and has material agential qualities as traced across multiple instantiations (or phenomena). Like an avatar moving through a virtual game, it is clearly identifiable as (in some sense) a continuous entity from one setting to the next even if its qualities are to-be-specified, may change over time, and may even be irreducibly multiple in nature – "fluid" in the sense that it stays the same even as it changes (Mol and Law 1994).

Hoskins (2006), in considering the nature of agency of "relatively generic classes of objects", cites Appadurai (1986b) and Myers (2001) for examples of multi-sited field projects "in order to trace things as they move through space and time" (pp. 74, 75).

> Critical fetishism – a heightened appreciation for the active materiality of things in motion – entails certain methodological questions and challenges, which recent writings in anthropology and geography address. For anthropologists, the exigencies of tracking commodities define a mode of fieldwork that Marcus has defined as doing ethnography "in/of the world systems". This sort of fieldwork requires ethnographers to work in and across multiple field sites (e.g., scientists and traders), images (e.g., Rambo and Pokemon), and commodities of 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*" ([Marcus] 1995: 105, [Foster's] emphasis). (Foster 2006, p. 286)

The "logic of association or connection" as defining the otherwise unspecified biographical subject is well illustrated in John Law's *Aircraft Stories* (2002). In this book, Law describes how his research into the fate of the failed TSR2 (nuclear fighter-bomber) military aircraft project challenged his notion of the object of study. In his account the TSR2 is not (solely) an aircraft or a project, it is ultimately, and irreducibly, the subject of multiple, unreconcilable narratives – a "decentered object".

The history of the TSR2 begins with a "gap" that opened up in the development of military aircraft (Law 2002, p. 67). The subsonic Canberra light bomber and reconnaissance aircraft had been immensely successful, but was aging and vulnerable to growing surface-to-air missile capabilities. In the meantime, the P1 Lightning supersonic fighter had been developed. The developer of both aircraft – English Electric – argued that its experience made it the best choice to develop a supersonic strike and reconnaissance aircraft as successor to the Canberra. This argument based on historical progress was, as Law observes, "perfectly plausible" (p. 69) – an example of an "origin story". "[L]et's say that this form of narrative is a coordinating strategy, a method for the cultural ordering of what would otherwise be disconnected objects." (p. 70) But this was only one way to rationalize the design of the aircraft: A competitor, Vickers, touted its "weapons systems" expertise, and created what Law calls a "virtual space, virtual because it is conceptual and contains such entities as cost, size, lethality and 'lethality per £ sterling'" (p. 77). Law describes the procurement process as a kind of story of interests, the many stories inherent in the design features and choices, and the "privileged place" of the designer.

A marketing brochure tells a different type of story about the TSR2, first generating a range of "object positions" and then coordinating them into a single aircraft. Law identifies the mechanisms the brochure employs to connect and coordinate disparate elements: syntax that turns multiple objects into one (or unifies disparate identities); the physical structure of the brochure; a tabular hierarchy effected in the table of contents and ordering of material; the use of perspective and maps to project the aircraft and its capabilities into space; the presentation of the TSR2 as a complex of interrelated systems; and the association of the aircraft with speed and heroism. "This analysis implies that coherent and single objects are effects or products. It also implies a shift from epistemology to ontology. This is because inconsistency between different performances reflects failing coordination between different object positions rather than differences between external perspectives on the same object." (Law 2002, pp. 8-9) He concludes: "[T]he work of object coordination and object disaggregation goes on – and on. It is to suggest that singularity of an object is precarious, uncertain and revisable." (p. 36) To the same effect he argues, "there is no such thing as a centered subject: like objects, subjects of knowledge are multiple or fractionally coherent. … the interferences between these different subject positions are a valuable source of data." (p. 9)

Law provides a kind of caution to the biography approach and the (provisionally) reified-but-unspecified biographical subject when he notes that there is a "bias in favour of narrative continuity, and … discontinuities are effaced or deferred" (Law 2002, p. 9). This is a bias that the researcher cannot avoid, and "the difference between insider and outsider cannot be sustained: social scientists and participants alike tell their stories in terms of these narrative possibilities." (p. 9) Law describes five narrative forms suggested during the course of his research project: plain history (though there is "no such thing"), a policy narrative (a "normative form of narrative, one that chains itself together by distributing praise, blame, and responsibility"), and ethical, esoteric and aesthetic narratives. He recounts how these patterns of narrative "coalesced in a particular way to interfere with one another and make a place of darkness" (p. 59). At this point the object became "decentered".

For purposes of the first research question, then, in light of these perspectives, I distinguish my approach from that taken by Vitari and Ravarini (2009) in their study of content management systems. First, I am not working from a constructed definition of the packaged software product, and, second, I do not conceive the biography of CMS as primarily about about price and functionality, though these things might be relevant. Instead it is about the life of CMS as commodity, the thing understood as such by and in the market, but otherwise unspecified, and potentially "decentered".

Turning to the second research question, the material culture studies perspective makes a further significant methodological contribution with its two-level subject-object analytical framework, in which the object of study, as subject, reveals the things and persons around it. "[I]t is the things-in-motion that illuminate their human and social context" (Appadurai 1986a, p. 5). "Biographies of things can make salient what might otherwise remain obscure" (Kopytoff 1986, p. 67).

In this case, the biographical subject is CMS and *its* object is contract. But a comparable two-level analytical structure (even if not expressed as such) is used in IS research whenever researchers analyse the relationship between an IT artefact and its project or object of organizational transformation, if they then go on to draw conclusions about the nature of that project or object (see Miettinen and Virkkunen 2005). Applying this two-level subject-object analytical framework to this case, we would say that CMS potentially reveals something about contract. The second research question ("To what extent did the market failure relate to contract?") can be stated in the alternative: "Is there something in the nature of contract that eludes and confounds automation as 'envisioned' or 'understood' by CMS?"

I also specifically draw upon the example of Mol and Law's "anemia" discussed in section 4.1.2, analogizing contract to "anemia" – unlocatable and relatively unspecified – and suggesting that "regions" of contract can be mapped against adoption of CMS as an organizing technology. That is, I hypothesize that there is a "CMS region" of contract and a "non-CMS region" of contract (like "the Netherlands" and "Africa" of anemia), and take the view that mapping these regions to get an indication of those contracting contexts where CMS worked well and those where it worked less well will reveal something about contract.

4.3 Overview of research design; multiple sources and multiple methods

As noted in section 4.2.1, research design for the biography of software approach encompasses multiple sources at multiple levels, and multiple methods, as appropriate to the research question. For this study, I began with the motivating question: "What happened to contract management software?", and thereafter the research progressed through iterative cycles of "constant comparison" (Urquhart et al. 2010). These cycles incorporated data analysis to identify emerging themes as against the research literature, refinement of the research question, and planning for the next step in data collection applying a logic of extension toward construction of a corpus (Bauer and Aarts 2000). In the following section I describe this process in detail, and then, in sections 4.3.2, 4.3.3 and 4.3.4, I describe the empirical material by type of data.

4.3.1 From inside to outside: the iterative cycle of constant comparison and corpus construction

I first heard of contract management software in 2002, when a colleague and I were approached to write a book on "contract management" (not contract management software). For my work, I was to be paid by a contract management software vendor. The purpose of this book, as described to us, was to explain the concept of contract management and to describe good contract management. My initial research indicated that there was little written on "contract management" as such; the term "contract management" had historically been used for the most part by US government contractors to refer to the administration of government contracts. In 2002-2003, I conducted a set of interviews on contract management (including with Tim Cummins, the president and CEO of the IACCM), saw a demonstration ("demo") of the vendor's software, attended an IACCM European conference, and made a two-day site visit with my colleague to a customer of the vendor to discuss the implementation of contract management software for their procurement operation. But after our site visit we were unable to make contact again with the customer. Our book was written but did not find a publisher, and my colleague and I went on to other things.

Through the IACCM connection, I met other people who during the years 2003-2007 invited me to speak occasionally on the subject of contract management and contract automation. In 2007 IACCM conducted a CMS "market sizing" survey, which showed a significant shortfall in industry revenues from what had been predicted five years earlier by Gartner. This raised the question: What happened to contract management software? I had not followed the market but based on my own favourable impression from 2003 had assumed that it would become a successful mainstream software product.

I began my research in 2008 by carrying out a detailed analysis (including detailed coding) of vendor marketing material to understand how the vendors characterized their product and its benefits. I also conducted a second round of eighteen interviews in early 2008, this time focusing specifically on CMS and on other IT tools used in contracting (Appendix 4.1). Most of these interviews were arranged through IACCM contacts, and a number of them were with vendors or with CMS customers. One of my interviewees was the founder of a CMS vendor firm. But I also carried out several in-depth interviews, including one on-site, with the head of contracting for a UK public sector entity that was not a CMS customer. In this on-site interview the interviewee and I together filled out a detailed questionnaire regarding the portfolio of contracts he managed. In addition I conducted update interviews with several 2003 interviewees who were neither vendors nor CMS customers.

My analysis of the vendor marketing material indicated that CMS was based on assumptions that (1) the contract document is the source of contract information, and that such information can be represented as discrete datapoints, (2) contract management is principally a matter of internal control and standardization, and (3) a closed, process-oriented application can overcome organizational fragmentation to centralize control over contracting and deliver an enterprise view of contract. These assumptions were not consistent with research on contract (see section 3.2), and interview data cast doubt on their validity. For the next stage of research, I sought an in-depth look at CMS in order to understand better its internal scope of implementation as against an organization's portfolio of contracts and contracting activities.

One vendor introduced me to three customers willing to be the subject of case study or site visit observations. My initial research design for this study contemplated three comparative case studies of the same software in different organizations. But over the course of 2008-2009, I was able to carry out only one in-depth site visit – at a division of a very large health insurance company in the United States (described in section 5.2). I conducted two interviews with a second customer – a global consumer products company – at their headquarters in London, but was unable to arrange any follow-up. In the third case – a very large UK public sector entity – I was able to conduct an initial interview but despite willingness in principle on their side, scheduling difficulties (and no doubt the low priority given to my request) resulted in the follow-up visit being put off multiple times. I eventually stopped asking. Nevertheless, the interviews I was able to carry out indicated that the three implementations of the same CMS product were significantly different from one another (discussed in section 5.2.6). At the same time, through 2008 and 2009, I continued to conduct additional interviews, for a total of sixteen in this third round of interviews (see Appendix 4.1). Throughout the second and third round of interviews I was not committed to a particular hypothesis, nor had I adopted a particular theoretical lens.

By the summer of 2009 I concluded I would not be able to progress the case studies or site visits. In addition I had reached a preliminary point of "saturation" (Bauer and Aarts 2000), as interview material became repetitive and predictable, depending on the positioning of the interviewee. Vendors continued to recite the benefits of CMS, but acknowledged that the market was immature, and that many customers remained at the lower levels of a "maturity model" (see Figure 5.5), implementing only a contracts repository but none of CMS's more advanced features. Implementations were localized, and were difficult to achieve. I had assembled a catalogue of issues for CMS, and yet I did not feel the story was complete.

Interview data had suggested that there was a correspondence between types of contract and CMS adoption. To get a broader and more structured data set, I designed a survey to locate CMS in relation to the TCE model of governance discussed in Chapter 3. To do this I designed a matrix (Table 4.1) bringing together a number of the perspectives surveyed in Chapter 3, and hypothesized that the dimensions of contract organized in this matrix would correspond to CMS versus non-CMS "regions" of contract.

Contract attributes	***Market governance***	***Hierarchical or hybrid governance***
Scale (volume and standardization)	High	Low
Relational contract	Low	High
Performance easy to define	High	Low
Data discreteness (how easily reduced to and represented by discrete data)	High	Low
Implicit terms of contract	Assumed relatively low and/or well-understood	Variable, but unlikely to be well-defined
Interdependency of performance	Low	High
Risk and extended risk (risk or liability beyond the immediate counterparty, i.e. network risk)	Assumed relatively low and/or well-understood	May be significant and complex
Counterparty information sharing	Low	High

Table 4.1 Hypothesized contract attributes against market versus hierarchical or hybrid governance[24]

In addition, to find a new perspective, in 2009 I carried out the first of two detailed website reviews of five CMS vendors (the "five focus vendors" and four (now three, following a merger) leading analyst firms substantially involved in defining and tracking the market. I selected the five focus vendors 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

[24] Market transactions rank low in asset specifity and thus high in standardization. In the idealized market, key contract variables are few (e.g. price, quantity, date), and thus market transactions also rank low in relational context, performance (or breach) is easy to define, and the contract may easily be reduced to and represented by structured datapoints – a quality I call "data discreteness". In the hierarchical or hybrid model, asset specificity and relational context may be high. Performance may be more "in the eye of the beholder" and there may be more recourse to unstructured data – that is, bespoke, natural language contract terms captured in a contract document. This means "data discreteness" may be low. In a well-defined and sophisticated market, a large portion of contract content may be implicit, i.e. well-defined within the trading community though not reduced to writing in each contract. Implicit content may or may not be present but is unlikely to be well-defined in the hierarchical or hybrid model. In an idealized market transaction, interdependence of performance is low: The buyer pays a price against delivery. In the idealized market, risk is either low or assumed to be well-understood, whereas risk is potentially high but in any case likely to be less well-understood in the hierarchical or hybrid model. There is no ongoing need for information sharing with counterparties in market transactions, whereas in a hierarchical or hybrid governance situation there is likely to be an ongoing need for information sharing.

information is publicly available. Two (Selectica and Ariba) are public; i-Many, an early leader in the field, was public until the middle of 2009; and two (Emptoris and Upside) are privately owned. I also reviewed SEC filings for the three focus vendors that were public companies. SEC filings include a variety of data, including a full set of financial statements (balance sheet, income statement and statement of cash flows), a description of the company and its business, a description of the company's products, customers, markets and competitors, and management's discussion and analysis of financial results. Public companies in the United States are required to submit annual reports on Form 10-K and quarterly reports on Form 10-Q. In addition they are required to provide prompt disclosure of material events (such as mergers and acquisitions) on Form 8-K.

In the course of the SEC filings review, I revisited and reframed my initial encounter with CMS when I discovered that at the time of the customer site visit in 2003 the reference customer was in contractual partnership with the vendor to develop and market software. The contract that required the customer to engage in outreach and other marketing efforts was part of the public record, as was the ultimate failure of their joint software development initiative. Our book project had been a small (vanishingly small) part of the vendor's marketing program and budget. The archival review of the five focus vendors showed that I, and my interviewees, had been taking the artefact too much for granted. Contract management software is entirely recast when set in the context of the producing firms' highly distinct histories. It became clear that I needed to extend my analytical frame to consider the vendors, and that I needed the views of more people familiar with CMS but not associated with vendors. I looked to the survey to produce some additional "non-aligned" interview subjects.

The archival review of the five focus vendors also produced a shift in my understanding of the motivating question. I had been thinking about it in terms of figuring out what was "wrong" with CMS. Now I wanted to know: Where did CMS come from? Why did the market expect it would be successful? In other words, I adopted a market perspective, and became more interested in the arc of disappointed market expectations. The key themes from Pollock and Williams (2009a) became the supplier-user nexus (later generalized as the knowledge network), supply-side rhetoric (generalized as the organizing vision) and generification. Following leads from Pollock and Williams's book, I found that the theory of commoditization and the studies of markets from economic sociology provided a theoretical perspective that supported this extended analytical frame and restructured my data toward broader implications. In particular, from the theory of performativity in markets, my corpus construction incorporated a fourth theme, breakdown, which was not relevant in Pollock and Williams's biography of a successful packaged software product. This stream of research thus provided a source of potential insights as well as a target for "theoretical integration" (Urquhart et al. 2010); in other words, my data was now in dialogue with a richly theoretical body of research.

My survey was sent to IACCM members in the spring of 2010. Based on the survey, I was able to conduct an additional seven highly informative interviews with survey respondents in early 2011 – breaking out of the closed circle of vendor-related interviewees. I also successfully arranged an interview with a founder of one of the five focus vendors and with an authoritative analyst who has been following, and publishing on, the market since its inception. I updated my earlier interviews with the vendor firm that had been particularly helpful and with their customer who had hosted my 2009 site visit.

As a subscriber to marketing material from the vendors and the analysts and a member of IACCM, I received a flow of emails from roughly 2007 through early 2011 on contract management software, and I listened in on various marketing "webinars" (presentations over the internet). In 2009 I spoke at a CMS user conference (the vendor is not one of the five focus vendors), and I wrote an article for IACCM's newsletter. In 2010 I chaired a roundtable on contract automation at IACCM's EMEA conference. These activities kept me generally abreast of market developments. In 2011, I carried out an updated review of archival material, consisting of SEC filings and website material, for both the five focus vendors and three key analysts and an archival review of IACCM materials, including a review of newsletters going back to 2002. To further explore the role of the analysts, I studied a legal proceeding against one of the analysts, Gartner, in the United States.

The data defined the overall time frame covered by the study. The "biography" of CMS starts around 2000-2001; the relevant firms and the concept had their origin in the dot.com era. It was in 2002 that Gartner made a prediction of a $20 billion market by 2007; in the same year, my colleague and I were recruited to write our book on contract management. After 2008, Gartner terminated its "Marketscope" coverage of "contract management software" – indicating that it was no longer an emerging software market – but did not initiate the "Magic Quadrant" coverage Gartner provides to established software markets. By 2011, it had become relatively easy to trace the fragmentation of the CMS category and the evolution of product delivery platforms. So the overall time frame of this study runs from 2000 to early 2011, coincident with an arc of disappointed expectations and product and market realignment.

In this section I have explained how the inductive approach suggested by grounded theory and principles of corpus construction successively refined and sharpened the research questions against the research literature and suggested the next step in data collection. There was a process of serial revelation, as the project followed a path from "inside" to "outside", and in the end I reached a second point of closure or “saturation”, where the early findings dropped into a more comprehensive explanatory framework. In the course of the journey I discovered a closed circle of self-referentiality, which was by no means apparent to me in either 2002, when I was recruited into the circle, or in 2007, when I took up the question of why CMS had “failed”. As we will see in Chapters 6 and 7, this closed circle of self-referentiality became part of the story.

4.3.2 The interviews, including the site visit

As discussed in section 4.3.1, I carried out interviews in roughly four stages, with the first in 2002-2003, and the last in 2011. The interviews included two site visits, one in 2003 and one in 2009. The list of interviews is included in Appendix 4.1, which also indicates by code other features of the interviews, such as whether interviews were conducted in person or by telephone, were part of a site visit, or incorporated a demonstration of software. Of the 53 interviews in total, the composition as between vendors, customers and others is shown in Table 4.2.

The five focus vendors	7 interviews (covering 4 of the 5), including 2 of the 5 founders of the companies
Other software vendors, including vendors of CMS	9 interviews
Customers of five focus vendors	18 interviews
Others (non-customer user organizations, IACCM staff, analysts, consultants)	19 interviews
TOTAL	**53 interviews**

Table 4.2 Summary of interviews by market position

All interviews were conducted with the intent of obtaining information about CMS from expert informants, not from a perspective of sampling or for close coding of the precise words used. Many of the interviews were with experienced and senior people, with ten, twenty or more years in the field. These interviews deeply informed the historical dimension, providing a kind of oral history (cf. MacKenzie 2004). Nearly all of the people I spoke with had been specifically following the development of the CMS product and market for years.

Except as indicated, interviews were not recorded but instead I wrote them up shortly afterwards and (as noted) sent them to the interviewee for review. Except for the interviews in 2002-2003, I generally sent the interviewee a set of questions in advance, though these were used as talking points or a rough guide to encourage interviewees to tell me their own story and to share any insights they might wish to offer on the subject; i.e. they were semi-structured (cf. Fontana and

Frey 2000). The protocol for the second and third stage interviews (2008-2009) is included as Appendix 4.2.

4.3.3 The survey

In February and March 2010, the IACCM distributed the survey to the members of its Contract Management and Automation Communities of Interest (according to the IACCM, 4962 members in all). The survey was in two parts, and was sent out by email with SurveyMonkey (www. Surveymonkey.com) links. Appendices 4.3 and 4.4 show the questions asked in the survey. I had a very low response rate relative to the size of the mailing, with N roughly 100 or so. This perhaps supports the comment made by one person from IACCM that contract managers are not all that interested in contract automation. Statistics that show the profile of respondents are set out in Appendix 4.5.

As a method of data collection, online surveys provide a number of advantages but present some problems as well (Evans and Mathur 2005; Maronick 2009). They are fast, they accommodate question diversity and branching logic, they have global reach; on the other hand, they may be problematic in terms of representativeness and response rate. With respect to both representativeness and the low response rate, it is important to note that, as with the interviews, I did not treat the survey respondents as a representative sample of a larger population. Instead my principal goals for the survey were (1) to complement and corroborate (or not) other data with input from engaged informants in the CMS target market (see Chapter 6), (2) to trace associations between CMS adoption and other variables, and (3) to obtain additional interviews through a channel other than introductions. In other words, this is essentially a qualitative study that makes use of survey data within an overall logic of corpus construction to “saturation”. Still, I note that of those who responded roughly half (Part 2) or more (Part 1) provided email addresses, and of these a number of url addresses were of recognizable companies (e.g. IBM, Emerson, Chevron, Zurich, Rockwell, Hewlett Packard, CSC, British Petroleum, British Telecom, Thales, ConocoPhillips, Honeywell, Accenture). I also note that although the number of responses was low, it was on the same order of magnitude as what IACCM had achieved in their 2007 and 2009 market surveys.

I downloaded the SurveyMonkey data into the statistical program SPSS for analysis. After download, I went through a process of scrubbing the data for uncompleted surveys, obvious errors and anomalies, and duplicate responses. I ended up with useful data for 106 respondents to Part 1 (N=106), and with useful data for 86 respondents to Part 2 (N=86). In Part 2, seven (7) responses were from vendors, consultants or resellers into the CMS market, and I had structured the survey so that these “sell-side” respondents answered only a subset of questions relating to

CMS priorities, to compare to non-vendor priorities. One non-vendor respondent incorrectly categorized his response as from a vendor, so did not complete most of the non-vendor questions. This means that for most of Part 2 questions, N = 78. Of these non-vendor respondents, 29 who were using, implementing or considering CMS answered a further subset of questions. In other words, respondents to Part 2 consisted of 86 total respondents; 7 sell-side versus 79 (or 78) non-sell-side; and, of non-sell-side, 29 CMS users (or prospective users).

In both parts of the survey, the key dependent variable is adoption of CMS, whether from a pure-play[25] CMS vendor, from another software vendor (such as an ERP vendor), or built in-house. Respondents were asked to indicate their level of adoption of CMS, ranked into various categories (Appendix 4.6). Cross-tabulations against the level of CMS adoption were run against other questions in the survey and tested for statistical significance.[26] In addition to questions regarding the association of CMS to type of contract, the survey asked a number of questions about the history of CMS, features of CMS, priorities with respect to CMS and the procurement and implementation of CMS. Answers to these questions where relevant are noted in Chapter 5. As discussed above, respondents were asked whether they would be willing to be contacted for interviews, and this yielded a relatively small number of especially informative "round four" interviews.

4.3.4 Archival research

Archival materials reviewed for the vendors included press releases, web materials (such as product descriptions, "white papers" and customer case studies), and analyst and news reports, as well as, for the three public focus vendors, SEC filings. As noted above I carried out these archival reviews twice, once in the summer of 2009 and a second time in early 2011. From this review and to the extent data was available, I prepared tables of financial data; strategic transactions; sales and marketing expenses and research and development expenses; stock return comparisons; capital infusions; segment reporting; revenue classification; customers; product evolution; the company description over time; and mentions of IACCM and analysts in press releases.

The IACCM resource library was also a useful source for tracing the evolution of CMS. In particular, the IACCM ran CMS "market sizing surveys" in 2007 and 2009. In addition, I

[25] "Pure-play" refers to a vendor that offers or specializes in only a single type of software. In this case, pure-play vendors are those whose sole or principal product is CMS, as distinct from vendors who might offer CMS modules or capabilities within a more general ERP, ECM or other larger category offering.
[26] I have noted P values < .10 as suggesting an association, but only within the limited scope and ambition of the survey as outlined above. For a number of cross-tabulations, given the low N, I reduced through combination the number of categories for CMS adoption and other variables, and have noted where cells (up to 20%) in the cross-tabulations might have counts less than 5. (Agresti and Finlay 2009; Kuha 2009)

researched contract management software and the five focus vendors on the websites of the (now) three analyst firms, Gartner (including AMR), Forrester and Aberdeen. Appendix 4.7 is an indicative list of Gartner materials relating to CMS and five focus vendors. I also researched a United States federal case against Gartner (ZL Technologies vs. Gartner) by reading the court filings, and read materials from CMS and other software vendors, in addition to the five focus vendors.

There are two points to note regarding the archival research. The first is the instability of vendor website material.

> For some, the internet increasingly approximates the Foucauldian notion of the archive as the collection of all potential statements, constantly being transformed and recast [citation omitted]. While often seen as an extremely versatile depository of documents, facts and information, the internet constantly changes and transforms the information posted. (Geiger et al. 2010)

Vendor websites change all the time, and substantially at the point of new ownership, so, for example, some materials found in my first website review in 2009 were no longer available online in 2011. On the other hand, the SEC website is a government document repository, as is the electronic document access portal for the US federal courts, so these sources represent stable content. The IACCM has continued to offer an archive of its newsletters and library materials. However, only some analyst materials are available without charge, and the analysts have no obligation to maintain an archive of historical material.[27]

A second point relates to the dual role of much of the archival material in this study, which both records events in the life of CMS and constitutes primary data as communications of members of the knowledge network regarding the organizing vision and the category. For example, SEC filings provide investor disclosure as required by law but to some extent (particularly at the time of an IPO) are a selling document (or public relations document, see McKinstrey 1996; cf. Preston et al. 1996; Preston and Young 2000). They are filled with risk factors and other caveats to limit liability to investors, but they also enable management to set out their vision for the firm and to comment on results, strategy and plans for the future. In using SEC filings and vendor press releases as records of events in the life of CMS, I have for the most part taken these documents to represent management's good faith effort to communicate to investors and the general public in compliance with any legal requirements. That is, I assume they represent a kind of self-reporting, are reasonably accurate as reflections of management's understanding of

[27] When Campbell-Kelly tried to obtain industry reports from analysts such as IDC, Datapro and Forrester, he was told that they did not archive their reports for more than ten years, and that in any case the reports would not be made available (Campbell-Kelly 2007).

the business (or at least of how management wants to present the business), and sufficiently accurate for purposes of the arguments laid out in the dissertation.

4.4 Summary of methodology; developing a table of breakdown

To summarize, my methodology for this study is the biography of software approach (Pollock and Williams 2009a), which I have adapted and extended in several ways. I have adopted a particular epistemological and ontological position, Barad's (2003, 2007) agential realism, arguing that it is particularly appropriate here where the objects of study – packaged software and contract – are, as I have shown in Chapters 2 and 3, to a degree fluid, inchoate or indeterminate, potentially "decentered objects" (Law 2002).

To keep the biography of CMS in bounds and responsive to the motivating question, I followed a strategy informed by grounded theory (Urquhart et al. 2010) and shaped by principles of corpus construction (Bauer and Aarts 2000). Over the course of the research, this strategy turned the motivating question into two research questions, and structured corpus construction around four themes: the organizing vision, the knowledge network and generification from Pollock and Williams (2009a) and breakdown.

Breakdown, as I have defined it to mean a failure of expectations associated with a performative assumption or operation, is used in this study as an analytical device, and, to record the evidence of breakdown as it appears in the empirical material, I work with a table of breakdown in three columns: (1) breakdown observed; (2) breakdown of what?; and (3) revealing what?. In the first column I collect the evidence of the various problems and issues that CMS seems to have encountered. The second column groups these into categories, not in terms of, say, software functionalities or the like, but instead in relation to expectations that have not been met – the business model for packaged software, the organizing vision for CMS, the category as the market correlate to the organizing vision, and lastly the market expectations for CMS. The third column is reserved for the performative assumptions and operations revealed by the breakdown.

The table of breakdown that I use to organize and present my data and analysis is of course only that – a tool for organization and presentation. But I found a number of advantages in using this tool. Generally, the table first disciplines and then illustrates corpus construction and analysis. More particularly, it operationalizes the notion that breakdown is revelatory, setting forth the evidence of breakdown, specifying what broke down, and showing what performative operations and assumptions were (in my analysis) revealed. Though this material could be set out in text, or in terms of a coding scheme, and without reference to performativity or “breakdown”, I am working within the performativity framework along a number of related but distinct lines: performativity in markets as developed by Callon, MacKenzie and others, classification performativity as suggested by Butler and (obliquely) by Bowker and Star, and, as I will discuss, Austin’s original performativity. The table of breakdown is a way of applying this theoretical orientation explicitly in data analysis. Further, the rows of the table – as they emerged from the data – generate a sense or story of interactions across different levels of commoditization. This informs my biography of CMS as a commodity, leading directly to an insight that I have theorized as a “substitution of performance” (section 7.3). Lastly, the sequential building of the table from Chapter 5 to Chapter 7 visually demonstrates the explanatory power achieved by expanding the scope of data collection to include the analysts and the vendors.

In Chapter 5, I present the data up to the first point of saturation, develop a biography of CMS as an organizational technology, and create the initial version of the table of breakdown, using only the first two columns. In Chapter 6, to explore the market perspective, I expand the analytical frame to include the analysts and the vendor firms. Based on this additional data, I develop a second, subsuming biography of CMS as commodity, and fill out the two-column table with additional evidence of breakdown. In my analysis in Chapter 7, I bring the data into closer dialogue with the research literature in response to the research questions and fill out the third column of the table. This presentation thus closely follows the unfolding of the overall project as discussed in section 4.3.1 and illustrates the additional explanatory power brought to bear by applying the market perspective.

Chapter 5 Empirical material: a biography of CMS as an organizing technology for contract

In this chapter, I draw on interview (including site visit) and survey data, vendor selling material and IACCM archival material to develop a biography of CMS as an organizing technology for contract, tracing the arc of disappointed expectations and building a catalog of breakdown against the organizing vision for CMS, the CMS category, and the business model for packaged software. In this version of the biography of CMS, CMS has precedents, an origin, and a name. It is a technological artefact with certain capabilities, brought to market with an organizing vision, sold by vendors, considered by prospective customers, implemented by user organizations, and remarked upon by industry observers. The business model for packaged software outlined an ideal career path for CMS, but CMS did not follow this path and accumulated a record of shortcomings. By the end of the story, "CMS" appears to be more than one technological artefact; as we will see, through the telling of the biography, the biographical subject fractures.

In section 5.1 I explain why CMS seemed promising, by describing predecessor technologies (section 5.1.1), the founding of the IACCM and the idea of contract management (section 5.1.2), and the organizing vision for CMS, as a natural progression in the application of ICT to contracting (section 5.1.3). In section 5.2, to compare CMS in a successful implementation against the organizing vision, I present data from a 2009 site visit, describing the reference customer (section 5.2.1), procurement and implementation (section 5.2.2), how CMS was used (section 5.2.3), and knowledge production capabilities of CMS (searches, reports and queries) (section 5.2.4). Two years later, I followed up the site visit to see what had happened with CMS in the interim (section 5.2.5). In section 5.2.6 I compare this implementation to the organizing vision for CMS and to two other implementations of the same software. In section 5.3, I briefly describe the role of the IACCM, a key participant in the knowledge network, in the biography of CMS.

In section 5.4 I discuss evidence of how CMS broke down. In terms of the business model for packaged software, the evidence points to a breakdown in generification, that is, a failure to make CMS into a product that would easily work for different types of contracts and "travel" across industry verticals (section 5.4.1). With respect to the organizing vision, CMS did not "enclose" contracting (section 5.4.2), generally failed to produce contracting knowledge (section 5.4.3), and did not work equally well for all contracting environments but was associated with "algorithmic" contracting (section 5.4.4). Lastly, a lack of coherence in the CMS concept pointed toward a breakdown in the CMS category (section 5.4.5). I conclude the chapter with a brief biography of CMS as an organizing technology for contract, and the initial table of breakdown (section 5.5).

5.1 Why CMS seemed promising: the organizing vision for CMS

5.1.1 Predecessor technologies

From a technology standpoint, contracting has evolved alongside other document-centric office work. In the 1970s and 1980s, contract managers (or their secretaries) used typewriters or electric and electronic (early word-processing) equivalents, paper, carbon paper, “white-out”, photocopy machines, and physical cutting and pasting “like in kindergarten”. Some organizations used typed or printed standard forms or templates to enforce or encourage standardization of contract terms. Traditionally, a key issue in any contracting context has been whose “paper” would be used. That is, the contract would typically be based on one party’s standard form, and that party would be in charge of drafting revisions. Negotiations were carried out in meetings or over the phone, and revised documents sent around by the drafting party. Proofreaders manually read documents against one another to find and mark changes. Contracts were exchanged during negotiations through physical distributions by mail or courier and were signed in duplicate original paper copies. Storage and retrieval systems consisted of folders in file cabinets; for sensitive contracts, storage of contracts might be in “vaults” – secure cabinets or filing rooms with check-in and check-out procedures.

With electronic word processing and email, the contract document environment speeded up but also to a degree became uncontrolled. It became easy to create a new contract using an old contract document that might be a poor model, or to use the wrong template, or to electronically cut and paste outdated or inappropriate language. Any party could make changes, and many drafts might be sent around for review. The “final” version of the contract was often left unprotected in the parties’ electronic records (not “locked down”), and might be inadvertently tampered with; or the electronic version might not reflect last minute handwritten changes. It was even the case that contracts were stored on personal computers and personal storage devices rather than on the firm network.

At the same time, IT held out the promise of not only more efficient contracting but improved control and better contract information, taking advantage of the electronic documents environment (word processing capabilities together with email) in conjunction with a contracts database or spreadsheet. Lawyers and contract managers also experimented with document automation tools, which could build a document based on filling in a form or working through a “wizard”.

For example, one contracting group at a global telecommunications company used Lotus Notes in a desktop application linked to a database that included a contract summary, some data fields and the contract document. In the late 1990s, they took up a more ambitious bespoke project, also built on Lotus Notes and costing millions of dollars. It included bid functionality, automatic document generation, a negotiation platform, a contracts repository and a contract administration module, with alerts and a milestone checkoff. But this system was not mandatory across the firm, data entry was burdensome, some people resisted the heightened visibility, and there was no integration with the pre-existing “legacy” system. The system fell into disuse. Shortly afterwards, the company took up an ERP project, and in the course of that project a basic contracts database with about twenty items of metadata was constructed. But there were no controls imposed on filling in the questionnaire for the metadata, so the database was not particularly reliable and therefore not too useful. It too was abandoned.

Such ad hoc efforts often did not take root. Initiatives would lapse when their proponents left the organization. In addition, the projects turned out to be more difficult than originally envisioned in terms of managing access, defining metadata fields, and coding contracts. To summarize, during the 1990s, as contracting professionals became familiar with the electronic documents environment and databases, they pursued ad hoc and often short-lived strategies based on the then-current versions of office IT. There was a sense that more could usefully be done with the right IT tools if they were available.

5.1.2 The founding of the IACCM and the idea of contract management

Around the same time, there was a growing focus on contract management as an organizational competence and as a profession. Contract management historically referred to making sure that complex contracts – mostly in the government contracts area – were carried out in accordance with their terms. Government agencies and government contractors had “contract managers” in charge of ticking the boxes of contract compliance and dealing with contract changes and problems. Over time, the skills and discipline associated with government contracting began to appear in commercial contracting contexts, which had historically been more informal.

In 1999, the IACCM (International Association for Contract and Commercial Management, www.iaccm.com) was founded with the support of British Telecom, Hewlett-Packard, IBM, Lucent Technologies, Marconi Communications, and Siemens. Tim Cummins, a former senior contracting executive with IBM, has been the president and CEO of IACCM since it was founded. The IACCM seeks to professionalize the role of the contract manager and to develop contract management as a key organizational function and capability worthy of recognition and support. It runs annual conferences (one each for the Americas, Europe and EMEA) and has developed individual training and certification courses as well as organizational benchmarking programs. As of 2011, IACCM claimed membership of over 20,000 individuals from 8724 organization in 128 countries (44% Americas, 39% EMEA, 15% Asia-Pacific), including about half of the Global 500. IACCM has expanded beyond the IT and telecommunications industries to include the pharmaceutical, aerospace, professional services, outsourcing and other industries. This reflects a growing recognition that the stakes in global contracting are high, and that contracting professionals need training and support. From a contract management perspective, contracting in many organizations is less than optimal – inefficient, opaque, and fragmented across multiple administrative and business functions. The lack of an organizing technology for contract suggested an opportunity for software vendors.

5.1.3 The organizing vision: automating the contract lifecycle across the enterprise

Starting in about 2000-2001, software vendors began to market contract management software as an organizing technology for contract. While ERP systems managed the structured data for sales and purchases (e.g. delivery of goods), and CRM systems provided a place to store information about customers, they did not provide an organizing technology for the contracting process and contract documents. CMS was positioned to fill the gap between CRM and ERP, linking knowledge about counterparties with contract terms and transactional data.

Contract management software provides workflow, automated document assembly, and a document repository, together with alerts, reporting and analytics capabilities, and was designed to support the entire contract lifecycle.

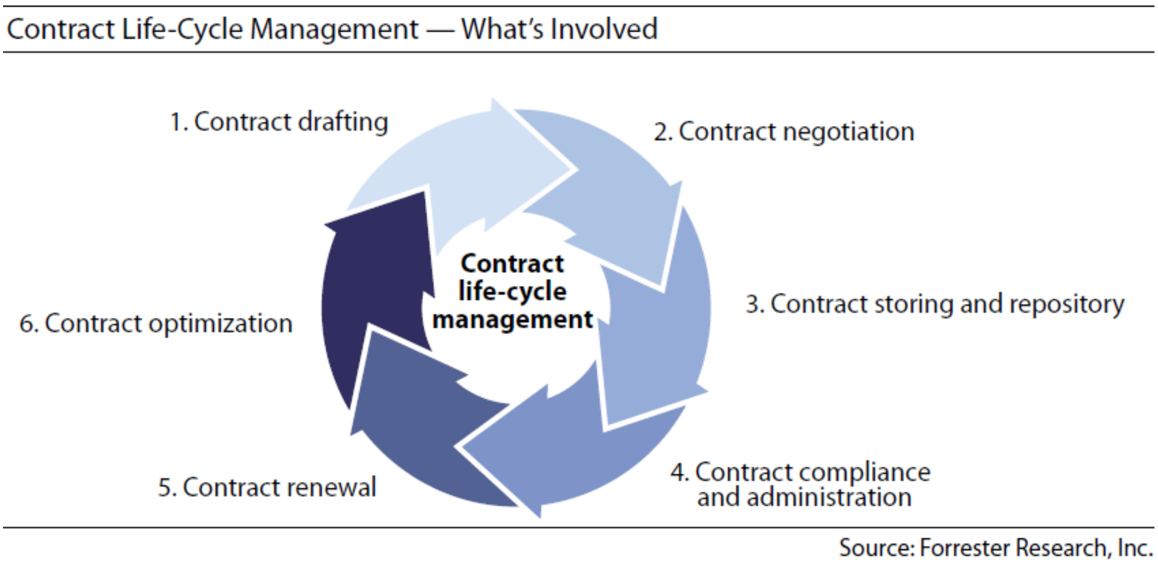


Figure 5.1 The contract lifecycle as defined by Forrester Research (Forrester Research Inc. 2008; with permission)

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 IT systems internally and possibly external (counterparty) systems as well.

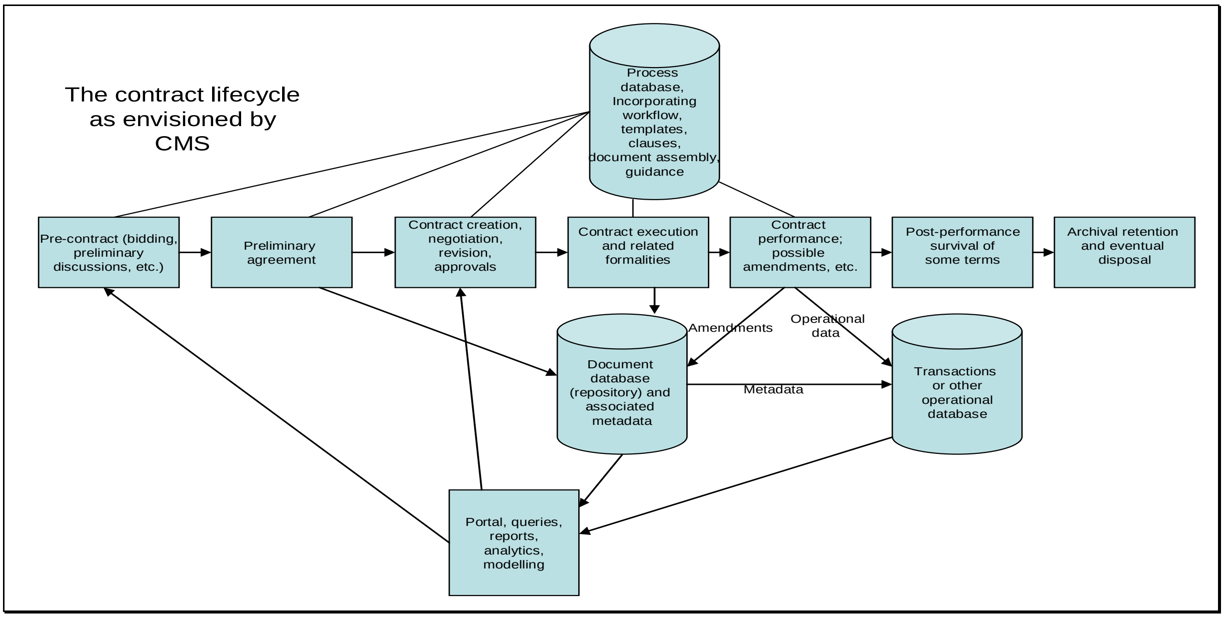


Figure 5.2 The contract lifecycle as envisioned by CMS (adapted from vendor materials and Saxena 2008)

This model of the automated contract lifecycle across the enterprise is continuous, closed and tightly coupled, with a single flow of key datapoints. Key dates (e.g. automatic renewal dates) can be automatically calendared for action; volume discounts and rebates can be monitored. Matching buy-side against sell-side (e.g. to manage warranties) or the "flowdowns" from main contracts to subcontracts becomes easier. The organization can map contract terms across its portfolio of contracts, spot trends or potential risks as they are developing. and manage the overall relationship with counterparties. With portal or query capabilities, contracting professionals can see what their colleagues are doing, find relevant precedents and in general be more informed about market conditions, trends, and customer requirements.

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 (Appendix 5.1). The anticipated benefits most commonly mentioned by interviewees are summarized in Table 5.1.

Anticipated benefits of CMS
Efficiency – including headcount reduction, ability of staff to handle more contracts, faster "cycle time" in parts of the contracting process, faster production of documents, and reduced need to call upon lawyers
Centralized control – through standardization of contract documents and rules-based approval processes (workflow)
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 (contract data flowing from and to other systems)
Data-based contracting process improvements, including: alerts (notices and renewals), discounts and rebates, clause level management of contracts in bulk, and special contracting needs, such as monitoring "underdelivery" against annual contracts or supporting contract clause reviews by regulators
Rapid integration in the M&A (merger and acquisition) context
Revenue recognition benefits

Table 5.1 Anticipated benefits of CMS based on interview data

Principally, CMS promised efficiency and control, automating the contract lifecycle as a kind of production function:

> Contracting starts with an opportunity (sales function) to a quote, to a contract (in Word), to an order, to an invoice and shipping. *It's like an assembly line.* (emphasis added) (user of CMS module in an ERP system, 2008)
>
> Besides software, an effective contract management system also has process and people in place, whether internal or provided as part of the solution, to perform the system implementation and management, perform contract negotiations, and maintain the overall system, including process modifications, clause library management and data entry. (Ariba, *Protecting the Single Source of Truth: Effective Contract Management as a Core Business Strategy*, 2007)

In addition to efficiency and control, CMS promised "visibility" into contracting, including a "holistic" view of contract management that would supplement financial accounting.

> Risk-aware, performance-driven organizations understand the immediate value that comes from using CM technologies to improve product and service availability, reduce

costs, and lower risks through a more holistic view of CM that spans the balance sheet and income statement. (AMR analyst Mickey North Rizza 2008)

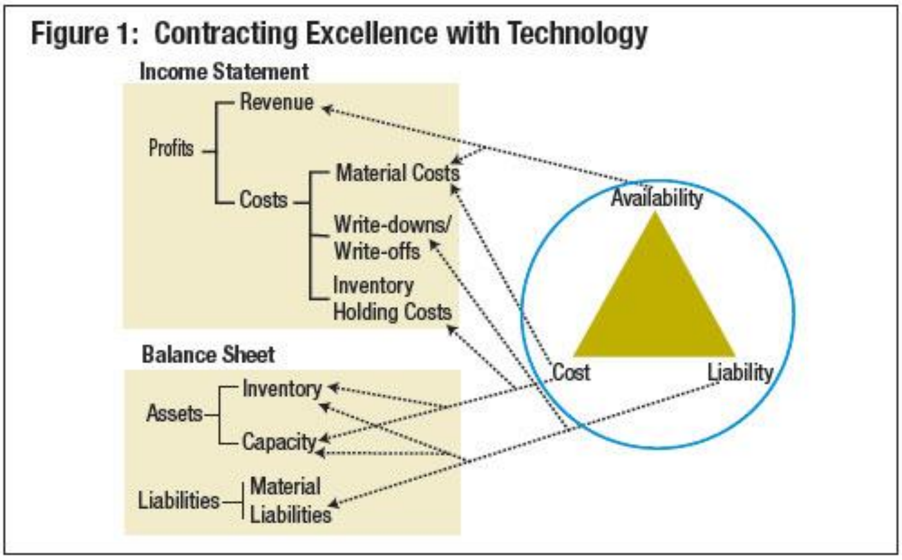


Figure 5.3 Linking contract to the income statement and the balance sheet, from North Rizza (2008; with permission of Gartner Inc.; see footnote 2)

Different groups within organizations had different priorities for CMS, but some contract managers looked to CMS to product contracting knowledge:

> The finance manager wanted the CM solution to be efficient, to be effective but mostly to reduce headcount. The director of global contracting (reporting to the finance manager) wanted to use the system to reengineer work processes, to segment work by expertise required, to use offshoring in India for some work and to work the time zones. He also believed it would make the contracting function more effective by providing a portfolio view. He wanted it in order to "understand what you are doing, and not on a deal-by-deal basis", but instead by e.g. country, product group or counterparty. He also felt it would permit a kind of gap analysis between how the company thought it was positioning itself with its contract terms and the reality of what it was agreeing. It would in his view support learning and knowledge management, moving away from everyone using their own personal hard disks, and creating a "corporate capability". (former director of global contracting, global telecommunications company, 2008)

To summarize the story thus far, an opportunity developed to organize ICT in support of contracting, integrating electronic document and database capabilities in a natural evolution of contracting technology. Vendors responded with contract management software, which filled a process and data gap between ERP and CRM, neither of which served as an "internal coordination form" or organizing technology for contracting. The organizing vision for CMS, creating an expectation of how CMS would transform contracting and contract management, was to automate the contracting lifecycle across the enterprise as a closed, continuous production function. While efficiency and control were the most important benefits associated with CMS, CMS also promised better contracting knowledge. With its design based on the generic contract lifecycle, CMS would work for all types of contracts, for all businesses in any industry; in other words it was intended to be "fluid", technologically appropriate across diverse settings. In the next section I provide an example of how CMS worked in successful implementation, to compare an instance of CMS against the organizing vision.

5.2 How CMS compared to the organizing vision in a successful implementation

5.2.1 The reference customer

In March 2009 I visited a customer reference site for one of the five focus vendors. This customer was a subsidiary (HealthSub) of one of the largest health insurance companies in the United States (HealthCo). HealthSub considered its business as innovative and offered customized packages of services to meet particular customer needs. The contract management group for HealthSub (CMGroup) was responsible for documenting and managing all of the contracts for the business unit. The group head had been in contracting for nearly two decades, starting in government subcontracting. His early experience with IT support for contracting was with litigation support case management tools, document databases developed for lawyers to help them manage documents in major litigations – a reminder that in terms of document storage and retrieval CMS did not offer anything particularly new or distinguishable from other products on the market.

The CMGroup consisted of a team of four or five people responsible for signing up about 3,000 contracts a year amounting to $1-2 billion in contract value. Part of CMGroup's mission was to help the sales force turn sales opportunities into contracts, but the group's portfolio of contracts also included buy-side agreements (agreements with providers), agreements with associated data handling providers under HIPAA (the Health Information Portability Accountability Act) and non-disclosure agreements (NDAs). The contract portfolio was a mix of short and relatively standard contracts and more detailed highly negotiated agreements, on both sell-side and buy-side.

5.2.2 Procurement and implementation

The procurement process for CMGroup's CMS system spanned two or three years, taking far longer than implementation. Vendor selection was politically charged, because there was another CMS product already implemented and running in another part of HealthCo. This other CMS product enjoyed a lot of internal support, including from the IT department. In the view of CMGroup, while the other solution might work for a high volume of standard contracts (e.g. individual doctor contracts), it was not a good fit for HealthSub's varied and innovative business. Nevertheless, CMGroup tried at first to use the other CMS product. They identified four major problems. First, they found the system tended to crash when they re-imported documents that had been exported for negotiation and revision. Second, the system had no ability to create ad hoc reports. Third, the system did not have a key word search capability. Lastly, and most critically, the vendor could not offer any support for getting the "legacy" contracts (contracts already in place) into the system in the first place. This initial step toward building a contracts repository (which would probably be set alongside an existing documents or records management system of some sort) was a major hurdle for CMS implementation generally.

After the trial period with the incumbent vendor ended, CMGroup succeeded in getting their favoured vendor approved. The selected vendor arranged for a subcontractor to code the legacy contracts for the initial load into the system of over 16,000 documents in 4 weeks (two years later there were 20,000 contracts in the system). "All the other vendors said 'I'll give you the spreadsheet, you fill it in.'" CMGroup had calculated that it would take two full time employees three years to populate a spreadsheet for their 16,000 legacy contracts – something they decided that was not feasible. To hand over the contracts for loading, the team had to put the contracts, which they had already scanned in a long-term project, into folders. The folder structure created the top level categories (template, organizational unit and contract type). The process was greatly expedited through the benefit of a long-standing file-naming convention that made the sort much easier. All that the subcontractor employees had to read was the party name and the contract date for an initial load with about five data fields, the rest to be filled in "on the fly" (i.e. in the ordinary course) later.

CMGroup chose a hosted solution (the CMS system was located on the vendor's servers, accessed through the internet) in part to minimize the ongoing involvement of HealthCo's IT department, which was not perceived as viewing contract management as an IT priority. As a hosted solution, the solution was available to users remotely from anywhere using a regular internet connection. In fact, the team found it faster running the application from home, and not via the enterprise network, due to bandwidth limitations.

The initial implementation in 2007 took about 11 weeks. By 2009 the solution had been through phased roll-outs to cover all HealthSub contracting. One group within HealthSub was using CMS to store and manage template-based documents other than contracts. In other words, the functionality of CMS supported other document-based work and processes, pointing out the versatility, but also the lack of distinctiveness, of CMS.

5.2.3 How CMS was used

Day to day, the CMGroup team leader was the principal liaison with the vendor support staff. The vendor was viewed as flexible and responsive, and relations with the vendor were very good, particularly in comparison to relations with the internal IT staff. The team leader attended the vendor's annual user conference and found it very useful. CMGroup was willing to serve as a reference site for the vendor and to participate in webinars with the vendor, where the team leader was willing to quantify the efficiency benefits and cost savings their group had achieved with CMS.

Indeed CMGroup users reported many benefits associated with CMS. Their CMS system gave them a place to store the definitive versions of their templates; before they could not be certain that they had the most recent version. They used the document automation feature to produce contracts much more rapidly; a task that might have taken 15-30 minutes before took only ten minutes using their CMS system. "Time spent drafting is reduced, and errors are reduced, from using the wrong language essentially." The organized collection of contract documents with data like "last amended date" was helpful in managing changes in contract terms that might be required for hundreds of agreements affected by a change in regulations. When rates were changed on an annual basis, dozens of contracts – with different entities in different states – were affected, and this was relatively easy to manage in the CMS system.

[Image removed as copyright is owned by Upside.]

Figure 5.4 An example of a "dashboard" from Upside's entry level on-demand product

Each user had a “dashboard” including a task list (see Figure 5.4 for an example of a “dashboard” from another product). On the day I visited, the team leader had 129 active items in his task list. Another member of the team was managing about 200 active files. From the dashboard, users could create and edit templates, manage language across templates, search for contracts, launch a new contract, update contract data, upload contracts, and create and request reports. To build a template, the user did a cut-and-paste from Word and selected variables from a pick-list pre-defined by the vendor. Users agreed that the list was too long and not always on point, but with time the user could find or adapt what she or he needed. There was no way to delete old templates, so these were marked “DO NOT USE”.

Contract creation and all of the interaction with the document database was through an interface called a header. There was a dropdown for selecting among existing counterparties with their addresses. But after initial contract creation, the database was not interactive with the document. That is, the database did not take in any changes from the document itself, as it might be revised over the course of negotiation. “It’s a one time deal.” This meant that coding of documents – tagging them with metadata for the repository – was a post-hoc, manual exercise. There was no flow-through of data.

After the team produced a contract using the contract creation tool, the draft document left the CMS system, exported by email or saved to a hard drive. CMGroup used a shared drive, set up in folders by counterparty, as the working drive for the negotiation period, a “housing unit for drafts”. Changes were not always properly redlined in documents returned by counterparties during the negotiation period. Although there was a check-in and check-out capability in the CMS system to catch changes made by the other side in an exchange of documents, the staff did not rely on this tool but used a separate redlining tool (Deltaview from Workshare) to identify changes the other side may have made. In other words, the contracting process, even within a CMS environment, was not closed and continuous; there were numerous offline steps.

Agreements were executed (signed) manually, because “wet signatures” were still required for revenue recognition. After an agreement was executed, the team scanned it into a static pdf format and then did a further conversion of the pdf into OCR (optical character recognition) format to permit full text search. Both documents were loaded into the CMS repository, the first as a “picture” of the executed contract, and the second to permit searching. The CMS vendor had tried to convince CMGroup that uploading the final Word document was sufficient but the team were of the view that “90% of our drafts, of our saved Word documents, aren’t final drafts”. Once again, there was a break in the CMS process, apparently not anticipated by the vendor.

In addition, executed contracts were loaded into Sharepoint (a Microsoft document management and collaboration platform that stores and manages access to documents). There were about 300 subscribers to the contracts library in Sharepoint, including the finance department and the sales team. By allowing this access, CMGroup could reduce the calls and emails with requests for information about contracts. But the Sharepoint collection was not marked to indicate the current status of contracts; once posted the contracts were never removed. So CMS did not become the generally accessible contracts repository for the enterprise, and the duplicating Sharepoint collection was accessible but not authoritative.

For handling amendments, CMGroup came up with their own use of the CMS functions. The CMS tool for amendments out-of-the-box (as provided by the vendor) did not work for them because, perhaps generalizing from another contracting environment, it made too many assumptions about how amendments were documented and handled. This was an example of a design feature carried over from another context that did not work for CMGroup.

CMGroup acknowledged that matching customers to their affiliated corporate groups was an important but difficult contract information problem that was not addressed in either the CMS system or the separate CRM system. In fact, they said, data problems were pervasive in the CRM system, in part because the sales team did not like it, and relied on administrative staff to enter information.

> They [track] by [sales] opportunity so it's not even tracked by customer. So they may have ten opportunities with [XCo] – you get ten records for [XCo], four of them might be with a division of [XCo] and one with the mother company of [XCo]. So you get ten records of opportunities in the CRM, where there may be only one contract tied to maybe one of those opportunities, so it's very difficult, very difficult. … when the sales person says, 'this is the opportunity,' what is heard by the account manager might be a little bit different, but that's what gets entered in the system, so you've already got a gap day one.

Discussion about the sales team's use of CRM revealed a more fundamental issue for CMGroup and their CMS system, arising from how the sales group worked to place HeathSub's products with customers, and how HealthSub's operations group made sure promised services were delivered.

> One thing about our business in and of itself it it's highly customisable, so we don't sell anything that's standard. You won't find an exact same solution for one customer to the next, so there's already from day one that you sell something – a lot of times the salesperson doesn't even know what the customer bought, and the customer a lot of times may not know either, so when you try to put that in a contract, oh boy, you end up with a lot of time spent just figuring out what was sold and what was bought.

HealthSub's sales team did not interact with the CMS system. Instead they sent the proposed contract terms to CMGroup by email with document called a "product form". This product form was generated and used by HealthSub's operations group to manage the delivery of services to HealthSub customers. The product form was described as dead, inert, not linked to a database. CMGroup viewed the product form as causing some problems for them, but they did not feel it was within their power to challenge its use or the practices of the sales team and operations group that were organized around the product form. This was because HealthSub sourced their services in a modular fashion but the sales team needed to offer customers what looked like integrated packages. The operations group's product form underpinned this very dynamic process by bridging the gap between sales and contract performance. CMGroup speculated that this might explain the complexity of the product form and the difficulty in stabilizing it sufficiently to reduce it to structured data and manage it within a database environment where it might, for example, support the production of contract documents. "And this is one of the reasons why the operations group took over the form because they were having trouble then operationalising this whole thing. Because literally the terms kept changing even as they were already implementing part of it."

> Interviewee: The customer says, "Well I think the salesperson was selling me this and how come I don't see this in your deliverable." "Oh, ok, well I'll give that to you," not knowing, not fully understanding the financial and the margin implications, how they're making agreements that are not in the contract but they're operationalising the verbal agreements they made for the customer. Comes time to collect revenue and "Why aren't we getting paid for these three things you turned on? They're not in the contract…" "Well we gave them to the customer because they asked for it." "Did you talk to anybody else about that?" "Well they said the salesman gave it to them."
>
> Q: In that model you have sales and then you have the operations group both trying to make the customer happy but contracting has been left out of the picture.
>
> Interviewee: And finance.

In other words, the "product form" and ongoing interactions between the sales teams and the operations team even after contract execution were essential elements of contract management for HealthSub but effectively bypassed CMGroup and their CMS system.

5.2.4 Knowledge production: searches, reports and queries

Although the vendor had been selected in large part because of its ability to help build the contracts repository, the result was not in all respects ideal. CMGroup felt that the industry generally, including their CMS vendor, did not provide a sufficiently robust text searching capability ("they're not perfect, they're not your Google"), but their team wanted to be ready with the OCR documents in the repository when the search tool was improved. Because the text search capability was not especially strong, CMGroup was dependent on their system's query and reporting capabilities based on the tagging of contracts with contract metadata. As described above, legacy contracts came into the system with only about five data fields tagged for each document. But on an ongoing basis the group manually tagged each contract with between ten and fifteen datapoints, including party name, dates (start, end, renewal), type of contract, contract manager name, business unit, business description, and a free text or comment field.

CMGroup had paid the vendor to create three user-defined fields (UDFs) important to their business. "Clean request" and"initial draft sent" were used to indicate how quickly their group responded to sales opportunities. "Initial term" generated renewal alerts on a scaled basis depending on the duration of the contract. However, there were other important data fields that were put into the comment field of the CMS database. "Affiliate data wall" marked those contracts that require segregation of data to make sure HealthCo (likely a competitor of HealthSub's contract counterparty) could not get access to it; this provision was worded in many different ways, and so could not be identified through key word search. CMGroup also needed to track contract provisions requiring data to be kept in the United States. CMGroup was able to run SQL queries on the comment field to produce ad hoc reports on these and other provisions. In this way CMS provided an important ability to track and report on a number of key contract terms important to HealthSub's business, and brought a major efficiency improvement over manual searching and reporting.

Still, the search and report capabilities reflected limitations in the system. Though these could be fixed through customization, there was a cost. For example, the team noted that the system did not have an "abandoned" status for contracts that did not go to completion, and this made it harder to work with the reports. The team leader said that at a recent user conference a participant brought this issue up, and half of the users put up their hands to indicate it was something they would like fixed. Of course an additional UDF for status could be added by the vendor, for a fee. CMGroup was looking forward to a new version of the software which would take user-defined fields directly into the underlying database without additional vendor time and charges.

The metadata tagging was also constrained by practical considerations. The metadata fields were carefully selected and managed by the team leader, who effectively acted as the data manager for the system. One member of the team who used to manage an Access database for some of the contracts felt that the CMS system was not as flexible and did not capture as much as his old custom database in Access. That database had a hundred or so fields, but many were not filled in because they did not apply to all types of contracts, or (as remarked by the team leader) because the data entry had simply not been done for whatever reason. The team leader felt that most of those fields were not that valuable, that the "return of value on those fields is so small. When we did implement [the CMS system] we cut all that fat out of it. We didn't need it. Nobody wanted that information or needed it." So the team leader had to balance the value of contract metadata against the work required to define and manage it and the ongoing work of manual tagging.

This manual tagging was done by the contract managers in CMGroup themselves, so they did not experience data quality as a problem. There was no need to have data analysis (e.g. volume discounts) apply across multiple contracts, so data tags (contract metadata) related to single contracts only. The reporting capabilities of CMS ran off the contract metadata. This ad hoc reporting capability of the CMS system, based on SQL, had been one of the important features in vendor selection; the team did not have to engage (and pay) their own IT department to build reports for them. Management of contract renewal dates was particularly important; the renewal process started at different times prior to expiry, depending on contract term as logged in CMS. Reports run out of CMS were also used to manage the work of the group by monitoring contract status, turnaround time and workload. This information helped CMGroup justify requests for new hires. In sum, CMS reporting capabilities did directly address some key contract management issues, such as contract renewals and contract processing workload and throughput.

However, as a standalone system, CMS produced standalone reports; there was no data integration horizontally with, for example, finance. CMGroup team members said that when finance called for periodic reports on sales activity, the finance executives ended up with three different reports, one on pricing, one on products, and one on contracts. CMGroup did not own the pricing information, which was in finance, or the product information: "So they're essentially getting like 3 data dumps and trying to match the keys together to get it to all reconcile." There was no data integration with other systems, and CMS did not generate an enterprise view of contract.

The business sponsor thought that an enterprise view of contract would be very hard to generate because of the need to agree on common field definitions among all the different functions and business units. Identifying counterparties by affiliated corporate group was something he considered a business intelligence problem, not a contract management issue. In general, he acknowledged that it would be desirable to be able to do more with contract information, but he believed that they had to start with the basics.

5.2.5 Two years on

At the time the CMGroup team leader joined HealthSub, there was no IT support for contracting, but by 2009 he felt that his group had become a leader in contract management within HealthCo, in large part due to their successful adoption of CMS. Over the following two years, CMGroup and the vendor continued to improve and expand the CMS system. The vendor built a contracts portal for HealthSub, enabling the broader user community to create some simple contracts, such as standard non-disclosure agreements, on their own. This "contracts on demand" feature was part of a move to a self-serve model. The query and ad hoc reporting tool was improved and made available to users outside CMGroup. Email integration had advanced for both outbound and inbound emails, and the team stored email approvals in CMS, not paper approvals. However, in terms of previously outstanding issues, redlining processes were still outside the CMS system, and the "product form" was still in use as before.

CMGroup had created a UDF checkbox for each of the most common information requests from business users – data-sharing restrictions, diversity requirements, and offshoring restrictions – and used the comment field in the database to store the associated contract provisions. The new reporting tool was then able to report out all the contracts that had the requested items together with the actual text. This helped the legal department and operations group with their compliance and strategic decision-making about these issues.

The team leader had also expanded his use of volume data to track staffing levels and, as appropriate, request additional staff. Despite all of the improvements in the CMS product, the software costs for CMS over the period had remained flat. The competing CMS product continued to be used in HealthCo, but other areas of HealthCo had started to use the same CMS product as CMGroup; by his team's example the CMGroup team leader felt he had expanded the vendor presence within HealthCo.

5.2.6 Summary: CMS in this implementation in comparison to the organizing vision and in comparison to two other implementations

Notwithstanding the various minor problems CMGroup encountered in working with CMS, the team leader firmly believed that the team would never be able to manage their workload without CMS. Among other things, it provided the group with a shared workspace and enabled the team members to cover queries and fill in for others as necessary. Other stakeholders also appreciated the system. For the business sponsor, CMS was principally a management and control system. He saw their business as in the nature of a subscription business, and a major benefit of CMS was its generation of renewal date alerts to the sales force. Another purpose of the system in his view was to identify and eliminate process bottlenecks. The lawyers appreciated CMS as a way to promote consistency in contract terms.

This customer success story demonstrates many of the promised benefits of CMS: efficiency, control and standardization, the ability to find documents, improved reporting capabilities, better amendments tracking, an important improved ability to flag up contracts coming up for renewal. However, there were a number of offline processes even within CMGroup and there was no continuous data flow from production of the initial draft through to tagging in the repository. CMS did not join up contracting across the business unit. Crucially, the "product form" was a parallel organizing technology for contract that coordinated selling with contract performance, and because HealthSub's offerings were so customer-specific and dynamic, evolving even over the life of a contract, it was not possible to capture the product form or product offerings in a structured data environment, such as a database. In addition, the penetration of the CMS system within HealthSub was only partial and localized; within the larger HealthCo it was one of two CMS systems in active operation. As an engine of production of contracting knowledge, CMS was limited. The contracts repository, once built, was not open to everyone in the business unit, and, at the time of implementation, was not full text searchable. CMGroup's team leader kept a tight rein on data management, and the structured data capabilities were closely focused on a relatively small number of key business issues, but there was no data integration. The business sponsor of the group had limited expectations for CMS in terms of contracting knowledge; for example, he did not look to CMS to produce "business intelligence". To summarize, while CMS was very valuable for CMGroup, it fell somewhat short of the organizing vision.

Interviews with two other customers using the same software indicated that their implementations were different from one another and different from the implementation at CMGroup. For a global consumer products company, CMS was a principally a contracts repository that had been mandated for the various business units around the world; for legal reasons the repositories of the various business units were kept separate, and the lawyer who had sponsored CMS did not know what data fields were being used. A large UK public sector entity had substantially built out its CMS product with the help of IT consultants to run a multi-billion pound annual procurement cycle in a data-intensive fashion. CMS at CMGroup was a very useful workspace for a small and highly productive contract management team. These were three very different adaptations of a single CMS software product. In particular, the divergence between CMS as a contracts repository (as used by the global consumer products company) and CMS as core software for a data-intensive procurement function (as in the case of the UK public sector entity) is reflected in additional data, as I will discuss further in relation to the breakdown of the CMS category.

Even in these CMS success stories, and looking across the three of them, there is evidence that the organizing vision for CMS was proving difficult to realize. A key supporter of CMS, the IACCM, has been the source of comments to the same effect.

5.3 The IACCM and CMS

The IACCM has long been a supporter of the use of IT to improve contracting processes and contracting knowledge. It has tracked the progress of CMS and provided a platform for communication for the CMS industry. For example, in 2003, IACCM released a report, with survey results, entitled "Contract Management – An Opportunity Still Being Missed?" According to this report, while significant numbers of contract managers characterized their contract management as falling short in cost control and risk management, fewer than a sixth of them contemplated implementing a contract management software solution in the coming year. IACCM identified a number of ways in which it could help – by collecting case studies, by engaging with vendors, through webcasts, and by developing standardized metrics for CMS solutions, and it has carried through with many of these initiatives. IACCM's online library contains many resources on contract management software, and many of IACCM's media center press releases are from and about the CMS vendor community. Over the years, software vendors have been sponsors of IACCM events, and Tim Cummins has appeared in vendor webinars. IACCM's newsletter has an Automation and Technology Panel comprised of software vendors, and CMS vendors have been frequent advertisers in or sponsors of IACCM's newsletter. In 2008, IACCM sponsored a book, *Enterprise Contract Management: A Practical Guide to Successfully Implementing an ECM Solution*, by Anuj Saxena (Saxena 2008); a chapter of this book ("co-sponsored by IACCM") was available for download from the Emptoris website in 2009. IACCM has conducted two market surveys for CMS, in 2007 and 2009.

Notwithstanding IACCM's support for contract automation and engagement with CMS, the organization has raised many questions about CMS over the years. For example, the 2007 market survey noted that while CMS seemed to provide benefits to those taking it up, it had not enjoyed the success earlier predicted, and, in commenting on the survey, Tim Cummins asked whether CMS was already a thing of the past (Cummins 2007). In 2009, Cummins summarized the reasons why CMS had not enjoyed greater uptake. At first, he said, there were technical difficulties, but these had been largely overcome. But there were continuing difficulties in building a cross-functional solution: "This is why many implementations start small and hope to expand; but often they seem to get stuck – or even worse, several competing solutions are adopted.” He observed that IT departments often resisted non-core applications like CMS, particularly when ERP vendors were promising contract management solutions in the near future. But mostly, he wrote, technology vendors were offering a solution to a problem that many firms did not realize they had (Cummins 2009). Cummins was well in tune with his constituencies on all points, as the next section shows.

5.4 Evidence of breakdown from interview, site visit and survey data and IACCM archival material

In this section I begin to fill out a table of breakdown, using it as a matrix to organize the evidence from interview, site visit, survey and IACCM archival data that points to a failure of expectations with respect to the the business model for packaged software (including generification), the organizing vision, and its market correlate the category. From the customer success stories described in section 5.2 and the IACCM’s expressions of disappointment, a story begins to emerge of a software product based on a flawed concept. In this section I summarize this and additional data to spell this out in more detail.

5.4.1 Breakdown in generification

The business model for packaged software described in Chapter 2 entails a strategy of generification to turn a customer-specific software product into a high margin information good, and CMS vendors I interviewed were well aware that they had to manage individual customer requirements against their goal of developing a standardized software product. They expressed this as the need to protect the core code, to avoid customization and to work instead with configuration options such as user-defined fields (e.g. as referred to in the case of HealthSub). Both vendors and customers appreciated that customization was not only costly at implementation but created an ongoing burden in the upgrade cycle, especially in an integrated environment. Still, customization could not always be avoided, and resellers and consultants played key roles in some CMS implementations, as in the case of the large UK public sector entity mentioned above. Implementations like that one involved significant investments of time and money on an ongoing basis.

But the data suggests that CMS was more rigid and more specialized than vendors realized. In some cases, design choices embedded in hard coding seemed to reflect prior customer experience. In particular, CMS seemed to reflect a tilt to the buy-side and to “commoditized” procurement. That is, some CMS products seemed designed to help professionalized procurement operations compare generic goods, like laptops or office supplies, and select suppliers on the basis of price. When products like these were considered for other contracting contexts, they did not fit. For example, the head of sell-side contracting for a global professional services firm said that they had built their own CMS system in-house because the commercial CMS products were designed for procurement, and for goods, not services. Survey data confirms the higher adoption on the buy-side (Table 5.3, p. 132). In addition, a number of interviewees questioned whether a generalized contracting process even existed, given how much contracting varies from industry to industry.

This testimony points toward a fundamental breakdown in the business model for packaged software, in particular, generification. In Chapter 6, the genesis of this breakdown will become clearer. In the following sections I begin to trace in detail the breakdown of the organizing vision for CMS.

5.4.2 Breakdown in the organizing vision: CMS did not "enclose" contracting

Automating the contract lifecycle across the enterprise as a closed and continuous production function (Figure 5.2) was the core of the organizing vision for CMS, but the data indicates that CMS failed in this regard. Contracting spilled over the boundaries of CMS into offline processes. CMS users continued to work with email and Word, outside CMS, and to require physical documents with signatures for execution. The case described in section 5.2 shows how, even in a successful CMS implementation and within the localized group working with CMS, steps in the process (revision of documents after the first draft, exchange of documents, redlining, execution) went offline. In particular, the idea that structured data (key terms, or variables) used to create a first draft of a contract document could also be used as contract metadata proved overly optimistic. CMS databases were not designed to keep up with changes in contract documents as they were revised over the course of negotiations. Furthermore, some contract data applies across multiple contract documents, or is not within the contract document (ISO requirements, internal approvals, and status of the document). This meant that tagging or coding contracts with structured data was often a manual, post-hoc exercise.

Second, interview data indicates that, even in successful implementations, CMS did not ensure functional or operational integration of contracting across the lifecycle of a particular contract. In the case of HealthSub, CMS provided significant benefits. However, it did not provide end-to-end integration of the contract lifecycle, which remained fragmented between sales, contract management and the operations group in charge of contract compliance. The critical "product form" essentially skipped over CMS, and sales and operations stayed in direct contact to make sure customers were happy. The legal and finance departments worked with the contract management group but were not part of the CMS process. In this customer success story, CMS was a valuable but highly localized digital work environment, but there was no attempt to reconcile the diversity of views and practices of other functions involved in contracting.

Third, fragmentation of contracting by type of contract or business unit persisted. This resulted in localized and even multiple implementations of CMS inside the organization, with a pronounced split between buy-side and sell-side. The case of HealthCo illustrates multiple, disconnected instantiations of CMS products from different vendors. In another company, the sell-side had adopted one CMS system while the procurement function used a different CMS solution with a strong strategic sourcing orientation. This phenomenon of localized and multiple implementations was mentioned several times in interviews, and survey data confirmed it is not unusual (Appendices 4.6 and 5.2). This again points to the diversity of contracting knowledge and practice inside the organization.

Briefly stated, CMS did not “enclose” contracting. Offline processes persisted, and CMS did not create a continuous data flow across the contract lifecycle. Functional or operational fragmentation across the lifecycle of a particular contract continued. Lastly, the fragmentation of contracting by type of contract or business unit resulted in localized and multiple implementations of CMS, with a pronounced split between buy-side and sell-side.

5.4.3 Breakdown of the organizing vision: CMS did not produce contracting knowledge

In Chapter 3, I identified knowledge as important in contracting, presenting an opportunity as well as a challenge for CMS. I also highlighted some known issues one might expect to encounter in any project to improve organizational knowledge, including the difficulty of converting unstructured data into structured data, the inadequacy of an approach based solely on structured data, and the localized, perhaps unreconcilably diverse nature of organizational knowledge. The data suggests that all of these were issues for CMS, reflected in the fragmentation of contracting across the contract lifecycle (described in the preceding section), but also in the challenges that CMS presented for adopting organizations in terms of data management, data extraction and data integration.

According to the organizing vision for CMS, automating the contract lifecycle across the enterprise as a closed and continuous production function (Figure 5.2) would produce structured data that in turn would generate “visibility” into contracting. This expectation was not generally met, for a number of reasons. First among them, the fragmentation of contracting described in the preceding section could not be expected to generate “holistic” contracting knowledge. But the data points to a number of other factors as well.

Users discovered practical limitations on the contracts repository in terms of completeness, access and searchability. At the point of implementation, it was not always easy to locate all existing ("legacy") contracts, and it was not always feasible to put them into the CMS system. Collecting and associating related documents, such as statements of work, certificates of milestone completion and the like could be difficult. Designing an access scheme was a new exercise for many organizations, access schemes require ongoing maintenance, and of course access to CMS could impact license costs. [28] In some CMS implementations full text search capability was not available.

A more fundamental problem was that definition and extraction of structured data proved more difficult than anticipated. Defining and managing the metadata fields was a significant non-technical exercise mentioned by a number of interviewees, including the head of CMGroup. Data fields beyond the most basic were not stable over time, and could not be comprehensive. For example, several interviewees mentioned that when they received requests to report on change of control provisions they found out that this was not captured in their contract metadata. Any change in the data fields might attract additional vendor charges (as in the case of HealthSub), and if documents were not recoded the database would become unreliable. As in the case of HealthSub, the initial coding of legacy contracts could be time-consuming and expensive, and possibly compromised on the completeness of the collection, the completeness of the coding, or both. After implementation, coding was an ongoing burden for contracting professionals, or required outsourced assistance. In light of these considerations, customers had to balance the benefits they expected to get from structured data as against its costs. Some customers put very ambitious programs in place, capturing dozens of datapoints for their contracts, but many settled for between ten and twenty basic items of data to tag contracts in the repository.

Another issue was the lack of integration with other systems. As vendors saw it, to get the most out of CMS, structured data should be integrated with (taking from, feeding to, or compared with) a transaction database like ERP and with specialty tools or other applications such as CRM (customer relationship management), SRM (seller relationship management), strategic sourcing or supply chain tools, project milestone or KPI (key performance indicators) applications. The vendors generally advertised their ability to integrate with ERP, SAP in particular. But integration was a significant additional implementation exercise, and it required ongoing upkeep. In many cases, data integration – making contract data "live" and operational

[28] No survey respondent selected "Quite open access" in answer to the question "Which best describes who has (or will have) direct access to your contract management system?" (see Appendix 5.3). Indeed corporate structure may be intentionally designed to preserve separate legal and operational entities within the global organization, for example to encourage arm's-length transactions in a shared services environment or for legal or tax reasons.

in the organization's transactional systems such as ERP – was not undertaken. In addition, "integration" might take the form of manual validation or reconciliation rather than direct data feeds, because some organizations protect their basic transactions database as the "system of record" and do not permit other, satellite applications like CMS to feed it directly without data quality checks. Companies sometimes expected to be able to pull counterparty data from financial or CRM systems, but this was often more difficult than expected, particularly with respect to counterparty and counterparty affiliate identification.

Lastly I note that adopters expressed rather modest ambitions for CMS in terms of its contributions to organizational contracting knowledge, ceding that ground to risk management, business intelligence or marketing initiatives, which are well-developed functions in the large organizations where contracting occurs at a scale that makes some form of contract automation necessary or desirable. This was the case for the CMS business sponsor at HealthSub, and for another business sponsor at an international consumer products company. In several instances, senior executives I interviewed did not know exactly what datapoints were being captured in their CMS system, but seemed to view that as a housekeeping detail – directly undercutting CMS as a generator of organizational contracting knowledge but consistent with viewing it as merely an "indexing system" (see section 5.4.5). In the survey (Appendix 5.1), customers did not rate moving to e-records in lieu of contracts or clause level management as priorities for CMS, and both vendors and customers rated outward-facing knowledge capabilities, such as counterparty and network risk management and network value creation, as less important than internal process improvements. Survey data regarding the features used by CMS adopters suggest that both internal advanced information features and outward-facing features are not so frequently used (Appendix 5.5): In 29 cases, only 3 used analytics, only 4 used data integration, only 5 used a shared workspace and only 6 exchanged data with counterparties, whereas 22 used amendment and change order tracking, 18 used contract creation and alerts, and 16 used full text search, the tying of related documents and a dashboard. Yet in interviews contract managers were able to identify knowledge problems they would like software to help them with, such as merger integration, or analysing contract terms against results. Survey data also indicates that customers were interested in matching contract terms to outcomes and in analytics and scenario planning (Appendix 5.1).

To summarize, the data points to a number of factors which contributed to the breakdown of the organizing vision for CMS insofar as it promised "visibility" into contracting and better contracting knowledge. These are: the fragmentation of contracting described in section 5.4.2; limitations on the contracts repository (completeness, access and searchability); difficulties in defining and extracting structured data; limited data integration; and reduced expectations for contracting knowledge as associated with CMS as opposed to risk management, business intelligence or other business initiatives.

5.4.4 Breakdown of the organizing vision: CMS was associated with “algorithmic” contracting

Notwithstanding the shortcomings of CMS as measured against its organizing vision in terms of process automation and knowledge production, CMS clearly worked well in some contexts. For example, a consistent theme in interviews was the use of CMS to force standardization of contracting processes, usually starting with commodity goods procurement or standard licenses rather than services. One procurement manager using CMS constantly looked to extend the “commodification” of procurement, running an internal “catalog” for most goods acquisitions and a much smaller but growing proportion of services procurement. For another contracting professional who had been able to institute clause level management of licenses using CMS, service contracts were the next step. Another interviewee remarked: “As soon as you can commodify services, you can use the technology to manage them.” Contract volume was also a key parameter. Contracting professionals used CMS to manage “40,000 suppliers”, or “tens of thousands [of licenses] globally”. Document assembly was used in another company for NDA’s (non-disclosure agreements): “There are about 2000 a year on a no-touch basis.” In the case of the large UK public sector entity mentioned in section 5.2.6, the system managed about 3500 providers under nine or ten thousand contracts.

As I discussed in Chapter 4, interview data suggested that CMS might work best for “market” contracting, i.e. that the CMS “region” of contracting corresponded to “market” contracting along the dimension from “market”, to “hybrid”, to “hierarchical” governance in the TCE model. For my survey I translated the distinction between “market” and non-“market” contracting as set out in Table 4.1, hypothesizing an association between CMS adoption on the one hand and, on the other hand: high scale (volume and standardization), low relationality, contract performance being easy to define, relatively data discreteness (how easily the contract can be reduced to and represented by discrete or structured data), low in implicit terms of contract, low interdependency of contract performance, lower risk, and low counterparty information sharing.

<u>Contract attributes</u>	***Market governance***	***Hierarchical or hybrid governance***	***<u>Association of CMS adoption to market governance indicated in survey results (p < .10)?</u>***
Scale (volume and standardization)	High	Low	YES – See Table 5.3
Relational contract	Low	High	NO
Performance easy to define	High	Low	NO
Data discreteness (how easily reduced to and represented by discrete data)	High	Low	YES – See Table 5.3
Implicit terms of contract	Assumed relatively low and/or well-understood	Variable, but unlikely to be well-defined)	NO
Interdependency of performance	Low	High	NO
Risk and extended risk (risk or liability beyond the immediate counterparty, i.e. network risk)	Assumed relatively low and/or well-understood	May be significant and complex	YES – See Table 5.3 and Appendix 5.8
Counterparty information sharing	Low	High	Possible – CMS not associated with counterparty information sharing; see Appendix 5.5

Table 5.2 Survey results regarding hypothesized contract attributes of market versus hierarchical or hybrid governance

For the most part, the survey data did not support an association between CMS adoption and those hypothesized dimensions of “market” contracting (Table 5.2). What the survey data did confirm was the association of CMS to what I characterize as “algorithmic” contracting (Table 5.3), as I will explain. First, there was an association with contracting scale – i.e. contract volume and standardization. Related to standardization, there was an association with the firm’s ability to use its own contracting document. Consistent with interview data, the survey indicated that CMS was more likely to be adopted for buy-side contracting than for sell-side contracting. And, not surprisingly, contracting scale that supports CMS tends to be found in larger companies.

Response Category	***Response***	***Does not have and is not considering CMS***	***Using, implementing or considering CMS***	***TOTAL***	***Significance (Pearson Chi-square)***
Important contract volume per year	100 or fewer	17 (29%)	41 (71%)	58	P < .05
	More than 100	4 (10.5%)	35 (89.5%)	38	
Important contract volume in effect	500 or fewer	19 (27%)	50 (73%)	69	P < .05
	More than 500	1 (4%)	25 (96%)	26	
Standardization	Below the mean	16 (36%)	28 (64%)	44	P < .01
	Above the mean	5 (12%)	38 (88%)	43	
Your form used (respondent's firm's contract document is used)	Below the mean	15 (33%)	31 (67%)	46	P < .05
	Above the mean	7 (15%)	41 (85%)	48	
Important contract buy-side, sell-side or other	Buy-side	2 (6%)	33 (94%)	35	P < .01*
	Sell-side	18 (34%)	35 (66%)	53	
	Other	2 (17%)	10 (83%)	12	
Firm size (revenues)[29]	Up to $10 million	7 (64%)	4 (36%)	11	P < .01*
	$10 million to $10 billion	10 (19%)	42 (81%)	52	
	Over $10 billion	5 (17%)	25 (83%)	30	
Data discreteness (contract can be represented by discrete datapoints)	Below the mean	14 (30%)	32 (70%)	46	P < .05
	Above the mean	7 (14%)	44 (86%)	50	
Extended risk (risk or liabilities beyond the immediate counterparty)	Below the mean	5 (13%)	34 (87%)	39	P < .10
	Above the mean	16 (27%)	43 (73%)	59	
Material risk-shifting to the respondent's firm?	No (risk shifting from the respondent's firm, risk is shared, or risk not material	8 (14%)	50 (86%)	58	P < .01
	Yes	10 (43%)	13 (57%)	23	

Table 5.3 The CMS "region" of contract: responses to questions about the most important type of contract as related to CMS adoption (* indicates 1 cell (16.7%) has expected count less than 5)

[29] In Part 2, similar analysis shows CMS non-adoption reducing for these 3 size categories from 75% (smallest firms) to 51.4% to 8.3% (largest firms), P = .001, 2 cells (33.3%) with expected count less than 5. Reducing the number of size categories to two, with the cutoff at $10 billion, non-adoption is at 53.7% for the smaller organizations and 8.3% for the larger organizations, P < .001, with no cells with expected count less than 5.

There was also an association with structured data. Survey data (Table 5.3) showed an association between CMS adoption and data discreteness – measured by the respondents' level of agreement with the statement that the contract could be represented by discrete datapoints.[30] Part 1 survey data also indicated a clear relationship between the number of datapoints regarding the most important type of contract captured in *any* information system or format and the adoption of CMS, and Part 2 survey data indicated a relationship between enterprise-wide data capture about contracts and adoption or consideration of CMS (Appendix 5.7). Datapoints captured most frequently were: expiry, renewal or other dates (85 of 99 respondents) and prices, discounts and rebates (65 of 99) (Appendix 5.8). These datapoints, often highlighted in CMS sales literature, are notably easy not only to define and and extract but to tie to increases in revenues (alerting sell-side customers to contract renewal opportunities) or reductions in cost (for buy-side customers with volume discount or rebate terms or wanting to avoid automatic contract renewals). It may have been far less easy to show the same sort of financial return for tracking other contract datapoints; again, the bigger benefit was probably on the buy-side.

Thus far, if one were to describe a CMS "region" of contracting, that region would feature standard contracting (more likely to be under the CMS user organization's contracting documents) in high volume, more likely in large companies and on the buy-side. The contracts – not surprising for standard contracts – would be relatively easy to represent using structured data.

In the survey I asked respondents to say whether or not their organization had various other types of IT systems or initiatives, not related to contract management. I had hypothesized that organizations rich in other IT systems might not need CMS. However, there were a number of associations between other IT systems and initiatives and CMS; relationships with ERP (enterprise resource planning), CRM (customer relationship management), BI (business intelligence), workflow, and Microsoft Sharepoint were significant, while relationships with SRM (seller relationship management), ECM (enterprise content management) and an automated document creation capability were suggestive (Appendix 5.9). Relationships were weaker with MDM (master data management), a documents or records management system, and supply chain management, while there appeared to be no relationship with a general risk management function. Of factors I listed as potentially relevant to CMS procurement (analyst recommendation, consultant recommendation, experience in the industry, customer recommendation, part of a suite of IT applications, fit with the rest of organization IT, independence from the IT department, independence from the vendor), the one rated most

[30] There may be some correlation between the precise performance question and the discrete datapoints question, but respondents appear to distinguish between the two aspects of contract (Appendix 5.6).

important was fit with the rest of organization IT (Appendix 5.10). These data taken together suggests that a significant factor in CMS adoption was the firm's conscious construction of, and investment in, an IT-based process and knowledge infrastructure built around structured data.

In light of the "visibility" into contract that CMS promised, I had originally thought that adoption of CMS would be more prevalent where contracts represented extended risk or liabilities (to parties beyond the immediate counterparty) or where risk-shifting to the organization was a significant factor in the contract. The data did not support this hypothesis, and indeed those who identified extended risk above the mean were more likely to have reached the conclusion that they were not interested in CMS; there is also a relationship suggested by the data between risk shifting to the organization and a reluctance to adopt CMS (Table 5.3). The evidence is not conclusive, but suggests firms may be more hesitant to move to an automated environment when they are taking on risk and where risk is more complex.[31] Consistent with this finding, risk aspects of the contract appear not to be included in data capture with much frequency and are not associated with CMS adoption (Appendix 5.8). Perhaps the negative association between CMS and risk should not have surprised me, because, upon reflection, it is consistent with the hypothesis that CMS would be associated with "market" contracting, where risk is assumed to be minimal or at least well-understood.[32] Still, this was a "surprise" in the data, hinting that contracting professionals are aware of contracting risk, and perhaps contracting knowledge more generally, as problems that resist reduction to structured data, and thus overflow the strictly computational approach implicit in, for example, Shiller's (2003) "smart computer network".

According to the organizing vision for CMS, based on the generic contract lifecycle, CMS would work for all contracting contexts. But the data presented in this section suggests that contract exists in a "fluid" topological space (Mol and Law 1994), relative to CMS as an organizing technology. That is, the multiple and various instances of contracting (like Mol and Law's anemia) are both the same, at some level, and yet not the same in important respects. One way that contracting is not the same is vis-à-vis CMS as an organizing technology, with adoption of CMS more likely for contracting at scale (featuring standardization and volume), reducible to structured data, on the buy-side of large companies, and presenting relatively low risk. The association with scale had been indicated in the interview data, leading me (influenced

[31] This may to some extent reflect the buy-side versus sell-side weighting of adoption, as buy-side appears to be transferring risk to others (reducing its risk) while the sell-side assumes it; however, I still observe a risk-shifting effect within the sell-side (Appendix 5.4).

[32] Somewhat paradoxically, in Part 2 of the survey, when I asked CMS adopters who took the lead in acquiring CMS (selecting all that apply out of sales, procurement, legal/compliance/risk management, IT, CFO, enterprise contract management and business unit contract management), legal/compliance/risk management was most frequently named (in 14 out of 29 cases) as taking a leading role. Notably, in terms of making a business case for CMS, this is not a profit-generating function.

by the frequent invocations of TCE in the relevant literature, as discussed in section 3.3) to the hypothesis that CMS might be associated with “market” contracting. But the data points to a more straightforward relationship. The CMS region of contracting is where contract is most easily matched to computer capabilities, in other words, where contracting is “algorithmic” – reduced to mechanistic operations using structured data (cf. Licoppe 2008; Mirowski 2002). Consistent with the match of contracting to computer capabilities, though contrary to my expectations, CMS adoption was associated with the presence of other significant IT systems, and the relevant scale was more often located in large organizations.

5.4.5 Category breakdown: lack of coherence in the CMS concept

In the packaged software market, the product category refers to a group of products and associates them to an organizing vision (Pollock and Williams 2009b, 2010, 2011); as I have phrased it, the category is the reification and market correlate of the organizing vision. In the case of CMS, the data reviewed in this chapter hint at weaknesses in the CMS category. There were questions about what CMS was, and whether it was necessary. A particularly vivid comment on the lack of coherence in the CMS concept came from the director of sales and marketing for one of the five focus vendors, when he said that it was unclear whether CMS was about process or about information: contracting processes were variable and could not be reconciled, but contracting information needed somehow to be brought together. The comment perhaps suggests an awareness of problems that customers were experiencing in data management for CMS. The contract lifecycle expressed a process orientation that took data definitions and data extraction for granted, but these were major stumbling blocks for CMS customers. Others remarked on the conflicting views of contract held by different corporate functions – an issue that complicated CMS procurement and tended to limit and localize implementations.[33] A long time industry observer speculated that it was “like the blind man and the elephant”, with various stakeholders defining “CMS” according to their own needs, and that the fragmentation of the market was inherent in these tensions present from the beginning – an observation that will become more meaningful in Chapter 6. Yet another long time industry observer and prospective customer who had been in the market periodically since its inception remarked on the instability of the product offerings, saying that they had “morphed” over the years.

Another indication of trouble for the category was that, while “contract management software” seemed to be understood as referring to software in support of contract management, it was not

[33] Bartels (Forrester Research Inc. 2006) observed that CMS could be delivered in either a process-centric or enterprise approach, and noted the conflicts within the organization that affect the CMS procurement process.

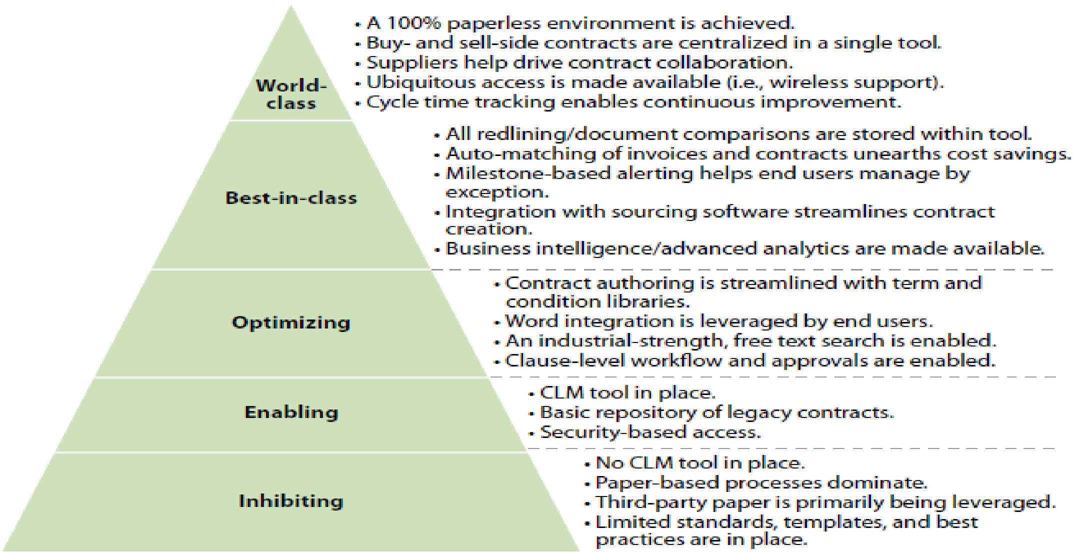
necessarily identified with a standalone packaged software product. Interview and survey data are consistent in showing that "CMS" could be bought from a pure-play CMS vendor, bought from an ERP or other software vendor, or built in-house (Appendix 5.11).[34] As a corollary, there was an overlap of functionalities with other software, especially CRM on the sell-side, and SRM, strategic sourcing, reverse auction and supply chain management applications on the buy-side.

Interviewees were confused not only about what CMS was, but whether it was necessary, expressing doubt about the business case for CMS and suggesting that costs outweighed the benefits (see Appendix 5.12). Several questioned whether IT support for contracting required anything more than Word, email and a spreadsheet. In several cases, a legacy ad hoc solution – a contracts repository or a document automation application, for example – (or its possible lack of use) was cited as a reason not to proceed with CMS. In other cases, firms that had records management or document management systems in place could not justify CMS, since contracts were already being stored and tagged with metadata; one consultant said that CMS was priced as an enterprise system but was often no more than an "indexing system". Advanced features of CMS were costly to build out and support, and could not be justified in the absence of contracting scale. As a consequence, in many cases, "CMS" fell back to a reduced version consisting of a contracts repository, putting it in competition with applications for enterprise content management, records management, document management or collaboration (e.g. Microsoft Sharepoint).

Putting the best light on this, some vendors and analysts developed a "maturity model" to benchmark an organization's adoption and use of CMS – acknowledging that CMS adoption could be staged or partial (Figure 5.5). This is largely consistent with survey data (Appendix 5.5), which shows early stage adoption centered on documents features of CMS rather than, say, data integration or modelling and analytics.

[34] One survey respondent from a global IT services company wrote in 2011: "Contract management, in my view, covers the entire 'life' of an opportunity, i.e. from opportunity identification through to payment of the last invoice by customer or end of the contract term, and closing all account IDs (if applicable). Contract management software for me, given my 'definition' of contract management above, is very broad and ranges from opportunity recording/tracking software and repositories for (mandatory) contractual evidences to process-based software and solid contract delivery applications and tools. Our CMS covers a range of interlinked programs, covering all CRM processes; the vast majority of this CMS is being developed globally and implemented locally, with some adjustments for mandatory local specifics. Globalization is ever increasing and any locally developed CMS will eventually be sunset (unless mandated by local legislation). The way I work today is perfectly supported by current CMS, i.e. my personal wish list is limited if not non-existent."

Figure 2 Clients Take An Incremental Approach To Adoption



57760 Source: Forrester Research, Inc.

Figure 5.5 Forrester's version of the maturity model (Forrester Research Inc. 2011a; with permission)

To summarize, there was a lack of coherence in the CMS concept. As it turned out, not only did contracting exist in a "fluid" topological space, so did "CMS". Instances and invocations of "CMS" were, at some level, the same, and yet they were not the same. It was unclear whether CMS was about process or information, and different organizational functions held conflicting views of CMS. While "CMS" was understood to mean software in support of contract management, it did not point to a particular software package, and pure-play CMS was in competition with in-house and other software solutions, especially ERP. CMS functionality overlapped with that of other software, e.g. CRM, or strategic sourcing. Some asked whether CMS was necessary at all; while the business case for CMS appeared weak, the costs of CMS as an enterprise system with advanced features were substantial. In consequence, CMS often appeared in limited implementation as only a contracts repository (an "indexing system"), putting it in competition with records or document management systems. Even in the case of a single software product, as discussed in section 5.2.6, three implementations were quite fundamentally different, suggesting that perhaps the "maturity model" did not map out a technological trajectory but instead different "sub-regions" of CMS adoption, regions that would never coalesce. This lack of coherence points toward breakdown of CMS as a packaged software category.

5.5 Summary: a biography of CMS as organizing technology for contract; the initial table of breakdown

A biography of CMS as organizing technology for contract begins with software vendors identifying an opportunity – contract management, as defined by the IACCM. With the benefit of learning from ad hoc applications of predecessor technologies for contracting, contract management software was essentially a bundling of already existing IT capabilities – document automation, databases and workflow. Understanding of CMS coalesced around an organizing vision – automating the contract lifecycle across the enterprise as a closed and continuous production function – and vendors and customers agreed on the likely benefits of a CMS system, centering on efficiency and control through standardization, with better contracting knowledge as a by-product of contracting process automation. Importantly, the contract lifecycle was not specific to any particular contracting context, and CMS was positioned to work for all types of contracts, and for all types of businesses, in any industry. There have been successful implementations of CMS, and I have described in detail one such case that demonstrates the benefits of CMS for a dedicated contract management group and their internal clients.

Nevertheless the data provides evidence of numerous breakdowns, which I have detailed above and organized against the expectation that has failed: the business model for packaged software based on generification (section 5.4.1), the organizing vision for CMS (sections 5.4.2, 5.4.3 and 5.4.4) and CMS as a packaged software category (section 5.4.5). That detailed discussion is summarized in Table 5.4, to be carried forward to Chapter 6.

Breakdown observed	***Breakdown of what?***
Hard coding from previous clients Buy-side or procurement bias Difficulty in generalizing cross-industry	The business model for packaged software (generification)
Process fragmentation (offline processes, no continuous data flow) Functional or operational fragmentation across the contract lifecycle Fragmentation of contracting by type of contract or business unit, especially buy-side versus sell-side; localized and multiple implementations	The organizing vision – automating the contract lifecycle across the enterprise
Fragmentation of contracting – see row above Limitations on the repository (completeness, access and searchability) Difficulties in defining and extracting structured data Limited data integration Reduced expectations for contracting knowledge as associated with CMS (as opposed to risk management, business intelligence or other business initiatives)	The organizing vision – contracting knowledge as an outcome of automating the contract lifecycle across the enterprise
CMS associated with scale (volume and standardization) and structured data CMS associated with large companies CMS associated with the buy-side CMS associated with IT infrastructure, especially ERP CMS associated with lower risk CMS associated with "algorithmic" contracting	The organizing vision – CMS as an organizing technology for all types of contracts
Unclear as to whether about process or information Conflicting function-specific views of CMS Competition with in-house and other software (e.g. ERP) Overlapping functionalities with other software (e.g. CRM, strategic sourcing) High cost of advanced features Weak business case Fallback to document repository (in competition with e.g. records or documents management systems)	Category

Table 5.4 Initial table of breakdown

To this point, the biography of CMS as an organizing technology gives an account of its precedents and its origin, in which CMS emerged, in a "harmonic convergence" (as one interviewee said, see Appendix 5.12), from antecedent technologies to meet a newly defined opportunity, contract management. But the biography shows that the business model for packaged software and the organizing vision for CMS as reified in its associated category failed to deliver on expectations in a number of ways. Most of all it shows that the CMS model of contracting – its organizing vision – did not sufficiently correspond to contracting as practiced in organizations to make CMS generally useful in the way anticipated. As in D'Adderio's (2008, p. 76) characterization of overflowing, "the model as statement has not been able to put into motion a world in which it can function". As one consequence, CMS did not seem particularly "fluid", in the sense of being technologically appropriate in diverse settings. As another, by the end of the story there is a question not only about whether CMS is necessary, but about what it is – and the biographical subject, provisionally assumed, begins to fracture, prompting questions about its "production". In the next chapter, adopting the commoditization perspective, I extend the empirical and analytical frame to include key market participants – the analyst firms and the vendors – and construct a biography of CMS as a commodity toward a fuller explanation.

Chapter 6 Empirical material: a biography of CMS as a commodity

While in the preceding chapter I presented evidence of the various ways in which CMS as an organizing technology for contract did not live up to expectations, in this chapter I switch to a market or, more precisely, a commoditization perspective. Rather than take CMS for granted, this perspective focuses on how it was "produced". In this second version of the biography of CMS, as a commodity, CMS still has precedents, an origin and a name. As before, CMS is sold by vendors, considered by prospective customers, implemented by user organizations, and remarked upon by industry observers; it had an ideal career path according to the business model for packaged software. But is no longer (just) a technological artefact. Instead, as a commodity, it represents a "very complex social form and distribution of knowledge" (Appadurai 1986a, p. 41) embodied, as I will show, not only in a technological artefact, but in other manifestations as well.

The key empirical move toward switching to the commoditization perspective is to extend the analytical frame to include analyst coverage and vendor histories as essential elements of the software biography. In section 6.1, I discuss the analysts that covered CMS (section 6.1.1), the role of analysts in IT procurement as illuminated by a recent litigation (section 6.1.2), and analyst coverage of CMS (section 6.1.3). In section 6.2, I provide brief histories of the five focus vendors: I-Many (section 6.2.1), Selectica (section 6.2.2), Ariba (section 6.2.3), Emptoris (section 6.2.4) and Upside (section 6.2.5). Section 6.2.6 draws together some observations regarding the marketing efforts of the vendors.

From this analyst and vendor data, I draw out additional evidence of how CMS failed to meet expectations (section 6.3). This comes under three headings: failure of the business model for packaged software (section 6.3.1), direct evidence of category breakdown (section 6.3.2) and the breakdown of correspondence between market perception and market performance (section 6.3.3), and is summarized in Table 6.2, which I take forward to Chapter 7 for further discussion and analysis. In section 6.4 I conclude with an alternative and subsuming biography of CMS as a commodity.

6.1 The analysts and their role in the biography of CMS

Pollock and Williams (2009b, 2010, 2011) have highlighted the role of analysts in the IT marketplace and in particular, as I discussed in sections 2.3.2 and 2.3.3, in what might be termed the reification of the organizing vision in the form of the category. In this section I discuss the analysts' involvement in the biography of CMS, toward developing a fuller understanding of not only how analysts figure in packaged software production but also the nature of the category.

6.1.1 The analyst firms

Three analyst firms – Gartner (including AMR, which Gartner acquired in 2009), Forrester and Aberdeen – have played a major part in the biography of CMS. Gartner, founded in 1979 by Gideon Gartner, a former Wall Street technology stock analyst, identifies itself as the world's leading IT research and advisory company.[35] Gartner's most well-known research product is its "Magic Quadrant" (see Pollock and Williams 2009b). Magic Quadrant coverage is for products in the growth and consolidation phases of a five-stage product lifecycle (emergence, growth, consolidation, maturity and decline), while MarketScope coverage is for products and vendors that are "distinct and viable" but in the emergent or mature phases (Gartner Inc. 2008a; Appendix 6.1).[36]

Forrester Research is a smaller company,[37] describing itself as an independent research company targeting companies with more than $1 billion in revenues. Corresponding to Gartner's Magic Quadrant, Forrester produces the Forrester Wave (see Figure 6.2). Forrester develops the Forrester Wave based on its own weightings of various criteria; it also provides an accompanying Excel spreadsheet so that clients to give their own weightings to the criteria.

The third analyst firm, Aberdeen, is owned by a marketing company, Harte-Hanks, and straightforwardly positions its research as serving "demand creation programs, online marketing campaigns and web-based sales and marketing tools" (Harte Hanks 2010 annual report).

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[35] As of year end 2010 Gartner claimed to have over 60,000 clients in 11,601 organizations and 85 countries. For 2010, revenues were $1.29 billion and net income was $96.3 million. According to its 2010 annual report, Gartner had 1,249 research analysts and consultants, speaking 47 languages.

[36] Magic Quadrant analysis is based on fifteen criteria in two categories: completeness of vision and ability to execute. MarketScopes use a limited set of criteria identified in the research to rate vendors/products in five categories ranking from strong negative up to strong positive. (Hawkins 2008) Gideon Gartner describes the origin of the "Magic Quadrant" as a "stalking horse" tool, never intended for publication. "Around 1987/88, I was working on further enhancing the Gartner Group Research Notebook, and happened to introduce the 'stalking horse' graphic as one technique which our analysts could occasionally use when presenting at research meetings to support a conclusion. This initiative was meant to be for internal discussion only, because the method seemed an oversimplification (yet an interesting starting point for certain confrontations which would be challenging and educational at our meetings). I do not recollect ever allowing the publication of an MQ, but during the mid-'90s and well after I left Gartner, the MQ feature grew to be a major deliverable for many of its clients! I acknowledge that we had left money on the table, as MQs grew in external popularity (and considerable dislike). In a future post, I expect to discuss the damage which this tool can create, sometimes leading to questionable corporate decision-making." (Gartner 2011)

[37] In 2010, revenues were $250.7 million, income from continuing operations was $20.5 million, and the company had 474 research and fulfillment employees.

Aberdeen writes research reports, case studies and "white papers" on a commissioned basis, and these reports are then made available by the sponsoring vendors. Aberdeen analysts are available to comment on vendor-sponsored webcasts, and Aberdeen also offers report sponsorship and event sponsorship opportunities to vendors.

Gartner and Forrester follow much the same research and business model, deriving a large part of revenues from research subscriptions. Vendors supply information about their products by filling out questionnaires and in vendor briefings, and analysts also consult with customers (see Pollock and Williams 2009b, 2011). Aberdeen's research model is based in part on email surveys; respondents are promised free access to the resulting reports (Appendix 6.2).

6.1.2 The analyst role in the IT marketplace: evidence from a recent litigation

To understand the role of the analysts in the biography of CMS, it is important to understand how they figure in the IT marketplace more generally (see Pollock and Williams 2009b, 2010, 2011). The ratings that vendors receive from technology analyst firms, Gartner in particular, are important in IT procurement, to the extent that vendors hire analyst relations professionals to manage their relations with analysts. These ratings are produced within a framework of IT categories that the analysts construct and actively manage. The classification schemes that organize the work and the products of analysts can be seen in, for example, Gartner's list of MarketScope and Magic Quadrant coverage (or see Appendix 6.2 for Aberdeen's categories). Pollock and Williams (2009b) have noted that analyst assessments are viewed with some scepticism, and the analysts' objectivity and independence have been questioned. In this section I discuss analyse a recent litigation in the United States that shines a light on the analyst role as gatekeepers in the technology marketplace and on the nature of the research they produce. Taking the commoditization perspective, this research constitutes not only "knowledge" in the chain of production from vendors to user organizations, but also a product in its own right – i.e. marketized criteria, or, in Pollock and Williams's terms, commodified "community knowledge".

IT vendor ZL Technologies sued Gartner in the US federal courts, claiming that it was treated unfairly by Gartner when it was characterized as a "niche" player in the Magic Quadrant for email archiving software.[38] Noting that Gartner's Magic Quadrant was a "key revenue driver"

[38] The procedural history of the case is as follows: On May 29, 2009, ZL Technologies filed suit against Gartner Group and Gartner analyst Carol diCenzo in the Northern District of California, alleging defamation, trade libel, false advertising (under the Lanham Act), false or misleading advertising (under California state law), unfair competition, and negligent interference with prospective economic advantage. On July 6, 2009, the defendants filed motions to dismiss, to which the plaintiff replied in

because it "heavily influenced IT purchase decisions", ZL claimed that its technology was superior but that it ranked lower because Gartner gave too much weight to vendors' sales and marketing capabilities. They argued that the Magic Quadrant has the appearance of objectivity but is in fact subjective, and that there is a lack of transparency as the underlying criteria weightings are kept secret. They suggested that Gartner was influenced by its commercial relations with vendors, and argued more generally that Gartner's "oppressive chokehold" stifles innovation (cf. Pollock and Williams 2011). ZL challenged Gartner's business model, alleging that it levered the non-transparency of its research and the underlying "critical fact base not available elsewhere" into the sale of analyst time.[39]

Gartner responded in several ways. First, they said that they never pretended to test or rate technology; instead their methodology was based on the collection and analysis of vendor briefings and customer opinions. Second they said that they did not assess technology separately from the vendor, and that considering sales and marketing support for a product was entirely legitimate; Gartner emphasized that customers make multi-year commitments to their vendors and need to be assured of their long-term prospects.[40] But Gartner's principal defense was their constitutional right to express a subjective opinion, and on this basis they ultimately won the case. "[T]he Magic Quadrant format itself rebuts any suggestion that it is a statement of fact." Gartner also argued that its claims about its own expertise ("high quality, independent and

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opposition September 18, 2009, and Gartner filed a reply in support of motion to dismiss October 9. On November 4, the motion to dismiss was granted with leave to amend in part. On December 4, 2009, ZL Technologies filed an amended complaint, and a motion to dismiss was filed on January 8, 2010. On January 22, ZL Technologies filed a memo in opposition to the motion to dismiss, with a reply memo filed January 29. The motion to dismiss was granted on May 3, 2010. ZL Technologies appealed to the 9th Circuit, filing an opening brief August 16, 2010. The answering brief was filed September 28, and a reply brief on October 29. On May 13, 2011, the 9th circuit affirmed the judgment of the lower court, and writ of certiori (application to the US Supreme Court to hear the case) was denied October 19, 2011. As noted by Pollock and Williams (2009b), the analyst firms assign particular individuals to cover technology markets. This figured in the ZL litigation when ZL sued the individual analyst alongside Gartner and when the Gartner ombudsman attributed ZL's unhappiness with its MQ ranking to a "relationship issue" with the individual analyst: "at this point it's come down to level of trust and respect" (ZL complaint filed May 29, 2009).

[39] "Gartner sells time with its analysts at a high price. As far back as 2004, Gartner charged $6,500 for a single engagement with an analyst over the phone, $10,000 for a face-to-face engagement with an analyst, $12,000 for an engagement with an analyst involving an external client audience and $16,000 for engagements with non-Gartner clients. The list price for an all-day session with an analyst was $15,000. Gartner also sells packages to clients for annual bundles of services totaling in the tens of thousands of dollars or more. On information and belief, those prices have increased since 2004." (ZL amended complaint filed December 4, 2009)

[40] "Accordingly, in evaluating vendors, Gartner considers not only their products, but also sales and marketing, financial strength, and other factors shedding light on the vendors' long-term prospects and ability to adapt to changing requirements. … Plaintiff asserts that the Magic Quadrant Reports assert facts because they are presented as 'fact-based mathematical reviews of product performance.' … That is plainly wrong. The Reports do not review product performance. Indeed, they do not even review products: instead, they evaluate vendors on an overall basis. A vendor's product is considered in evaluating vendors, but it is only one of many criteria and it is assessed based upon customer opinions rather than product testing or other quantitative evidence." (Gartner answering brief filed September 28, 2010)

objective") were likewise merely opinions, and thus protected speech. (Gartner motion to dismiss filed July 6, 2009)

> The reader of a Gartner Magic Quadrant report could not mistake it for a compendium of objective fact or quantifiable test results. From the title page – which identifies the report as a "*Magic* Quadrant" and notes the contents to be opinion [footnote to MQ] – through to the end, it is evident from both tenor and substance that the Magic Quadrant is not the test-driven "Consumer Reports"-style product review the plaintiff suggests. As the plaintiff highlighted in its Complaint, the Magic Quadrant reports "do not involve a single minute of independent testing of . . . products." … Instead, as made clear by three statements made at the outset of the report, the Magic Quadrant is subjective in nature. (Gartner reply in support of motion to dismiss filed October 9, 2009) (emphasis on *Magic* in the original)

This case first of all demonstrates that both vendors and Gartner understand that Gartner has a key gatekeeping role in the IT marketplace. Second, Gartner, though calling itself an IT research and advisory company, does not test or analyse technology; it collects opinions, i.e. it does market research, which it reports back to the marketplace. Third, Gartner does not consider that it rates software products; instead it rates vendors, with the software only one factor contributing to the overall rating, the vendor's marketing budget and its commitment to marketing being another.

6.1.3 Analyst coverage of CMS

With this background, I now turn to the role of the analysts in the biography of CMS. Gartner has been a key observer of the CMS marketplace, producing many research articles on CMS and CMS vendors (see Appendix 4.7); in addition, both Gartner and Forrester followed CMS vendors Ariba and Emptoris under other categories, such as e-procurement.

Tracing analyst coverage of CMS, we see how, through words (and pictures; see Figure 5.1), the organizing vision is first turned into a financial opportunity for prospective customers, then a financial opportunity for vendors, and then an IT product category to which an expectation is attached. Illustrating this transformative enactment is the widely cited *Contract Life-Cycle Management: A $20 Billion Market*, by Gartner's Andy Kyte, published in April 2002, which described the anticipated benefits of contract life cycle management and early industry expectations for the market.

> Enterprise management teams should stand back and look at the greater problem before rushing into piecemeal investments in changes to procurement processes. In many industry sectors (especially capital-intensive industry sectors), contract life cycle management is a core process, but is not recognized as such and suffers from diverse ownership and little or no coordination. Enterprises should audit the risks to which they are exposed through poor contract management, and assess the opportunities for

> immediate bottom-line cost savings that could be achieved through better visibility and management of contracts. … [the financial opportunity for customers]
>
> The increased awareness of the importance of contracts has not gone unnoticed by the IT industry. Solutions and services vendors are congregating around this opportunity for new business. … [the financial opportunity for vendors]
>
> Confusion in the marketplace is normal at the inception of a major new application domain. Contract life cycle management is almost an unexamined territory in many major global corporations, but it will soon be on the executive management agenda and will attract substantial investment. This investment will be driven by three strong themes. First, the desire to cut costs by using every opportunity to reset contract prices, by re-examining established contracts and improving the structure of new contracts. Second, to make all the risks embedded in the contract infrastructure visible, and to establish mechanisms to reduce and manage the risk. Third, to seize the opportunity to define new, flexible working relationships with suppliers as part of the underlying imperative to restructure the enterprise cost base. *These forces will combine to make contract life cycle management a highly visible program of work in at least 60 percent of Global 2000 enterprises by the first half of 2003. As a result of the potential demand for radical improvements in this space, enterprises will be spending more [than] $20 billion a year on software and services for contract life cycle management by the end of 2007 (0.7 probability).* (Gartner Inc. 2002; see footnote 2) (emphasis added) [the expectation for the category]

Cost reduction was at the heart of this version of contract management, with risk management a second place consideration. But Kyte also addressed contracting knowledge, recommending a “contract health check” and emphasizing that senior managers should have the information at hand 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.Of the $20 billion in predicted revenues, 80% would be in services, a detail that was not so widely reported. Kyte also observed, in what might in light of subsequent developments be taken as a warning sign, that contract management had been taken up by ERP vendors, e-procurement and SRM vendors, and vendors specializing in CMS (pure-play vendors), as well as in “specialist offerings aimed at particular markets”.

Andy Kyte and his successor as Gartner’s analyst for contract management software, Deborah Wilson, co-authored "MarketScope for Contract Management, 2007” (Gartner Inc. 2007a; see footnote 2), saying that “[t]he early enterprise contract management solutions are maturing into cohesive tools, while many new entrants in the market are driving innovation”. The 2008 MarketScope reported that the market had grown 23% in 2007, and was expected to grow 16% in 2008 (Gartner Inc. 2008c; see footnote 2). However, after writing the 2008 MarketScope, Wilson posted a blog entry questioning the rationale for CMS, saying she had been “too easily swayed by the 'contract lifecycle management' rhetoric" defining the CMS industry (Wilson 2008; Appendix 6.3; see footnote 2).

As of February 2011, Gartner's list of Magic Quadrant and Marketscope coverage said that "Contract Management" as a category had been "retired", with the 2008 MarketScope listed as the last. As of January 2012, "Contract Management" was no longer listed at all. One explanation would be that contract management did not "graduate" to the Magic Quadrant. Another somewhat more nuanced interpretation of the "retirement" of MarketScope coverage is that the category did not cohere. In May 2010, Wilson (Gartner Inc. 2010; see footnote 2) produced an "Enterprise Contract Management Solutions Vendor Guide", describing an "already fragmented market" that had become "even more fragmented". This guide divided the "ECM solution market landscape into 8 segments: strategic sourcing application suite add-ons, content management application add-ons, e-signature-based, sell-side solutions, industry-specific solutions, ITAM (IT asset management) tools, ERP suite applications, general purpose ECM solutions and other ECM solutions". In February 2011, Wilson and colleagues considered whether enterprise contract management could be implemented across the entire enterprise. Their advice was that CMS as "über-filing cabinet" (i.e. a contracts repository) could indeed be implemented enterprise-wide and that this sort of implementation "should not be overlooked just because it is relatively simple and unconnected to other applications". But "[w]hen extensive integration and contract-type-specific functionality is required for multiple contract types (i.e., for sales and purchase contracts), separate, type-specific CLM solutions are the most cost-effective, practical alternatives" (Gartner Inc. 2011; see footnote 2).

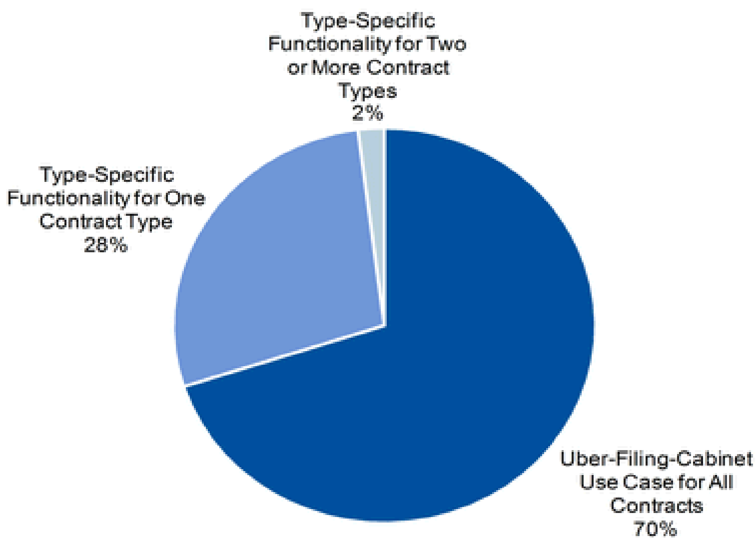

Figure 6.1 Gartner's analysis of CMS implementation style (from Gartner Inc. 2011; with permission; see footnote 2)

In December 2009, Gartner bought a competitor, AMR Research. AMR had covered contract management software from the beginning, publishing reports and offering commentary on industry developments. AMR had its own CMS analyst, Mickey North Rizza, who joined Gartner where she continued to work as a research analyst until June 2012. One blogger noted a divergence in historical coverage of CMS as between AMR and Gartner – with focus vendor Upside winning high marks from AMR but left out of Gartner's coverage (Busch 2010).

Like Gartner, Forrester has been observing the CMS market from the beginning; its long-time lead analyst on the market is Andrew Bartels. Forrester issued Forrester Wave reports on CMS (which they call contract life-cycle management software, or CLM) software in 2006, in 2008 and in 2011. In 2006 (Forrester Research Inc. 2006), Bartels identified I-Many, Upside and diCarta as some of the vendors that had helped create the category, noting that Ariba was also in the Leaders category. Bartels described two approaches to CMS (process-centric or enterprise), noted the conflicts within the organization that affect the CMS procurement process, and advocated the cross-process implementation that would cover multiple types of contracts. The report also noted that CMS (CLM) faced competition from ERP, SRM and ECM solutions.

[Image removed as copyright is owned by Forrester Research Inc.]

Figure 6.2 Forrester Wave for Contract Life-Cycle Management 2006 (Forrester Research Inc. 2006)

In the 2008 Forrester Wave (Forrester Research Inc. 2008), Emptoris (having acquired diCarta, see section 6.2.4), Upside, Ariba and Selectica are in the Leader category, and I-Many is a Strong Performer. The market for CLM purchases was reported as growing in excess of 25%, but also consolidating. ERP vendor SAP is also in the Leader category.

[Image removed as copyright is owned by Forrester Research Inc.]

Figure 6.3 Forrester Wave for Contract Life-Cycle Management 2008 (Forrester Research Inc. 2008)

By 2011, Upside, Ariba, Selectica, Emptoris, ERP vendor Oracle's E-Business Suite and SAP were in the Leader category (Forrester Research Inc. 2011a). The 2011 Forrester Wave reported revenues figures showing buy-side CMS as a component of e-purchasing, growing at 17% a year, with revenues of $368 million. Giving an insight into their methodology, the 2011 Forrester Wave indicated that Forrester had evaluated ten vendors (selected based on product fit, customer success, and Forrester client demand). The data collected for each vendor included one day of scenario-based product testing, a vendor survey, a product demo and three customer reference calls.

In research later that year, Forrester (Forrester Research Inc. 2011b) issued a report authored by Bartels noting that:

> Four forces are keeping the $5 billion ePurchasing and contract life-cycle management (CLM) software markets highly competitive and dynamic. First, cloud delivery via software-as-a-service (SaaS) is a growing part of the market, reaching 41% of total vendor revenues by 2012. Second, Smart Computing is permeating the market, with embedded analytics and rich collaborative environments becoming key functions in products like CLM, services procurement, supplier risk and performance management, and of course automated spend analysis. Third, vendors with a strong vertical focus in several cases have outperformed the overall market, while many other vendors are concentrating on several vertical industries. Fourth, the activity of exchanging critical work objects like purchase orders (POs), invoices and contracts, and necessary business information is raising the importance and value to vendors of networks for connecting buyers and suppliers together.

None of these were features of the organizing vision for CMS.

[Image removed as copyright is owned by Forrester Research Inc.]

Figure 6.4 Forrester Wave for Contract Life-Cycle Management 2011 (Forrester Research Inc. 2011a)

Aberdeen has put out many reports on the CMS market and vendors over the years, including several "benchmark" reports. These reports focus on the benefits of contract management and contract management software, e.g.:

Table 2: The Impact of Poor Contract Management within the Enterprise

Issue	Impact to Procurement	Impact to Sales
Fragmented procedures	Increased maverick buying Increased supply and financial risk Under-leveraged spending	Unprofitable deals Missed sales opportunities Increased financial, legal risks
Labor-intensive processes	Long sourcing, contracting cycles Less spend under contract and mgmt Non-competitive negotiations	Long sales cycles Missed sales opportunities Extended order-to-cash cycles
Poor visibility into contracts and terms	Poor compliance Inconsistent and risky terms Limited visibility into spending	Lost revenue No holistic view of customer SLA and payment penalties
Ineffective compliance monitoring and management	Increased maverick buying High PPV, missed rebates, and discounts Overpayments and performance risks Unnecessary evergreen renewals	Lost revenue Missed renewal opportunities Customer dissatisfaction
Inadequate performance analysis	No view into category performance Policy and regulatory violations Under-leveraged spending, high risk	Ineffective pricing, performance, and profit analysis Financial reporting violations

Source: AberdeenGroup, July 2006

Figure 6.5 Aberdeen's "The Impact of Poor Contract Management within the Enterprise" (Aberdeen Group 2006; with permission)

As an example of Aberdeen Group research, in April 2007 Aberdeen Group issued a report called: "Contract Lifecycle Management and the CFO: Optimizing Revenues and Capturing Savings". The report was underwritten in part by I-Many, Selectica, CMS vendor CMA Contiki, and document automation vendor Business Integrity. Another Aberdeen report, "Select[ica] EMC – Contract Lifecycle Management from Selectica and EMC", dated May 2009, presented survey results from Aberdeen Group's August 2008 "Contract Lifecycle Management Report", which was for a time made available on a complimentary basis in part due to sponsorship by Selectica and SAP (as of July 2012 it cost $399). Tim Minahan followed the CMS market at Aberdeen for a number of years, before moving to Procuri, later acquired by Ariba, where he became chief marketing officer.

To summarize, Gartner, Forrester, Aberdeen and, prior to its acquisition by Gartner, AMR all covered CMS. Gartner provided "MarketScope" coverage to CMS in 2007 and 2008, but has since retired the category. Lead analyst Deborah Wilson questioned the "contract lifecycle" in 2008, and has tracked the fragmentation of the CMS category, particularly between a contracts repository (the über-filing cabinet) and specialized process applications. Forrester issued Forrester Waves on CMS in 2006, 2008 and 2011, charting the shifts in relative positioning of the key pure-play vendors and the encroachment of ERP and ECM vendors into the CMS space. Tracing coverage of CMS, individual analysts do offer insightful and sometimes critical commentary based on following their assigned markets day to day. As examples of this sort of synthesizing guidance I would point out Wilson's distinction between enterprise-wide and more specialized, purpose-built applications (Gartner Inc. 2011; see footnote 2), her blog questioning the contract lifecycle (Wilson 2008; Appendix 6.3; see footnote 2), and Bartels's (Forrester Research Inc. 2011b) commentary on the evolution of the CMS market. In reports like these, analysts not only explain software products and vendors to customers but interpret the market for all participants, including vendors and their investors. In this respect, analysts are like other specialty trade media, and the case of CMS supports Pollock and Williams's characterization of analyst research as commodified "community knowledge". In Chapter 7 I will take this point forward in a somewhat different way to explain the failure of CMS within a commoditization framework.

6.2 Five focus vendors

Having traced the analyst coverage of CMS, I now turn to the five focus vendors: I-Many, Selectica, Ariba, Emptoris and Upside. In the following brief histories distilled from hundreds of pages of archival materials, I am looking first of all to understand them in relation to the business model for packaged software, including generification, and more generally to draw out the implications of Sawyer's (2001) observation that profitability and market share, not user adoption and user satisfaction, are the measures of success for packaged software. .

6.2.1 I-Many

I-Many is considered a pioneer in the contract management software market (Forrester Research Inc. 2006). Incorporated in Massachusetts in 1995, I-Many went public in 2000, and, in the circumstances described below, was acquired by a private equity company in 2009. Appendix 6.4 presents an overview of key measures of the company's size and financial results for the years when it was a public company.

Before going public, I-Many's focus was on sell-side software for contracting in the healthcare industry, and in its initial S-1 registration statement for the IPO (initial public offering), filed in March 2000, the company linked its prospects to the growth of the healthcare industry. The S-1 characterized healthcare purchasing as complex, with pricing determined off a number of variables: volume and composition of items purchased, number of parties to the contract, seller's market share and purchaser's demographics, as well as how many products are used in a particular surgical procedure. Pricing incentives were generated through chargebacks and rebates, and US government healthcare regulations added another layer of complexity.

I-Many executed several strategic moves intended to improve its positioning in advance of the IPO. It launched an internet portal, "I-Many.com", intended to serve as a "marketplace for trading partners in the healthcare industry". But management also believed "*that the purchase contracting practices in many other industries are similar to those in the healthcare market*" (emphasis added) and intended to explore opportunities to serve other industry verticals. In May 2000 they entered into a strategic partnership arrangement with Procter & Gamble in order to move into the consumer packaged goods market (see Appendix 6.5). The company suggested that this strategic partnership would help them extend their reach into broader B2B (business to business) e-commerce, which they believed was "increasingly characterized by the use of complex purchasing contracts" (I-Many S-1 filed May 17, 2000) – like the healthcare contracts described in the initial S-1. The industry section of the S-1 was recast from healthcare to B2B e-commerce. Immediately after the IPO the company turned to making strategic acquisitions and alliances (see Appendix 6.6) intended to grow or consolidate market share, enter new markets and gain new software capabilities. In August 2001 and March 2002, I-Many bought contract management software vendors Provato and Menerva, and in 2002 I-Many released its ContractSphere product for "full contract lifecycle management capability, buy-side and sell-side".

Over the following years, I-Many won analyst praise but despite significant expenditures on sales and marketing (see Appendix 6.26) failed to achieve profitability. I-Many was unable to expand into new verticals: No royalties were earned, and no milestones reached under the agreement with P&G, and the agreement was amended so that P&G was paid in warrants for I-Many stock. During 2004, I-Many's auditors resigned, NASDAQ threatened a delisting because of I-Many's low stock price, and management looked for a buyer for the company. In December 2004, I-Many announced a merger with Selectica, which Selectica's chief described as a combination of Selectica's pricing engine (see section 6.2.2) with I-Many's contract management expertise. In January 2005, another software company, Trilogy, made a tender offer for Selectica, based on an assumption that the I-Many merger would not go through. The Trilogy offer was rejected by Selectica, which remained committed to the merger with I-Many. But in March 2005, I-Many shareholders rejected the merger on the basis that the price ($1.55 a share) was too low.

By June 2005, investors called for new management, long-time CEO Leigh Powell left in August 2005,[41] and from the summer of 2005 through 2008 there was a significant changeover of executives. Strategy under new management was to capitalize on I-Many's dominant position

[41] In 2011 he was CEO of iContracts, a vendor of contract management and compliance solutions for the pharmaceutical and healthcare industry.

in healthcare, through still proclaiming its status as “the only publicly-traded, independent company devoted to Enterprise Contract Management”. They also shifted their business model away from the sale of licenses toward subscription and other “recurring” revenues. At the end of 2007, I-Many placed $17 million of senior convertible notes to shore up its cash position. In 2008, the company made two acquisitions in the healthcare software business, and expanded into the medical devices market. But in the third quarter of 2008 the financial crisis caused a collapse in I-Many’s stock price, and the company was again threatened with a delisting by NASDAQ. The senior convertible notes were accelerable on delisting, so I-Many faced a liquidity crisis. In December 2008, the company announced that it had agreed to be bought by a private equity company for a price of $.43 a share, eventually increased to $.61 a share, far lower than the price offered by Selectica in 2004-2005 (see Appendix 6.7). The new owners announced a far narrower brief for the company, focusing on regulated industries requiring “enhanced data management, data processing and business intelligence” (Appendix 6.8).

In summary, I-Many began and ended the period 2000 to 2010 as a provider of specialty contracting applications for the healthcare business, with a particular expertise in US government healthcare regulations. In preparation for its IPO, I-Many constructed a broader business model under the banner of contract management, which was “agnostic” in terms of industry specialization, and entered into a strategic partnership with Procter & Gamble to develop a consumer packaged goods business. The P&G partnership would have been the first step in a horizontal move across industries. However, the company failed to substantially extend its reach into industries beyond healthcare, which remained the mainstay of its business. Segment reporting (Appendix 6.9) shows the anticipated development of a consumer packaged goods segment (2000-2002), which was dropped by 2003. The high water mark of non-healthcare revenues was 2003, and by 2008, it accounted for only 15% of revenues; for many years I-Many said that it needed to move beyond the healthcare industry, and then acknowledged that it was highly dependent on the healthcare industry. Throughout the period 2000 to 2008, I-Many generated losses and ran down its cash position until a liquidity crisis forced its sale for a price per share far lower than the price Selectica had offered four years earlier.

[Image removed as copyright is owned by I-Many.]

Figure 6.6 I-Many's "Enterprise Software for Contract Management – A Buyer's Guide" (I-Many 2006)

The history of I-Many suggests that a data-centric model of contracting developed to suit a specialized contracting context was not easily generalizable. Strategic transactions, including partnerships with customers to extend market reach, high sales and marketing expenditures and a shift of the business model toward recurring revenues (Appendix 6.10) were not sufficient to make CMS profitable. As a footnote to the I-Many experience with CMS, I point out here a white paper called "The Myths, Pitfalls and Realities Around Enterprise Software for Contract

Management: A Buyer's Guide" that I-Many produced in 2006; it was no longer available on the I-Many website as of 2011. This white paper identifies many of the uncertainties around the business case for CMS, consistent with findings outlined in Chapter 5. It is not clear why I-Many produced this document, though I surmise that it was intended, in a perhaps self-serving way, to help prospective customers develop realistic expectations for CMS, and to distinguish I-Many, as an established and experienced CMS vendor, from the many smaller competitors beginning to offer CMS products.

6.2.2 Selectica

Selectica, which became a public company in 2000, was a late-comer to CMS. Appendix 6.11 presents an overview of key measures of the company's size and financial results. Selectica was incorporated in 1996, acquiring the technology and assets of Catalogics Software Corporation, a company founded by Dr. Sanjay Mittal. Both Dr. Mittal and Selectica co-founder Rajen Jaswa were graduates of the Indian Institute of Technology, and for some years a significant portion of Selectica's staff and operations were located in India. Selectica's software enabled companies such as BMW to configure and price complex products (i.e. products with lots of "options") for sale in web-based environments. Selectica described its "configuration, pricing and quoting" or "CPQ" application as a rules-driven "pricing engine" incorporated in an "internet selling system". Selectica's product was intended to replace sales personnel in e-commerce, and, though the company had only a few customers, management believed that its model was extendible to new vertical markets.

After its IPO, Selectica had over $200 million in cash and it made some strategic acquisitions into new industry verticals. Like I-Many (and many other dot.com companies), Selectica used its equity as currency, giving warrants to partners and customers but also relying on stock-based compensation to pay its employees. Its stock price collapsed from a high of $86.50 in the quarter ended June 30, 2000 to $3.53 a year later, and Gartner commented in May 2001: "Sales configuration vendors have lost nearly 96 percent of market value in the past year and laid off more than 800 employees." (Gartner Inc. 2001; see footnote 2)

From the beginning, Selectica had listed as risk factor the trouble it experienced extracting the "knowledge base" from its customers during implementations. A pattern developed where customers seemed to rotate in and then out of the top revenue spots, for example:

	Customer revenues, year ended March 31,					
	2003		**2002**		**2001**	
Customer A	25	%	*		*	
Customer B	14	%	11	%	*	
Customer C	*		*		17	%
Customer D	*		*		16	%
Customer E	*		*		14	%

Table 6.1 Selectica top customers by revenue shares, fiscal years 2001-2003

By March 2003, Selectica's stock was trading for less than its cash and investments, making it a potential takeover target. Yet Selectica featured in Gartner's 1H 2003 Magic Quadrant for sales configuration as a leader, together with Oracle and Siebel (Gartner Inc. 2003a; see footnote 2). In December 2003, the company started to work on "lower-priced versions of its configuration, pricing and quoting solutions designed to target companies with projects of mid-tier complexity that do not require customized solutions"; they identified telecommunications and manufacturing as their core markets (Selectica press release January 22, 2004). The company also reported "making progress in developing *vertical industry-specific applications that deliver out-of-the-box solutions*" (Selectica press release April 29, 2004, emphasis added).

In May 2004, Selectica had its first tangle with a competitor, Trilogy, when Trilogy sued Selectica for patent infringement; Selectica countersued in November. In January 2005 Trilogy made a tender offer for Selectica (see section 6.2.1), which did not go through. Conflict with Trilogy (later acquired by Versata) would plague the company for years to come, and a comprehensive settlement was not agreed until 2011.[42]

[42] In January 2006, Selectica settled its original lawsuit with Trilogy for $7.5 million, but in October 2006, Trilogy (now Versata) sued them again, again alleging patent infringement. In October 2007, Selectica announced a settlement with Versata over the CPQ business. Under the terms of the settlement, Selectica was required to pay a $10 million lump sum plus additional amounts in excess of $7.5 million over time. There was a full license of Versata patents for CPQ, and the two parties allied to sell CPQ to existing Versata customers. In July 2008, Versata made an offer for Selectica, which the board rejected, and Versata proceeded to accumulate Selectica stock, acquiring over 5% by November. Selectica's management then amended Selectica's existing shareholder rights plan ("poison pill") to reduce the triggering event threshold from 15% to 4.99%, justifying the action on the basis that changes in control over 4.99% might jeopardize one of Selectica's principal assets – its accumulated NOL (net operating loss) position for tax purposes. As a result, Versata's equity position was effectively diluted in January 2009 when the pill was triggered. Selectica sought a declaratory action in Delaware Chancery Court to have its shareholder rights plan upheld. In February 2010, in a significant corporate law decision, the

While the company had not spent down its cash from the IPO, its product and its business model were not succeeding. In a strategic break away from reliance on its CPQ software, Selectica made the failed attempt to acquire I-Many (section 6.2.1), and, when the acquisition was turned down by I-Many shareholders, Selectica bought Determine contract management software, in May 2005. The company's market strategy now encompassed buy-side as well as sell-side. In addition, they began to offer a web-based hosted or on-demand product, targeting the middle market customer and looking to generate a subscription-type stream of revenues. The company acknowledged a growing reluctance on the part of their traditional customer base to take on large scale custom implementation projects, as well as growing competition from ERP vendors. Domain expertise was now recognized as a critical success factor, and Selectica claimed manufacturing, banking and insurance as their three principal verticals.

By February 2006, the contract management business was starting to take hold, and Selectica's CEO said he was "very optimistic about that little business". During 2006 Dr. Mittal left the board, and by the end of the year Selectica's crossover to the contract management software business was well underway. Selectica's original business was described as the "legacy" CPQ business, and put into maintenance or run-off mode to support existing customers. Jason Stern, formerly of I-Many, was hired in 2006, and by 2010 was credited with leading the turnaround of the company, when Selectica finally started reporting positive cash flow, albeit on a low revenue base. As of 2011, Selectica described itself as "provider of deal management solutions, including sales configuration and contract lifecycle management solutions", and its motto was "Get Deals Done *Right*". The company provided its own take on its history – as a smoothly transitioning concept-driven business:

> Our company was founded in 1996 based on the then revolutionary idea that Internet technologies could provide users with "selection and configuration expertise" to guide users in making better decisions in the sales process. Over the years, we've expanded on our vision to encompass the entire deal management process, with a comprehensive suite of solutions that includes sales configuration, pricing, quoting, and contract lifecycle management, with modules for mobile devices, employee self-service, and Salesforce.com. Today, our solutions help companies get deals done right in over 20 industries, by over 100,000 users, to process over one million new contracts annually. (www.selectica.com, accessed November 18, 2011).

Delaware Chancery Court held in favor of Selectica and against Versata on the rights plan amendment. This decision was appealed by Versata but upheld in October 2010. On September 20, 2011, Selectica and Versata entered into a comprehensive settlement agreement. Under the settlement agreement Selectica agreed to pay Versata about $6 million, and Versata sold its Selectica shares back to Selectica and agreed not to buy any more for 25 years.

Selectica began life as a configuration, pricing and quoting (CPQ) software company, and the founders and investors believed that the future of e-commerce for sellers was in algorithmic configuration capabilities. They believed that Selectica's early experience developing software of this type for several large companies would translate into broader success, but they met competition from ERP vendors. When this business collapsed, the original management left. The proposed merger with I-Many in 2004-2005 was an attempt at strategic consolidation, matching Selectica's still large cash reserves and sell-side CPQ platform with I-Many's contract management business. When the merger fell through, Selectica bought a contract management capability (Determine). Over the following years they were able to build this into a small, marginally cash-flow-positive business, under the leadership of a former I-Many executive, while the original CPQ business declined (Appendix 6.12). During this time, Selectica spent more than seven years locked in a running battle with another software company over intellectual property rights, customers and revenues, and corporate control; their court case in Delaware made new corporate law.

Selectica was like I-Many in that it started with a data-centric model of contracting which it believed would have wide applicability in e-commerce, and in that its experience points to the domain-specificity and even customer-specificity of contract data – its customer concentration being noteworthy (Appendix 6.13). Like I-Many, Selectica relied on strategic transactions and high sales and marketing expenditures to grow revenues, but was locked into a high proportion of low margin service revenues (Appendix 6.14). Unlike I-Many, Selectica did not run out of cash, but its history demonstrates the use of intellectual property litigation and unfriendly stock acquisitions as competitive strategies. Also unlike I-Many, Selectica came late to CMS – in 2005, when its original CPQ capability was being overtaken by ERP or internally developed systems. As of July 2012, the company was repackaging CPQ as a cloud application available through salesforce.com's AppExchange.

6.2.3 Ariba

Ariba, which went public in 1999, came into the CMS market from yet a different angle – B2B e-commerce for "indirect spend", i.e. expenses not directly tied to the production of the products or services the company sells. [43] Appendix 6.15 presents an overview of key measures of the company's size and financial results. Ariba originally positioned itself within B2B e-commerce for what they called "operating resources", a category which corresponds to indirect spend.

[43] For a bakery the cost of flour is direct spend, while the cost of a telephone is indirect spend. Cf. Lacity et al. (2006).

Ariba intended to link its customers' purchasing with Ariba's supplier network, an e-commerce portal or platform. Ariba's target customers were:

> large, multinational corporations and public sector institutions … We believe these organizations will be the most likely early beneficiaries of an automated, reliable, robust and scalable procurement solution and can provide strong customer references. Furthermore, we believe the large spending power these organizations can channel through our Ariba.com network will attract suppliers to the network. Finally, these organizations have demanding requirements and rigorously test our products, assisting us in designing a robust, reliable and scalable solution. (Ariba S-1 filed April 23, 1999)

Ariba believed it had "first mover advantage" with this customer group and expressly invoked the "network effect" which it expected to exploit.

After the IPO, Ariba made a series of acquisitions in the B2B e-commerce (or "net market") business, using its inflated equity as currency (Appendix 6.16) and taking on a large amount of goodwill. In 2001, when the dot.com bubble burst, and e-commerce did not achieve its expected level of success, Ariba went through a period of crisis. By 2003 the company had largely written off its "net market" acquisitions and repositioned as a provider of "spend management" solutions. Co-founder of Ariba Keith Krach left the company in 2003.[44] Over the following years, Ariba consolidated its position in spend management, making several strategic acquisitions (e.g. of Freemarkets), shifted to a subscription model, and in the background continued to expand and develop its supplier network. "We believe that technology alone is not enough to transform procurement from a tactical to a strategic function. Accordingly, Ariba Spend Management solutions combine domain expertise, operational services, software applications and network access." (Ariba 2004 10-K) Still, Ariba was not profitable, with relatively high levels of low margin service revenues (Appendix 6.17).

In 2004, Ariba began charging suppliers fees for access to its Ariba Supplier Network. In 2005, the Ariba Supplier Network had been opened up to customers using competing e-procurement software. In 2006, the supplier network had 140,000 registered suppliers and handled more than $90 billion of transactions. In June 2007, Aberdeen Group issued a report called "Could Ariba Be B2B's Comeback Kid?"

Though Ariba was named a leader in the 2006 Forrester Wave for contract life-cycle management, in Ariba's annual report for 2006 contract management was listed as just a component of Ariba's spend management solutions. In 2007, Ariba bought Procuri, "a

[44] In 2011 he was the head of DocuSign, a major e-signature provider (docusign.com, accessed November 18, 2011).

privately-held provider of on-demand supply management solutions"; Procuri had bought CMSI, a contract management software vendor, in 2005. Gartner commented that for Ariba the Procuri transaction removed a competitor, as Procuri's products were largely duplicative, but complemented Ariba's large company (more than $2 billion in revenue) customer base with mid-market customers from Procuri (Gartner Inc. 2007b; see footnote 2). Procuri customers were migrated to Ariba over the next several years. Ariba held its position in the CMS category when it was named as a leader in the Forrester Wave for Contract Lifecycle Management in August 2008 (Forrester Research Inc. 2008). But for Ariba contract management was part of procurement. The company strengthened its procurement offerings with solutions for the "contingent labour" (temporary contract work) market.

Ariba moved to profitability in 2009, and in 2010 effected a further repositioning, as "the leading provider of collaborative business commerce solutions", no longer limited to spend management, and a player in "cloud computing". In Ariba's description of its offerings as of the end of 2010, contract management products were split between buy-side and sell-side, and allotted only one paragraph each (Appendix 6.18). Meanwhile, the "Ariba Network" was featured much more prominently than in the past. The supplier network was by this time quite substantially built out; access from the supplier side was quality controlled, and attracted a fee based on deal flow (e.g. 1% for $100 thousand to $10 million), with supplier fees an increasing proportion of revenues for Ariba. In January 2011, Ariba bought Quadrem, a European-based online network for buying and selling goods and services. As of 2011, Ariba seemed poised to realize, to some extent at least, on the original vision of networked e-commerce. In May 2012, the company announced that it had entered into an agreement to be acquired by SAP for $4.3 billion. In the joint press release (May 22, 2012), the companies said that "[t]he acquisition will combine Ariba's successful buyer-seller collaboration network with SAP's broad customer base and deep business process expertise to create new models for business-to-business collaboration in the cloud".

Ariba started with a vision of B2B e-commerce for indirect spend (or "operating resources"). Using their stock as currency they made a number of expensive acquisitions during the dot.com boom, which they had to write down when the bubble burst, generating large non-cash losses. B2B e-commerce did not materialize as quickly as early proponents had expected, and after the first few years Ariba re-positioned as expert in spend management. Ariba came late to CMS, and contract management has always been a secondary or complementary offering. In 2007, Ariba bought Procuri in a market consolidation move and in this way acquired the contract management capabilities originally developed at CMSI. But in the meantime Ariba continued to expand its supply network, moved to an on-demand model, and, in 2010, associated itself with cloud computing. In a fashion, it continued to work its original vision, and after a decade of loss moved to a profit position in 2009. As of 2011, Ariba, as an “eProcurement” vendor, was a leader in CMS, as judged by Forrester (Forrester Research Inc. 2011a), and by 2012 became an attractive acquisition for SAP. But Ariba is not a success story for CMS.

Ariba’s history is notable for a number of reasons. Like I-Many and Selectica, Ariba initially used its stock in strategic transactions, but to a far greater degree – resulting in enormous amounts of goodwill and then enormous losses as goodwill was written down. But in many other ways Ariba is different from I-Many and Selectica. Foremost is its approach to the issue of scale. Instead of starting with a particular customer or industry with the expectation that the experience would generalize, the company all along targeted the professionalized procurement function of very large companies, a kind of industry-agnostic specialty. It was committed to the buy-side, and to a supplier network, which it opened to competing enterprise software solutions. They evolved on-demand and cloud computing capabilities and eventually supported the sell-side for their suppliers. In this overall story, CMS plays a relatively small role, and is split between buy-side and sell-side.

6.2.4 Emptoris

Like Ariba, Emptoris (founded in 1999) began life by claiming a place in B2B e-commerce, with strategic sourcing and request for quote applications. As in the case of Selectica, the company’s rules-based and algorithmic foundation was associated with an individual technology entrepreneur, Avner Schneur, a graduate of Technion University in Israel. Unlike Selectica, Emptoris focused on the buy-side.

Emptoris’s ePass capability centered around “sourcing events”. In July 2001, Emptoris announced that there had been 21 sourcing events using ePass, covering 500 types of items and over 20 million individual items of industrial parts, ingredients and business services. The company claimed major savings for its customers directly attributable to Emptoris’s “optimization-based decision support” software capabilities, as an overlay to ERP. Appendix 6.19 gives a sense of both the scale and granularity of Emptoris’s data-centric approach.

> Poor analytics and toxic data locked inside ERP systems make it impossible to gain a comprehensive view of spend. … Even if companies have pursued an ERP solution, a data warehouse solution, or a business intelligence solution, they can now augment these initiative with new key technology offerings from Emptoris, to gain true spend visibility using these existing investments, in as little as three months. (Emptoris press release November 14, 2006)

Emptoris made many strategic e-commerce alliances during the dot.com era, including, in February 2001, a strategic partnership with diCarta, "the award-winning leader of Internet-based business-to-business contract and revenue management solutions" with a "web-based contract lifecycle management application". DiCarta was named a leader in the 2006 Forrester Wave for CMS, and that year merged with Emptoris. Andy Kyte of Gartner (the author of the $20 billion prediction for CMS) commented, suggesting that CMS vendors like diCarta were being acquired by vendors in the more "mature" e-sourcing category.

> Most large organizations have accepted that there is value in using IT systems for handling requests for information, proposals or quotations: They have accepted the e-sourcing model. However, the market for e-sourcing systems is far from saturated and there is still a lot of growth potential. *Meanwhile, the paradigm for contract life cycle management has not yet achieved visibility or acceptance. System vendors have not been able to achieve the growth that their value proposition deserves. When a mature market and an emerging market overlap in their buying centers and value propositions, the vendors in the mature market tend to acquire those in the emerging market to grow and to extend their own value propositions. There has been a quiet, but strong trend for providers of e-sourcing systems to acquire companies offering contract management systems.* (Gartner Inc. 2006; see footnote 2) (emphasis added)

Following the diCarta acquisition, Emptoris's CMS profile and its marketing efforts in support of CMS increased. For example, in March 2008, Emptoris partnered with IACCM to present a series of seminars in Europe on the role of technology in contract management, and an Emptoris customer was profiled in IACCM's newsletter. In July there was an Emptoris webcast featuring Syngenta Crop Protection and Tim Cummins of IACCM. Citing the 2008 Forrester Wave for CMS, Emptoris noted:

> The Forrester Report calls contract management software one of the most important business applications of the decade, stating, "At the risk of engaging in a bit of hyperbole, we believe that CLM could turn out to be one of the most important new business applications of the first decade of the 21st century." Further, "Forrester's analysis of CLM market data shows that purchases of CLM are growing at rates in excess of 25%, and we continue to get more client inquiries about CLM than any other ePurchasing product." (Emptoris press release August 13, 2008)

In November 2008, Emptoris was rated "positive" in Gartner's MarketScope for contract management software (Gartner Inc. 2008c; see footnote 2), while earlier in the year it was rated a leader in Gartner's Magic Quadrant for sourcing applications (Emptoris press release December 3, 2008).

Emptoris worked to take customers from competitors, Ariba in particular, by making promotional offers. For example, in 2006, Emptoris announced a "ValueNow" program of incentives for customers switching to Emptoris from another vendor; in November of that year it announced it had taken "large marquee accounts" from Ariba. When Ariba bought Procuri in

2007, Emptoris invited Procuri customers to migrate to Emptoris under its "conversion" program. Emptoris renewed this invitation in 2008 when Ariba announced that it would end support for Procuri solutions in 2009. In April 2007, Ariba sued Emptoris for patent infringement, seeking "damages for losses related, in part, to Fortune 500 customers who had converted from Ariba to Emptoris". In December 2008, a $7 million judgment was entered against Emptoris. Based on analyst commentary,[45] notwithstanding Emptoris's continuous announcements of increasing revenues, the judgment appears to have put the company in a cash bind, and in January 2009 Emptoris announced that it had been acquired by Marlin Equity Partners, a private equity company. Avner Scheur left the company later that year.

After the change in ownership, Emptoris continued to develop expertise in particular areas of procurement. In 2010, Emptoris developed the "contingent workforce" or "contingent labour" management area, offering to "demystify" services procurement in a webinar co-hosted by HCMWorks, "leaders and pioneers in the field of human capital optimization and services procurement" (Emptoris press release April 29, 2010). In September 2010, Emptoris was ranked a leader in Forrester Wave: Services Procurement Q3 2010 (Emptoris press release September 30, 2010). In January 2011, Emptoris announced the acquisition of Rivermine, a leader in Gartner's first Magic Quadrant for telecom expense management (Rivermine press release January 6, 2011). In December 2011, IBM announced a definitive agreement to acquire Emptoris for its "Smart Commerce" initiative, with contract management just one part of its procurement offering.

Emptoris, like Ariba, was originally positioned in the B2B e-commerce space, offering an algorithmic capability for its "sourcing events". During the dot.com era it made strategic alliances, including with diCarta, an early entrant in the CMS market with a highly developed contract creation capability. In 2006 Emptoris bought diCarta as part of the wave of consolidation. As with Ariba, contract management was a secondary or complementary capability relative to Emptoris's principal business, sourcing and spend analysis. Ariba and Emptoris were competitors: Emptoris worked to take customers from Ariba, particularly after Ariba's Freemarkets and Procuri acquisitions. Ariba sued Emptoris for patent infringement.

[45] In March 2008, Gartner's Deborah Wilson had issued a Vendor Rating on Emptoris, saying that "Emptoris has established itself as a general-purpose, premium sourcing and contract management applications vendor" (Gartner Inc. 2008b; see footnote 2). But in the summer of 2009, Emptoris announced that it was starting a search for a new executive. Wilson, while commenting on the loss of Avner Schneur, noted that "Last year's disclosure (that came as a result of the Ariba patent infringement lawsuit) that Emptoris' revenues were much lower than the analyst community had been left to believe were quite unsettling. Even more surprising was the fact that Emptoris was no where near profitable (at least not in 2007), which given its size and age, it should have been. It is not a good sign that Emptoris was not able to get another round of funding from its existing investors last December when it had to pony up $7 million in damages to pay Ariba." (Wilson 2009; see footnote 2)

When the judgment in this case was handed down, Emptoris was apparently short of cash and had to turn to Marlin Partners. The founder of Emptoris subsequently left. Within two years, Marlin had sold Emptoris to IBM.

6.2.5 Upside

Upside also started as the vision of an individual technology entrepreneur. Ashif Mawji moved to Alberta, Canada from Kenya in 1987, when he was 15, and it was in Alberta that he started an e-billing company in 1999. This is the company that became Upside Software. Although early on Upside received "first round funding", Upside has never gone public. Neither did it become a private equity portfolio company. Instead, as of 2011, about 90% of the company was owned by management. Ashif Mawji was still the head of Upside in 2011. In 2000 Upside hired Doug Hay, a business intelligence software engineer (previously from Cognos and IBM), and Mr. Hay was still Upside's chief architect in 2011. Upside's business description has been consistent over the years (Appendix 6.20).

Upside continuously improved their product, tracking the changes in press releases and on their website, and offering affordable options. They introduced low-cost, easy deployment version of the products starting in 2000: "License fees for UpsideContract-LITE start at $1,500 and deployment costs are as low as $5,000, providing a price point that enables companies to manage their investment and receive a very fast return on investment (ROI), often in as little as 30 days." (Upside press release December 2, 2002) In 2004, Upside made a number of product innovations – integrating with Word, offering a fully hosted solution, and creating a very low-priced option with fees as low as about $50 per month, with a 2-week free trial offer. Mr. Mawji emphasized the product's affordability, noting as well that Upside had a "100% zero customization track record (meaning that its flagship product, UpsideContract, has been installed at customer sites with no changes to the core product code" (Upside press release June 15, 2006). In 2011 the company began to offer UpsideLiveLite – SaaS contract management software for "as little as $19.99 a month" or $220 for 30 users (with a 45-day free trial).

Upside steadily built its business starting with early customer partnerships. In 2000, it entered into a marketing alliance with the Government of Alberta in exchange for use of its software and a percentage of gross sales. In 2001, Upside signed a major deal with Burlington Northern, and in 2002 signed another major client – Hewlett Packard. By the time of Upside's 2007 user conference, Procter & Gamble (formerly a marketing alliance partner of I-Many, as noted in section 6.2.1) delivered a "success story" presentation. Upside press releases frequently mentioned industry analysts Aberdeen, AMR and Forrester and the IACCM (see Appendix 6.24). For example, in November 2003, an Upside press release contained favourable comments from Tim Minahan of Aberdeen and from IACCM, as well as a quotation from Gartner on the contract management market. In July 2005, when Aberdeen released a report on the contract management software market, Upside issued a detailed press release, and a complimentary copy of the report was made available through the press release. IACCM's 2007 market sizing survey was also made available through an Upside press release, which contained favourable commentary from Tim Cummins and from AMR Research. Upside's continuing close relationship with IACCM ("Upside helps educate the industry about IACCM") was signaled in 2008 when Upside offered a complimentary IACCM membership to its customers. In November 2009, AMR ranked Upside number one of seventeen CMS vendors in an analysis of 17 criteria (Upside press release October 29, 2009), and Upside was a leader in the 2011 Forrester Wave for CMS.

Upside press releases have provided periodic reports of revenue growth (as Emptoris's press releases did), but also say that Upside has been continuously profitable starting in 2001. For example, in 2005, the company announced that they had increased sales "in just four short years by a whopping 1,984% and profits have grown by over 455%" (Upside press release January 17, 2005). Even so, Upside does not seem to have been a very large company in terms of revenues and profitability. On July 24, 2012, Upside announced that it would be acquired by NASDAQ-listed Sci-Quest, "a leading provider of cloud-based source-to-settle solutions", for approximately $22 million. This acquisition would represent the absorption of Upside into a e-procurement.

Upside stands out against the other four focus vendors for the continuity of its management and business, and linear or organic product development. While the company has large customers with complex deployments including data integration, Upside moved early to offer lower cost versions of its product that might compete with the many low-cost document-centric CMS vendors that emerged. Upside worked early to build substantial alliances with key clients such as the Government of Alberta, and has always emphasized its links with analysts Aberdeen, AMR and Forrester as well as the IACCM. According to its press releases, Upside moved to profitability from its second fiscal year of operations. However, with the 2012 announcement of its acquisition by Sci-Quest, there is an acknowledgment that contract management software is a complementary offering.

6.2.6 "Supply-side rhetoric": marketing CMS

All five vendors were very active in generating "supply-side rhetoric", marketing across many channels and to many audiences simultaneously, in particular targeting large companies (the Global 2000 or the Global 1000) as potential customers (see e.g. Appendix 6.19). An Ariba annual report provides an indicative account of vendor marketing efforts (Appendix 6.21). Concepts such as the "contract lifecycle" were mobilized, and illustrated (see Figure 5.1 and Appendix 6.22). For the public companies, SEC filings were directed principally toward investors but also referenced by analysts and customers in the course of due diligence and analysis.

Vendor websites posted press releases, guides and educational materials such as so-called "white papers", sponsored analyst reports, marketing brochures and webcasts or webinars (see, e.g., Appendix 6.23). Press releases announced product developments, client wins and favorable analyst ratings or commentary (see Appendix 6.24 for a list of analyst and IACCM mentions in Upside and Emptoris press releases). The typical webinar involved a customer and vendor representative, with commentary provided by an analyst, a media representative or a representative of the IACCM. Vendors also provided materials intended to assist in the procurement process, such as I-Many's buyer's guide referred to in section 6.2.1, or an RFP template for CMS procurement with an analysis of deployment options Selectica made available on its website in 2009. Vendor websites also featured customer lists, customer testimonials, "success stories" and case studies. Customers presented their "success stories" at conferences, another key marketing platform, and acted as references. User group meetings were platforms for discussion of technical issues but also marketing and community-building, where successful customers might be given awards. Selling interaction would incorporate software demos, and vendors increasingly used web interactivity for demos, links to promotional videos posted on youtube.com, and targeted web ads (see Appendix 6.25).

What stands out in a review of marketing materials is the self-referentiality among market participants. Customers were cited in marketing materials for investors (SEC filings and press releases) and to other customers, the analysts and the IACCM. The analysts and the IACCM were cited to investors and customers. Investor support was important to analysts; for example, analysts commented favorably when private equity investors acquired I-Many and Emptoris, promising financial support. This body of discourse built up, echoing and amplifying in a kind of collective marketing, or co-marketing, within the knowledge network.

Marketing costs for CMS were high.[46] For the years 2000-2003, aggregate sales and marketing expenditures were $80 million against revenues of $186.7 million, or 43% of revenues, for I-

[46] Marketing expenses can be significant for IT companies. In the original filing for its IPO, Groupon presented a non-GAAP figure for "Adjusted Consolidated Segment Operating Income" or Adjusted CSOI, which excluded online marketing expense on the basis that "Online marketing expense primarily represents the cost to acquire new subscribers and is dictated by the amount of growth we wish to pursue." For 2010, online marketing expense was over $421 million on revenues of $713 million. "[W]e think of it [Adjusted CSOI] as our operating profitability before marketing costs incurred for long-term

Many; $112.3 million against revenues of $152.8 million, or 73% of revenues, for Selectica; and $638.3 million against revenues of $1.1 billion, or 55% of revenues, for Ariba. For these three vendors, aggregate sales and marketing expenses for 2000-2007 were approximately $1.2 billion, revenues were approximately $2.9 billion, and there was an aggregate loss of more than $5 billion (Appendix 6.26).[47] As the principal of one CMS vendor (not one of the focus vendors) said in 2009:

> At the tail end of the internet boom, CMS became the "next hot topic". The North American companies followed the normal pattern for that time which was to buy market share, using the proceeds of multiple rounds of VC funding, with the VC looking to capital gain on exit. A typical marketing program involved spending of about $40 million, which assumes a market cap of about $500 million. This was okay in the good old days but didn't work any more. So in 2002-3, the providers were burning up venture capital, building up huge sales forces, but the market was not moving. So there has been attrition and consolidation.

In this quote we see the perceived direct relationship between market capitalization, marketing and market share, organized around the "next hot topic", CMS as a category – a direct line running from equity investments in vendors, through marketing the category, to market share. The software itself is nowhere to be seen. I suggest that this may be part of what it means to say that market share and profitability substitute for user satisfaction as measures of success for packaged software. In Chapter 7, I will expand on this observation in relation to the theory of commoditization.

6.3 Evidence of breakdown from analyst and vendor archival material

In this section I draw on the data from the analyst and vendor archival material to present further evidence of how CMS failed to meet expectations with respect to the business model for packaged software, including generification, and the category. With the analyst and vendor data in hand, it also becomes possible to address more directly the motivating question for this study ("What happened to contract management software?") as a failure of correspondence between market expectations and market performance. This is an important reorientation away from "What was wrong with CMS?" to "Why were market expectations for CMS so high?" This material is under three headings – evidence of the breakdown of the business model for

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growth." (Groupon S-1, June 2, 2011) The SEC responded: "We note your use of the non-GAAP measure Adjusted Consolidated Segment Operating Income, which excludes, among other items, online marketing expense. It appears that online marketing expense is a normal, recurring operating cash expenditure of the company. Your removal of this item from your results of operations creates a non-GAAP measure that is potentially misleading to readers. Please revise your non-GAAP measure accordingly." (SEC comment letter made available June 30, 2011)

[47] Noting here that a large portion of this loss was non-cash – the write-down of goodwill after stock acquisitions. Probably some of the market expenditures were also non-cash.

packaged software; direct evidence of category breakdown; and the breakdown of correspondence between market expectations and market performance – and is summarized in the italicized items in Table 6.2, where they are added to the table of breakdown brought forward from Chapter 5.

Breakdown observed	***Breakdown of what?***
Hard coding from previous clients Buy-side or procurement bias Difficulty in generalizing cross-industry *Contract data was domain-specific and even customer-specific* *Instability of products and vendors* *Strategic transactions to acquire customers and extend into new verticals* *Conflict over customers and IP* *High proportion of service revenues* *Development of multiple delivery options from enterprise to low-cost subscription model; emergence of "commoditized" competition at the low end*	The business model for packaged software (generification)
Process fragmentation (offline processes, no continuous data flow) Functional or operational fragmentation across the contract lifecycle Fragmentation of contracting by type of contract or business unit, especially buy-side versus sell-side; localized and multiple implementations	The organizing vision – automating the contract lifecycle across the enterprise
Fragmentation of contracting – see row above Limitations on the repository (completeness, access and searchability) Difficulties in defining and extracting structured data Limited data integration Reduced expectations for contracting knowledge as associated with CMS (as opposed to risk management, business intelligence or other business initiatives) *Contract data and knowledge are domain-specific and even customer-specific*	The organizing vision – contracting knowledge as an outcome of automating the contract lifecycle across the enterprise

Breakdown observed	***Breakdown of what?***
CMS associated with scale (volume and standardization) and structured data CMS associated with large companies CMS assocated with the buy-side CMS associated with IT infrastructure, especially ERP CMS associated with lower risk CMS associated with “algorithmic” contracting *CMS vendors targeted large firm customers* *4 of 5 focus vendors started with an algorithmic contracting capability* *Algorithmic contracting is domain-specific and even customer-specific*	The organizing vision – CMS as an organizing technology for all types of contract
Unclear as to whether about process or information Conflicting function-specific views of CMS Competition with in-house and other software (e.g. ERP) Overlapping functionalities with other software (e.g. CRM, strategic sourcing) High cost of advanced features Weak business case Fallback to document repository (in competition with e.g. records or documents management systems) *Clear encroachment into CMS space by ERP and other software vendors* *Rating of CMS vendors under other categories* *CMS subsumed under other categories such as e-purchasing* *Gartner retirement of the category* *Emergence of subcategories along various dimensions (repository versus process; documents (Upside) versus data; verticalization (I-Many); procurement focus with a network (Ariba) or purchase category expertise and granularity (Emptoris))*	Category
(Early) vendor equity valuations relative to revenues and profitability *Projected market size as compared to lack of revenues* *Category success as compared to product unprofitability*	*Market expectations in relation to market performance*

Table 6.2 The extended table of breakdown (italics indicates evidence from analyst and vendor data)

6.3.1 Further evidence of the breakdown of the business model for packaged software

The business model for packaged software described in Chapter 2 entails a strategy of generification to turn a customer-specific software product into a high margin information good. With respect to generification, the histories of the vendors tell an interesting story. Generification to new verticals was the cornerstone of I-Many's strategy from before its IPO until roughly 2007. The P&G alliance and other strategic transactions were motivated by the desire of management to move beyond the healthcare industry, but their efforts to extend beyond this industry ultimately failed. Generification to new verticals was also Selectica's strategy for its CPQ engine. Early acquisitions were attempts to buy into new verticals, and management appears to have been very sensitive to the importance of domain expertise, certainly for CPQ and its hard-to-extract "knowledge base". But the most striking thing about Selectica is persistent, "revolving door" customer concentration, which did not go away when Selectica moved out of CPQ into CMS (Appendix 6.13). The experience of these two companies indicates that moving to new verticals was a challenge for the data-centric models of CMS, and the early assumptions that these companies made (expressed in their SEC filing documents) about the generalizability of data-intensive buying or selling in specialized domains were not borne out. The contract data and algorithmic contracting developed by I-Many for the healthcare domain did not transfer to the consumer packaged goods industry (Procter & Gamble) or beyond, and Selectica's CPQ engine, though generic in concept, required a great deal of customization to specify pricing parameters and business rules. These approaches were domain-specific and even (as indicated in the case of Selectica) customer-specific. This had negative implications not only for generification as an element of the business model for packaged software, but for the organizing vision for CMS: For CMS to produce contracting knowledge from contract data, there would need to be a significant investment in domain-specific or customer-specific data management, and, contrary to the idea that CMS would work for all types of contracts, in all types of businesses in any industry, that investment would be of limited use in other contexts.

The other three vendors effectively sidestepped generification, if generification is understand as a strategic extension of product adoption within and then across industries. From the beginning, Ariba management evidenced a sensitivity to scale issues by targeting the indirect spend programs of very large companies, a kind of cross-vertical domain, which they actively supported through their supplier network. In order to build out this e-commerce platform, Ariba reached out to suppliers as well as their own competitors through open standards and community-building efforts. Emptoris also focused explicitly on serving the procurement function of the largest global companies with data-rich contract analytics. Upside, working from a document-centric orientation, does not seem to have struggled with industry specialization or customer concentration; on the other hand it does not appear to have grown very large, with an acquisition price of $22 million in 2012 after being in business for over ten years.

In other words, none of the five focus vendors in this ultimately unsuccessful category successfully executed a strategy of generification. But the breakdown of the business model for packaged software is evidenced in a number of other ways. First, with the exception of Upside, the companies struggled to stabilize their software offerings and their industry positioning, as can be traced through product and company descriptions and segment reporting over the years (see e.g. Appendices 6.9 and 6.12). Vendors pursued strategic acquisitions to buy software and customers (see Appendices 6.6 and 6.16), tried to take customers from other vendors through direct appeals, or attempted to weaken rivals with IP litigation. Notwithstanding these efforts, based on the data from the three public companies, vendors were locked into low margin services, while high sales and marketing costs and research and development costs made it hard to achieve profitability (see Appendices 6.10, 6.14, 6.17 and 6.26). Over time the vendors moved to different selling models, first taking up subscription pricing to smooth revenues, and then offering SaaS, on-demand or cloud solutions. They developed low-cost or "on-ramp" alternatives to extend product reach, as the novelty of the product wore off, competing low-cost, generic, "commoditized" versions of CMS became available, and customers became more reluctant to take up costly, high risk enterprise implementations. Except at Upside (for which no hard data is available), CMS per se does not seem to have been a profitable concept or product, and, as noted, Upside does not seem have become a very large company. As evidenced by all these particulars, CMS did not become a high margin information good.

6.3.2 Direct evidence of category breakdown

The breakdown of the CMS category, suggested in section 5.4.5, comes into clear view with the benefit of analyst and vendor data. It is signaled by the competition from ERP and other software vendors, by the fact that the five focus vendors (with the exception of Upside) have all been associated by analysts with other categories (the healthcare sector for I-Many, CPQ for Selectica, e-purchasing for Emptoris and Ariba), and by the fact that CMS is sometimes subsumed within other categories, usually e-purchasing. Gartner retired the category for MarketScope or Magic Quadrant coverage, and both Gartner and Forrester have remarked on the fragmentation of the category and emergence of subcategories along various dimensions (repository versus process; documents (Upside) versus data; verticalization (I-Many); procurement focus with a network (Ariba) or purchase category expertise and granularity (Emptoris)). In Chapter 7, I explore the meaning of this de-composition of the CMS category in more detail.

6.3.3 Breakdown of correspondence between market expectations and market performance

The early years of CMS, at the end of the dot.com era, evidence overoptimistic projections for the future of CMS, as reflected in inflated stock valuations and the use of company stock and rights to revenues in deal-making. This was not unusual for the time, and stock prices of the three public focus vendors did collapse early on. However, the analysts continued to support the category, with the first questioning of the rationale for CMS coming from Deborah Wilson of Gartner at the end of 2008. Juxtaposing analyst coverage with the vendor histories, they do not match up. First of all, analysts continued to focus on growth prospects as the vendors continued to post losses. More fundamentally, the core vendors in the CMS categories were in fact very disparate, coming at contract management from very different perspectives, with different histories, different products and different capabilities. For all of the vendors except Upside, CMS was not the initial core product offering, but instead a strategic extension, complementary, or even marginal. Analysts reported on the CMS category and gave high marks within that category to the focus vendors. Meanwhile, except at Upside, CMS was neither stable nor profitable.

I suggested in section 5.4.5 that perhaps instances and invocations of "CMS" were, at some level, the same, and yet they were not the same – that, is that CMS existed in a "fluid" topological space (Mol and Law 1994), and that there were different "sub-regions" of CMS (e.g. enterprise systems versus "indexing systems"). In the breakdown of correspondence between market expectations and market performance, there are hints of another sort of multiplicity – of two related but distinguishable phenomena, a product and a category, that share the same name. In Chapter 7, I analyse these as two different levels of commoditization.

6.4 Summary: a biography of CMS as a commodity

In Chapter 5, I described the emergence of CMS as a natural progression from antecedent technologies, as vendors organized software capabilities to meet a newly defined opportunity – contract management. It was, as one interviewee said, a "harmonious convergence". This is one version of the origin narrative. It is similar in structure to the origin narrative for the TSR2 aircraft described by Law (2002) – a "gap" opened up, and, in a kind of inevitable trajectory, predecessor technologies evolved to fill the gap. But – for some reason – CMS as an organizing technology did not work, or did not work as intended. This narrative is reasonably satisfying but incomplete. It takes the production of CMS for granted, and does not really explain where CMS came from and who made it.

The history of the five focus vendors reveals a more surprising yet more believable story. While Upside moved swiftly to claim, develop and consistently maintain a document-centric contract management software space, all of the other five focus vendors started out in other businesses and were data-centric in their approach to contracting. That is, all of the vendors other than Upside began with a view of contracting as a data-rich, specification-driven, and somewhat mechanistic transactional environment offering opportunities for optimization through computational capabilities, and there was a link to e-commerce. Two of the companies (I-Many and Ariba) built e-commerce platforms. I-Many's was quickly abandoned, but Ariba continued to develop and expand their supplier network, and ten years later it was the focus of their business and strategy.

Very briefly, the years 1999-2003 might be characterized as the years of promise, marked by optimistic predictions by Gartner and others. The background was e-commerce. The vendors pursued strategic transactions using stock and other equity interests as currency and (in the case of I-Many and Selectica) believed in extension to new verticals. After the dot.com crash and collapse of early e-commerce initiatives, there followed a period (roughly 2004-2007) of consolidation and repositioning. Vendors were not able to generalize their earlier industry- or customer-specific successes, and were locked into low margin services. There was a fight for revenues through consolidation, direct competition for customers, IP litigation and hostile stock acquisitions. Except for Upside, products and vendors were unstable. Evolving their offering to try to achieve a better balance between high margin software sales and low margin services, to "smoothe" revenues, and to reach new markets, vendors designed low-cost simplified alternatives to their original "enterprise" offerings, as well as SaaS, on-demand cloud products, shifting product delivery to a subscription basis. However, low end offerings also suggest a stratification of the product to include a low-cost, generic "commodity" tier, corresponding to the fragmentation of the market and increasing competition from new CMS entrants as well as from ERP, ECM, other software products and in-house solutions. By around 2008, vendors had established clearly distinct positioning (toward documents, spend, or a vertical specialization). There was a de-composition of the CMS category alongside the second coming of e-commerce and the emergence of the cloud.

Alternatively, we could trace "CMS" as software code. To take just what we understand from the vendor histories: "CMS" as software code originated at Upside (on its way to SciQuest); at Provato and Menerva (ending up at I-Many); at diCarta (ending up at Emptoris, now IBM); Determine (ending up at Selectica); and at CMSI (ending up at Procuri, then Ariba, on its way to SAP).

Separately, a group of facilitators (vendors, investors, analysts, the IACCM and customers) developed and promoted the organizing vision for CMS and the CMS category. Upon inspection, and as set out in section 6.2, the group is revealed as closed and self-referential. Analyst rankings and IACCM pronouncements were posted on vendor websites and included in SEC filings; vendor and analyst communications were made available by IACCM; a key analyst (Tim Minahan) moved from Aberdeen to Procuri, which was then acquired by Ariba; Selectica and I-Many tried and failed to merge; Nextance (an early CMS vendor) was bought by Trilogy (Versata) in 2006, which was engaged in nearly continual conflict with Selectica from 2004 through 2011; Emptoris tried to take customers from Ariba, Ariba sued Emptoris; Upside offered IACCM memberships to customers; an executive from I-Many took over at Selectica, while I-Many's long time and founding CEO became CEO at an I-Many competitor.

The biography of CMS as organizing technology for contract, following the origin narrative of organic emergence, or "harmonious convergence", does not reflect the turbulent life of CMS as a commodity, when we take into account the circumstances of its production including the vendor histories, analyst coverage in relation to the category, the role of marketing, and the workings of the knowledge network generally. In Chapter 7, using the table of breakdown as a guide, I tie these aspects of the biography of CMS together to put forward an account of the failure of CMS from a market perspective and in relation to contract. In this story the product category plays a major role, and so does marketing. By the end of this story, CMS as a technological artefact has receded into the background, and "CMS" as the biographical subject is recharacterized as a related set of material enactments following the logic of commoditization, but failing to produce the intended packaged software market. Tracing this story sheds light on the failure of CMS from a market perspective and on the nature of packaged software production. It also ties the failure of CMS to the nature of contract and contracting, with implications for ICT, contract and knowledge.

Chapter 7 Analysis: accounting for the failure of CMS from a market perspective on packaged software and in relation to contract

In this chapter I bring the data into closer dialogue with the research literature to offer an explanation of how CMS failed from a market perspective on packaged software and to what extent this failure related to contract. First, in section 7.1, I relate the data to the preliminary hypothesis (section 2.2.3) that the failure of CMS can be traced to a failure of the knowledge network around an organizing vision or a failure in generification, concluding that, for CMS, generification did not work. In section 7.2, I go beyond this conclusion by using the table of breakdown carried forward from Chapter 6 to identify performative assumptions and operations in the biography of CMS: that packaged software is an information good and that generification is a generalizable strategy toward creating a packaged software product and market (section 7.2.1); the organizing vision for CMS (contract management as process automation, structured data as knowledge, and contract as algorithmic) (sections 7.2.2, 7.2.3 and 7.2.4); and classification as performative (section 7.2.5). In section 7.3 I trace the logic of commoditization in the biography of CMS to identify a "substitution of performance" across three levels of commoditization (financialized meta-commodities in the form of equity interests in vendor firms, marketized criteria in the form of analyst ratings, and CMS as product) as a further performative assumption and operation in the biography of CMS. In section 7.4, I present the completed table of breakdown, summarize my analysis with respect to the research questions, and conclude with a brief retrospective on contract management software.

7.1 Revisiting the preliminary hypothesis: a failure of generification

From a reading of Pollock and Williams (2009a) and consistent with other research on technology production, making a market in packaged software requires a knowledge network mobilized around an organizing vision and the process of generification. The knowledge network solves the problem of distance between developers and users of packaged software, while generification resolves their competing interests. In section 2.2.3, I set out a preliminary hypothesis that the failure of CMS was due to a lack of a knowledge network mobilized around an organizing vision, or due to a failure of generification. In this section I discuss this hypothesis in light of the data.

In section 5.1, I described the organizing vision for CMS – automating the contract lifecycle across the enterprise as a closed, continuous production function, producing contracting knowledge. With its design based on the generic contract lifecycle, CMS would work for all types of contracts, in all types of businesses in any industry. As discussed in Chapters 5 and 6, marketing materials, analyst coverage and IACCM commentary reiterated the organizing vision, which "provide[d] the discourse with its content, structure, motivation and direction" (Swanson and Ramiller 1997, p. 458). The organizing vision was shared across a knowledge network including vendors, customers, the IACCM and analysts. Pollock and Williams (2009b, 2010, 2011) have identified the role of analysts as central in the packaged software industry, and the biography of CMS bears this out. As outlined in section 6.1.3, the analyst firms Gartner (including AMR), Forrester and Aberdeen covered the CMS product and vendors from the beginning. Gartner's $20 billion prediction was an early milestone in defining a market and building expectations for market growth, though it later pulled back from the category. Forrester has continued through 2011 to generate Forrester Wave reports for CMS. Aberdeen, a "demand generation" firm, has produced sponsored reports explaining the CMS concept and value proposition. Section 5.1.3 outlines the consistent support that the CMS concept has received from the IACCM. Customers have also been an important part of the knowledge network for CMS, providing references, participating in user groups and in marketing efforts, and even involved as business partners in product development (e.g. P&G in the case of I-Many; the Government of Alberta in the case of Upside) (see section 6.2). There is no indication of a lack of a knowledge network in support of an organizing vision.

However, generification, if understood as starting with a working instance of software and then generalizing it first within and then across industries, was not a successful strategy for CMS vendors (sections 5.4.1 and 6.3.1). Customers noticed hard coding from previous clients and identified a buy-side or procurement bias in some products. It was difficult to generalize enterprise CMS from one industry to another; contracting data was domain-specific and even customer-specific. In other words, at CMS was not very "fluid", in the sense of technological appropriateness in diverse settings (de Laet and Mol 2000). Turning then to the vendor histories, I first note that I-Many followed an express strategy of generification to new industry verticals, which it failed to execute and eventually abandoned when it retreated to its healthcare specialty. Selectica was not able to generalize its CPQ product, and experienced high customer concentrations and low revenues even after switching to contract management. Thus for I-Many and Selectica the strategy of generification did not work. On the other hand, Ariba and Emptoris sidestepped the problem of generification by identifying the professionalized procurement operation in large companies as their target customers. In this way they developed a cross-industry domain specialization. Upside, too, seems for the most part to have bypassed generification with a document-centric approach. I-Many, Ariba, Emptoris and Upside thus illustrate three different paths to scale and profits: industry specialization (I-Many); development of an industry-agnostic specialization in procurement (Ariba and Emptoris); and an industry-agnostic documents focus (Upside).

By negative implication, the case of CMS, where vendors did not successfully follow a strategy of generification, is consistent with Pollock and Williams's explanation of the success of ERP and can be read to support an argument that a successful packaged software product is built through generification. However, this does not explain in detail how or why generification failed, and it does not explain why market expectations for CMS were – in retrospect – so inflated. I take these questions forward in sections 7.2 and 7.3.

7.2 Performative assumptions and operations in the biography of CMS: analysing the evidence of breakdown

In this section I analyse the evidence of breakdown to identify three key sets of performative assumptions and operations in the biography of CMS. The first – packaged software as an information good and the generalizability of generification – relates to the breakdown in the expectation that the CMS market would develop according to the business model for packaged software. The second – contract management as process automation, structured data as knowledge, and contract as algorithmic – relates to the breakdown in the organizing vision for CMS as an expectation of how CMS would transform contracting and contract management. The third – classification performativity of the software category – relates to the breakdown of the CMS category as reification and the market correlate of the organizing vision.

7.2.1 Packaged software as an information good and the generalizability of generification

As discussed in section 2.1.2, the business model for packaged software is based on the logic of scale and the production of a high margin, "make one, sell many" information good. That is, packaged software production depends on some strategy of standardization. In this respect, packaged software is not markedly different from other commodities: Kopytoff (1986) wrote that turning an object into a commodity meant carving homogeneity, i.e. a class of goods, out of heterogeneity. In the studies of markets from economic sociology, this has been theorized as product qualification, the processes by which a product is defined, described, given attributes, and stabilized (Callon et al. 2002; Lepinay 2007b; cf. Caliskan and Callon 2010). Standardization and stabilization make the product replicable so it can achieve scale. Further, while Kopytoff (1986) observed that a commodity bears traces of its past history, Thomas (1991) argued that commoditization involves detachment of an object from its history – "the alienation of a thing is its dissociation from producers, former users, or prior contexts" (Thomas 1991, p. 39), and Pollock and Williams (2009a, pp. 117-118, referring to Thomas) observed that packaged software vendors try to present their products as detached from the context of their origins and histories. That is, the business model for packaged software incorporates decontextualization, as an element of or complement to standardization and stabilization, as demonstrated in Chiasson and Green's (2007) staged decontextualization of the healthcare planning application.

For packaged software, then, successful product qualification – standardization, stabilization, decontextualization – results in a replicable high margin information good that is portable and can "travel"; generification is a strategy toward successful product qualification. Generification – starting with one working instance of software then shaping it to extend into other organizations within and across industries – selectively decontextualizes the product and makes it more "fluid", i.e. "technologically appropriate" across many diverse settings (de Laet and Mol 2000). As such, generification seems a generalizable approach to packaged software production (e.g. as argued by Chiasson and Green 2007), and I-Many and Selectica expressly adopted a strategy of generification in an apparent belief in its efficacy.

I have already noted in section 7.1 the evidence that generification did not work for CMS. However, there is additional evidence from the vendor histories of their struggle to make CMS a high margin information good (Table 7.1, excerpted from Table 6.2). Except in the case of Upside, vendors and their products were unstable. In attempts to generate sales, vendors engaged in strategic transactions to acquire customers and extend into new verticals, and there was conflict over customers and intellectual property. Low margin service revenues remained high as a proportion of total revenues, indicating that the software was not really severable from the vendor. At the same time, to attract customers with affordable options, to try to achieve a better balance between high margin software sales and low margin services, and to meet increasing competition, vendors developed multiple delivery models ranging from a low-cost subscription product to compete with low-cost, generic, "commodity" alternatives coming to market, to enterprise implementations with a high service component, to software incorporating significant domain expertise.

Evidence of breakdown observed	*Breakdown of what?*
Hard coding from previous clients Buy-side or procurement bias Difficulty in generalizing cross-industry Contract data was domain-specific and even customer-specific Instability of products and vendors Strategic transactions to acquire customers and extend into new verticals Conflict over customers and IP High proportion of service revenues Development of multiple delivery options from enterprise to low-cost subscription models; emergence of "commoditized competition at the low end	The business model for packaged software (including generification)

Table 7.1 Breakdown of the business model for packaged software, including generification

The lack of stability in the CMS product and vendors corresponds to what Vitari and Ravarini (2009) observed in their longitudinal study of content management systems, where the software changed, and vendors came and went ("In the end, only four packaged CMS [content management software] applications remained in all three of our examined sets from 2002 to 2007" (Vitari and Ravarini 2009, p. 259). In addition, the evolution of the CMS business model is consistent with their conclusion that "commoditization" (a product becoming generic and widely available) and a trend toward service offerings as differentiator are characteristic of the packaged software market. Coming from a different direction, Zysman (2006), writing about service transformation, has reached a similar conclusion about the conversion of information goods into subscription services and the offering of services as differentiator for information goods.

> Just as important, this algorithmic transformation blurs the line even further between product and service. …. IBM has transformed from a company selling a product in which service support provided competitive advantage into a service company embedding products in its offerings. The services that ride on the product platform become the differentiated asset that creates value for the firm. (Zysman 2006, p. 4)

Seen in this light, the fact that CMS was not really severable from the vendors is not surprising. Indeed, Gartner's Magic Quadrant, with its two dimensions of "completeness of vison" and “ability to execute”, positions vendors, not software, and the ZL litigation discussed in section 6.1.2 further underscores the point that Gartner does not consider software severable from the vendor. As noted by a Gartner analyst in an excerpt quoted by Pollock and Williams (2009b, p. 138), “buying software [is] a partnership with a vendor, and that’s a long-term relationship”.

On the one hand, it could be said that the case of CMS confirms the business model for packaged software in that it demonstrates a failure in product qualification as we understand it for packaged software. Vendors were not able to create a standard and homogeneous class of products that corresponded to the organizing vision for CMS: in other words, CMS did not achieve “ontological stability” (Lepinay 2007b). CMS products did not become severed from their histories of prior implementations, or from the vendors. Decontextualization through generification did not work for those vendors that adopted it as a strategy, and CMS did not become an information good. On the other hand, the case of CMS, read together with Pollock and Williams (2009b), Vitari and Ravarini (2009) and Zysman (2006), complicates our understanding of product qualification in the packaged software market as standardization, stabilization and decontextualization, and indicates that packaged software can be more than, or different from, a high margin information good like a piece of recorded music.

Pollock and Williams (2009a) and Howcroft and Light (2010) have already suggested that packaged software cannot be properly understood as standardized or stabilized, but instead is essentially malleable, or provisional. The biography of CMS supports this conclusion. But just as notable in the biography of CMS was the inability to sever the software from its context, illustrating the limits of decontextualization. The high service component of vendor revenues shows that CMS could not be severed from the vendors, but the failure of I-Many and Selectica to extend their markets through a strategy of generification further shows that CMS could not be severed from its past customers. Nor could it be severed from its existing customer base, given the importance of customer references and customer success stories in marketing and of user group involvement in software development as well as marketing. Lastly, the ownership of the vendor, and the vendor’s profitability and stability, mattered. When vendors needed cash, they turned to new owners. New owners might or might not (as in the acquisition of Procuri by Ariba) continue to support the product and its users. I argue that the software links all of these market participants, as a location of a type of co-investment perhaps not so far, conceptually, from Grover and Kohli’s (2012) cocreation of IT value as a collective leveraging of IT investments. One could say that this is what vendors promise when they say that their software incorporates “best practice”, and it is directly implicated in those markets that feature increasing returns. Rather than decontextualization, there is recontextualization within an emergent network of dependencies, most clearly illustrated by Ariba's business model designed around its supplier network and its pending acquisition by SAP.

In the biography of CMS, the failure of the market to evolve according to the business model for packaged software reveals the assumptions that packaged software is a high margin information good – standardized and stable – and that generification, or selective decontextualization, is a generalizable strategy in packaged software production toward creating a "fluid" information good that "travels". As a "failure case", the case of CMS could be read to support (by negative implication) the business model for packaged software and its underlying assumptions. However, reading the case together with with Pollock and Williams (2009b), Vitari and Ravarini (2009) and Zysman (2006) suggests that it may not be useful in all instances to think of packaged software as an information good shaped by decontextualization. In the next section, where I discuss the breakdown of the organizing vision for CMS, I argue that packaged software like CMS is better understood as an instance of process commoditization.

7.2.2 The organizing vision for CMS: contract management as process automation

As discussed in section 5.1.3, the organizing vision for CMS was to automate the contract lifecycle across the enterprise, generating "visibility" into contracting, in other words, better contracting knowledge. Since the contract lifecycle was a generic model of contracting, CMS was proposed and positioned as an organizing technology for all types of contracts, for all businesses in any industry. In this section and the following two sections, I discuss the breakdown of the organizing vision and identify three underlying performative assumptions – contract management as process automation, structured data as knowledge, and contract as algorithmic.

The core of the organizing vision for CMS was the contract lifecycle, modelled as a closed, continuous production function, joining up fragmented processes and generating structured data that would flow through to transactional databases and analytics applications. In section 5.4.2, I have documented the ways in which contracting overflowed the process model of CMS (see Table 7.2, excerpted from Table 6.2). Contracting remained fragmented by offline processes, by function across the contract lifecycle and by type of contract or business unit, resulting in localized or even multiple CMS implementations, and with a pronounced split between buy-side and sell-side. Even in an implementation that was considered successful by the vendor, which I describe in section 5.2, there were offline processes, with no continuous flow of data as promised by CMS's enclosing and integrating model. In addition, functional fragmentation across the contract lifecycle persisted: The sales force used a "product form" that bypassed contract management altogether, and went directly to the operations group responsible for contract compliance. While CMS provided a valuable working space and work management tool for the contract management group, the implementation was localized, and a competing solution was used in another part of the organization.

Evidence of breakdown observed	***Breakdown of what?***
Process fragmentation (offline processes, no continuous data flow) Functional or operational fragmentation across the contract lifecycle Fragmentation of contracting by type of contract or business unit, especially buy-side versus sell-side; localized and multiple implementations	The organizing vision – automating the contract lifecycle across the enterprise

Table 7.2 Breakdown of the organizing vision – contract management as process automation

According to Hanseth and Lyytinen’s taxonomy, CMS was an application, a bundling of IT capabilities predicated on the enclosure of a process: “Therefore, most proposed design theories address the design of applications by promoting ways of generating effectively a closure in the included IT capabilities as to meet user’s needs” (Hanseth and Lyytinen 2009, p.2). Put another way, an application should correspond to a valid instance of “functional simplification and closure” (Kallinikos 2006 from Luhmann 1993). Simply put, contracting resisted enclosure by CMS, which imagined contract management as an instance of process automation.

I argue that to better understand this breakdown, CMS should not be conceptualized as a (failed) information good, or in terms of how it was sold (see Vitari and Ravarini’s (2009) definition of packaged software, section 2.1.1), but instead as a form of process commoditization, that is, conversion of organizational processes into products, following a program of functional simplification and closure, or decontextualization. To ground this assertion and relate it to the origins of CMS, I compare CMS to the CRM project at IBM described by Ciborra and Failla (2000). That project followed the path prescribed by management literature in the 1990s, which advised companies to set up infrastructures (Broadbent and Weill 1997) and link them to business process re-engineering (BPR) projects (Davenport and Short 1990; Hammer 1990), on the assumption that switching from a hierarchy view to a process matrix using IT would result in dramatic efficiency gains. In the project described by Ciborra and Failla, CRM was envisioned as a major new infrastructure consisting of processes, people and technology, and the goal was "to outline the sequence of activities needed to complete a negotiation cycle that starts from identifying a business opportunity and continues through making an offer, writing the contract, and delivering the solutions procured internally and/or through business partners, up to the monitoring of client satisfaction" (p. 107). Notably, the task assigned to CMS (on the sell-side) is virtually indistinguishable from the task assigned to CRM at IBM. In each case, the idea was to use IT to knit together fragmented processes across organizational functions and business units through process standardization.

At the time that CMS was brought to market, BPR was a widely accepted model for business improvements (see Newell et al. 2000), suggesting that the process orientation may have informed the organizing vision for CMS. The difference between the CRM project at IBM and CMS was that the CRM project was clearly localized and customized to a particular organization whereas CMS was sold as a packaged software product – one that not only reflected a process orientation but assumed the generalizability or standardizability of an organizational process following a program of functional simplification and and closure or decontextualization – as outlined by Davenport (2005). In the final step, "formalizable, codifiable, computable processes with clearly defined rules for their execution" can be located anywhere: "[A]s information moves, many activities that were previously tightly linked to particular places can be moved" (Zysman 2006, p. 48). Codified processes can become commodities in a kind of radical decontextualization – not only stripped of particularity but physically relocated – to an enclosing enterprise application, to a vendor's remote server, or to an outsourcing provider. CMS offered a codified process as a commodity, but could not "enclose" contracting.

The overflowing of codified processes is a phenomenon long remarked and well understood in IS research. Winograd and Flores (1986) and Dreyfus (1992) cautioned that success in solving problems that feature discrete data and explicit rule sets cannot be simply extrapolated to predict success with more complex, context-dependent problems. "The professional discipline of 'systems analysis' has focused on routine structured processes, frequently attacking problems of volume and routine rather than problems of communication" (Winograd and Flores 1986, p. 151). Other scholars have written extensively on the subject (e.g. Ciborra 1996; Suchman 2007), and, to cite a recent study from economic sociology, Licoppe (2008) observes that there is a regular "overflowing of the electronic transaction frame" in e-commerce. So the finding that CMS could not enclose contracting is not surprising, but it has implications for the program of process commoditization that I discuss in section 8.2.

7.2.3 The organizing vision: structured data as knowledge

CMS promised "visibility" into contracting, but was not particularly successful in producing organizational contracting knowledge, as I discuss in section 5.4.3 (see Table 7.3, excerpted from Table 6.2). There 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. Data integration was limited. CMS was not associated with risk management, and users generally did not look to it to produce organizational contracting knowledge. In the implementation I describe in section 5.2, 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.

Evidence of breakdown observed	***Breakdown of what?***
Fragmentation of contracting as described in Table 7.2 Limitations on the repository (completeness, access and searchability) Difficulties in defining and extracting structured data Limited data integration Reduced expectations for contracting knowledge as associated with CMS (as opposed to risk management, business intelligence or other business initiatives) Contract data and knowledge are domain-specific and even customer-specific	The organizing vision – contracting knowledge as an outcome of automating the contract lifecycle across the enterprise

Table 7.3 Breakdown of the organizing vision – structured data as knowledge

From a perspective informed by the research discussed in section 3.3.3, CMS can be said to have incorporated a quite limited and perhaps naïve perspective on organizational knowledge, or, put in the alternative, its knowledge program was more ambitious than proponents understood. The CMS model conceptualized contracting knowledge largely as a matter of the structured data corresponding to variables in contract templates. The assumption was then that organizational contracting knowledge would be a direct outcome of automating the contracting process and the continuous flow of structured data through to transactional databases and analytics applications. By working to this assumption, CMS took on all of the difficulties of turning unstructured data into structured data (Clark et al. 2007; Negash 2004) and building a cross-functional database that would reconcile the conflicting perspectives of organizational functions having an interest in contract processes and information (cf. D'Adderio 2004; Howard-Grenville and Carlile 2006; Nonaka and van Krogh 2009). While reconciling the views held by different organizational functions is a perennial problem in organizational knowledge, as noted by these authors, CMS encountered a special version of this problem in that other organizational contracting knowledge initiatives overlapping contract management, such as risk management, business intelligence and supply chain management, were already separately established and resourced. At the same time, it was unclear whether investment in CMS's structured data approach was really the path to contracting knowledge (cf. Chapman and Kihn 2009; Dechow and Mouritsen 2005; Elbashir 2011; Nonaka 1994; Winograd and Flores 1986). Many reduced the scope of the data extraction and integration elements of a CMS program, implementing it as a contracts repository or "indexing system", and adopted limited expectations for CMS as associated with contracting knowledge.

Some CMS customers, like the large UK public sector entity discussed in section 6.2.6, did make substantial investments in managing contract data, but these were highly particularized. Emptoris claimed that customers using its reverse auction capability to run multi-million dollar procurement programs at a high level of data granularity would achieve direct cost savings. Some CMS vendors, like I-Many, created valuable market niches by developing domain-specific expertise and content. In cases like these, CMS did produce and manage structured data and support computational aspects of contract management. That is, some contracting and contracting knowledge did benefit from a data-intensive approach but only when the data was particularized to a domain (healthcare; large scale procurement) or a customer (the UK public sector entity). The fact that contracting data was domain-specific and even customer-specific meant that high value data-rich implementations did not necessarily generalize to other contracting contexts. In this respect, the nature of contracting knowledge directly impacted generification.

The nature of contracting knowledge also set CMS went down two different paths – toward specialized, data-rich, high value implementations or toward a more general document repository with limited metadata, corresponding to the eventual category breakdown described by Gartner (specialized process applications as against the "über-filing cabinet"). The "über-filing cabinet" was relatively "fluid", technologically appropriate for many organizations and so corresponding to a potentially large "region" of contracting, but hard to distinguish from other, widely available general purpose software that an organization might already have. Specialized process applications were not as "fluid" but had high value in their respective "regions" of contracting. This was reflected in the eventual fragmentation of the CMS category, discussed in section 7.2.5.

One might ask, given what is known about organizational knowledge and about contract, as discussed in Chapter 3, why CMS was based on such a reductionist view of the relationship between ICT and organizational contracting knowledge. Here the vendor histories provide some measure of explanation. All of the vendors other than Upside began with a calculation capability that had applicability in a contracting context. In their early experience, tracking a few discrete contracting variables – expiry and renewal dates and volume discounts and rebates (as of 2009 still the most frequently tracked structured datapoints; see Appendix 5.8) – could generate quantifiable increased revenues or cost savings, and Ariba's and Emptoris's systems encouraged competitive pricing from suppliers. Through the lens of their particular expertise and early experience, and with a particular view of how e-commerce would develop – largely consistent with Malone et al.'s (1987) electronic markets hypothesis – it made sense that contract would resolve to the manipulation of discrete market-defined variables corresponding to terms in contract documents and data in organizations' internal information systems.

7.2.4 The organizing vision: contract as algorithmic

In fact, as discussed in section 5.4.4, there was an association between CMS and such "algorithmic" contracting. The contract lifecycle was a generic model, abstracted away from any particular organization or domain, and CMS was supposed to work for all types of contracts, and for all types of businesses, in any industry. But CMS did not work equally well for all contracting environments (see Table 7.4, excerpted from Table 6.2). Based on survey data, the CMS "region" of contracting (see Table 5.3, p. 132) tends to feature scale (volume and standardization) and data discreteness (the relative ease with which contracts can be reduced to structured data). For example, in my survey, while only 4% of respondents with more than 500 of their most important type of contract in effect did not have and were not considering CMS, that percentage was 27% for respondents with 500 or fewer of their most important type of contract in effect. CMS was associated with large companies, with 83% of survey respondents with firm revenues in excess of $10 billion using, implementing or considering CMS. It was also associated with the buy-side, with lower risk, and with investment in other organizational IT infrastructure, especially ERP. Since algorithmic contracting depends on the specifics of structured data, it tends to be domain-specific and perhaps even customer-specific (e.g. as reflected in Selectica's customer concentration or in the case of the large UK public sector entity discussed in section 6.2.6).

Evidence of breakdown observed	***Breakdown of what?***
CMS associated with scale (volume and standardization) and structured data CMS associated with large companies CMS associated with the buy-side CMS associated with IT infrastructure, especially ERP CMS associated with lower risk CMS associated with "algorithmic" contracting CMS vendors targeted large firm customers 4 of 5 focus vendors started with an algorithmic contracting capability Algorithmic contracting is domain-specific and even customer-specific	The organizing vision – CMS as an organizing technology for all types of contracting

Table 7.4 Breakdown of the organizing vision – contract as algorithmic

To summarize, CMS seemed to work best for algorithmic contracting at scale, with an implication that this is the region of contracting where the cost of advanced, data-rich features could be justified. In other cases – where contracting was not algorithmic or where scale could not justify the cost – organizations were not interested in CMS, or, as noted above, CMS might be implemented on a reduced basis, as a contracts repository (the über-filing cabinet). The CMS "region" of contract was limited, indicating that contracting resists characterization as universally or essentially algorithmic in nature.

This is consistent with Mithas et al. (2008). In operationalizing their test of the electronic markets hypothesis, the authors take a reverse auction as a proxy for an ICT-enabled market mode of coordination. In particular they are adopting Malone et al.'s (1987) definition of a market as a mechanism that enables a buyer to choose among the competing offerings of multiple sellers. The reverse auction represents, in my terms, algorithmic contracting, and I read their finding to say that contracting professionals resisted an algorithmic contracting technology for situations featuring elements of "non-contractibility" (quality, supplier technological investments, information exchange, responsiveness, trust, and flexibility). That is, some contracting is algorithmic in nature, but some ("non-contractible" contracting) is not, and contracting that is not algorithmic in nature resists ICT-enabled algorithmic reduction. Licoppe (2008, p. 318), in considering e-commerce, cites Mirowski's (2002) description of markets as "automats" and market transactions as "algorithms": "Information and communication technologies (ICT) have contributed toward translating economic interactions into algorithms, especially in the context of financial markets and e-commerce. … However, commercial interactions themselves cannot be entirely equated to a finalized algorithmic process and reduced to a sequence of discrete steps leading toward a predefined goal."

The experience of CMS in confronting limits to algorithmic contracting is also consistent with the many other empirical studies of ICT, contract and knowledge discussed in section 3.3. These studies emphasize the importance of knowledge in contracting in supply chains (Frances and Garnsey 1996; Malhotra et al. 2005; Subramani 2004), in outsourcing (Dibbern et al. 2008; Gefen et al. 2008; Gefen and Carmel 2008) or in non-market transactions more generally (Caglio and Ditillo 2008). This sort of knowledge-intensive contracting is unlikely to be "algorithmic". Theories of contract discussed in section 3.2 are similarly incompatible with an idea that contracting is essentially algorithmic. The premise of relational contracting (Bernstein 1992, 1996; Macauley 1963, 2003; Macneil 1985, 2003) is that in many cases the essential elements of the contractual relationship are not reduced to writing, so it could hardly be the case that they are captured in structured data parameters, no matter how granular these might be.

Likewise, that data-rich algorithmic contracting is domain-specific – that for ICT and contract, industry has to be "taken seriously" (see Chiasson and Davidson 2005) – is not a surprising outcome in light of research that shows that contracting takes place in a contracting community (Bernstein 1992, 1996; Suchman 2003). In fact, in the course of formulating EMH, what Malone et al. (1987) observed but did not remark upon is that ICT was enabling contracting in data-rich environments where large organizations had made substantial investments in domain-specific platforms (American Airlines) or the sharing of detailed specifications with suppliers, two rather different phenomena that the authors characterized as electronic markets because, in accordance with TCE's efficiency-optimizing function and buy-side focus (Coase 1988), they facilitate a buyer's review of multiple purchasing options. However, if the organizing vision for CMS was not consistent with what is known about knowledge in contracting, relational contracting or contracting communities, it was consistent with the expertise and early experience of key vendors, and it reflected their targeting of large companies as customers, the buy-side orientation of several key vendors (Ariba and Emptoris), and dot.com era visions of e-commerce. Above all, it imagined contracting in terms of computer capabilities.

To summarize, the organizing vision of CMS broke down in three respects, revealing the corresponding performative assumptions. First, CMS envisioned contract management as a process automation project, largely in accord with BPR and the more recent model of process commoditization, following a program of functional simplification and closure, or decontextualization. Second, CMS imagined that process automation would produce structured data and that structured data is the same as knowledge. Thus stated, this represents a common misapprehension of IT capabilities and, in light of research on ICT, contract and organizational knowledge, the outcome for CMS is unsurprising. But here the particular failure of these assumptions against the domain-specificity of contracting data and knowledge was directly implicated both in the failure of generification, discussed above, and the eventual fragmentation of the category, discussed in the next section. Lastly, CMS conceived of contracting as essentially or potentially algorithmic – contracting through the lens of computer capabilities. The organizing vision for CMS incorporated a process orientation like BPR and a model of algorithmic reduction not unlike that embodied in a reverse auction (Mithas et al. 2008), in e-commerce (Licoppe 2008) or in Malone et al.'s (1987) concept of electronic markets. It had a tilt to the buy-side, like TCE (Coase 1988). Richly reflecting all of these influences, and the expertise and early experience of key vendors, the organizing vision for CMS performatively excluded much of contracting, which overflowed CMS, materializing in breakdown of the organizing vision but also a generative, productive, or corrective breakdown, or fragmentation, of the category, discussed in the next section.

7.2.5 Classification performativity in product qualification: the category as reification and market correlate of the organizing vision

Pollock and Williams (2010, 2011) have described the classification work of analysts in creating categories for IT products and noted the effects of these categories in shaping the IT marketplace – that is, the performative role of classification in product qualification in the IT marketplace. They have also drawn a link between the category and the organizing vision (Pollock and Williams 2011), and, in section 2.3.2, I have characterized the product category as the market correlate of the organizing vision, a reification of the organization that is specifically enlisted in the creation of expectations in the IT marketplace.

Stepping back from the IT domain, Sjögren and Helgesson (2007) have noted that classification is an essential element of product qualification (in their case, of medicines), and both they and Pollock and Williams cite a definitive work on classification, Bowker and Star (1999). Because what Bowker and Star have to say about classification directly bears on this case, it is worth noting here some of their key precepts. According to Bowker and Star, a sound classification system is one that is internally consistent, with no gaps and no overlaps between categories. A sound category should correspond to its referents, and not to other things, and its referents should fall into that category and no others. Having too few categories (too high a level of abstraction of generality) results in having information that is not meaningful or valuable, but having too many generates errors or randomness; the level of abstraction or granularity should be pitched to scale. When things being categorized do not fit the established categories, resulting in ad hoc responses, these anomalies indicate problems in the classification system, and may reveal residual categories – the dolphin in the sea creature sorting system. Reconstituting the classification system to accommodate the anomalies can be corrective. On the other hand, things that do not fit the established categories might be put in the wrong category, or they might just not be recognized and disappear; in Pollock and Williams's (2010) account, software products that do not fall within a category become to some extent invisible. A classification system organizes, but it also excludes, an idea resonant with Barad's perspective in her focus on the excluding properties of an apparatus or other material-discursive practice.

Pollock and Williams (2010) note that not all attempts at classification succeed, and in the case of CMS, the evidence (discussed in sections 5.4.5 and 6.3.2, and summarized in Table 7.5, excerpted from Table 6.2) points to technical classification problems for the CMS category when assessed against the rules laid out by Bowker and Star. CMS overlapped with too many other products in the market and general purpose IT capabilities already available to organizations. It was unclear what CMS actually referred to. There was a question about whether it was about process or information; there were conflicting function-specific views of CMS that were hard to reconcile. The vendors and products classified as CMS were not the same, and some of those vendors and products appeared under other categories. CMS itself was sometimes treated as a part of e-purchasing. Pitched at too high a level of abstraction and generality, the category was to some extent abandoned by Gartner, and reconstituted into subcategories. In particular, the high cost of advanced features and the corresponding weakness of the business case for many organizations were reflected in a de-composition of the category, split between a low value, general purpose document repository and high value, data-rich and domain-specific applications.

Evidence of breakdown observed	*Breakdown of what?*
Unclear as to whether about process or information Conflicting function-specific views of CMS Competition with in-house and other software (e.g. ERP) Overlapping functionalities with other software (e.g. CRM, strategic sourcing) High cost of advanced features Weak business case Fallback to document repository (in competition with e.g. records or documents management systems) Clear encroachment into CMS space by ERP and other software vendors Rating of CMS vendors under other categories CMS subsumed under other categories such as e-purchasing Gartner retirement of the category Emergence of subcategories along various dimensions (repository versus process; documents (Upside) versus data; verticalization (I-Many); procurement focus with a network (Ariba) or purchase category expertise and granularity (Emptoris))	Category

Table 7.5 Category breakdown

The classification problem for CMS was similar to that described by Vitari and Ravarini in their study of content management systems:

> While the name Content Management Systems is commonly used for commercial purposes, it has no generally recognized definition, so the market offers products under that label that differ significantly, while at the same time software systems with many similar functionalities are commercialized under labels such as Document Management Systems (DMS) and Knowledge Management Systems (KMS). (Vitari and Ravarini 2009, p. 250)

As discussed in section 4.2.3, Vitari and Ravarini build their own definition by separately sourcing meanings for “content management” and “packaged software” and define content management systems as “commercially produced software packages supporting the management of web site content”. Working with their definition, they nonetheless found that, over time, content management systems evolved to support other activities such as e-commerce, knowledge management and document management, “blurring even further the already fuzzy boundaries between these different types of applications". By finessing the definitional difficulty they originally observed, they elide the classification problem in qualifying content management systems as a product. That is, content management systems as a software category was not distinguishable from other software categories and was too abstracted to correspond to a real, singular, enclosable process. Vendors faced competition from low-cost, generic, "commodity" products offering the same functionalities and developed service capabilities as a differentiator.

In light of Vitari and Ravarini's example and the emergence of the relatively "commoditized" über-filing cabinet version of CMS, Chiasson and Green's (2007) description of their project to generify, or decontextualize, a healthcare planning application takes on a different meaning. The software developers started with an application for breast cancer healthcare planning, and ended up with an application that could be used in any planning context. The case of CMS and that described by Vitari and Ravarini suggest that this generic planning application, empty of domain-specific content, might become a low value "commodity". This theme is echoed by Pollock and Williams (2009b), who note that Gartner began to focus on differentiating vendor qualities ("ability to execute" and "completeness of vision") in part because IT systems are no longer all that distinguishable in terms of functionalities. Taken to its logical conclusion, this observation suggests that a strategy of generification which is based solely on decontextualization (as modelled in Chiasson and Green 2007) may be counterproductive. Just as suggested by Bowker and Star, there is a tradeoff between the level of abstraction and value.

As described in the previous three sections describing the breakdown of the organizing vision, contracting overflowed CMS, and correspondingly resisted classification under the CMS category, resulting in breakdown marked by the generative, productive or corrective emergence of subcategories. The case demonstrates that while classification performativity is powerful in product qualification, including in the IT marketplace, it is not all-powerful. Expectations are not always realized, and it is necessary to account for both the content of the vision and the work involved in its production (Pollock and Williams 2010, p. 529). In the preceding section, I discussed the content of the (organizing) vision for CMS; in the next section I look more closely at the work involved in the production of its market correlate, the CMS category, as well as the place and nature of the category within the overall logic of commoditization in the biography of CMS.

7.3 The logic of commoditization in the biography of CMS: a "substitution of performance"

I return now to the motivating question for this study – the difference between the projected market for CMS and actual market size realized (see the discussion in section 6.3.3 and Table 7.6, extracted from Table 6.2). This was initially reflected in the high early vendor equity valuations in relation to low revenues and lack of profitability, common in the dot.com era. However, even after the dot.com crash, category success in the form of favorable analyst reviews continued in the face of product unprofitability. Though the evidence of breakdown reviewed so far describes a number of reasons why CMS failed, what it does not explain is what sustained the CMS program for so long.

Evidence of breakdown observed	***Breakdown of what?***
(Early) vendor equity valuations relative to revenues and profitability Projected market size as compared to lack of revenues Category success as compared to product unprofitability	Market expectations in relation to market performance

Table 7.6 Breakdown of correspondence of market expectations and market performance

My argument is that this breakdown can be traced to the logic of commoditization as theorized by Appadurai (1986) – to the workings of the knowledge network in extended or remote production, and in particular to the emergence of financialized meta-commodities and marketized criteria in relation to an underlying commodity. In this tiered structure, the category is the space where marketized criteria trade. In this section, I use these concepts to develop a theory of "substitution of performance" across three levels of commoditization in the biography of CMS. These three levels of commoditization were related, as I will show, but distinct and separate: "This is because inconsistency between different performances reflects failing coordination between different object positions rather than differences between external perspectives on the same object"; "the interferences between these different … positions are a valuable source of data" (Law 2002, pp. 8-9).

To begin, the packaged software market is an example of remote production; developers are separated from users (Sawyer 2000). In the case of ERP, as described by Pollock and Williams (2009a), the distance between developers and users was successfully bridged by the knowledge network. The knowledge network for CMS included vendors, customers, the IACCM and analysts. Pollock and Williams (2009b, 2010, 2011) have identified the role of analysts as central in the packaged software industry, and, as discussed in section 7.1 above, analysts played a leading role in the biography of CMS. Section 5.1.3 outlines the consistent support that the CMS concept has received from the IACCM. Customers have also been an important part of the knowledge network for CMS, providing references, participating in user groups and in marketing efforts, and even involved as business partners in product development. However, the case of CMS demonstrates a dynamic of the knowledge network different from that observed by Pollock and Williams, and more along the lines suggested by Appadurai (1986a).

Appadurai (1986a) theorized that in the production of demand in a chain of production where knowledge is fragmented – "partial, contradictory, and differentiated" – the knowledge network may not so much bridge the gap between producers and consumers as arbitrage discontinuities in knowledge. The consumer who does not have direct experience of the product and its production is in something of the position of a cargo cult: A new product appears, but the consumer, not knowing how it is produced, how it works or how to use it, becomes receptive to mythologies, or framing discourse, about its origin, its nature and its import. In these circumstances, knowledge about the product (or claims that purport to represent knowledge about the product) becomes valuable. Appadurai hypothesizes that in such a case, knowledge (or purported knowledge) about a commodity may even become a commodity in its own right, that is, markets in criteria will develop: "The carpet business involves not just the supply of carpets as in the case of other commodities, but also the supply of information about them" (Spooner 1986, p. 198).

The role of analysts in IT marketplace and in the biography of CMS can be seen as constituting a market in commoditized criteria of type hypothesized by Appadurai. The analysts generate knowledge (or knowledge claims) about products and vendors, and the principal intended consumers or users of knowledge are organizations buying IT products. The nature of the knowledge produced by analysts is controversial, as noted by Pollock and Williams (2009b) and illustrated in the ZL litigation I discuss in section 6.1.2. This is in part because it is well known (if not in detail) that, notwithstanding that user organizations are the primary target customers for analyst research, vendors are a principal source of revenues for analyst firms. In other words, there is a suggestion (e.g. in the ZL litigation) that analysts' research is biased in favour of vendors who pay them. However, in the case of CMS, apart from Aberdeen, which is openly in the business of "demand generation", it cannot be said that the analysts were passively unquestioning industry spokesmen. As noted in section 6.1.3, Gartner and Forrester have offered critical commentary. The analysts have their own reputations to manage and protect in order to preserve the value of their research. This still leaves open the question of the nature of that research. To defend their legal position under the First Amendment (guaranteeing freedom of speech) in the ZL litigation, Gartner argued that their research is essentially opinion, protected under the First Amendment – a subjective opinion, based on sifting and collating the opinions of others. Pollock and Williams (2009b) advance a not dissimilar position when they theorize Gartner's research process as the objectification and commodification of "community knowledge" gathered from vendors and customers and thus reflexively shaping the IT marketplace (Pollock and Williams 2010, 2011).

I make a somewhat different point here, suggesting that analysts establish categories in part to organize the knowledge (or knowledge claims) that they sell – marketized criteria in the form of research-as-product. I argue that the categories constitute part of the infrastructure of the market in which their research-as-product can be sold, or, alternatively, that the categories themselves constitute knowledge (or knowledge claims) or research-as-product. In either case, the analysts become, in an oblique but very real sense, invested in these categories and the organizing visions to which they correspond because they are part of and necessary to their own research-as-product. Following Law's (2002) conception, the category might be said to create a virtual space in which disparate objects – the vendors and their software – can be connected and coordinated, accommodating the commensurability required for the analysts' ratings and rankings (Pollock and Williams 2009b, 2011; cf. Scott and Orlikowski 2012). The space then becomes a focus of an "obsession with positioning products" (Callon et al. 2002). Graphical presentations such as the Magic Quadrant and the Forrester Wave translate these virtual spaces into actual two-dimensional images, where a vendor and its software are materialized as a single x-y coordinate of value.

According to this view, both vendors and analysts were invested in the CMS category as a key coordinating device for their products. But other participants in the knowledge network were also invested in the CMS category, obliquely through their ownership of equity interests in the vendor firms. From a commoditization perspective, equity stakes in the vendor firms represent a kind of financialized meta-commodity in contract management software as the underlying commodity. That is, an equity interest in a CMS vendor firm represents an interest in future cash flows from CMS, and the market in shares is a market in expectations for the category. Looking at the biography of CMS, we can identify a number of participants taking equity stakes in vendor firms, all across the knowledge network. Not only shareholders, but employees, resellers, consultants and other business partners received shares, options or other equity interests in vendor firms. So did customers, such as Procter & Gamble in the case of I-Many or the Government of Alberta in the case of Upside.

There are other more attenuated forms of investment in the category across the knowledge network. In the dynamic so clearly identified by Gartner in the ZL litigation, even when packaged software customers do not take equity interests in a vendor firm they are of course invested in vendor support of the product and, so long as the product is not proprietary to them, they benefit from an increased customer base. The IACCM's investment in CMS is complex and may involve an unstated reciprocity. Though the IACCM has no doubt received revenues from CMS vendor firms, it may have been just as important to have vendors participate in IACCM and support the still relatively new concept of contract management, for example as Upside did when it offered its customers memberships in IACCM.

A large part of the cash invested in CMS vendor firms went to build the expectations for the category through marketing expenditures in support of the category and the organizing vision, as discussed in section 6.2.6. Some of those funds undoubtedly made their way to other knowledge network participants, in particular the analysts. Gartner, in both the ZL case and their explanation of the Magic Quadrant, emphasizes sales and marketing as key in the software industry, and there is no indication that CMS vendors failed either to devote significant resources to marketing CMS or to deploy a range of marketing tools, all as described in section 6.2.6. In fact, as I will go on to argue, they may have succeeded too well.

To summarize thus far, the knowledge network for CMS was invested, albeit differentially and in some cases obliquely, in the CMS category and organizing vision, which had the benefit, over seven years, of more than \$1.2 billion in sales and marketing spend, most of that coming from vendor firm investors. The participants in the knowledge network were thus in a relationship of material co-dependency (see Howcroft and Light 2010), one that could probably be traced in detail and quantified (i.e. assigned monetary values) given sufficient access, time and resources.

While concepts such as mass-production communities (Koch 2003) and agora (Kaniadakis 2006) hint at a kind of free-flowing openness and symmetry in participation between developers and users, Pollock and Williams suggest that the supply side is "privileged" (2009a, p. 55), and they (Pollock and Williams 2011) challenge the notion of a "communitarian" framing of technology categories in favour of an emphasis on the role of analyst firms as "knowledge institutions of information technology" that "draw up and police the boundaries that surround new technological fields of activity". The biography of CMS suggests that the supply side achieves and maintains its "privileged" position in large part by dominating and setting the terms of the discourse through marketing expenditures. It is somewhat less easy to explain how the category and organizing vision can continue to thrive in the knowledge network in the face of evidence that the underlying product is struggling to find customers.

In this regard, Cochoy (2010) provides a provocative hint. In Chapter 2, I discussed the case of *The Progressive Grocer*, a trade publication targeted at modernizing the merchandising practices of small grocers. *The Progressive Grocer* was not the organ of a professional association of grocers but instead was produced and published by a trade press founded by a group of journalists. The journalists had identified the modernization of small grocers as creating a business opportunity for them, which they financed by selling magazine advertisements to companies that sold store furniture, cash registers and other magazines to small grocers. These advertisers were *The Progressive Grocer*'s real clients, and the magazine was sent to grocers for free. Just as in today's internet advertising, the grocers were effectively "sold" to the advertisers. Notably, in 1931, the magazine published an ad describing its success in attracting advertisers even during the Depression.

> This strategy, which is highly similar to the rhetoric used by the founders of the Journal of Marketing in 1936 (Cochoy 1998), consists of substituting one performance for another: the money manufacturers invested in Progressive Grocer to advertise 'displays that sell' was presented as the proof of the practical efficiency of the same displays. (Cochoy 2010, p. 305)

Cochoy argues that "investments" made by advertisers were touted as evidence of the success of the products promoted in the magazine. In this way, the magazine as advertising vehicle and the products it advertised were cross-sold. That is, there was a "substitution of performance" across multiple levels of commoditization.

Taking up Cochoy's (2010) insight, one explanation for the lack of correspondence between market perception and market performance in the case of CMS might be that investor support, analyst reviews, IACCM support, and customer references substituted for proven success of the software product. This substituted performance was to a significant degree produced by the marketing budgets provided by investor funds following a belief that packaged software production can be led by category construction around an organizing vision, i.e. a substitution of performance created through marketing, first to investors and then, with funds provided by investors, to customers, just as suggested in the interviewee quote in section 6.2.6. In this way, three markets were materially linked – the market in CMS, the market in equity interests in CMS vendors (financialized meta-commodities), and the market in analyst ratings, recommendations and coverage (a market in criteria).

Pollock and Williams (2009b) describe such a substitution of performance in relation to analyst rankings when a user organization IT executive links progress on a CRM project to a good showing for the vendor on Gartner's "ability to execute" axis – using this linking to get more resources from the vendor. The customer and the vendor engage in a form of exchange and partnership structured around the Gartner ranking, the Gartner category, and the vendor's commitment to the product, with the Gartner ranking put in play as a kind of currency between the vendor and the customer. Specifically, the vendor's improved performance vis-a-vis the customer is directly traded for an improved Gartner rating. This transitive substitution of user satisfaction to analyst rankings occurred after the procurement decision, in the course of the vendor's performance.

But I argue that substitution of performance across the levels of commoditization is characteristic of the packaged software market, with user satisfaction in the underlying often substituted out. With respect to financialized meta-commodities in the form of equity interests in vendor firms, it was Sawyer (2000) who observed that, for packaged software, profits and market share substitute for user satisfaction. That is, a software product is of interest to vendor firms only insofar as it generates customer revenues as the path to profits and market share. The biography of CMS shows vendors actively pursuing customer revenues by buying software with its installed base of customers, by aggressively competing to attract customers from other vendors, or by buying firms with a competing or complementary offering to force market consolidation and migration of customers to the acquiring firm. The vendors demonstrate a keen awareness of the market, and make alliances and acquisitions, or file patent lawsuits and buy stock of competitors, to buy or create the opportunity for incremental revenues. Strategic transactions figure prominently in the biography of CMS, demonstrating that in a calculus that privileges financialized meta-commodities, software is only one factor in the production of revenues, profits and market share. Gartner's analytical approach, which weights technology as only one factor in its rankings of products and vendors, is fully consistent with this perspective.

In the pursuit of revenues, market share and profitability, marketing is key. Particularly at the stage of procurement, marketized criteria such as analyst rankings stand in for user satisfaction based on prior experience. Shapiro and Varian (1999, pp. 5-6) effectively justify such a substitution of performance when they claim that, for "experience goods" like software, branding and reputation (howsoever produced) become proxies for understanding based on prior experience, and, consistent with this model, the role of analysts as gatekeepers in the IT marketplace is well understood and to a degree accepted. In this way marketized criteria can lead the underlying market both in impact and in time. The performativity of marketing centered around category construction and marketized criteria is thus central to making a market in packaged software. So long as the category is strong and the organizing vision convincing and widely held, any problems a customer might experience with the product might be considered anomalous, a localized issue of organizational misfit or the like.

The CMS industry appears to have succeeded in establishing a software category, through "reiterative and citational practice by which discourse produces the effects it names", or performativity (Butler 1993, p. xiii). In other words, the category was successful, for a time, in that it was "able to bring about the world that it points to (i.e., actors come to think of others and themselves according to these terms)" (Pollock and Williams 2009b). The "rhetoric" of CMS – a commoditized expectation or imagining – proceeded on a relatively smooth trajectory, but it separated from the life of the product and the vendors, and took on a life of its own. Similar observations have been made by Newell et al. (2000) regarding BPR, and by Mitchell (2007, pp. 251-252) regarding Soto's prescription for unlocking the value of land by creating alienable title – concepts that enjoyed wide acceptance but were not so successful in operation. To take another example, Callon describes how marginalist analysis enjoys success in universities and compares that to what it would take to make marginalist analysis work in practice:

> In the paper world to which it belongs, marginalist analysis thrives. All it needs are some propositions on increasing returns, the convexity of utility curves, and so forth. Transported into an electricity utility (for example, Electricite de France), it needs the addition of time-of-day meters set up wherever people consume electricity and without which calculations are impossible; introduced into a private firm, it requires analytical accounting and a system of recording and cost assessment that prove to be hardly feasible. (Callon 2007, pp. 331-331)

By analogy to Callon's example, and returning to Pollock and Williams's suggestion to look at the work involved in the production of the category, Table 7.7 compares what it took to create the CMS category to what was required of vendors, customers and intermediaries in order to make CMS work. Creating a category required a significant marketing budget deployed in the knowledge network. To get CMS to work was an entirely different undertaking. In particular, the third column of Table 7.7 shows how much of the cost and work fell upon the user firm.

What it took to create the CMS category	***What it took to design, sell and support CMS***	***What it took to buy, implement and use CMS***
Marketing resources Organizing vision (the contract lifecycle) Analyst validation of the category Professional organization support Customer references Multiple communications formats for the narratives and signs (e.g., websites, white papers, webinars, conferences)	Designing or acquiring software capabilities Managing intellectual property issues Selling efforts Negotiating a contract Implementation generally Meeting maintenance and user support needs Managing upgrades	Building a business case Selecting a procurement strategy and provider Negotiating a contract Coordination with internal IT Implementation generally Legacy contract import Data definitions agreement Data integration (if attempted) Ongoing compliance, including coding and data entry Ongoing vendor management Managing upgrades

Table 7.7 Creating the CMS category versus making CMS work

The organizing vision on which the category and the product were based abstracted out all the specifics of contracting, marginalizing users and excluding practice. It decontextualized contracting, in theory producing a standard and generic information good that was “fluid” and could “travel”, but in practice making CMS costly and burdensome to adopt. This suggests a certain risk, often overlooked, in neglecting the materiality of practice in favour of radical decontextualization; it may not always be cheaper to buy instead of build.

In brief, early equity investments funded the marketing of CMS. The substitution of marketing success, as proxy for anticipated profits and market share, as proxy in turn for user satisfaction, succeeded for a time (roughly, until the cash ran out) within the invested knowledge network but eventually collapsed when CMS failed to manifest in practice, and produce cash profits. It was easy to make the category, it was harder to make CMS work. It is a pale copy of the Enron story, where accounting constructed a profitable enterprise, up to the point when profits failed to manifest in practice. In Barad's terms, discourse encountered the limits imposed by the "constitutive outside".

I come back to Appadurai's (1986a, pp. 50-51) observations regarding commodities futures trading, where "the moment of prices becomes an autonomous substitute for the flow of commodities themselves", involving a "double degree of removal from the social relations of production and exchange". That is, he is describing a "substitution of performance" – as I have described here, but not linked to markets in criteria and not as attenuated as stock prices in relation to the products sold by the issuing firms (which I have called financialized meta-commodities). In these "tournaments of value" whose "concern with commodities is purely *informational* and *semiotic* and is divorced from consumption" – commodities as signs (citing Baudrillard 1981) can yield profit if "manipulated properly". He also speculates that these "tournaments of value" affect more mundane commodity flows and calls for a fuller examination of the "the modes of articulation of the 'tournament' economies with their more routine commodity contexts". Appadurai is saying that trade in commodities *as signs* in relation to – *representing* – other, underlying commodities – can both be autonomous and affect the underlying commodities, and that it is material: It can yield profits. "Substitution of performance" as illustrated in the case of CMS links these insights to the theory of performativity in markets, evidencing the performativity of discourse in markets in the form of trade in commodities as signs: What the case of CMS illustrates is that the trade in commodities as signs (marketized criteria and financialized meta-commodities), apparently representationalist in relation to and substituting for an underlying commodity, can indeed be autonomous, separating from the underlying commodity, and can yield profit, constituting a self-sustaining performative realm, but subject to collapse when it encounters the "constitutive outside". That is, there are limits to an otherwise "sovereign" performativity (Butler 2010).

7.4 Accounting for the failure of CMS from a market perspective on packaged software and in relation to contract; retrospective on CMS

Pollock and Williams's (2009a) biography of ERP suggests that a successful packaged software market requires the mobilization of a knowledge network in support of an organizing vision (Swanson and Ramiller 1997), but more substantively the successful execution of a strategy of generification, to turn a particularized software product into a standardized, high margin information good. The first version of the biography of CMS, as organizing technology for contract, shows an active knowledge network in support of a coherent and compelling organizing vision, but indicates that generification did not work, and CMS accumulated a record of shortcomings. This biography begins with a technological determinist or essentialist assumption that the technological artefact is ontologically coherent and that it was designed ("from nowhere" in Lucy Suchman's sense) as a neutral, technical solution to meet a specified need. But by the end of the story, the CMS category is breaking down, and "CMS" appears to be more than one technological artefact; through the telling of the biography, the biographical subject fractures, calling into question our understanding of how it came to be.

The second version of the biography of CMS, as a commodity, is an account of the "production" of CMS, and of how it broke down (see Table 7.8 for a summary). This second version of the biography subsumes and to a degree explains the first. CMS was associated with an organizing vision and its market correlate the category. The category was a site of material enactment, a coordinating mechanism (Law 2002) for disparate objects (the various CMS products and vendors) but also for investment, both financial and cognitive, across the knowledge network. Separately, CMS as a technological artefact was variable and unsettled, the subject of conflicting views, bought and sold, moving through and to different organizations, positioned and repositioned. Law (2002), in his study of the TSR2 aircraft, found a "place of darkness", where competing narratives could not be reconciled. The table of breakdown decenters CMS, locates it along multiple dimensions, and illustrates the lack of convergence between the category and the technological artefact and product, Law's "place of darkness". While Pollock and Williams note the relative "boundedness" of tangible commodities as contrasted to the malleability of software, in the case of CMS this is more than a question of the lack of stability in software code and capabilities, the temporal provisionality of a technological artefact. "CMS" was not ontologically coherent.

Breakdown observed	***Breakdown of what?***	***Revealing what?***
Hard coding from previous clients Buy-side or procurement bias Difficulty in generalizing cross-industry *Contract data was domain-specific and even customer-specific* *Instability of products and vendors* *Strategic transactions to acquire customers and extend into new verticals* *Conflict over customers and IP* *High proportion of service revenues* *Development of multiple delivery options from enterprise to low-cost subscription models; emergence of "commoditized" competition at the low end*	The business model for packaged software (generification)	Packaged software is an information good Generification is generalizable
Process fragmentation (offline processes, no continuous data flow) Functional or operational fragmentation across the contract lifecycle Fragmentation of contracting by type of contract or business unit, especially buy-side versus sell-side; localized and multiple implementations	The organizing vision – automating the contract lifecycle across the enterprise	Contract management means process automation

Breakdown observed	***Breakdown of what?***	***Revealing what?***
Fragmentation of contracting – see row above Limitations on the repository (completeness, access and searchability) Difficulties in defining and extracting structured data Limited data integration Reduced expectations for contracting knowledge as associated with CMS (as opposed to risk management, business intelligence or other business initiatives) *Contract data was domain-specific and even customer-specific*	The organizing vision – contracting knowledge as an outcome of automating the contract lifecycle across the enterprise	Structured data is knowledge
CMS associated with scale (volume and standardization) and structured data CMS associated with large companies CMS associated with the buy-side CMS associated with IT infrastructure, especially ERP CMS associated with lower risk CMS associated with "algorithmic" contracting *CMS vendors targeted large firm customers* *4 of 5 focus vendors started with an algorithmic contracting capability* *Algorithmic contracting is domain-specific and even customer-specific*	The organizing vision – CMS as an organizing technology for all types of contracting	Contract is algorithmic

Breakdown observed	***Breakdown of what?***	***Revealing what?***
Unclear as to whether about process or information Conflicting function-specific views of CMS Competition with in-house and other software (e.g. ERP) Overlapping functionalities with other software (e.g. CRM, strategic sourcing) High cost of advanced features Weak business case Fallback to document repository (in competition with e.g. records or documents management systems) *Clear encroachment into CMS space by ERP and other software vendors* *Rating of CMS vendors under other categories* *CMS subsumed under other categories such as e-purchasing* *Gartner retirement of the category* *Emergence of subcategories along various dimensions (repository versus process; documents (Upside) versus data; verticalization (I-Many); procurement focus with a network (Ariba) or purchase category expertise and granularity (Emptoris))*	Category	Classification is performative
(Early) vendor equity valuations relative to revenues and profitability *Projected market size as compared to lack of revenues* *Category success as compared to product unprofitability*	Market expectations in relation to market performance	Substitution of performance through marketing

Table 7.8 Completed table of breakdown (italics indicates evidence from analyst and vendor data)

The table of breakdown points to three levels of commoditization in the biography of CMS: the underlying product (computer code packaged as organizing technology), its financialized meta-commodity (equity interests in producing firms), and commoditized criteria (analyst ratings and rankings). The case demonstrates that financialized meta-commodities and marketized criteria can have a privileged role in product qualification for packaged software, effectively standing in for user satisfaction. I theorize this as a "substitution of performance" across multiple levels of commoditization, as suggested by Cochoy (2010) in another context. In the case of CMS, substitution of performance was effective, to a point, masking the lack of ontological coherency.

The table of breakdown also draws out the assumptions performatively at work in the biography of CMS – beliefs in packaged software as an information good and in the generalizability of generification as a strategy (a kind of meta-organizing vision for the packaged software industry) toward creating an information good; in the organizing vision of CMS (contract management as process automation, structured data as knowledge, and contract as algorithmic); in classification as performative; and indeed in the substitution of performance through marketing. These assumptions, materially enacted as intentional performative operations, were the site of significant investment (financial and cognitive), and succeeded in creating a software category and generating expectations for that software category. However, they not only produced but simultaneously constrained understanding and, within the larger phenomenon, they broke down when they encountered the "constitutive outside".

How can we account for the failure of CMS from a market perspective on packaged software? I argue that the fundamental breakdown was in classification performativity in product qualification when an attempt to classify a new technology failed (see Pollock and Williams 2010). The category for CMS was overly abstracted and insufficiently differentiated. The organizing vision and its generic model of the contract lifecycle eliminated critical distinctions and smoothed over significant tensions inherent in the category's disparate origins. It was a model based on idealization (MacKenzie 2006a), corresponding to "dreamed of states of commerce" (Cochoy 2010), "drawing on a world … that had not yet been realized" (Lepinay 2007a, p. 270). Accordingly, the organizing vision broke down. Contracting resisted classification as algorithmic, and would not stay within the bounds of the CMS process model. CMS did not generally deliver the sort of "visibility" into contracting – the contracting knowledge – that it promised would arise from the automation of the contract lifecycle. Contracting and contract data were variable – across industries and as between buy-side and sell-side. So vendors could not execute on their strategies of generification, and CMS failed to become an information good. These compounding breakdowns eventually materialized in a divergence between market expectations – as evidenced first in the financialized meta-commodities of equity interests in vendor firms and thereafter in the marketized criteria of analyst coverage – and market performance as measured by revenues and profits. This produced the motivating question for this study. The multi-level breakdown analysis turns the motivating question upside down, from "What happened to contract management software?" to "Where did the expectation of market success come from?" – that is, from a question about an IT product failure to a story about performativity and breakdown in market making. Vendors eventually took different paths to look for scale and profitability. However, it took some years for this to unfold. During those years, first financialized meta-commodities (equity interests in vendor firms) and then marketized criteria (in the form of favourable analyst coverage) kept the CMS program alive. The invested knowledge network and the organizing vision with its market correlate the category detached into a closed performative realm that eventually – when customer revenues failed to materialize – collapsed.

With respect to the second research question, the breakdown of the organizing vision indicates that market failure for CMS was directly related to the nature of contract and contracting. Contracting is not universally susceptible to algorithmic reduction; but where it is, it is scale that warrants the substantial cost of specialized ICT, including data management and data extraction. CMS was designed around an unstated assumption that contracting was algorithmic, and its proponents underestimated or underplayed the data management and data extraction requirements. Contracting is domain-specific so that, to be valuable, ICT for contracting should grapple with specialized knowledge and practice requirements and their cost. Contracting is fragmented inside organizations, both across the contract lifecycle and for different kinds of contracting, with a notable split between buy-side and sell-side, but internal fragmentation by type of contract may to some extent be explained and indeed justified by the domain-specificity of contracting, or by other mandates of the various "knowledge regimes" (Howard-Grenville and Carlile 2006) having an interest in contract (e.g. risk management, business intelligence or supply chain management). Organizational contracting knowledge is a problem not susceptible to simple ICT approaches based on process automation and structured data.

However defensible this analysis might appear from today's perspective, it is important to keep the story of CMS in perspective. First, it is in part a dot.com story. Kirsch and Goldfarb (2008) estimate that as many as several thousand internet firms got venture capital funding to pursue "get big fast" strategies, on the basis, crudely put, that market share could be bought (see section 6.2.6). But "most Internet business concepts were not capable of productively employing tens of millions of dollars of venture capital" (Kirsch and Goldfarb 2008, p. 262). They conclude that the dot.com bust was more about the collapse of oversold valuations than the failure of inherently bad ideas (cf. Ashkenas et al. 2012), and many smaller firms did survive the dot.com shakeout. Though "get big fast" was not the right model for many internet firms, Kirsch and

Goldfarb's analysis indicates that the exit rate in the internet business was not unusually high compared to that in other emerging industries.

Second, the breakdown of the CMS category is not the end of the story. Vendors have found different ways to move forward. Thus the resistance of contracting to an overly simplistic classification was not only revelatory but generative, productive, or corrective (cf. Barad 2007; Bowker and Star 1999; Callon 1998c). Notwithstanding the relative weakness of the CMS category, observers believe it will likely persist in some form, in the reconstituted sub-categories or possibly subsumed within stronger categories/products, such as e-procurement or ERP. Indeed the recently announced acquisitions of Emptoris by IBM, of Ariba by SAP and of Upside by Sci-Quest indicate that this is happening. Pollock and Williams (2010) describe how a Gartner analyst was able to defend several patently failed predictions by pointing out how some aspect of the prediction, or some insight it contained, or its general thrust or underlying theme, was in some way borne out. In the same way, Gartner's prediction for CMS may have come true. That is, there may be a $20 billion market for software and services supporting "contract management", but not under that name.

In Pollock and Williams's (2010) typology of promissory behaviour, Gartner's prediction was perhaps a "vision let loose": speculative and low in accountability. On the other hand, I would argue that vendors, the IACCM, customers and even the analysts did not see that way: In 2009 the prediction was still cited to me by a vendor and noted by Tim Cummins (Cummins 2009) as an indication of the level of disappointment in the product and category. At this point it is interesting to revisit this high point of the CMS trajectory. Gartner identified three goals for improved contract management: to reduce costs including through an accelerated contract cycle; to identify and reduce contract risks; and to enable improved, more flexible arrangements with suppliers "to restructure the enterprise cost base": in other words – risk management and buy-side cost reduction. But CMS does not seem to be associated with risk management except at a very rudimentary level (e.g. making sure there are executed contracts in place and that they can be located) (section 5.4.4). Buy-side cost reduction is operationalized principally as a data-driven process which need not be associated with contract management per se but might instead be called strategic sourcing, spend management or supplier relationship management. "New, flexible working relationships with suppliers" would entail supplier collaboration capabilities, but these are not features of CMS, and instead would be more associated with supply chain management (e.g. as in Malhotra et al. 2005; Rai et al. 2006). Cost reduction and supply chain management are brought together in "inter-organizational cost management" (Cooper and Slagmulder 2004; Fayard 2012). In other words, the programs identified by Kyte remain important but have been taken up by other, more successful “organizing visions”, under other names (cf. Pollock and Williams 2010, 2011).

I would argue, however, that the CMS project and the efforts of the vendors, the analysts, and the IACCM have resulted in higher awareness among contracting professionals of the possibilities for ICT in relation to contracting. In particular, the biography of CMS provokes important and still unanswered questions about how organizations in the networked economy can understand and manage their contracts, i.e. the problem of synthesizing organizational contracting knowledge. In the next chapter I discuss this and other implications of this study.

Chapter 8 Implications of this study

In this chapter, I discuss the implications of this study for packaged software (section 8.1), for process commoditization (section 8.2), for ICT, contract and knowledge in the networked economy (section 8.3), for practice (section 8.4) and for the theory of performativity (section 8.5). Beginning with the implications for packaged software, I question the business model for packaged software, suggesting that packaged software is not best understood as an information good (section 8.1.1), and that the logic of commoditization in packaged software production gives rise to more fundamental conflicts of interest between vendors and customers and between analysts and customers than may be taken account of in the buy-versus-build procurement model (section 8.1.2).

With respect to process commoditization (section 8.2), this study illustrates on the one hand the critical importance of classification in product qualification, but suggests on the other that classification of process commodities is always and essentially, not contingently, provisional and contested. This study also suggests that process commoditization involves a different type of product qualification, where overflowing, dependencies and provisionality must be accommodated, and thus may revolve around contract and information exchange rather than product definition.

In section 8.3, I draw out several implications of this study for ICT, contract and knowledge. In section 8.3.1, I hypothesize that trends in ICT-enabled contracting involve further fragmentation of contracting and dis-location of the contract vis-à-vis the organization. In section 8.3.2, I discuss how not only these trends but the logic of commoditization, the phenomenon of process commoditization and the interdependency, consequentiality and a strong Austinian performativity of contract in the networked economy suggest that the problem of organizational contracting knowledge is more acute than has been suggested by the IS or accounting literature to date. From the arguments laid out in these sections, I conclude that contract is located between organizations, involves information exchange, is not inert and can have network effects beyond the contract parties. Based on this conclusion, in section 8.3.3, I offer an alternative or complementary theory of contract – as a technology of connectedness, with possible strong Austinian performativity, in a relationship of potential convergence, complementarity and substitution with ICT.

In section 8.4, I draw together the implications of this study as they relate to practice – specifically, for packaged software design, procurement and investment. This study joins others in challenging the dominance of organizing visions and categories in shaping the IT marketplace but goes on to ground a more fundamental critique of the buy-versus-build analytical framework for procurement.

In section 8.5, I discuss the implications of this study for the theory of performativity, as an empirical study that applies and explores the notion of breakdown and that identifies multiple instances of performativity, supporting in principle an analytic decomposition of "performativity" as suggested by MacKenzie (2004, 2006a), but raising some questions about his proposed schemas. In particular I argue that Austin's (1962) original insight into the strong performative effect of expressions that on execution have rule-based mechanistic or deterministic material outcomes is relevant to the theorization of contract as a technology of connectedness and to other phenomena characteristic of the networked economy.

8.1 Implications of this study for packaged software

A starting point for the understanding of packaged software is through the lens of software engineering, as packaged software is compared to custom software (Sawyer 2000). From that perspective, the business model for packaged software production is based on the logic of scale (Brooks 1987; Light and Sawyer 2007), with software theorized as a "make one, sell many" high margin information good (see Gallaugher and Wang 2002; Pollock and Williams 2009a, p. 20; Teece 1998; Xu and Brinkkemper 2007). For user organizations, because of the assumed scale economies, buying software should be cheaper than building it in-house. However, the logic of scale sets up the problem of standardization for packaged software, and thus a tension between vendors and customers (Chiasson and Green 2007), often complicating procurement (Chiasson and Green 2007; Howcroft and Light 2010) and implementation (e.g. Lucas et al. 1988; Strong and Volkoff 2010). Pollock and Williams's (2009a) important study of ERP, applying a biography of software approach, identified generification as an important process in the successful making of a software product and market, solving the problem of standardization, reconciling the interests of vendors and customers, and, as related to the business model for packaged software, resulting in the production of a high margin information good. This study impacts this understanding of packaged software in several respects. First, it questions the business model for packaged software. Second, by tracing the logic of commoditization in packaged software production, it informs a market perspective on packaged software that, among other things, challenges the buy-versus-build analytical framework for procurement.

8.1.1 Questioning the business model for packaged software

As discussed in section 7.2.1, this study shows that packaged software is not an information good in the sense that a piece of recorded music is an information good – standardized, stable and decontextualized. Howcroft and Light (2010) have argued that packaged software is unlikely to be standardized and stable. Pollock and Williams (2009b) have observed that packaged softare is not severable from its vendor, and this study shows that packaged software is not always easily disentangled from its history, its past users, its current users and the vendor's owners. That is, decontextualization may not be possible.

Decontextualization can also be taken too far. The biography of CMS, read together with Vitari and Ravarini (2008) and Chiasson and Green (2007), shows how decontextualization that marginalizes users and excludes practice can have two counterproductive effects. First, it can invite competition, including from low-value, generic, "commodity" products. Second, it can put burdens on the user organization, which has to devote substantial resources toward making the software work. Simply put, in some cases, software that is generic and context-free may be less valuable for any particular user and face more competition. On the other hand, packaged software that is generic and context-free but sets the standard for interoperability or other dependencies (networks and platforms) may indeed benefit from network effects and increasing returns – if it has not been given away free, as in the case of email programs (Haigh 2008).

If packaged software is not an information good, it may be useful instead to understand what it actually does – that is, to take a performative perspective. As one example, I-Many, offering software to aid compliance with Medicare and Medicaid regulations, is a kind of bolt-on to the US regulated healthcare industry comprising highly specialized knowledge directly supported by software, and it might be more meaningful to consider I-Many as a specialized IT systems sub-contractor to big pharmaceutical companies rather than as a vendor of packaged software. From its early strategy of generification, I-Many made a pivot toward data-rich, domain-specific recontextualization to find scale and profitability. As another example, Ariba recontextualizes large company procurement, relocating this organizational activity to its supplier network. In the case of CMS generally, I have proposed that it is best understood as a process commodity, with implications I discuss in section 8.2.

To summarize, this study questions the business model for packaged software understood as an information good – standardized, stable and decontextualized. In particular, it suggests that decontextualization may not be possible, and further that it may not be desirable. Generification is one path to scale and profitability; recontextualization may be another.

8.1.2 A market perspective on packaged software: the logic of commoditization in packaged software production

In section 2.4, I suggested that research to date had not pursued the meaning of Sawyer's (2000) observation that profitability and market share are measures of success for packaged software (see also Chiasson and Green 2007; Ó Raian 2010). In section 7.3, I have theorized this as a "substitution of performance", where not only financialized meta-commodities in the form of equity interests in vendor firms (as Sawyer observed), but also marketized criteria in the form of analyst ratings and rankings, take precedence over the packaged software itself. Because of the substitution of performance, packaged software production reflects the logic of commoditization, not software engineering.

By implication, the production of packaged software cannot be understood (solely) through the lens of, or by analogy to, software engineering. Product extension, market consolidation and firm growth oriented toward the production of revenues, profits and market share, as illustrated in the case of CMS, bear little correspondence to the "waterfall" model of software development against user requirements, even an attenuated "waterfall" model translated to RFX-based procurement practices and negotiated through knowledge intermediaries. Packaged software that is a product of this logic may not be "designed" against a set of user requirements in the sense generally understood in the systems development literature (such as Boehm 1988). Perhaps it was "designed from nowhere":

> Within prevailing discourses anonymous and unlocatable designers with a license afforded by their professional training problematise the world in such a way as to make themselves indispensable to it and discuss their obligation to intervene, in order to deliver technological solutions to equally decontextualized and consequently unlocatable users. *This stance of design from nowhere is closely tied to the goal of construing technical systems as commodities that can be stabilized and cut loose from the sites of their production long enough to be exploited en masse to the sites of their use. … this ethos of commodity production and marketing stands as an ideal for many manufacturers of computer systems* … . (Suchman 2002, p. 95) (emphasis added)

But one could make the case that CMS and perhaps other packaged software may be "designed from nowhere" in a different sense – in the sense that it is not "designed" at all. Instead, following the logic of commoditization, software companies strive through various means, including software acquisition and development, corporate deal-making, IP litigation and the deployment of large marketing budgets, to generate revenues, profits and market share. The expectations of revenues, profits and market share trade as financialized meta-commodities in the form of equity interests in vendor firms. Those expectations are built through a kind of trade in marketized criteria in the form of analyst ratings and ranking around the organizing vision and its market correlate the category.

In the case of CMS, the category was a site of material enactment, a coordinating mechanism (Law 2002) for disparate objects (the various CMS products and vendors) but also for investment, both financial and cognitive, across the knowledge network. The category provided the cognitive framework, whereby "'imaginary' niches may become self-fulfilling prophecies" (Suchman et al. 2001, p. 351). This involved "construct[ing] a mental map of underexploited opportunities, generat[ing] a coherent model for organizing around those opportunities, and communicat[ing] a legitimating account of the endeavor to potential stakeholders. Together, maps, models and accounts make up a cognitive framework …" (Suchman et al. 2001, p. 351), with entrepreneurship "a product of underinstitutionalized cognitive models, not of under-exploited economic niches". But in the case of CMS, the engagement with "contract management" appears to some extent "opportunistic and ephemeral" (Pollock and Williams 2009a, p. 125). Appan and Browne (2012) have identified a general "misinformation effect" in the requirements elicitation process (not in the context of packaged software procurement), where users tend to recall misinformation provided by analysts rather than their own beliefs and knowledge. This study suggests that an organizing vision can have a similar powerful "misinformation effect" not just on customers but on analysts (as suggested in Wilson's 2008 blog questioning the contract lifecycle), vendors and investors, distorting packaged software procurement but perhaps also software design, strategy and investment.

To summarize, I suggest that, from a market perspective, packaged software is more radically different from custom software than is generally appreciated. While the problem of standardization for packaged software has been cast as a conflict between vendors and customers (Chiasson and Green 2007), the financialized "substitution of performance", where market share and profitability, as well as commoditized criteria, serve as proxies for user satisfaction, puts a more fundamental conflict of interest at the heart of the vendor-customer relationship. In addition, the interest of analysts is in maintaining the value of their proprietary models, such as categories, and revenue streams from vendors. Neither the vendors nor the analysts have a deep knowledge of user organization needs. I note here that in the course of interrogating the economy of scale assumption in IT outsourcing, Lacity and Willcocks (1995) identified costs that fall uniquely on outside vendors: the costs of acquiring business expertise, marketing expenses, and shareholder returns. That these considerations need to be accounted for alongside the presumed economies of scale in production seems an obvious point and yet is often overlooked in the buy-versus-build analytical framework that underpins software procurement.

8.2 Implications for process commoditization

In sections 3.1.3 and 3.1.4, I discussed the arguments suggesting that process commoditization – the conversion of organizational processes into products, following a program of functional simplification and closure, or decontextualization (see Davenport 2005; Zysman 2006) – would be an increasingly important aspect of the networked economy, corresponding to the de-composition or de-verticalization of the organization described by Kallinikos (2006). In section 7.2.2, I suggested that packaged application software like CMS is a form of process commoditization. In this section I draw out the implications of the case of CMS for process commoditization generally.

The case of CMS illustrates the critical importance of classification in product qualification for process commodities. Drawing lessons from the failure of classification in the case of CMS, we would conclude that the boundaries of the product category must be clear; that the boundaries of the process being commoditized should also be clear; that the process commodity should correspond to an actual process – one that already exists, or one that can be adopted *in vivo*; and that the process commodity should be pitched to a level of abstraction (or generality) to produce tangible economic benefit to customers at a scale that produces profit for the seller. Put another way, process commoditization, ideally, is based on a "valid" instance of functional simplification and closure (Kallinikos 2006, from Luhmann 1993; cf. Hanseth and Lyytinen 2009), the codification and relocation of process described by Zysman (2006) and standardization (Davenport 2005). In this model, process commoditization is based on radical decontextualization, but the case of CMS gives warning of possible weakness in the program.

First, the overflowing of CMS's process model described in section 7.2.2 suggests that the radical decontextualization underlying process commoditization is liable to overflowing. To take an example from another context, one interviewee, a contracts lawyer at a global outsourcing company, observed:

> In the service area compliance is much more subjective. If you contract for No. 2 yellow pencils, and they send No. 3 red pencils and half are broken, it is easy to say there's non-compliance. But if you say: Are you responding to a call within fourteen seconds 90% of the time within business hours? This raises questions: how to track it, how to calculate it. How do you treat a call that comes in four seconds before close of business? What if there is an ice storm? What if Microsoft puts out a patch and you are loaded with call volumes while people are scrambling to figure out what happened and how to calm everybody down? What about the fact that the internal help desk took thirty seconds to answer a call? … So as operations move outside the organization, contracts come much more into play. Contracts are creating standards of operational performance at a very granular level. … And company culture. The contract is your way to express that culture to strangers. This is how we do business, this is what our

> customers expect, this is what you have to do to make it invisible to our customers that they are not dealing with us.

As noted in section 7.2.2, the overflowing of codified processes is a phenomenon long remarked and well understood in IS research. Of more interest is the fact that what is conceptualized as decontextualization is materialized as recontextualization. That is, codifying and relocating process in the course of process commoditization may reveal previously unnoticed or latent dependencies and create new dependencies. In the case of CMS, by codifying "contract management" and relocating it to a packaged software environment, user organizations became entangled in a network of co-dependent relations incorporating technological artefacts, markets and market participants, including previous and current customers. Most significant was the interdependency between the vendors, who owned the software code and who retained both the right and the obligation to maintain it, and the users, who had to invest significant resources to make CMS work.

At this point, for further illustration of the overflowing and dependencies that may characterize process commoditization, I return to Lepinay's (2007a) detailed look at what it takes to turn a process or a service into a product from the seller's point of view. In the case analysed by Lepinay, a bank designed a new class of products called correlation products, which, in Lepinay's account, transformed a service – hedging for a client through portfolio balancing on an ongoing basis – into a contract issued by the bank. We might characterize this as contract-as-product. Lepinay describes the operational assumptions that underpinned the bank's presumed ability to perform its obligations and profit under the contract, and shows how these assumptions proved to be false, as regards both trade execution in the relevant financial markets spread across the world's time zones and the bank's back office capabilities.

Interestingly for this study of CMS, a principal issue in managing the product was what could be characterized as poor contract management: "Preserving the product essentially meant preserving the latest and most accurate version of the contract, the one that was shared by the bank and its client" (Lepinay 2007a, p. 272). Contract changes were agreed in confirmations exchanged between the bank and the customer, sometimes through several rounds of negotiation. "But this waltz involving the bank and the client, actually displayed a fragmentation within the bank", namely between the traders and the back office staff. These positions turned over frequently, so there was little personal continuity, and processing times were significantly different as between the two operations. These issues were presumptively resolved through the maintenance of matching folders, one in each of the two departments and a third archival version, which were supposed to reflect all communications concerning the contract.

At one point a contract folder was lost by traders, and as it transpired the lost traders' version of the folder was the only correct version; the others had not been kept up to date. Further, the mismatch between the trading desk and the back office was reflected in inconsistent data entries in their respective databases. Only by taking the embarrassing step of asking the client for copies of the relevant communications could the bank figure out its obligations under the contract. To prevent recurrence of this situation, the bank created software that monitored the two databases for discrepancies and, more importantly, created a digital archive of all contract communications. This solved the problem as between the traders and the back office but did not work well for the traders because the software revealed their strategies among themselves, an extremely problematic feature for the competitive trading desk community. "[F]inance was proving that it had a body, fragile and made of a very tenuous fabric" (Lepinay 2007a, p. 275).

In the next stage of Lepinay's story, the product evolves from a custom, hand-crafted, product to one that is fully supported by "industrial processing", using a computerized system to manage pricing and product information. No such system was available off the shelf, and the bank was reluctant to work with an outside vendor to build one, since this would give the vendor access to valuable proprietary intellectual property, and, by way of the vendor selling to another bank, help competitors and drive the product toward "commoditization" (meaning it would become generic and widely available). "This solution would have been available to another bank and the investment would be worthless." (Lepinay 2007a, p. 275) The bank therefore opted to build an in-house proprietary system, which was positioned as a strategic competitive advantage for selling the product to clients. Lepinay says that the system, which was fully integrated and highly specific, was also strategic within the bank, helping to insure that this trading activity could not be easily sold off or otherwise jettisoned as a standalone business.

> [T]he products and the system had been designed in such a way as to not be easily detachable from one another. It came as a bundle but, with the incorporation of back office facilities, it ended up being much more than a package. Actually, management struggled against moves toward a packaged commodification of its activities, doing its utmost to attach it through as many channels to make its substitutability unlikely. (Lepinay 2007a, p. 277)

Lepinay notes that the bank was offering this particular product when other banks could not, and that the product was difficult to value as it was not comparable to other assets and liabilities of the bank. This meant the product was rather opaque to bank shareholders, and vis-à-vis regulators required a customized and specially approved risk valuation strategy. But this was counter to the general structure of accountability for the bank, which was based on the assembly of modular but standardizable, commensurable business units. Lepinay suggests that the product and its associated program confounded the liquidity and calculability assumptions underpinning the bank's overall coherence and accountability vis-à-vis investors.

Lepinay (2007a) illustrates the problems encountered in converting a service or process (ongoing management of a diversified portfolio) into a product (in this case, a contract-as-product). As it emerged, the process being commoditized depended on markets and institutional functions and processes that resisted enclosure within the process model, and the process commodity created new dependencies on market capabilities and on record-keeping, computerized systems and other "internal coordination forms" (cf. Håkansson and Lind 2004) that did not exist before. "This product was drawing on a world of finance that had not yet been realized" (Lepinay 2007a, p. 270).

The overflowing and dependencies in process commoditization were remarked by Lacity and Willcocks (1995) when they noted that the "ubiquitous nature of information technology penetration" presented a challenge to IT outsourcing.

> When participants tried to isolate information technology activities for outsourcing, they often discovered that changes to the outsourced function affect other areas of the business. The vendors typically lacked the specialized knowledge to cope with organizational interfaces outside the boundaries of the information technology outsourcing contract. (Lacity and Willcocks 1995, p. 227)

I suggest that because process commodities are characterized by overflowing and dependencies, their definitions and their boundaries are inherently and always provisional and subject, or vulnerable, to overtaking classification schemes, new categories, and the encroaching extension of other product categories. Therefore, notwithstanding classification's central position in qualifying process commodities, it is always and essentially, not contingently, provisional and contested. "[T]he work of object coordination and object disaggregation goes on – and on. … the singularity of an object is precarious, uncertain and revisable." (Law 2002, p. 36)

A view of process commodities that is not based on functional simplification and closure but acknowledges overflowing, dependencies and provisionality causes us to rethink product qualification – the processes whereby the product is defined, described, given attributes, and stabilized (Lepinay 2007a), and alienated or severed from the site of production (Thomas 1991). One way to interpret the implications of this study for process commoditization is that product qualification, if it means the standardization and stabilization of the product and its detachment from the site of production, or decontextualization, is more difficult to achieve and maintain for process commodities than Zysman (2006) and Davenport (2005) seem to suggest. As an alternative, Callon et al. (2002) proposed that "what is important in the service business is the relationship or, rather, system of relationships which, on a material and collective basis, organize the qualification of products". In their theorized "economy of qualities", "the economy of goods gives way to an economy of relations" (Callon et al. 2002, pp. 210-211, 213). More in accord with Callon et al. (2002) than Davenport (2005), this study suggests that process commoditization involves a different type of product qualification altogether, where overflowing, dependencies and provisionality are tolerated, and must be accommodated.

This means, among other things, that the pre-commoditization object quality ("thing-ness") of the subject of the buy-versus-build analytical framework for procurement is not so clear, and the bright line between buy and build is not so bright (see Cooper and Slagmulder 2004). It also means that that process commoditization may revolve around contract and information exchange rather than product definition. That is, process commoditization is part of the "move to the middle" (Koch and Schultz 2011) discussed in section 3.3.2. According to Håkansson and Lind (2004), we would expect process commoditization to require inter-organizational ICT; or, according to Boland et al. (2008) process commoditization would generate "temporary assemblages" of contract counterparties, each "temporary assemblage" requiring its own "management control system". In section 3.3.3 I raised the question of what this means for organizational contracting knowledge, and I return to the subject of organizational contracting knowledge in the next section.

8.3 Implications for ICT, contract and knowledge in the networked economy

In Chapter 1, I characterized the relationship of ICT, contract and knowledge in the networked economy as evolving, perhaps undertheorized, and, in some circumstances, problematic. In this section I discuss some aspects of how ICT and contract are evolving, suggest some problems that these and other emergent phenomena create for organizational contracting knowledge, and propose a new theorization of ICT and contract as the basis for further research.

8.3.1 The dis-location of contracting knowledge and practice vis-à-vis the organization

In section 3.3.2, I noted a hypothesized "move to the middle", or increase in "hybrid" contracting in networked relations. I suggested that this would seem to entail a proliferation of inter-organizational ICT and speculated, in section 3.3.3, that it might exert a centrifugal, dis-integrating or fragmenting effect on organizational knowledge, as contracting knowledge and practice is located outside or just at the boundary of the organization in a "temporary assemblage" or quasi-organization. In other words, there would be a kind of dis-location of contracting knowledge and practice vis-à-vis the organization. But the case of CMS, by illustrating the domain-specificity of contracting data and knowledge, provides a useful reminder that the location of contracting knowledge and practice relative to the organization is a more fundamental issue, not limited to "hybrid" contracting. Indeed, as Millo et al. (2005) show, even in market transactions, the knowledge aspect of contracting does not disappear; for market transactions, contracting knowledge and practice is relocated to market infrastructure, such as a clearinghouse. Approaching contract from the perspectives of relational contracting and as a social artefact and technology, respectively, Bernstein (1992, 1996) and Suchman (2003) both locate contracting in contracting communities. But CMS did not address the ICT needs of a contracting community, nor did it work in the inter-organizational space. CMS placed the contract lifecycle inside the organization; but the common ground of contracting knowledge and practice is located in the relationship between organizations and within the contracting community.

There was a separate but related problem for CMS that bears on the location of contracting knowledge and practice, and that is the issue of cost. High value data-rich versions of CMS tended to be limited to larger firms with thousands or tens of thousands of relatively standard contracts to manage. Accordingly, CMS vendors targeted the large firm market. Malone et al. (1987) observed that large organizations were developing ICT-based contracting capabilities, and Mithas et al. (2008) noted that larger organizations seemed more likely to engage in reverse auctions, probably because of the cost. In other words, ICT-enabled contracting is expensive, but can be cost-effective over volume. I suggest that cost has significant implications for where ICT-enabled contracting will be located.

Taking these two points into consideration, it seems reasonable to expect ICT-enabled contracting to gravitate to those locations where an investment in domain-specific contracting knowledge and practices can be justified by scale. This might include a procurement portal for a very large organization. An example would be the Tennessee Valley Authority's Supplier Connections Portal, "which manages contracts that provide services and materials to TVA and oversees warehousing, investment recovery, and logistics operations" (www.tva.gov/doing_business.htm, accessed December 5, 2011). Data-intensive verticalization strategies, such as that of I-Many, show that ICT-enabled contracting can also be located in software effectively shared across organizations in specialized contracting domains, while Ariba's supplier network suggests that ICT-enabled contracting can be cost-effective at domain-specific contracting nodes of the networked economy. This follows the same logic as the organization of markets generally, toward a concentration of specialized knowledge and the sharing of costs of standards, risk management and transaction execution (e.g Langlois 2006; Millo et al. 2005).

This trend would weaken the case for enterprise CMS, as firm portals and industry trading platforms continually reconfigure the corresponding contract data and process requirements inside counterparty organizations. The resulting contracting data and processes would be unlikely to converge to or produce a unified, holistic view of contracts inside the organization. Further, while a firm of diamond merchants might share diamond trading practices with other diamond merchants (Bernstein 1992), there is no particular reason to think the firm would benefit from analysing diamond trading activities and purchases of office equipment together by reference to a unified CMS database. Likewise it is hard to imagine that an airline has any reason to integrate its online booking system (which it might not own but instead license or participate in) with its employee payroll and benefits system (which it might outsource).

The example of an airline and its online booking system points to a second important development affecting the location of contracting knowledge and practice relative to the organization, the proliferation of “distributed contracting”. By distributed contracting I refer to instances where the terms of contract are constituted and made of record across multiple ICT and other tangible or intangible modalities, as in e-commerce. For example, in the online travel sector, “the contract” between a traveller and the travel services providers is effectively distributed between background laws and regulations, database records, electronic communications and personal interactions. Distributed contracting challenges the traditional notion of contract as embodied in a single contract document. Google’s attempt to construct an effective agreement with authors for its Google Books program (Helft 2011; Rushe 2011) is another example of distributed contracting. As a further example, there is increasing visibility across logistics, as hand-offs to delivery services are communicated through to purchasers of goods (through package tracking websites) to a degree that would have been considered astonishing not too many years ago. The collaborative working relationship between seller and logistics provider is opened up by information technology, not only as between them but for the benefit of the purchaser. From an information systems perspective, this is based on giving outsiders access to organizational databases, as anticipated by Malone et al. (1987).

To summarize, we can identify several trends in the co-evolution of ICT and contract that point to further fragmentation and dis-location of contracting knowledge and practice vis-à-vis the organization. First, perhaps somewhat consistent with TCE and EMH, I suggest that ICT-enabled contracting will be located where scale supports the cost of system build-out and maintenance (minimizing per-transaction contracting costs). Second, I have pointed out the proliferation of distributed contracting, which may make locating “the contract” potentially more challenging. The first development promotes further internal fragmentation of contracting, and both of these developments involve a dis-location of the contract vis-à-vis the organization. It seems reasonable to suppose that, at least in some cases, this dis-location of contract may make it harder to know when contracts have been entered into, where they might be located, and what their terms are.[48] Briefly stated, contract is located between organizations, not inside them, and involves information exchange between counterparties. This may not automatically generate but instead confound the creation of synthesizing organizational contracting knowledge, a point I consider when I return to the problem of organizational contracting knowledge more generally in the next section.

8.3.2 Respecifying the problem of organizational contracting knowledge

To review, as discussed in section 3.3, research indicates that knowledge is an essential aspect of contracting (e.g. Frances and Garnsey 1996; Malhotra et al. 2005; Dibbern et al. 2008; Gefen et al. 2008) and that hierarchical or hybrid contracting (in TCE terms) requires integrative inter-organizational ICT to support knowledge sharing between contract counterparties (e.g. Boland et al. 2008; Caglio and Ditillo 2008; Håkansson and Lind 2004). However, while organizational contracting knowledge is obliquely and partially addressed under numerous organizational knowledge initiatives (business intelligence, risk management, customer relationship management and so forth), research points to the inadequacy of financial accounting systems, and to the lack of any other “internal coordination form” (cf. Håkansson and Lind 2004) for contracting, and thus to a significant gap in organizational contracting knowledge. CMS was positioned to address this gap, but largely failed to do so, for all the reasons discussed in section 7.2.3. In brief, the case of CMS shows that organizational contracting knowledge is a problem not susceptible to simple ICT approaches based on process automation and structured data. It further suggests, by implication as I have elaborated in the preceding section, that the creation of synthesizing organizational contracting knowledge is more challenging than generally appreciated because of the dis-location of contracting practices and knowledge vis-à-vis the organization.

[48] Note that in this comment I am remarking on the knowledge of organizations as counterparties; the owners of portals and e-commerce or industry platforms will become catchments for specialized market and contracting knowledge – informational entrepots, which is one of the reasons that a market participant may find it advantageous to build a trading platform.

Moreover, this study also points out the importance of markets in financialized meta-commodities and commoditized criteria as hypothesized by Appadurai (1986a), and illustrates their potentially distorting effects on knowledge across the knowledge network. At a minimum, the knowledge network as an aspect of extended remote production should be taken into account in problematizing contracting knowledge. The commoditization perspective characterizes knowledge in extended or remote production as likely to be "partial, contradictory, and differentiated" (Appadurai 1986a), and I have theorized a "substitution of performance" that may privilege financialized meta-commodities and marketized criteria, or "signs" as commodities, relative to what they purport to represent. To the extent that ICT enables the proliferation of these "signs" as commodities, its effect may be quite contrary to an expectation that ICT will directly promote information sharing and thus knowledge (see Teece 1998).

In addition, I note the implications of process commoditization for organizational contracting knowledge. In the networked economy, as understood through the lens of TCE and EMH, contracting will increase, as products, work and risk are re-located around the network to achieve maximum overall efficiency (as discussed in section 3.1.1), including through process commoditization and resulting in the "distributed organization" discussed in section 3.1.3. In section 8.2, I described process commoditization as characterized by overflowing, dependencies and provisionality, but here I shift to a focus on the consequences for organizational contracting knowledge. I return again to Lepinay's (2007a) financial contract-as-product. Contract-as-product is a perspective on contract not discussed in Chapter 3, but process commodities are generally memorialized in contracts. The problem of organizational contracting knowledge for process commodities is illustrated several times in Lepinay's account – and his account covers only the bank's side. The bank could not keep track of the contract; it could not reconcile its databases to the contract; it could not reconcile its databases to each other; it was difficult to value the contracts; and it was difficult to reconcile reporting of the contracting unit's business to the style of reporting the bank normally required of its business units.

Returning now to AIG's credit default swaps discussed in section 3.3.3, we see the same type of internal opacity, but in addition the effect of reference to market information as a substitute for understanding of the underlying assets – another substitution of performance. The CDS book at AIG was managed by reference to market valuations, with reliance on market price discovery substituting for actual credit underwriting. Critically, contractual arrangements created extended interdependencies, producing and transmitting adverse events through latent contract mechanisms: In particular, AIG does not seem to have modeled the contractual effects of its own credit downgrades or of collateralization requirements, i.e. liquidity dynamics. That is, though AIG struggled to value the contracts by market standards, the more important thing was how the contracts would work in certain circumstances, i.e. what they would do. In Austin's original sense, they were performative speech acts. Furthermore, their performativity was transmissive – it had "hydraulic" ripple effects that extended beyond the immediate counterparties. Contractually created interdependence in the network can generate a cascade of amplification effects, which in the case of AIG posed a threat to many other financial institutions.

Ciborra (2007) cautioned of risks that would be "new and surprising": A folding or collapse of the network can create sudden, unanticipated proximity in terms of risk and consequences, as the distributed organization discovers extended vulnerability, such as supply chain risk. Significantly, these effects are not described per se in contract documents but are effects of how the contracts work (do things) and are thus performative, not only in Austin's (1962) original sense but in their in their potential effectiveness beyond the immediate counterparty: what I will call a "strong Austinian" performativity. This strong Austinian performativity might include the ability to transmit, transform, absorb, or amplify effects across the network, or a role in constituting network phenomena such as risk concentration (as in the case of AIG), or business networks (as described by Teubner and Collins 2011).

The interdependency and consequentiality of contract is not a phenomenon limited to the financial industry. As argued by Teubner and Collins (2011), there are a number of common contracting situations where contractual interdependency and consequentiality in the network often overflow a legal framework designed to enforce and interpret a standalone agreement between two parties. Their examples are just-in-time supply chains and franchising, but subcontracting and outsourcing are others. This non-obvious or opaque web of interdependency and consequentiality may result in loss of traceability and accountability. Collins characterizes contractually constituted business networks as potentially having it both ways:

> Unless the law responds appropriately to these particular qualities of networks, this type of business co-ordination creates the risk of "organized irresponsibility". In other words, the network achieves the level of organization that it requires for efficient co-ordination of productive relations, but simultaneously minimises the risk of external liability for the network as a whole. (Teubner and Collins 2011, p. 68)

As an example, Collins considers the proliferation of multi-layered temporary employment arrangements as a use of the network to subvert employment and social regulation. He thus suggests that one possible consequence of using contractually produced business structures in the networked economy is loss of accountability. "This discussion of the external liability of networks examines their darker side" (Teubner and Collins 2011, p. 71).

That is, a localized and bilateral analysis of contract, even one that acknowledges its "hybrid", implicit, or relational characteristics, does not really do justice to what contract is "doing" in the network. In this regard I refer to Callon's (1998b) citation of Granovetter (1985).

> For Granovetter the only possible solution is that provided by the network; not a network connecting entities which are already there, but a network which configures ontologies. The agents, their dimensions, and what they are and do, all depend on the morphology of the relations in which they are involved. (Callon 1998b, p. 8)

That is, there are network phenomena that are not apparent when seen through the lens of the "firm" and "bilateral private ordering". This constricted understanding of the networked economy collapses when it encounters the "constitutive outside" created by contract – a supply chain, a franchise arrangement, multiple layers of subcontracting, "cocreation of IT value", or an invisible vortex of risk like AIG. Just as Enron could not be fully understood in isolation from its affiliated off-balance-sheet counterparties, nor AIG's counterparties fully understood in isolation from AIG, a network of connected contracts cannot be fully grasped through the lens of the "firm" and "bilateral private ordering". Contract is not inert, and it has network effects beyond the counterparties.

A view of contract that takes account of the location of contracting knowledge and practice, the proliferation of financialized meta-commodities and marketized criteria, the phenomenon of process commoditization, and the strong Austinian performativity of contract giving rise to network phenomena significantly complicates the problem of organizational contracting knowledge (see Table 8.1), beyond what research to date would suggest. The problem of organizational contracting knowledge, raised but not resolved by CMS, remains substantially unsolved, with implications that are not well understood. In the next section I propose a new theorization of ICT and contract as a basis for taking this forward as a subject for further research.

Respecifying the problem of organizational contracting knowledge
Need for inter-firm IS to coordinate hybrid and hierarchical contracts (see Caglio and Ditillo 2008) (from Chapter 3)
Fragmentation of organizational contracting knowledge initiatives (business intelligence, risk management, customer relationship management, etc.) (from Chapter 3)
Inability to account for hybrid and hierarchical contracts (see Håkansson and Lind 2004) (from Chapter 3)
Internal process fragmentation, functional or operational fragmentation across the contract lifecycle, fragmentation of contracting by type of contract or business unit
Contract not generally algorithmic, not reducible to structured data
Increased fragmentation of contracting due to inter-firm governance requirements for hybrid and hierarchical contract, relocation of contracting to large company portals and trading platforms
The proliferation of distributed contracting
Markets in financialized meta-commodities and commoditized criteria; fragmented knowledge ("partial, contradictory and differentiated") in extended or remote production (Appadurai 1986a); substitution of performance
Provisionality, overflowing and dependencies in process commoditization
Subsitution of market price information for knowledge of the underlying (another substitution of performance)
Performativity of contract, including strong Austinian performativity
Interdependency and consequentiality of contract (including latent and non-obvious dependencies and consequentiality) giving rise to risk
Networks of connected contracts that overflow bilateral analysis

Table 8.1 Respecifying the problem of organizational contracting knowledge

8.3.3 Theorizing ICT and contract: contract as a technology of connectedness

As discussed in Chapter 3, empirical research on ICT, contract and knowledge is often framed in relation to transaction cost economics. But TCE has been qualified and criticized over the years (section 3.1.5). Research suggests it provides at best a partial explanation of the relationship of ICT and contract in the networked economy, and does not assign knowledge a major role (section 3.3.1).[49] In section 3.2, I briefly surveyed several alternative theories of contract, in particular noting Mark Suchman's (2003) idea of contract as a social and technological artefact and Collins and Teubner's (2011) of networks as connected contracts. However, these theories do not address the evolving relationship between ICT and contract, and organizational contracting knowledge is not a particular focus. In section 8.3.2, I discussed contract as a performative speech act, but without making a specific link to ICT. All of these diverse perspectives are surely relevant to understanding ICT, contract and knowledge, but the co-evolution of ICT and contract I have described seems to overflow TCE and the other theories of contract reviewed thus far. From the preceding sections I conclude that contract is located between organizations, involves information exchange, is not inert and can have network effects beyond the contract parties. Based on this conclusion, I propose as a basis for further research a deliberately underspecified and open theorization of contract as a technology of connectedness, with possible strong Austinian performativity, in a relationship of potential convergence, complementarity and substitution with ICT.

[49] This study suggests several issues for TCE in addition to those already noted in section 3.1.5. First, I point out that studies of markets from economic sociology by implication directly challenge TCE's continuing reliance on price as the first-order and presumptively exogenous mechanism of market organization. If markets are created in the way described by the economic sociologists, price can be seen as a highly contingent product of other more essential dynamics. In other words, price is an outcome, not an organizing principle – particularly when price is affected by financialized meta-commodities or marketized criteria. Second, this study suggests that the buy-versus-build analytical framework does not take account of the inherent conflict of interest created by the logic of commoditization: From the sell-side, financialized meta-commodities and marketized criteria will tend to be privileged relative to the underlying, in a "substitution of performance". Third, this study suggests that for process commodities, characterized by overflowing, dependencies and provisionality, buy-versus-build is a false dichotomy. Fourth, this study further caveats the buy-versus-build schema because it calls into question the pre-commoditization object-quality (thing-ness) of the subject of the buy-versus-build analysis, particularly for process commodities. Fifth, as a corollary, this study calls TCE into question as an explanation of firm formation: Firm formation in the biography of CMS has nothing to do with the focus vendors as buyers but is all about a supply-side effort to create and aggregate demand based on a concentration of specialized capabilities – an attempt to generate complementarity, as in Levina and Ross (2003) or in accord with Richardson (1972). Sixth, the costs of "market" transactions may be understated if the costs of market creation and maintenance (e.g. the costs of a clearinghouse function or of technology platforms, including the costing of the concentrated risk associated with the clearinghouse or platform) are defined as out of scope by focus on the transaction as unit of analysis. In fact, it is not clear how the costs of ICT, which can be substantial, even prohibitive, are accounted for in the electronic markets hypothesis. Lastly, costs arising from the problem of organizational contracting knowledge, as respecified here, are likely understated; they are almost certainly unquantifiable prior to realization, when things go wrong. These factors argue for reduced expectations in working with TCE – as urged, in different ways, by Richardson (1972) and Granovetter (1985) – and in particular caveat the buy-versus-build analytical framework.

In putting forward this idea, I first note a possible parallel with the substitution effect between money and information (e.g. Power and Laughlin 1996: “Like Parson, Habermas follows the cybernetic insight that money encodes information and releases agents from the burden of communication.”). Indeed the conversion of money to digitized records (Knights et al. 2007) has been so complete – underpinning the banking sector but also materialized in other phenomena such as e-commerce, mobile phone payments and online gaming virtual currencies – that it seems hardly noteworthy and yet is perhaps highly consequential in ways we have yet to realize, or experience.

Next, I note that a relationship of potential convergence, complementarity and substitution between contract and IT is already signalled or occurring in a number of ways. It is obliquely indicated in the literature on inter-firm governance (see section 3.3.2) as well as in the literature on supply chains and other ICT-supported contracting (see section 3.3.1). The interpenetration of contract and ICT is already an accomplished fact in the financial sector and in e-commerce. It seems inherent in Grover and Kohli’s (2012) notion of cocreation of IT value as the collective leveraging of IT investment. Distributed contracting in any form is a further example. In sum, I would argue that there is evidence of significant and growing convergence, complementarity and substitution, or more simply interpenetration, of contract in relation to ICT on a largely domain-specific basis.

What would be the implications of adopting this notion as a theoretical lens for future research? First, by tracing the evolving interpenetration of contract and ICT across regions or industries, we might better understand the implications for affected organizations. For the reasons outlined in the preceding section, I hypothesize that this trend does not eliminate but instead potentially exacerbates the problem of organizational contracting knowledge, but we do not know whether this is true or more generally how organizational information systems design is being impacted.

We might also better understand to what extent the problem of organizational contracting knowledge constitutes a real (though ever-shifting) limit on “contractibility” (using the term in a broad and literal sense to refer to what can and should be made the subject of contract). I hypothesize that the networked economy will not evolve according to an uncomplicated, direct correlation between ICT and the dissolution of the firm in favour of markets, as predicted by EMH and its proponents. Instead it may produce and sustain both new economic configurations and, because of the problem of organizational contracting knowledge and the background legal framework still constructed around firms and bilateral contracts, counter-tendencies and new motivations toward traditional or tightly bound effective vertical integration.

Lastly, we might better understand the nature and location of effective agency in the networked economy. As suggested by Granovetter (1985, 1995), our understanding of the economy tends to be through the lens of concepts that both assume and produce an "atomistic" ontology of "firms" linked through bilateral contracts. In this ontology the firm plays a central role as the location of profit and accountability. But this is only one way of understanding the coordination of economic activity. The "move to the middle" implies a possible overflowing not only of TCE's unidimensional governance dimension of market-versus-hierarchy but of the "firm" as the (sole) central construct. Phenomena such as "business networks" (see Castells 2010, p. 178; Granovetter 1995; Teubner and Collins 2011) and the "cocreation of IT value" (Ceccagnoli 2012; Grover and Kohli 2012) point toward the need for alternative conceptualizations, including perhaps, as suggested by Teubner and Collins, of accountability. An investigation of the conjoint performativity of ICT and contract holds some promise, I believe, as a way to approach these issues.

8.4 Implications for practice

In this section I draw together several implications of this study for practice. The case of CMS suggests that packaged software production reflects the logic of commoditization and thus cannot be understood solely through the lens of software engineering. Because of the logic of commoditization, which privileges financialized meta-commodities and marketized criteria over the underlying, there is a conflict of interest between vendors and customers that is more profound than the problem of standardization, and the interest of analysts is in maintaining the value of their proprietary models, such as categories, and revenue streams from vendors. Neither the vendors nor the analysts have a deep knowledge of user organization needs. These considerations are not easy to take account of in a buy-versus-build analytical framework for procurement. The study also suggests that the buy-versus-build model is likely to understate overflowing and dependencies, and, more fundamentally, takes for granted the pre-commoditization object-quality of the thing (e.g. "CMS") being procured: CMS was a process-oriented software that on the one hand did not correspond to an enclosable process but on the other was very similar to a number of other software products; years after its introduction, users and vendors alike were still struggling to define, and to justify, CMS. Taken in total, the study points to the lack of, and need for, a stable taxonomy, analytical framework and vocabulary for packaged software design, procurement and investment, in the absence of which not only customers and analysts but also vendors and investors may be led astray by "organizing visions" and their market correlates, product categories.

8.5 Implications for the theory of performativity

In section 2.3.3, I discussed the theory of performativity, first put forward by Austin (1962) to describe certain kinds of statements, including a contract, that do not describe the world but instead make the world. Butler (1990, 1993) adopted the notion to describe the effects of an iterative discourse that, in her argument, creates that which it purports to describe (e.g. a prediscursive gender); her emphasis was on classification performativity. Callon (1998a, 1998b) initiated the discussion of performativity in markets, arguing that economic models become embedded in the construction of markets and thus shape the phenomenon they purport to model. Subsequently the notion of performativity in markets has been extended to other disciplines and practices, such as marketing (Cochoy 1998, 2010), and applied to packaged software markets (Pollock and Williams 2009b, 2010, 2011). As part of agential realism, Barad (2007) has theorized a more all-encompassing "posthumanist" performativity, the essence of which is a break with representationalism in favour of the inseparability of matter and meaning, and which accords to non-humans and to matter a role in performative enactments (section 4.1.4). Performativity then has been invoked in a number of forms and toward a number of different aims, and, as discussed in section 2.3.3, MacKenzie (2004, 2006a) has, within the economics domain, suggested an analytic decomposition of performativity.

As part of the theory of performativity, there has always been a notion that performative operations might not work. Austin called this "misfire", which would occur when the "conditions of felicity" were absent. Callon theorized an "overflowing" of a "frame" attributable to the residual and latent attachments from within the frame to what it excludes, "the omnipresence of connections with the outside world" (Callon 1998b, 1998c). Butler suggested that "performative breakdown" – "when the effects of a performative operation fail to work" (Butler 2010, p. 150) – reveals the operation and demonstrates its limits; in Barad's (2007) terms, discourse has encountered the "constitutive outside". In this study I have taken literally the suggestion that breakdown is revealing (Butler 2010; MacKenzie 2004), using breakdown as an analytical device to trace the failure of CMS and to identify the multiple performative asssumptions and operations at work in the biography of CMS. The emergence of CMS subcategories shows how breakdown can be anomaly-resolving – generative, productive, corrective.

This study provides a number of examples of performativity. First are the various performative assumptions enlisted, consciously or unconsciously, toward the making of the CMS market: packaged software as an information good and the generalizability of generification as a strategy; the organizing vision of CMS (contract management as process automation, structured data as knowledge, and contract as algorithmic); classification as performative; and the substitution of performance through marketing. In terms of MacKenzie's (2006a) second schema, I would characterize all of these as instances of effective performativity, where these assumptions were used as models and were materialized in product design and in strategies and practices of the vendors and other members of the knowledge network. They primed a cycle of expectations toward realization. Market participants clearly aspired to Barnesian performativity, especially in marketing and category construction, but – ultimately – failed.

In section 7.2.5, I argued that the fundamental breakdown in the story of CMS was in classification performativity (cf. Butler 1993; Bowker and Star 1999). While Bowker and Star's (1999) has been referred to in studies of product qualification (e.g. Sjögren and Helgesson 2007), in this study I follow Pollock and Williams (2010, 2011) in making the relationship more explicit and draw upon Bowker and Star's insights directly to describe how classification performativity failed here. The breakdown of the CMS software category revealed not only the assumptions underlying the failed instance of classification performativity but also the belief in classification performativity enlisted in the creation of expectations.

In this study I have also described a "strong" Austinian performativity. Although in 2006 MacKenzie adopted "Barnesian" over "Austinian" to emphasize that the performativity he was describing was not purely a matter of linguistics, I make the case here that Austin's original insight – that an expression could effectively bring a material reality into being – is relevant to the theorization of contract as a technology of connectedness and to other phenomena characteristic of the networked economy.

Contract is probably one of the best examples of Austinian performativity. A (properly formed) contract creates legal facts and entails direct and predictable (rule-bound or machine-like) material consequentiality. This study makes the point that in the networked economy contract is not only performative, in Austin's original sense, it is likely to be potentially, if differentially, able to transmit, transform, absorb or amplify effects across the network. Contract also has a constitutive role in creating and sustaining network phenomena such as risk concentration and business networks, in ways that have yet to be understood. I have called this strong Austinian performativity and suggested that it is characteristic of contract as a technology of connectedness alongside and interpenetrating with ICT in the networked economy.

Separately, but intriguingly for this study, D'Adderio (2008) has characterized computer code as performative. Code exhibits strong performativity in that, assuming the enforcing background of hardware and (as relevant) framing software such as the appropriate operating system, it executes in a rule-bound, machine-like way. If code by its nature exhibits strong Austinian performativity, we might speculate that, like contract, it is not only performative but potentially transmissive and constitutive in its effects, and indeed manifestations of this quality are not hard to find (e.g. in computer worms or the effects of technical errors in automated trading).

This strong Austinian performativity can be characterized as an attribute of those expressions (such a contracts or computer code) that are materialized in a rule-bound mechanistic way – that are, in the right environment, self-executing in a deterministic fashion, and thus potentially autonomous. Though originally formed (by a human, or not, as in the case of high frequency trading) as a statement, they take on independent, posthumanist agency. I argue that strong Austinian performativity is highly consequential in the networked economy, where not only contract and ICT in a relationship of convergence, complementarity and substitution, but related technologies such as accounting and "financial innovation" (see Lepinay 2007a, p. 103) give rise to a conjoint performativity – perhaps Castell's "global automaton" (2010, p. xxi) – as demonstrated in the case of AIG and more generally in the recent financial crisis. As another example, strong performativity is a characteristic of classification systems that have been embodied in databases, when those databases have direct material consequences that are hard or impossible to contest or resist, such as when they are used in automated credit approval processes (credit scoring), to block financial account access, to determine the ability to fly in an airplane (no-fly lists) or to determine healthcare costs (see Bernstein 2012). In these cases, classification performativity takes on strong Austinian performativity. Perhaps the emergent "automata" merit the same type of ethical scrutiny that is being applied to other automata such as robots and drones (see e.g. Finn and Wright 2012; Lin et al. 2012).

The instances of performativity illustrated in this study in their multiplicity support in principle the analytic de-composition of "performativity", as suggested by MacKenzie with his schemas of 2004 and 2006. Generalizing his 2006 categories beyond the domain of economics, this case suggests that there may be a range of relative effectiveness within his "effective" category, and that his "counterperformativity" may incorporate some types of breakdown (as suggested by Callon 2007, p. 323), but not others. However, his Barnesian performativity, in which the practical use of a model makes processes more like the model they depict, does not really encompass the strong version of Austinian performativity I have put forward. In considering the examples of performativity encountered in this study, I see that performativity has been invoked to describe phenomena that vary significantly in terms of not only relative effectiveness, but also visibility, intentionality, as to whether a feedback cycle is set (or intended to be set) in motion, and the extent of strong Austinian performativity. I believe MacKenzie has initiated an interesting project, made more interesting when Barad's posthumanist performativity is taken into account, that merits further exploration.

I would agree with MacKenzie that performativity, however defined and regardless of type, is at a minimum "empirically important" (MacKenzie 2004). It provides a productive analytical framework for interrogating intangible but pervasive technologies – such as marketing and accounting (MacKenzie 2006a), but also ICTs, money and classification systems – and revealing their assumptions and operative mechanisms. Performativity (whether so-called or not) invokes important questions of intention, consequentiality and responsibility of the type raised by Barad (2007), MacKenzie (2006a) and Suchman (2002). To paraphrase Walsham (2012): Are these technologies making the world a better place? In particular, I suggest that strong Austinian performativity, as a special case within the general theory, is an important material, traceable phenomenon, characteristic of ICT and contract (as a technology of connectedness) and significantly implicated in the problems of knowledge, risk, and responsibility in the networked economy.

Chapter 9 Conclusion

In this study I have investigated the case of contract management software (CMS), a packaged software product that promised – according to its "organizing vision" (section 5.1.3) – to automate the contract lifecycle across the enterprise as a closed, continuous production function and provide "visibility" into contracting – that is, organizational contracting knowledge. Designed on the basis of a generic contract lifecycle, CMS was positioned to work for all types of contracts and for all types of businesses, in any industry. However, despite many successful implementations, including one I describe in section 5.2, CMS failed to generate the levels of revenues and profitability that investors and analysts expected (IACCM 2007; see Forrester Research Inc. 2011a; Gartner Inc. 2002; see footnote 2).

The failure of CMS to meet market expectations provides an opportunity to study packaged software, as well as the relationship of ICT, contract and knowledge in the networked economy. Pollock and Williams's (2009a) biography of software approach, which they developed in analysing the success of ERP, provides the framework for this case of market failure. To develop a market perspective (Sawyer 2001) and relate the study to broader theoretical development not limited to the software domain, I have looked to the theory of commoditization (Appadurai 1986a; Kopytoff 1986) and studies of markets from economic sociology (e.g. Callon 1998a; Cochoy 2010; Lepinay 2007a, 2007b; MacKenzie and Millo 2003), in particular the notions of product qualification (referring to the processes by which products are standardized, stabilized and decontextualized) and of performativity in markets (referring to economic models, but also other market practices such as marketing, that bring into being that which they purport to describe). Taking breakdown – a failure of expectations associated with a performative assumption or operation – as potentially revealing (Butler 2010; MacKenzie 2004), my biography of CMS is constructed around developing a table of breakdown, toward answering two research questions:

> (1) How can we account for the failure of CMS from a market perspective on packaged software? What are the implications for packaged software?
> (2) To what extent did the market failure relate to contract? What are the implications for ICT, contract and knowledge in the networked economy?

9.1 Key findings: evidence of breakdown in the biography of CMS

The biography of CMS was developed and is presented here sequentially in two versions. First, in Chapter 5, the biography of CMS as an organizing technology for contract is presented alongside an initial table of breakdown (Table 5.4). This first version of the biography was based on interview and survey data, vendor selling material and material from the IACCM archives. In this account, CMS emerged, in “harmonic convergence”, from antecedent technologies organized to meet a newly defined opportunity, contract management. However, CMS encountered unexpected difficulties and accumulated a record of shortcomings, or breakdowns, at a number of levels. First, both customers and vendors struggled with rigidities in the product that limited its adoption. Some CMS products featured hard coding from previous clients, some had a buy-side or procurement bias, and there was a difficulty in generalizing from one industry to another (section 5.4.1). This evidence points to a failure in generification.

Second, despite the organizing vision for CMS that modelled contracting as a closed and continuous production function, CMS did not “enclose” contracting, which remained fragmented by offline processes, by function across the contract lifecycle and by type of contract or business unit, resulting in localized or even multiple CMS implementations, and with a pronounced split between buy-side and sell-side (section 5.4.2). To take an example, even in an implementation that was considered successful by the vendor, which I describe in section 5.2, offline processes persisted, and there was no continuous flow of data as promised by CMS’s enclosing and integrating model. In addition, functional fragmentation across the contract lifecycle persisted: The sales force used a “product form” that bypassed contract management altogether, and went directly to the operations group responsible for contract compliance. While CMS provided a valuable working space and work management tool for the contract management group, the implementation was localized, and a competing solution was used in another part of the organization.

Third, there was an expectation that CMS would make contracting “visible”, but CMS was not particularly successful in producing organizational contracting knowledge, for a number of reasons (section 5.4.3). 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. Data integration was limited, and users generally did not look to CMS to produce organizational contracting knowledge. For example, in the implementation I describe in section 5.2, 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.

Fourth, 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 (Table 5.3, p. 132). 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", at a scale where the cost of advanced, data-rich features could be justified. In other cases, CMS was implemented on a reduced basis, as a contracts repository (section 5.4.4).

Lastly, CMS competed with custom software built in-house and with multi-purpose software platforms such as enterprise resource planning and enterprise content management systems that offered CMS capabilities, and it overlapped in functionality with these and other products such as client relationship management systems or strategic sourcing software. There was some confusion about what CMS was, and what it was supposed to do; given the high cost of full-scale implementation and the overlap with other systems, the business case for CMS was weak. As a result, CMS was often implemented in a reduced version as a contracts repository only. In sum, evidence pointed to the breakdown of the CMS category (section 5.4.5), and by the end of the story the biographical subject begins to fracture, prompting questions about its "production".

Extending data collection and analysis to include analyst coverage and the histories of five key vendors (in Chapter 6) reveals a more surprising story, the second and subsuming biography of CMS as a commodity. What the additional data shows is that while analyst firms developed and supported CMS as a coherent category, five key vendors who largely defined the category were a disparate group – with different histories and different products (section 6.2). Four of the five focus vendors started with data-centric capabilities and a data-centric model of contracting. I-Many, a "pioneer" of CMS, was in the regulated healthcare business, offering software to manage rebates and discounts; after trying for years to generalize its product under the contract management banner, it eventually retreated to the healthcare sector (section 6.2.1). Selectica (section 6.2.2) had a "CPQ" (configuration, pricing and quotation) capability for selling over the internet. When this business began to be overtaken by ERP capabilities, Selectica transitioned to CMS, which it built into a small, marginally cash-flow positive business. Ariba (section 6.2.3) targeted the professionalized procurement operation in large companies, offering a suite of buy-side software products, which over time incorporated a CMS module. Ariba also built a supplier network which appears to be the basis of its current success as a "cloud" provider; as of the summer of 2012 Ariba had agreed to be acquired by SAP. Emptoris (section 6.2.4) offered strategic sourcing software for large scale, professionalized procurement, and eventually acquired CMS as a complement to its main offering; Emptoris was acquired by IBM in early 2012.

All four of these companies took a strongly data-centric, or algorithmic, approach to contracting, which they assumed would come to dominate in e-commerce, and which they believed was generalizable. They targeted large company customers, looking for the scale that would support data-rich features of their software. Their experience shows that contract data and algorithmic contracting are domain-specific and even customer-specific, with Ariba and Emptoris marking out industry-agnostic professionalized procurement as their domain. In view of the histories of these four key vendors, it is not surprising that CMS was associated with algorithmic contracting, with large companies and with the buy-side.

These four vendors experienced periods of instability, and there was conflict with other vendors over customers and intellectual property. Of the four, the three for which financial results are available were (with the exception of Ariba in recent years) unprofitable; the fourth was bought out by a private equity company when it could not pay a judgment in a patent litigation. Low margin services made up a large portion of vendor revenues, indicating that the software was not really severable from the vendor – and supporting the position of technology analysts (as outlined in the Gartner litigation I discuss in section 6.1.2) that software is only one element considered in rating vendors, marketing capabilities being another key attribute. Marketing costs for CMS were high. For I-Many, Selectica and Ariba, aggregate sales and marketing expenses for 2000-2007 were approximately $1.2 billion, revenues were approximately $2.9 billion, and there was an aggregate loss of more than $5 billion (section 6.2.6).

The fifth focus vendor, Upside (section 6.2.5), took a different approach, focusing on documents, and it stands out among the five focus vendors for the stability of its management, ownership, product and vision; Upside claims to have been consistently profitable since its second fiscal year of operations. Even so, it does not appear to have grown very large in terms of revenues or profits; in 2012 Upside announced that it would be acquired by Sci-Quest, a provider of cloud-based procurement services, for $22 million.

None of this variability among the vendors and products they offered appears in the model of the contract lifecycle put forward as the “organizing vision” for CMS, and it was elided in CMS as a software category. However, over time, what one observer characterized as the conflicts and tensions present at the origin, and what other interviewees remarked upon as confusion about CMS (section 5.4.5) – what it was, whether it was needed, whether a generalizable contract lifecycle existed – manifested in a category breakdown eventually acknowledged by the analysts (section 6.1.3). In 2002, Gartner predicted a $20 billion market for contract management software and services by 2007, but by 2008 the Gartner lead analyst said that she had been “too easily swayed by the ‘contract lifecycle management’ rhetoric” that defined the industry. Gartner retired the category after 2008, and, like Forrester, has analysed the ongoing fragmentation of the category, with many companies competing in the low-end contracts repository business, encroachment by ERP vendors, and the emergence of specialty providers. Looking back, “CMS” has proved somewhat ephemeral, to use Pollock and Williams’s term, and the vendors associated with the category took different paths forward in the search for scale and profitability. By 2012, one of the five focus vendors had retreated to an industry niche, one was very small, and the remaining three were being absorbed into cloud-based procurement.

9.2 Summary of analysis

Pollock and Williams’s (2009a) study of ERP suggests that a successful packaged software market requires the mobilization of a knowledge network in support of an organizing vision (Swanson and Ramiller 1997), but more substantively the successful execution of a strategy of “generification”, to turn a particularized software product into a standardized, high margin information good. The first version of the biography of CMS, as organizing technology for contract, shows an active knowledge network in support of a coherent and compelling organizing vision, but indicates that generification did not work, and CMS accumulated a record of shortcomings. This biography begins with a technological determinist or essentialist assumption that the technological artefact is ontologically coherent, but by the end of the story, the CMS category is breaking down, and “CMS” appears to be more than one technological artefact; through the telling of the biography, the biographical subject fractures, calling into question our understanding of how it came to be.

The second version of the biography of CMS, as a commodity, is an account of the “production” of CMS, and of how it broke down (see Table 7.8 for a summary). This second version of the biography subsumes and to a degree explains the first. CMS was associated with an organizing vision and its market correlate the category. The category was a site of material enactment, a coordinating mechanism (Law 2002) for disparate objects (the various CMS products and vendors) but also for investment, both financial and cognitive, across the knowledge network. Separately, CMS as a technological artefact was variable and unsettled, the subject of conflicting views, bought and sold, moving through and to different organizations, positioned and repositioned. While Pollock and Williams note the relative “boundedness” of tangible commodities as contrasted to the malleability of software, in the case of CMS this is more than a question of the lack of stability in software code and capabilities, the temporal provisionality of a technological artefact. “CMS” was not ontologically coherent.

The table of breakdown (Table 7.8) points to three levels of commoditization in the biography of CMS: the underlying product (computer code packaged as organizing technology), its financialized meta-commodity (equity interests in producing firms), and commoditized criteria (analyst ratings and rankings). The case demonstrates that financialized meta-commodities and marketized criteria can have a privileged role in product qualification for packaged software, effectively standing in for user satisfaction. I theorize this as a "substitution of performance" across multiple levels of commoditization, as suggested by Cochoy (2010) in another context. In the case of CMS, substitution of performance was effective, to a point, masking the lack of ontological coherency in the category and the product.

In my analysis, I identify assumptions performatively at work in the biography of CMS – beliefs in packaged software as an information good and in the generalizability of generification as a strategy (a kind of meta-organizing vision for the packaged software industry) toward creating an information good; in the organizing vision of CMS (contract management as process automation, structured data as knowledge, and contract as algorithmic); in classification as performative; and in the substitution of performance through marketing. These assumptions, materially enacted as intentional performative operations, were the site of significant investment (financial and cognitive), and succeeded in creating a software category and generating expectations for that software category, expectations that were not ultimately realized.

How can we account for the failure of CMS from a market perspective on packaged software? I argue that the fundamental breakdown was in classification performativity in product qualification when an attempt to classify a new technology failed (see Pollock and Williams 2010). The category for CMS was overly abstracted and insufficiently differentiated. The organizing vision and its generic model of the contract lifecycle eliminated critical distinctions and smoothed over significant tensions inherent in the category's disparate origins. It was a model based on idealization (MacKenzie 2006a), corresponding to "dreamed of states of commerce" (Cochoy 2010), "drawing on a world … that had not yet been realized" (Lepinay 2007a, p. 270). Accordingly, the organizing vision broke down. Contracting resisted classification as algorithmic, and would not stay within the bounds of the CMS process model. CMS did not generally deliver the sort of "visibility" into contracting – the contracting knowledge – that it promised would arise from the automation of the contract lifecycle. Contracting and contract data were variable – across industries and as between buy-side and sell-side. So vendors could not execute on their strategies of generification, and CMS failed to become an information good. These compounding breakdowns eventually materialized in a divergence between market expectations – as evidenced first in the financialized meta-commodities of equity interests in vendor firms and thereafter in the marketized criteria of analyst coverage – and market performance as measured by revenues and profits. This produced the motivating question for this study. The multi-level breakdown analysis turns the motivating question upside down, from “What happened to contract management software?” to “Where did the expectation of market success come from?” – that is, from a question about IT product failure to a story about performativity and breakdown in market making. Vendors eventually took different paths to look for scale and profitability. However, it took some years for this to unfold. During those years, first financialized meta-commodities (equity interests in vendor firms) and then marketized criteria (in the form of favourable analyst coverage) kept the CMS program alive. The invested knowledge network and the organizing vision with its market correlate the category detached into a closed performative realm that eventually – when customer revenues failed to materialize – collapsed.

With respect to the second research question, the breakdown of the organizing vision indicates that market failure for CMS was directly related to the nature of contract and contracting. Contracting is not across-the-board susceptible to algorithmic reduction; but where it is, it is scale that warrants the substantial cost of specialized ICT, including data management and data extraction. CMS was designed around an unstated assumption that contracting was algorithmic, and its proponents underestimated or underplayed the data management and data extraction requirements. Contracting is domain-specific so that, to be valuable, ICT for contracting should grapple with specialized knowledge and practice requirements. Contracting is fragmented inside organizations, both across the contract lifecycle and for different kinds of contracting, with a notable split between buy-side and sell-side, but internal fragmentation by type of contract may to some extent be explained and indeed justified by the domain-specificity of contracting, or by other mandates of the various “knowledge regimes” (Howard-Grenville and Carlile 2006) having an interest in contract (e.g. risk management, business intelligence or supply chain management). Organizational contracting knowledge is a problem not susceptible to simple ICT approaches based on process automation and structured data.

9.3 Summary of implications of this study

This study has implications for packaged software (section 8.1), for process commoditization (section 8.2), for ICT, contract and knowledge in the networked economy (section 8.3), for practice (section 8.4), and for the theory of performativity (section 8.5). First, based on this study, I question the business model for packaged software, suggesting that packaged software is not necessarily best understood as an information good (section 8.1.1), and that packaged software like CMS is a process commodity, with implications for process commoditization (see the next paragraph). I also suggest that the logic of commoditization in packaged software production gives rise to more fundamental conflicts of interest between vendors and customers and between analysts and customers than may be taken account of in the buy-versus-build procurement model (section 8.1.2).

With respect to process commoditization (section 8.2), this study illustrates on the one hand the critical importance of classification in product qualification, but suggests on the other that classification of process commodities is always and essentially, not contingently, provisional and contested. This study also suggests that process commoditization involves a different type of product qualification, where overflowing, dependencies and provisionality must be accommodated and thus may revolve around contract and information exchange rather than product definition.

In section 8.3, I draw out several implications of this study for ICT, contract and knowledge. In section 8.3.1, I hypothesize that trends in ICT-enabled contracting involve further fragmentation of contracting and dis-location of the contract vis-à-vis the organization. In section 8.3.2, I discuss how not only these trends but the logic of commoditization, the phenomenon of process commoditization and the interdependency, consequentiality and a strong Austinian performativity of contract in the networked economy suggest that the problem of organizational contracting knowledge is more acute than has been suggested by the IS or accounting literature to date. From the arguments laid out in these sections, I conclude that contract is located between organizations, involves information exchange, is not inert and can have network effects beyond the contract parties. Based on this conclusion, in section 8.3.3, I offer an alternative or complementary theory of contract – as a technology of connectedness, with possible strong Austinian performativity, in a relationship of potential convergence, complementarity and substitution with ICT.

In section 8.4, I draw together the implications of this study as they relate to practice – specifically, for packaged software design, procurement and investment. This study joins others in challenging the dominance of organizing visions and categories in shaping the IT marketplace but goes on to ground a more fundamental critique of the buy-versus-build analytical framework for procurement.

Lastly, in section 8.5, I discuss the implications of this study for the theory of performativity, as an empirical study that applies and explores the notion of breakdown and that identifies multiple instances of performativity, supporting in principle an analytic decomposition of “performativity” as suggested by MacKenzie (2004, 2006a), but raising some questions about his proposed schemas. In particular I argue that Austin’s (1962) original insight into the strong performative effect of expressions that on execution have rule-based mechanistic or deterministic material outcomes is highly relevant to the theorization of contract as a technology of connectedness and to other phenomena characteristic of the networked economy.

9.4 Contribution

This study makes a contribution in three areas. My principal contribution is to IS and organizations research on the topics of packaged software and the relationship of ICT, contract and knowledge. With respect to packaged software, I make an empirical contribution by tracing the logic of commoditization in the the production of packaged software, applying the biography of software approach developed by Pollock and Williams (2009a) and extending their research regarding the role of analysts in the IT marketplace (Pollock and Williams 2009b, 2010, 2011). I challenge the common understanding of the business model for packaged software as an information good and theorize certain kinds of software as process commodities. I also theorize a "substitution of performance", in which marketing and categories play central roles, in the commoditization of packaged software. I make a contribution to practice by drawing out the implications of the logic of commoditization in packaged software production, including a challenge to the buy-versus-build analytical framework for procurement. In terms of methodology, in this study I have extended the biography of software approach to incorporate the producing firms and the object of the software (contract, in this case) within the scope of inquiry, and I have also explored the nature of the biographical subject.

With respect to the relationship of ICT, contract and knowledge, I have contributed an empirical investigation of the use of a packaged software product as an organizing technology for contract and in particular for organizing contracting knowledge, have identified trends that dis-locate contract vis-à-vis the organization, and have respecified the problem of organizational contracting knowledge as more acute than has been suggested by the IS or accounting literature to date. Concluding that TCE and other theories of contract do not directly address the evolving relationship of ICT and contract and the problem of organizational contracting knowledge as I respecify it here, I offer an alternative or complementary theory of contract as a technology of connectedness in a relationship of potential convergence, complementarity and substitution with ICT.

I also make a contribution to economic sociology. Here, my empirical contribution is to further extend the study of markets into the domain of packaged software (see Pollock and Williams 2009b, 2010, 2011). In terms of theory, my first contribution is to trace three levels of commoditization – financialized meta-commodities, commoditized criteria, and an underlying commodity – as related through a "substitution of performance"; in this respect I bring the performativity perspective to observations made by Appadurai (1986a) regarding "signs" as commodities. I also propose a new understanding of product qualification in process commoditization based on provisionality, overflowing and dependencies, rather than standardization, stabilization and decontextualization.

Lastly, I make a contribution to the theory of performativity. First, I develop the notion of breakdown as an analytical device and demonstrate the use of that device to organize and present findings in a table of breakdown (see Table 7.8). Second, this study contains a number of examples of performativity and supports, in principle, MacKenzie's (2004, 2006a) project of analytical decomposition of "performativity", but also raises some questions about his schemas. Linking the theoretical with the empirical, this study emphasizes the critical importance, and notes the ethical dimensions, of what I have termed strong Austinian performativity as relevant to the theorization of contract as a technology of connectedness and to other phenomena characteristic of the networked economy.

9.5 Reflections and limitations

In the investigation of commercial software, access to the software and to vendors, customers and analysts can be problematic, as noted by Pollock and Williams (2009a, p. 87). The researcher may be recruited into the "knowledge network" supporting the software product as a price of admission. Where access is granted, this is an element of bias that should be acknowledged by expressly bracketing the data sources from within the chain of production. In particular, both vendors and vendor-identified reference customers will tend to "sell" the product, and the researcher must acknowledge, reflexively, an involuntary role as "participant-observer" in the processes of commoditization. As a practical matter, the researcher needs to be prepared to work with such data as is accessible, and at the same time try to make sure the scope of inquiry include sources not directly implicated in the chain of production.

I promised interviewees that I would not use their names or the names of their organizations in my writing, so these have been anonymized, and I have not identified the source of a particular quote. This promise of anonymity of course does not apply to the archival material I have obtained from public sources. I considered whether to anonymize the names of the five companies I researched, which might theoretically have permitted me to link the interview material to the companies through code names. However, the histories of the companies are too easily identifiable. So I have decided to use their real names, while interview material is not associated to any of the five companies.

The scope of my research is limited in a number of other respects. There is no consideration here of open source software, which Vitari and Ravarini noted as a competitor to the vendors of the content management software they studied. The perspectives on contract are mostly based on the Anglo-American common law experience, though one interesting possibility is that cross-border ICT-enabled contracting practices might result in a de facto convergence of contract law, at least in some domains. Lastly, I would have liked more hands-on experience with the software and more direct interactions with technical staff at the vendors; that access would no doubt have produced a somewhat different account.

9.6 Areas for further research

The study suggests numerous avenues for additional research. I have mentioned several of them in Chapter 8 and will briefly note them again below. Preliminary to that, I offer an observation or suggestion, based on the case of CMS, regarding IS and organizations research. Researchers have recently called for a perspective of sociomateriality on technology, work and organization (Orlikowski and Scott 2008). This study suggests that such a perspective might incorporate three subjects that do not appear to have received the attention in IS and organizations research that might be warranted: the economic (including financial) aspects of technology and in particular the cost of technology (cf. MacKenzie and Wajcman 1985; Noble 1984, 1999; Yates 2005); the weighty materiality of data (data extraction, data entry, data quality, the construction and consequences of databases) (cf. Poon 2007; Suchman 1996, 2002; Yates 2005); and the practical implications of the irreducibly multiple nature of knowledge and practice within the organization (cf. D'Adderio 2004; Nonaka and von Krogh 2009). All of these factors were highly consequential in the biography of CMS. To the same point, I note that the case of CMS supports the argument made by Chiasson and Davidson (2005) that industry (the "vertical") is an important parameter for information systems, but relatively neglected in IS research. Perhaps the powerful logic of abstraction that motivates IS as an engineering discipline tends to locate these (literally) mundane considerations as out-of-scope. However I believe they have much potential to generate new insights that matter.

In terms of further research: first, as noted in section 8.4, I have pointed out that the IS research and practitioner communities seem to be lacking a taxonomy, analytical framework and a vocabulary for software design, procurement and investment. The problem of procurement and the disproportionate and distorting effects of the organizing vision and its market correlate, the product category, are indicative of this larger issue. Further research, engaging with business users, IT procurement professionals, software vendors, software designers, technology analysts and technology investors, is warranted.

As noted in section 8.3.3, contract as a "technology of connectedness in a relationship of potential convergence, complementarity and substitution with ICT" is deliberately underspecified and open, but with, I believe, much potential as a research agenda. An example would be to trace the evolving interpenetration of contract and ICT and the rise of distributed contracting, within and across industries, including an analysis of the the implications for organizational contracting knowledge and more generally the impact on organizational information systems design. For example, an investigation, compilation and comparison of the various ways organizations are (or are not) using ICT to create organizational contracting knowledge, under whatever name or rubric would be of interest. I have also suggested that it would be interesting to know if, or to what extent, the problem of organizational contracting knowledge poses a limit on "contractibility" (in the broad and literal sense) or otherwise shapes organizational and other economic configurations.

More ambitious would be to apply the theorization of contract as a technology of connectedness toward developing a better understanding of the nature and location of effective agency in the networked economy. There is an existing significant amount of research into outsourcing and supply chain management. But Granovetter (1985, 1995) and Teubner and Collins (2011) suggest that any analysis of the economy that does not take into account business groups may be missing much of the picture (cf. Castells 2010). I suggest that studying the interpenetration of ICT and contract and their conjoint performativity offers a path forward toward developing an alternative and richer understanding of the networked economy, including its ethical dimensions.

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Appendices

Appendix 4.1 Table of interviews (DNA = date not available; T = telephone; IP = in person; SV = part of site visit; SD = software demo included; R = recorded; NR = notes sent for review; QW = questions answered in writing; UC = user conference)

Interview number	**Date**	**Interviewee**	**Organization**	**Codes (see below)**
1	Fourth quarter, 2002	CEO	CMS software vendor (one of the five focus vendors)	DNA, T
2	Fourth quarter, 2002	President and CEO	IACCM	DNA, T
3	Fourth quarter, 2002	UK sales director	CMS software vendor (one of the five focus vendors	DNA, IP, SV, SD
4	January 28-29, 2003	Director of procurement and various of his colleagues	Global consumer goods products company and CMS customer (one of the five focus vendors)	IP, SV
5	First quarter, 2003	Director of global contracting	Global networking equipment company (not a CMS customer)	DNA, IP, NR
6	First quarter, 2003	Director of sales	Document automation vendor (not one of the five focus vendors)	DNA, IP, SV, SD
7	February 7, 2008	Contract manager	UK public sector research entity (not a CMS customer)	IP, NR
8	February 8, 2008	Contracting consultant (same person as interview 5)	Independent consulting company	IP, NR
9	February 14, 2008	Director for medical systems and business development	Large Blue Cross-Blue Shield insurance company and CMS customer (one of the five focus vendors)	T, NR
10	February 19, 2008	Contracting consultant	Independent consulting company	T, NR
11	February 20, 2008	Contract management software consultant (former lawyer)	Independent consulting company (not affiliated with any of the five focus vendors)	T, NR
12	February 21, 2008	President and CEO (same person as interview 2)	IACCM	T, NR

Table of interviews, cont.

13	February 22, 2008	Vice president, strategic sourcing and operational excellence	International publishing company and CMS customer (one of the five focus vendors)	T, NR
14	March 5, 2008	Research officer	IACCM	T, NR
15	March 11, 2008	President, CEO and founder	CMS software vendor (one of the five focus vendors)	T, NR
16	March 13, 2008	Vice president, sales	Major ERP vendor (as user of that vendor's CMS product)	T, NR
17	March 18, 2008	President and CEO	Independent consultant advocating Microsoft Sharepoint for contract management	T, NR
18	March 18, 2008	Senior vice president, marketing	CMS software vendor (one of the five focus vendors)	T, NR
19	March 20, 2008	Director, sales relationship management solutions marketing	Major ERP vendor marketing CMS product	T, NR
20	April 8, 2008	Manager of institutional contracts	Large Blue Cross-Blue Shield insurance company and CMS customer – same company as interview 9 (one of the five focus vendors)	T, NR
21	April 10, 2008	Global contracts manager	Global networking equipment company and CMS customer (one of the five focus vendors)	T, NR
22	April 14, 2008	Vice president, procurement	Major ERP vendor – same as interview 19 (as user of that vendor's CMS product)	T, NR
23	April 21, 2008	Senior director, legal services	Global networking equipment company and CMS customer (one of the five focus vendors)	T, NR
24	June 24, 2008	Contract manager (same person as interview 7)	UK public sector research entity (not a CMS customer)	IP, SV
25	February 25, 2009	Vice president of marketing and product management	CMS vendor (one of the five focus vendors)	T, NR

Table of interviews, cont.

26	March 3, 2009	Executive director, contract management	Global technology consulting firm (not a CMS customer)	IP, NR
27	March 5-6, 2009	Head of contract management	Unit of very large US health insurance company and CMS customer (one of the five focus vendors)	IP, SV, SD, R
28	March 5, 2009	Contract manager	Unit of very large US health insurance company – same as interview 27	IP, SV, R
29	March 5, 2009	Contract manager	Unit of very large US health insurance company – same as interview 27	IP, SV, R
30	March 5, 2009	Contract manager	Unit of very large US health insurance company – same as interview 27	IP, SV, R
31	March 5, 2009	Business sponsor	Unit of very large US health insurance company – same as interview 27	IP, SV
32	March 5, 2009	In-house lawyer	Unit of very large US health insurance company – same as interview 27	IP, SV
33	March 19, 2009	Director of IT shared services organization	Global consumer products company and CMS customer (one of the five focus companies)	IP, R
34	March 19, 2009	Head of legal strategy and planning	Global consumer products company and CMS customer – same company as interview 33 (one of the five focus companies)	IP
35	March 30, 2009	Chief operating officer and marketing director	CMS vendor (not one of the five focus vendors)	T, NR
36	April 1, 2009	VP, operations	Independent consultant advocating Microsoft Sharepoint for contract management – same company as interview 17	T, SD, NR
37	April 4, 2009	In-house lawyer	Unit of very large US health insurance company – same as interview 27	T
38	May 12, 2009	Founder and principal	Vendor of software for joint ventures and partnerships	IP
39	August 31, 2009	Contract and project manager	Global farm and construction equipment company and CMS customer (one of the five focus vendors)	T, NR

Table of interviews, cont.

40	October 29, 2009	Chief operating officer and marketing director – same person as interview 35	CMS vendor (not one of the five focus vendors)	IP, UC
41	May 26, 2010	Various participants at IACCM roundtable	IACCM (EMEA conference)	IP
42	June 8, 2010	Head of contract management	Large UK public sector entity and CMS customer (one of the five focus vendors)	IP, SV
43	February 8, 2011	Senior consultant to contract management department	Global networking equipment company	T, NR
44	February 9, 2011	In-house attorney	Global outsourcing company	T, NR
45	February 15, 2011	Lawyer and contract manager	Global computer and IT consulting company	QW
46	February 16, 2011	Contract manager	University-affiliated physicians group	T, NR
47	February 22, 2011	Director, contracts and pricing	Global engineering company	T, NR
48	February 24, 2011	Principal	Independent IT procurement consulting company	T, NR
49	February 28, 2011	In-house lawyer and contracts manager	Global computer hardware and consulting company	T, NR
50	March 25, 2011	Head of contract management (same person as interview 27)	Unit of very large US health insurance company and CMS customer (one of the five focus vendors) – same as interview 27	T
51	March 29, 2011	Founder and former CEO	CMS vendor (one of the five focus vendors)	T
52	March 30, 2011	IT analyst who has tracked CMS	One of the three key analyst firms	T
53	April 5, 2011	Vice president of sales and marketing	CMS vendor (one of the five focus vendors) – same as interview 15	T

Appendix 4.2 Interview protocol (second stage and third stage interviews)

INTERVIEW regarding contracting and contract management software

Purpose of the interview: The interview is part of a research project on the current status of contract management software. In the course of the research we are also interested in collecting observations about contracting and contract management, and in exploring more generally how (in what ways and in which circumstances) ICT (information and communications technology) can/should support contracting.

QUESTIONS

1. Please discuss generally your professional history, current role and activities relating to contracting and/or to contract management software.

2. When did you first hear of/what is your first involvement with contract management software? What was its origin or beginnings, as you recall – relative to contract management, relative to other software or relative to other developments and trends as relevant?

3. What is contract management software, as you understand it?

4. What has been your experience with contract management software?

Contracting parties (users or potential users of contract management software): Have been involved in decisions about procurement? Have you been involved in any implementations? If so, what was your experience with implementation and as relevant subsequent use?

Software providers: Can you describe the contract software space from your perspective? How have you envisioned and positioned your product, including vis-à-vis other internal software (e.g. ERP, CRM)? Does your product have functionality for multiple, related contract relationships? What has been your experience regarding customer reaction, takeup, implementation and use, in different contexts?

Industry/professional analysts and consultants: All of the above.

5. What do you see as the benefits of contract management software? What organizational goals do you think it serves? Are there any downsides, issues or points of conflict/controversy that you are aware of? Can you comment on how you think others view (react to) various aspects of contract management software?

6. Can you comment on: the relevance of the internal installed base of ICT? The relevance of the counterparty's internal installed base? (I.e. integration, customization requirements, standards, interoperability, etc.)

Contracting and ICT support of contracting more generally: In terms of the contracting activities you participate in or are familiar with, could you comment on the following:

7. What types of contracts do you work with? Buy-side/sell-side/all; length and complexity of the contract, the contract documentation, the contract negotiation; variability from one contract to another; use of standard forms (if so, what is the source?); term of the contracts; how many contracts per year? In force at any time?; nature of performance as between the parties; nature of the underlying counterparty relationships vis-à-vis the contracts; languages; global reach; types of counterparties and relative leverage.

8. In the organization(s) you work in or are familiar with, how are contracts handled, in terms of roles and functions? Buy-side/sell-side/all; is there a contract management function and if so to whom does it report; what is the role of legal/compliance; who handles the contacts with the counterparties and does that change over the life of the contract; local versus central control; business unit control versus

enterprise control? What are the processes (e.g. describe a typical process if that is possible including cycle time and approvals)? How often do these processes change?

9. What ICT is presently used to support contracting? What other ICT support of contracting do you think is likely to be most useful or necessary in the settings you are familiar with? Consider: document build; repositories; databases; trading, bidding or RFP spaces or platforms; collaboration or negotiation spaces or platforms; approvals and signatures; post-execution compliance management; integration of contract terms with internal ICT infrastructure; integration of contract terms with counterparty ICT infrastructure. Which roles/functions (internal) and counterparties would likely see the benefit of these? In which settings do you believe ICT-supported contracting is most likely to be seen as valuable?

10. What are trends and developments in contracting and contracting relationships that you believe bear on these questions? What about for example “win-win” or “trust” perspectives?

Other comments? Please provide any other comments/insights you may have relevant to the experience of contract management software to date, and more generally the question of how you think ICT can (or should not) be deployed to support contracting.

For contracting parties (customers or potential customers of contract management software): Would your organization be interested in being the subject of an in-depth case study?

Appendix 4.3 Questions in Part 1 of the survey

Contracting in the Networked Economy - Part 1

1. Your most important type of contract -- the counterparty relationship

These are questions about the nature of the counterparty relationship for your MOST IMPORTANT type of contract.

*** 1. Your organization**

	Industry	Your location	Head office location
Your organization			

Other industry (please specify)

*** 2. Size of organization in annual revenues (or size of budget, for education/non-profit/governmental)**

*** 3. Your function (can select more than one, if relevant)**

- ☐ sell-side
- ☐ buy-side, procurement
- ☐ enterprise level contract management
- ☐ business unit contract management
- ☐ legal, compliance, risk management
- ☐ IT
- ☐ other (please specify below)

Other (please specify)

*** 4. What is the MOST IMPORTANT type of contract you work with, from a business/strategic perspective (e.g. would not include NDAs (non-disclosure agreements))?**

If you work with more than one type of contract that is important, select ONE type of contract to answer the following questions.

Describe the type of contract:

Page 1

Contracting in the Networked Economy - Part 1

*** 5. For THIS TYPE of contract, can you provide a rough percentage breakdown indicating the extent to which individual transactions are part of a bigger, ongoing relationship?**

	Larger relationship/repeat business	In between	One-offs or relatively anonymous market transactions
Percentage by NUMBER of contracts (add up to 100%)			
Percentage by VALUE of contracts (add up to 100%)			

Comment

*** 6. For THIS TYPE of contract GENERALLY, indicate the extent to which you agree with the following statements:**

	5 Agree strongly	4	3	2	1 Disagree strongly	N/A, don't know, or too variable to say
Performance is precisely defined and compliance is easy to measure; there are few implicit elements of performance.	○	○	○	○	○	○
These contracts present risks OR LIABILITIES beyond the immediate counterparty (e.g. supply chain or warranty risk).	○	○	○	○	○	○
These contracts can be easily represented with discrete datapoints, i.e. numbers, dates, ratings, checkboxes.	○	○	○	○	○	○

Comment

Page 2

Contracting in the Networked Economy - Part 1

* 7. For THIS TYPE of contract, how INTERDEPENDENT is PERFORMANCE as between the parties? **By this we mean:** to what extent does **successful** performance by each party to the contract depend on the cooperation, collaboration and/or work of the other party?
(For example, many software development agreements depend for **successful outcomes on work contributed by both the buyer and the** developer, and in such a case performance is interdependent. Delivery of standard parts by a seller to the buyer's factory is not interdependent.)

Comment

* 8. For THIS TYPE of contract, what is the nature of RISK ALLOCATION between the parties?

Comment

Contracting in the Networked Economy - Part 1

2. Your most important type of contract -- variability

Please continue to answer these questions about your MOST IMPORTANT type of contract.

*** 1. For THIS TYPE of contract ONLY:**

	1 to 10	11 to 100	101 to 500	501 to 1000	1001 to 5000	5001 to 10000	10001 to 50000	more than 50000	don't know
About how many do you sign up per year, including extensions and renewals?	○	○	○	○	○	○	○	○	○
Of these, about how many are simple extensions or renewals?	○	○	○	○	○	○	○	○	○
About how many are in effect at any time?	○	○	○	○	○	○	○	○	○

*** 2. For THIS TYPE of contract, can you provide a rough percentage breakdown of how STANDARD or commoditized they are?
(How standard are the goods to be delivered or the services to be performed, and the contract documents used?)**

	Commodity or standard	In between commodity and customized	Customized/bespoke
Percentage by NUMBER of contracts (add up to 100%)			
Percentage by VALUE of contracts (add up to 100%)			

Comment

*** 3. For THIS TYPE of contract, and disregarding one-offs or isolated exceptions:**

	1	2 to 5	6 to 10	11 to 20	more than 20	don't know
How many languages are they in?	○	○	○	○	○	○
How many jurisdictions (affecting governing law or terms) do they cover?	○	○	○	○	○	○

*** 4. For THIS TYPE of contract, about how many standard forms or templates do you use?**

Page 4

*** 5. For THIS TYPE of contract, whose contract documents are used (by NUMBER of contracts)?**

	Your contract documents (your paper)	Other side's contract documents	Industry standard form, trading platform or the like	Other (describe below)
Indicate percentage by NUMBER of contracts (add up to 100%)				

Describe other:

6. For THIS TYPE of contract, what is the typical term of contract performance from contract execution, WITHOUT taking into account renewals and extensions?

Contracting in the Networked Economy - Part 1

3. Your most important type of contract -- information capture

Please continue to answer these questions about your MOST IMPORTANT type of contract.

*** 1. For THIS TYPE of contract, the number of items of structured data (such as party name, date of contract) you capture in a spreadsheet, database or contract management system or other information system is about how many? (You might refer to this as metadata, codes, tags or fields.)**

- ◯ 1 to 5
- ◯ 6 to 10
- ◯ 11 to 20
- ◯ 21 to 50
- ◯ more than 50
- ◯ no data capture
- ◯ don't know

*** 2. For THIS TYPE of contract, what structured data (beyond party name, name of contract and date of contract) do you capture in a spreadsheet, database, contract management system or other information system?**

- ☐ Expiration, termination or renewal dates
- ☐ Quantities, delivery dates, milestones
- ☐ Pricing, discount and rebates
- ☐ Counterparty affiliate (i.e. corporate group)
- ☐ Change of control (your organization's)
- ☐ Change of control (counterparty's)
- ☐ Counterparty risk (e.g. counterparty credit risk)
- ☐ Country risk
- ☐ Currency risk
- ☐ Governing law/jurisdiction
- ☐ Disputes
- ☐ Intellectual property issues
- ☐ Internal contract owner, internal approvals, relevant employees
- ☐ Business interruption criticality, supply chain or other systemic risk
- ☐ NONE
- ☐ DON'T KNOW
- ☐ OTHER (please specify)

* 3. With respect to THIS TYPE of contract, which best describes your current status vis-a-vis a contract management software system (built in-house, from a CMS (contract management software) vendor or from another software provider)?

Comment

* 4. If you have (in use, development or implementation) a contract management system for THIS TYPE of contract, the system is:

- from a vendor specializing in contract management software
- from an ERP provider (e.g. Oracle or SAP)
- from a documents, records or enterprise content management system provider
- from an office productivity suite provider (e.g. Microsoft Sharepoint)
- from a word-processing or document automation provider
- home-grown/built in-house
- DON'T KNOW
- NOT APPLICABLE
- OTHER (please specify)

Contracting in the Networked Economy - Part 1

4. Questions about the entire portfolio of contracts you work with

The remaining 4 questions in this survey are about the ENTIRE PORTFOLIO of contracts you work with (i.e. not just the most important ones but e.g. including NDAs (non-disclosure agreements)).

*** 1. Please indicate whether you work with (and answers on this page relate to) contracts**

- ◯ for the entire organization/enterprise-wide
- ◯ for a single function or business unit only
- ◯ for multiple functions/business units but NOT enterprise-wide
- ◯ other (please specify)

*** 2. For the ENTIRE PORTFOLIO OR BOOK OF CONTRACTS you work with:**

	1 to 10	11 to 100	101 to 500	501 to 1000	1001 to 5000	5001 to 10000	10001 to 50000	more than 50000	don't know
About how many contracts do you sign up per year, including extensions and renewals?	◯	◯	◯	◯	◯	◯	◯	◯	◯
Of these, about how many are simple extensions or renewals?	◯	◯	◯	◯	◯	◯	◯	◯	◯
About how many contracts are in effect at any time?	◯	◯	◯	◯	◯	◯	◯	◯	◯

Contracting in the Networked Economy - Part 1

*** 3. For the ENTIRE PORTFOLIO OR BOOK OF CONTRACTS you work with, how do contracts signed up each year (including extensions and renewals) break down by type of contract, roughly?**

	None	1 to 10	11 to 100	101 to 500	501 to 1000	1001 to 5000	5001 to 10000	10001 to 50000	more than 50000	don't know
Sell side										
Buy side										
NDAs (non-disclosure or confidentiality agreements)										
Real estate, facilities, construction										
Joint venture, M&A, finance, other corporate agreements										
Other										

Other contracts (please specify type and number)

*** 4. With respect to this ENTIRE PORTFOLIO OR BOOK OF CONTRACTS you work with, which best describes any contract management software systems (built in-house, from a CMS (contract management software) vendor or from another software provider) you have or are working on?**

Comment re status and your approach with respect to a contract management software system for this entire portfolio or book of contracts

5. Further comments regarding the subjects mentioned in this survey are welcome.

Contracting in the Networked Economy - Part 1

6. If you would be willing to be contacted for a possible interview or followup questions, or if you would like to receive the results of this survey, please provide your email address.

☐ I would be willing to be contacted for a possible interview or followup questions, and have included my email address below.

☐ I would like to receive results of this survey, and have included my email address below.

Email address

Thank you very much for participating in our survey!

Appendix 4.4 Questions in Part 2 of the survey

Contracting in the Networked Economy - Part 2

1. Contracting in the networked economy - Part 2: Strategies for contracting i...

Still to go: only 2 pages after this page.

* **1. Your organization**

	Industry	Your location	Head office location
Your organization			

Other industry (please specify)

* **2. Size of organization in annual revenues (or size of budget for education/non-profit/governmental)**

* **3. Your function (can select more than one, if relevant)**

- [ ] sell-side
- [ ] buy-side, procurement
- [ ] enterprise level contract management
- [ ] business unit contract management
- [ ] legal, compliance, risk management
- [ ] IT
- [ ] other (please specify below)

Other (please specify)

* **4. Please indicate if you have involvement with contract management software as:**

Page 1

Contracting in the Networked Economy - Part 2

2. Your priorities for contracting intelligence

Still to go: only 1 page after this page.

*** 1. How important are the following DOCUMENTS CAPABILITIES for your contracting area -- (i.e. you would prioritize them for additional resource allocation)?**

	5 High priority	4	3	2	1 Not a priority	Not relevant/don't have a view
Efficient production of contract documents	○	○	○	○	○	○
Ability to find contract documents	○	○	○	○	○	○
Reduce need to contract documents at all, e-records should be sufficient	○	○	○	○	○	○
Clause level management of contracts in bulk	○	○	○	○	○	○

List other priority DOCUMENTS CAPABILITIES:

*** 2. How important are the following INTERNAL PROCESSES for your contracting area -- (i.e. you would prioritize them for additional resource allocation)?**

	5 High priority	4	3	2	1 Not a priority	Not relevant/don't have a view
More efficient contracting processes, faster cycle time as shown by metrics	○	○	○	○	○	○
Better internal coordination, less internal fragmentation, better handovers	○	○	○	○	○	○
Centralize control over contracting through standardization	○	○	○	○	○	○
Matching buy side to sell side to capture value and reduce risk	○	○	○	○	○	○

List other priority INTERNAL PROCESSES:

Page 2

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* 3. How important are the following OUTWARD-FACING INFORMATION AND KNOWLEDGE CAPABILITIES for your contracting area -- (i.e. you would prioritize them for additional resource allocation)?

	5 High priority	4	3	2	1 Not a priority	Not relevant/don't have a view
Counterparty and extended network information exchange for risk management (e.g. supply chain risk)	○	○	○	○	○	○
Counterparty and extended network information exchange (e.g. data exchange, open book) for value creation, performance automation or optimized performance	○	○	○	○	○	○
Making contract information available to auditors, regulatory authorities and others	○	○	○	○	○	○
Counterparty/contract governance	○	○	○	○	○	○
E-commerce, social networking or industry trading platforms or exchanges	○	○	○	○	○	○

List other priority OUTWARD-FACING INFORMATION AND KNOWLEDGE CAPABILITIES:

Contracting in the Networked Economy - Part 2

* **4. How important are the following INTERNAL INFORMATION AND KNOWLEDGE CAPABILITIES for your contracting area -- (i.e. you would prioritize them for additional resource allocation)?**

	5 High priority	4	3	2	1 Not a priority	Not relevant/don't have a view
Data integration with other systems	○	○	○	○	○	○
Support contracting personnel with better information	○	○	○	○	○	○
Ability to link contract terms with ultimate contract value/risk	○	○	○	○	○	○
Holistic view of counterparty and counterparty affiliate relationships	○	○	○	○	○	○
Contract information for scenario building, strategic planning	○	○	○	○	○	○

List other priority INTERNAL INFORMATION AND KNOWLEDGE capabilities:

5. Are there any other process, information, communication or knowledge capabilities that you view as strategic for your area of contracting?

Contracting in the Networked Economy - Part 2

3. Your strategy for contracting intelligence

Last page of questions

1. For your organization, is there an ENTERPRISE-WIDE system or program that captures common structured data (e.g. party names, contract dates) about contracts?
Structured data might be referred to as metadata, codes, tags or fields, and captured in a spreadsheet, database, contract management system or other information system.

◯ yes ◯ no ◯ don't know

* **2. For your organization as a whole, and for the function or business unit you are most familiar with, please indicate the number of items of structured data about contracts that you capture:**

	no data capture	1 to 5	6 to 10	11 to 20	21 to 50	more than 50	varies by type of contract	don't know
organization as a whole, enterprise-wide	◯	◯	◯	◯	◯	◯	◯	◯
function or business unit you are most familiar with	◯	◯	◯	◯	◯	◯	◯	◯

Comment

* **3. When did you FIRST hear of "contract management software" (CMS, also called "contract lifecycle management software")? (approximate, or as best as you can recall)**

◯ before 1999 ◯ 1999-2000 ◯ 2001-2003 ◯ 2004-2007 ◯ since 2007 ◯ haven't heard of CMS before

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* 4. As best as you can recall, from what source(s) did you FIRST hear of CMS? (select up to two only)

- [ ] research/analyst (e.g. Gartner, Aberdeen, Forrester)
- [ ] CMS vendor
- [ ] ERP vendor (e.g SAP or Oracle)
- [ ] other software vendor (not CMS or ERP)
- [ ] consultant, reseller or systems integrator
- [ ] IACCM
- [ ] other professional or industry association (not IACCM)
- [ ] professional publication, trade press
- [ ] HAVEN'T HEARD OF CMS
- [ ] DON'T RECALL
- [ ] Other (please specify)

* 5. Which of these does your organization have, so far as you know (NOT specifically related to contracts)?

- [ ] ERP (enterprise resource planning system, such as SAP or Oracle)
- [ ] CRM (customer relationship management system)
- [ ] SRM (seller relationship management system)
- [ ] BI (business intelligence system or initiative)
- [ ] MDM (master data management system or initiative)
- [ ] business process or workflow (routing and approvals) system or initiative
- [ ] DMS/RMS (documents management or records management system or initiative)
- [ ] ECM (enterprise content management system or initiative)
- [ ] office productivity suite collaboration system or initiative (e.g. Microsoft Sharepoint)
- [ ] automated document creation system or capability
- [ ] strategic sourcing, reverse auction or supply chain management system or initiative
- [ ] a general risk management function or system
- [ ] DON'T KNOW
- [ ] OTHER general function or system that captures contract information or supports contract processes (NOT including a purpose built contract management system) -- describe

* 6. Which best describes your current status vis-a-vis a contract management software system (built in-house, from a CMS vendor or from another software provider)?

Contracting in the Networked Economy - Part 2

4.

* 1. Would you be willing to answer some more questions regarding your experience with contract management software (CMS)? These questions should take no more than 4 minutes.

- ◯ yes
- ◯ no

Contracting in the Networked Economy - Part 2

5. Contract management system selection

Thanks for being willing to answer some more questions!!

Still to go: maximum 3 pages after this page.

* 1. In terms of your contract management software system selection decision, rate the importance of

	5 Very important	4	3	2	1 Not important	N/A or don't know
Analyst research, ranking and recommendations	○	○	○	○	○	○
Consultant/reseller/systems integrator recommendations	○	○	○	○	○	○
Vendor expertise and experience in your industry	○	○	○	○	○	○
Customer recommendations	○	○	○	○	○	○
Part of a suite or extension of larger applications (e.g. SAP)	○	○	○	○	○	○
Fitting into overall organization information or IT strategy	○	○	○	○	○	○
Minimizing ongoing dependence on internal IT department	○	○	○	○	○	○
Minimizing ongoing dependence on vendor and/or consultant/reseller/systems integrator	○	○	○	○	○	○

Other important factor (please specify and rank)

* 2. Who took or is taking the LEAD in advocating and designing the system from a business content perspective? (select all that apply)

- ☐ sales
- ☐ procurement
- ☐ legal/compliance/risk management
- ☐ IT
- ☐ CFO
- ☐ enterprise contract management
- ☐ business unit contract management
- ☐ DON'T KNOW
- ☐ OTHER (please specify)

Contracting in the Networked Economy - Part 2

* **3. Did you (or will you) use an external consultant/reseller/systems integrator?**

○ yes ○ no ○ haven't decided ○ don't know ○ not relevant

* **4. Do you have a contract management system CURRENTLY IN USE OR IN PROCESS OF IMPLEMENTATION?**

○ yes, an in-house system (no outside vendor) ○ yes, from an outside vendor ○ no ○ don't know

Contracting in the Networked Economy - Part 2

6. Relationship with your outside vendor

Still to go: 2 pages after this page.

* 1. The contract management system(s) you have is:

- ◯ from a vendor specializing in contract management software
- ◯ from an ERP provider (e.g. Oracle or SAP)
- ◯ from a documents, records or enterprise content management system provider
- ◯ from an office productivity suite provider (e.g. Microsoft Sharepoint)
- ◯ from a word-processing or document automation provider
- ◯ DON'T KNOW
- ◯ OTHER (please specify)

* 2. Which best describes your input into the design of the system? (select one)

- ◯ The system was developed for us.
- ◯ The system was co-developed by the vendor with us and other customers.
- ◯ We needed to customize the system.
- ◯ We configured the system within the configuration options provided.
- ◯ We took the system out of the box, minimal configuration required.
- ◯ The system is on demand, we work within its constraints.
- ◯ DON'T KNOW
- ◯ OTHER (please specify)

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* **3. Please indicate how the following describe your ongoing relationship with the vendor:**

	5 very true of our relationship	4	3 somewhat true of our relationship	2	1 not at all true of our relationship	Don't know/don't have a view
We are reliant on the vendor doing ongoing work with us.	○	○	○	○	○	○
The vendor provides valuable services such as business process re-engineering and business analysis.	○	○	○	○	○	○
We have internal resources who know the product extremely well and we can be involved in coding ourselves.	○	○	○	○	○	○
There is a consultant/reseller/systems integrator who manages the relationship between us and the product/vendor.	○	○	○	○	○	○
We are closely involved with the vendor on an ongoing basis, providing design input, and consider ourselves a lead user.	○	○	○	○	○	○
We are involved in user conferences and user groups, but our input is just one of many.	○	○	○	○	○	○
We can do all or nearly all of our own configuration because of the configuration options in the product.	○	○	○	○	○	○
We don't have much interaction with the vendor because of the product and how we use it.	○	○	○	○	○	○

Comment regarding your ongoing relationship with the vendor

4. Is the system (or will the system be) deployed:

- ◯ inside your organization (behind the firewall)
- ◯ hosted (e.g. by vendor)
- ◯ on-demand, SasS (software as a service), cloud computing
- ◯ DON'T KNOW
- ◯ OTHER (please specify)

Contracting in the Networked Economy - Part 2

7. Your contract management system and how it will be used

Still to go: one page after this one.

* 1. Which best describes the implementation of your contract management system? (select one)

- ◯ The implementation is NOW IN EFFECT enterprise-wide.
- ◯ The implementation is INTENDED TO BE enterprise-wide.
- ◯ The implementation is specific to one or more functions or business units, but there are no competing solutions (other contract management systems) in our organization.
- ◯ The implementation is specific to one or more functions or business units, and there are competing solutions (other contract management systems) in our organization (i.e. multiple contract management systems).
- ◯ Hasn't been decided.
- ◯ DON'T KNOW
- ◯ OTHER (please specify)

* 2. For which types of contract is your CMS system most fully implemented (or intended to be most fully implemented)? (select all that apply)

- ☐ ALL CONTRACTS/ALL TYPES
- ☐ Buy side
- ☐ Sell side
- ☐ NDAs (non-disclosure or confidentiality agreements)
- ☐ Real estate, facilities or construction
- ☐ Joint venture, M&A, finance, other corporate
- ☐ Hasn't been decided
- ☐ DON'T KNOW
- ☐ OTHER (please specify)

* 3. About how many contracts are (or will be within a year of implementation) in your contract management system?

◯ 1 to 10 ◯ 11 to 100 ◯ 101 to 500 ◯ 501 to 1000 ◯ 1001 to 5000 ◯ 5001 to 10000 ◯ 10001 to 50000 ◯ more than 50000 ◯ don't know

* 4. How many of the relevant "legacy" (i.e. pre-existing, already-in-effect) contracts are in the system (or will be within one year of implementation)?

◯ all or nearly all ◯ some ◯ none ◯ don't know

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* 5. Which best describes who has (or will have) direct access to your contract management system? (select one)

- ◯ Tightly controlled, single function or business unit access only
- ◯ Multiple functions but on need to know basis only
- ◯ Relatively wide access but on a views- and permissions-controlled basis
- ◯ Quite open access
- ◯ Hasn't been decided
- ◯ DON'T KNOW
- ◯ OTHER (please specify)

Contracting in the Networked Economy - Part 2

8. Features of your contract management system

Last page of questions

* 1. Which of the following DOCUMENTS FEATURES do you use (or expect to use within the first year of implementation)?

- [ ] original contract document creation using standard template
- [ ] modular construction of contract documents
- [ ] clause level management
- [ ] clause library, guidance or commentary
- [ ] repository with metadata (codes or tags)
- [ ] records management features (e.g. lock-down, access records, destruction schedules)
- [ ] full text search
- [ ] association of related documents (e.g. amendments)
- [ ] NONE
- [ ] DON'T KNOW
- [ ] OTHER (please specify)

* 2. Which of the following INTERNAL PROCESS AND INFORMATION FEATURES do you use (or expect to use within the first year of implementation)?

- [ ] amendments and change order handling
- [ ] workflow for approvals (internal)
- [ ] dashboard, e.g. for status management
- [ ] reports, metrics
- [ ] alerts (e.g. renewals)
- [ ] modelling or analytics
- [ ] data integration (internal)
- [ ] NONE
- [ ] DON'T KNOW
- [ ] OTHER (please specify)

Contracting in the Networked Economy - Part 2

* 3. Which of the following COUNTERPARTY COLLABORATION FEATURES do you use (or expect to use within the first year of implementation)?

- [ ] control/redlining features for counterparty email exchange
- [ ] counterparty collaboration platform or shared workspace
- [ ] strategic sourcing, reverse auction or other bidding platform
- [ ] milestones, checklists, KPI's or the like
- [ ] OTHER (please specify)
- [ ] direct data sharing with counterparty
- [ ] NONE
- [ ] DON'T KNOW

* 4. Please note any other contract management system features you use or intend to implement, not listed above:

- ○ none/not applicable
- ○ other (please specify)

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9. Priorities for contracting intelligence

Last page of questions

* **1. How important do you feel the following DOCUMENTS CAPABILITIES are for the contracting community as a whole -- (i.e. should be considered priorities for additional resource allocation)?**

	5 High priority	4	3	2	1 Not a priority	N/A or don't know
Efficient production of contract documents	○	○	○	○	○	○
Ability to find contract documents	○	○	○	○	○	○
Reduce need to contract documents at all, e-records sufficient	○	○	○	○	○	○
Clause level management of contracts in bulk	○	○	○	○	○	○

List other priority DOCUMENTS CAPABILITIES:

* **2. How important do you feel the following INTERNAL PROCESSES are for the contracting community as a whole -- (i.e. should be considered prioritize for additional resource allocation)?**

	5 High priority	4	3	2	1 Not a priority	N/A or don't know
More efficient contracting processes, faster cycle time as shown by metrics	○	○	○	○	○	○
Better internal coordination, less internal fragmentation, better handovers	○	○	○	○	○	○
Centralize control over contracting through standardization	○	○	○	○	○	○
Matching buy side to sell side to capture value and reduce risk	○	○	○	○	○	○

List other priority INTERNAL PROCESSES:

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* **3. How important do you feel the following INTERNAL INFORMATION AND KNOWLEDGE CAPABILITIES are for the contracting community as a whole -- (i.e. should be considered priorities for additional resource allocation)?**

	5 High priority	4	3	2	1 Not a priority	N/A or don't know
Data integration with other systems	○	○	○	○	○	○
Support contracting personnel with better information	○	○	○	○	○	○
Ability to link contract terms with ultimate contract value/risk	○	○	○	○	○	○
Holistic view of counterparty and counterparty affiliate relationships	○	○	○	○	○	○
Contract information for scenario building, strategic planning	○	○	○	○	○	○

List other priority INTERNAL INFORMATION AND KNOWLEDGE CAPABILITIES:

Contracting in the Networked Economy - Part 2

*** 4. How important do you feel the following OUTWARD-FACING INFORMATION AND KNOWLEDGE CAPABILITIES are for the contracting community as a whole -- (i.e. should be considered priorities for additional resource allocation)?**

	5 High priority	4	3	2	1 Not a priority	N/A or don't know
Counterparty and extended network information exchange for risk management (e.g. supply chain risk)	○	○	○	○	○	○
Counterparty and extended network information exchange (e.g. data exchange, open book) for value creation, performance automation or optimized performance	○	○	○	○	○	○
Making contract information available to auditors, regulatory authorities and others	○	○	○	○	○	○
Counterparty/contract governance	○	○	○	○	○	○
E-commerce, social networking or industry trading platforms or exchanges	○	○	○	○	○	○

List other priority OUTWARD-FACING INFORMATION AND KNOWLEDGE CAPABILITIES:

5. Are there any other process, information, communication or knowledge capabilities that you view as strategic for the contracting community?

Contracting in the Networked Economy - Part 2

10. Thank you!

Thank you very much for participating in the survey!

1. Further comments regarding the subjects mentioned in this survey are welcome.

2. If you would be willing to be contacted for a possible interview or followup questions, or if you would like to receive the results of this survey, please provide your email address.

☐ I would be willing to be contacted for a possible interview or followup questions, and have provided my email address below.

☐ I would like to receive results of this survey, and have provided my email address below.

Email address

Appendix 4.5 Profile of the respondents

Parameter	**Category**	**Number of respondents – part 1**	**Number of respondents – part 2, non-vendors only**
Industry	Aerospace/defense	11	9
	Banking/insurance/financial	6	4
	Education/non-profit/governmental	2	2
	Energy/resources/utilities	12	7
	Engineering/construction	12	10
	Healthcare/pharma/biotech	10	5
	IT/telecoms/software/high-tech	26	20
	Manufacturing	8	8
	Retail	3	1
	Services – other	1	1
	Services – outsourcing	2	2
	Services –professional	10	1
	Transportation/distribution/logistics	3	1
	Other	0	7
	TOTAL	**106**	**78**
Head office location	Americas	73	49
	Asia/Pacific	9	9
	EMEA	24	20
	TOTAL	**106**	**78**
Size of business (revenues, or size of budget, for education/non-profit/governmental)	Less than $10 million	13	5
	$10 million to $100 million	8	9
	More than $100 million to $1 billion	17	11
	More than $1 billion to $10 billion	30	23
	More than $10 billion	30	29
	Don’t know or n/a	8	1
	TOTAL	**106**	**78**

Appendix 4.6 Survey responses regarding status of CMS*

Part 1 of survey: With respect to THIS TYPE of contract [your most important], which best describes your current status vis-à-vis a contract management software system (built in-house, from a CMS (contract management software) vendor or from another software provider)?

Response	**Number of responses**	**Percentage of responses**
We have a contract management software system in use, development or implementation for ALL OR MOST of these contracts.	41	39%
We have a contract management software system in use, development or implementation for SOME of these contracts only.	21	20%
We are considering a contract management software system for these contracts.	16	15%
We don't have and are not considering a contract management software system for these contracts.	22	21%
Other	4	4%
I don’t know the status	2	2%
TOTAL	106	100%

*****Percentages may not sum to 100% due to rounding in this and other Appendices.

Part 1 of survey: With rest to this ENTIRE PORTFOLIO OF BOOK OF CONTRACTS you work with, which best describes any contract management software systems (built in-house, from a CMS (contract management software) vendor or from another software provider) you have or are working on?

Response	**Number of responses**	**Percentage of responses**
We have a SINGLE contract management software system in use, development or implementation for ALL OR MOST of these contracts.	31	29%
We have a SINGLE contract management software system in use, development or implementation which covers SOME of these contracts.	7	7%
We have MULTIPLE contract management software systems in use, development or implementation which together cover ALL OR MOST of these contracts.	15	14%
We have MULTIPLE contract management software systems in use, development or implementation which together cover SOME of these contracts.	9	8%
We don't have but are considering a contract management software system for some or all of these contracts.	14	13%
We don't have and are not considering a contract management software system for these contracts.	21	20%
Other	1	1%
I don’t know the status.	5	5%
No response	3	3%
TOTAL	106	100%

Part 2 of survey (non-vendors only): Which best describes your current status vis-a vis a contract management software system (built in-house, from a CMS vendor or from another software provider)?

Response	**Number of responses**	**Percentage of responses**
We have a contract management software system in use.	26	33%
We have a contract management software system in development, implementation or rollout.	8	10%
We are considering a contract management software system.	8	10%
We don’t have and are not considering a contract management software system.	24	31%
I don’t know the status	6	8%
No response	6	8%
TOTAL	78	100%

Appendix 4.7 Gartner coverage of CMS and CMS vendors (indicative; see footnote 2)

Outsourcing: Effective Contract Management (December 1998)
Ariba ORMS: Managing High-End E-Procurement (March 2000)
B2B Positioning in State and Local Government and Higher Education: AMS and Ariba Launch E-Market Maker (March 2000)
VeriSign Scores Big With Ariba/Amex E-Payment Venture (June 2000)
Ariba to Acquire SupplierMarket.com (June 2000)
Ariba to Support Financial Services Needed for Ecommerce (August 2000)
Ariba Dynamic Trade: Beyond the Acquisition (September 2000)
IBM/i2/Ariba: E-Marketplace Methodology or Monster? (September 2000)
Technology Partners Chip In to Enhance Electronics EMarketplace (January 2001
Purchase of Agile to Extend Ariba's Limited Range of Motion (February 2001)
Ariba Aims at C-Commerce With Value Chain Management (March 2001)
RightWorks Will Bring i2 More Procurement Capabilities and Integration Challenges (March 2001)
Ariba After the Fall (March 2001)
Agile After Ariba: OK for Now, but Challenges Lie Ahead (May 2001)
E-Commerce Heavyweights: Can They Go the Distance? (May 2001)
Economic Downturn Hits Sales Configuration Vendors Hard (May 2001)
Ariba Buyer 7.0 (May 2001)
Ariba on Problem Watch (May 2001)
Selectica's Enhanced Configurator Lacks Price Maintenance (July 2001)
Ariba No Longer on Gartner's Problem Watch (September 2001)
Selectica: Extending TES Market Penetration for Payers (January 2002)
Contract Life-Cycle Management: A $20 Billion Market (April 2002)
Ariba's Outlook Is Improving (September 2002)
Sales Configuration Vendors: 1Q03 Magic Quadrant (February 2003)
Use Crisis and Contract Management for 409 Compliance (September 2003)
Good Contract Management Demands Fused Business Processes (October 2003)
Ariba to Buy Alliente, Enter the Procurement BPO Market (January 2004)
Ariba Will Buy FreeMarkets, Raise Stakes in ERP Market (January 2004)
Ariba's 'Invoice' Leverages Ariba E-Procurement Success (February 2004)
Management Update: New and Increased Challenges for Contract Managers (February 2004)
The First Law of Contract Management (March 2004)
Vendor Rating: Selectica (May 2004)
Selectica/I-many Merger Links Pricing, Contract Management (December 2004)
Ariba/ePlus Settlement Could Spark More Patent Lawsuits (February 2005)
Boost for Procurement Systems as Emptoris and diCarta Merge (April 2006)
SAP Advances With Frictionless Buy, but SRM Weakness Remains (May 2006)
I-many Release Refocuses on Life Sciences Contract Management (July 2007)
MarketScope for Contract Management, 2007 (July 2007)
Ariba Deal Will Remove a Competitor From the Market (September 2007)
Vendor Rating: Ariba (October 2007)
Vendor Rating: Emptoris (March 2008)
Magic Quadrant for Sourcing Application Suites (April 2008)
Ariba's Transformation Journey Is Not Complete (July 2008)
Marketscope for Enterprise Contract Management (November 2008)
Ariba Lawsuit Delivers a Moderate Blow to Emptoris (December 2008)
The Four Axes of Contract Management: Authoring, Execution, Partner Boilerplate Support and Administration (January 2009)
Key Issues for Enterprise Contract Management and Procurement Applications, 2009 (March 2009)
I-many Deal Will Benefit Revenue Management Software Market (June 2009)
Vendor Managers Must Understand Outsourcing Contract Schedules to Effectively Manage the Deal (August 2009)
Cloud-Enabled Outsourcing: New Ideas for Effective Governance and Management (August 2009)
Vendor Management Key Initiative Overview (February 2010)
Enterprise Contract Management Solutions Vendor Guide, 2010 (May 2010)
IT Score Overview for IT Sourcing and IT Vendor Management (September 2010)
Accenture-Ariba Deal Shows How SCM BPO Market May Evolve (October 2010)
Magic Quadrant for Telecom Expense Management (December 2010)
Rivermine Acquisition Expands Emptoris' Service Spend Capabilities (January 2011)
Exploiting a Single Contract Life Cycle Management Solution Across the Enterprise (February 2011)

Appendix 5.1 Vendor versus non-vendor comparison of CMS priorities (difference in means not statistically significant)

CMS feature priorities (rated from 1 (not a priority) to 5 (high priority)		**Vendor mean (N = 7)**	**Non-vendor (N = 79)**	**Total mean (N = 86)**	**Difference**
Document features	Efficient production of contracts	4.29	4.22	4.22	.07
	Ability to find documents	4.86	4.54	4.57	.32
	E-records in place of contracts	3.43	2.58	2.65	.85
	Clause level management	3.43	2.82	2.87	.61
Internal process features	Reduced cycle time	4.57	4.25	4.28	.32
	Internal control	4.43	4.24	4.26	.19
	Standardization	4.29	3.76	3.80	.53
	Match buy-side to sell-side	3.71	3.13	3.17	.58
Internal information and knowledge capabilities	Data integration	3.57	3.73	3.72	-.16
	Supporting contract personnel	4.43	4.20	4.22	.23
	Match contract terms to outcome	4.43	4.13	4.15	.30
	Holistic view of counterparties	3.71	3.37	3.40	.34
	Analytics, scenario planning	3.14	3.48	3.45	-.34
Outward-facing information and knowledge capabilities	Counterparty and network risk	2.86	3.03	3.01	-.17
	Counterparty and network value creation	2.43	2.84	2.8	-.41
	Information available to auditors, regulators and the like	4.00	3.34	3.40	.66
	Counterparty and contract governance	3.57	3.22	3.24	.35
	E-commerce, social networking or industry trading platforms or exchanges	2.57	2.05	2.09	.52

Appendix 5.2 Scope of CMS implementation (from Part 2 of survey – 29 users)

Which best describes the implementation of your contract management system? (select one)

Response	**Number of responses**	**Percentage of responses**
The implementation is NOW IN EFFECT enterprise-wide.	11	38%
The implementation is INTENDED TO BE enterprise-wide.	3	10%
The implementation is specific to one or more functions or business units, but there are no competing solutions (other contract management software systems).	5	17%
The implementation is specific to one or more functions or business units, and there are competing solutions (other contract management software systems).	4	14%
Hasn't been decided.	1	3%
Other	2	7%
Don't know	1	3%
No response	2	7%
TOTAL	29	100%

Appendix 5.3 Access to CMS (from Part 2 of survey – 29 users)

Response	**Number of responses**	**Percentage of responses**
Quite open access	0	0%
Relatively wide access but on a views- and permissions-controlled basis	9	31%
Multiple functions but on need-to-know basis only	10	34%
Tightly controlled, single function or business unit access only	7	24%
Don't know	1	3%
No response	2	7%
TOTAL	29	100%

Appendix 5.4 Type of most important contract as related to risk-shifting (P < .05; 2 cells (22.2%) have expected count less than 5); **risk-shifting by type of contract and relationship to CMS adoption** (sell side ONLY: P< .05)

		Risk shifting AWAY FROM respondent firm	**Risk is shared or not material**	**Risk is shifted TO respondent firm**	**TOTAL**
Important contract is buy-side, sell-side or other	Buy-side	12 (43%)	12 (43%)	4(14%)	28 (100%)
	Sell-side	7(15%)	22 (46%)	19 (40%)	48 (100%)
	Other	4 (36%)	6 (55%)	1 (9%)	11 (100%)
TOTAL		23 (26%)	40 (46%)	24 (28%)	87 (100%)

Type of contract		Status of CMS adoption		Total
		Does not have and is not considering CMS	Using, implementing or considering CMS	
Other	Risk shared or shifted away from respondent	1 10%	9 90%	10
	Risk shifted to respondent	0 0%	1 100%	1
	Total	1 9%	10 91%	11
Buy-side	Risk shared or shifted away from respondent	2 9%	21 91%	23
	Risk shifted to respondent	0 0%	4 100%	4
	Total	2 7%	25 93%	27
Sell-side	*Risk shared or shifted away from respondent*	*5* *20%*	*20* *80%*	*25*
	Risk shifted to respondent	*10* *56%*	*8* *44%*	*18*
	Total	*15* *35%*	*28* *65%*	*43*

Appendix 5.5 CMS features expected to be used within 1 year of implementation (italicized features are those fewer than 10 of 29 users expect to use within 1 year of implementation)

CMS features expected to be used within 1 year of implementation		**Frequency (N = 29)**
Documents features	Automated document creation	18 (62%)
	Full text search	16 (55%)
	Linking related documents	16 (55%)
	Repository (documents database)	14 (48%)
	Clause level management	12 (41%)
	Clause library	11 (38%)
	Records management features	10 (34%)
	Modular construction of contracts	9 (31%)
Internal process and information features	Amendments and change orders	22 (76%)
	Alerts	18 (62%)
	Dashboard	16 (55%)
	Reports	15 (52%)
	Workflow for approvals	14 (48%)
	Data integration	*4 (14%)*
	Modelling/analytics	*3 (10%)*
Counterparty collaboration features	Redlining	12 (41%)
	Milestones monitoring	*8 (28%)*
	Strategic sourcing	*6 (21%)*
	Data-sharing	*6 (21%)*
	Shared workspace	*5 (17%)*

Appendix 5.6 Precise definition of contract performance as related to data discreteness (whether a contract can be easily represented with discrete datapoints (i.e. numbers, dates, ratings, checkboxes; P =.107 so not statistically significant)

		Data discreteness (below the mean)	**Data discreteness (above the mean)**	**TOTAL**
Whether contract performance is precisely defined and compliance easy to measure; few implicit elements of performance	Below the mean	29 (55%)	24 (45%)	53 (100%)
	Above the mean	19 (39%)	30 (61%)	49 (100%)
TOTAL		48 (47%)	54 (53%)	102 (100%)

Appendix 5.7 Capture of contract data generally as related to CMS adoption

Response category	**Response**	**Does not have and is not considering CMS**	**Considering, implementing or using CMS**	**TOTAL**	**Significance (Pearson Chi-square)**
Part 1 – number of data points captured for most important contract	None to 10	17 (45%)	21 (55%)	38	P < .001
	11 to 20	0 (0%)	27 (100%)	27	
	More than 20	4 (12%)	29 (88%)	33	
	TOTAL	21 (22%)	77 (78%)	99	
Part 2 – enterprise-wide capture of contract data?	Yes	9 (23%)	30 (77%)	39	P < .01
	No or don't know	14 (56%)	11 (44%)	25	
	TOTAL	23 (36%)	41 (64%)	64	

Appendix 5.8 Particular contract datapoints captured as related to CMS adoption

Datapoints captured	Frequency (percentage of 100 respondents)	Significant relationship to CMS adoption?
Expiry, renewal or other dates	85 (85%)	P < .001*
Price, discount, rebate	65 (65%)	P < .01
Governing law	56 (56%)	NO
Quantities, delivery or milestones	54 (54%)	NO
Internal ownership, approvals	5 (53%)	P < .005
Disputes	47 (47%)	NO
IP (intellectual property)	39 (39%)	NO
Corporate affiliation of counterparty	38 (38%)	P < .005
Change in control (respondent's firm)	35 (35%)	P < .10
Change in control (counterparty's)	27 (27%)	NO
Systemic risk	20 (20%)	NO
Counterparty credit risk	15 (15%)	NO
Currency risk	15 (15%)	NO
Country risk	14 (14%)	NO
NO DATAPOINTS	10 (10%)	P < .005 (negative association)

*1 cell (25%) has expected count less than 5.

Appendix 5.9 Other IT systems to CMS adoption (no significant association found for MDM (master data management) (P = .170), DMS/RMS (documents or records management) (P = .142), SCM (supply chain management) (P = .144) or a general risk management function (P = .607))

Other IT system or initiative not specific to contracting	**Responses (percentage of total responses (66)) (yes indicates box ticked; no indicates box not ticked**	**Of the positive responses: Does not have and is not considering CMS (percentage of positive responses)**	**Of the positive responses: Using, implementing or considering CMS (percentage of positive responses)**	**Significance (Pearson Chi-square)**
ERP (enterprise resource planning)	45 yes (68%) of responses)	9 (20%)	36 (80%)	P < .001
	21 no (32%)	15 (71%)	6 (29%)	
CRM (customer relationship management)	34 yes (52%)	9 (26.5%)	25 (73.5%)	P < .10
	32 no (48%)	15 (47%)	17 (53%)	
SRM (seller relationship management)	10 yes (15%)	1 (10%)	9 (90%)	P < .10*
	56 no (85%)	23 (41%)	33 (59%)	
BI (business intelligence)	25 yes (38%)	2 (8%)	23 (92%)	P < .001
	41 no (62%)	22 (54%)	19 (46%)	
Business process or workflow	29 yes (44%)	6 (21%)	23 (79%)	P < .05
	37 no (56%)	18 (49%)	19 (51%)	
ECM (enterprise content management)	13 yes (20%)	0 (0%)	13 (100%)	P < .01*
	53 no (80%)	24 (45%)	29 (55%)	
Office productivity collaboration (Sharepoint)	29 yes (44%)	6 (21%)	23 (79%)	P < .05
	37 no (56%)	18 (49%)	19 (51%)	
Automated document creation	13 yes (20%)	2 (15%)	11 (85%)	P < .10*
	53 no (80%)	22 (41.5%)	31 (58.5%)	

*1 cell (25%) has expected count less than 5.

Appendix 5.10 Factors important when selecting CMS (from Part 2 of survey – 29 users)

In terms of your contract management software system selection decision, rate the importance of the following (from 5 (very important) to 1 (not important).

Factor in CMS selection decision (29 users)	**Average score**
Fitting into overall organization information or IT strategy	4.00
Minimizing ongoing dependence on vendor and/or consultant/reseller/systems integrator	3.73
Vendor expertise and experience in your industry	3.61
Customer recommendations	3.61
Part of a suite or extension of larger applications (e.g. SAP)	3.41
Analyst research, ranking and recommendations	3.36
Minimizing ongoing dependence on internal IT department	3.32
Consultant/reseller/systems integrator recommendations	2.74

Appendix 5.11 CMS selection among pure-play vendors, other software vendors and built in-house

From Part 1 of survey: If you have (in use, development or implementation) a contract management system for THIS TYPE [your most important type] of contract, the system is:

Type of system	**Number of responses**	**Percentage of responses**
From a vendor specializing in contract management software	23	30%
Home-grown/built in-house	20	26%
From a documents, records or enterprise content management system provider	8	10%
From an ERP provider (e.g. Oracle or SAP)	8	10%
From an office productivity suite provider (e.g. Microsoft Sharepoint)	7	9%
From a word-processing or document automation provider	2	3%
Other	6	8%
Don't know	3	4%
TOTAL	77	100%

From Part 2 of survey (27 users with CMS currently in use or in process of implementation): The contract management system you have is:

Type of system	**Number of responses**	**Percentage of responses**
From a vendor specializing in contract management software	11	41%
An in-house system (no outside vendor)	10	37%
From an ERP provider (e.g. Oracle or SAP)	2	7%
From an office productivity suite provider (e.g. Microsoft Sharepoint)	2	7%
From a documents, records or enterprise content management provider	1	4%
Other	1	4%
TOTAL	27	100%

Appendix 5.12 The business case for CMS – three perspectives

[Global networking equipment company] have studied contract management software quite extensively and are fans of what it does. But they have a major problem because they have so many existing tools that overlap with it. These are 1) For tendering – a common sales platform which manages configuration options (SAP), 2) An ERP – SAP, and 3) a sales workflow tool that runs a gated system for approvals, based on limits of authority tied to the risk identified. (They are consolidated with their US parent company for financial accounting purposes so need to demonstrate Sarbanes-Oxley compliance.)

What is missing are: 1) A contract-drafting tool, 2) A contracts database, and 3) A claims and change management tool. Given tight budget constraints they are trying to figure out how to meet these needs without a lot of expense.

They do have standard contract templates but most of the time they have to use the customer's template. They have a document management system they from OpenText Enterprise Content Management, and their contracts are in that system – it was a standard product that was customized for them, similar to Documentum. It is just an electronic store for documents. There is full text search but it doesn't help you find things, it throws up too much. Also it is set up to match the company structure. They are starting to look at Sharepoint.

The general problem is that everything is needs-driven, just set up to meet particular needs. There is guidance on how to put things into the DMS but nobody follows it. Right now they are trying to create a contracts database. SAP has some contract data for ordering and invoicing but it captures minimal terms, and no contract wording. For example, it may say that payment is in 30 days but it doesn't say anything about the conditions for prepayment. So they are trying to work out a cheap way of building a database with a depository for the documents and a searchable summary for each. This would be poor in comparison to say [CMS from two of the five focus vendors]. But what those vendors offer overlaps too much with what our company already has, so it is hard to make the case.

Each of the existing systems has been created to meet the needs of a particular department rather than to create an overview. The documents repository would be a library in their existing DMS, where they would put the document in whatever form, Word or pdf. Then there is a list of about 80-90 datapoints that the contract management professionals would like to capture. Ideally, the contract would be broken up against these datapoints but they don't have the workforce to do that. They would do this going forward for contracts and for a selection of their existing contracts (not all). About 60-70% of the contracts need to be in the database. He expects many companies that have grown up in this way are in a similar position.

The software companies keep calling him to see the demos. You can't translate the ideal situation from the software demos into the mess that is there. The CM professionals would like CMS, but the challenge is why they should have it just to fill in the gaps. The ERP system has been growing out since the merger of [former parent companies]. It has been hard to adapt into one company and taken lots of effort. The end of 2011 is the target for that. Now they have purchased [another company], another big chunk is coming in. The need to harmonize these companies takes up the resources and the "nice to have" get left behind. SAP has a CM module that maybe could be used. Right now SAP is mostly used for ordering and invoicing/accounting. It is hard to know how these various SAP modules are harmonized. They also use the SAP CRM module but it is mostly about contacts, and is not linked to contracts. You could find the contracts by going back through the workflow approvals but it isn't that easy.

A long-time contract manager assessed CMS against a “pyramid” of capabilities. At the bottom was a spreadsheet of basic contract information. “You can do a lot of this with Excel.” The next level would be document management capabilities, including document creation and routing for approvals. But he thought that when focus shifted to this, people sometimes lost sight of the need to track simple contract information, such as expiry dates. For most companies, he thought that these two capabilities would be enough. Grafted onto this by some vendors was a push to automate purchasing and reduce costs through reverse auctions and the like. In his view, this was a way to shift power toward buyers, and it worked very well for commodity purchasing but not for other contracting. “It just doesn’t work for global procurement, for outsourcing, for offshoring of complex technology. For buying sheet metal, oil, coal and for commodities like these it can be pretty slick. It is good at picking up the incremental commodity opportunity. You can’t use it to automate the buying of components and assembly services in China or Taiwan. …” At the highest level of the pyramid were the industry-specific contracting data and practices. “Pick any industry, there’s a special set of considerations. … *So the idea of a unified industry software for standard business processes of contracting – it just may not be there*.” (emphasis added)

He described the CMS concept as the product of a “harmonic convergence” – workflow, document automation, reverse auctions – but “sellers looked at it and said there’s nothing in it for us other than decreased margins and lost opportunities to sell based on value, not just cost. There is a comparable trend on the sales side around CRM systems, which are sold to shift relationship and historical power back to sellers. Purchasing communities vary across the spectrum in terms of the importance of cost versus other attributes.

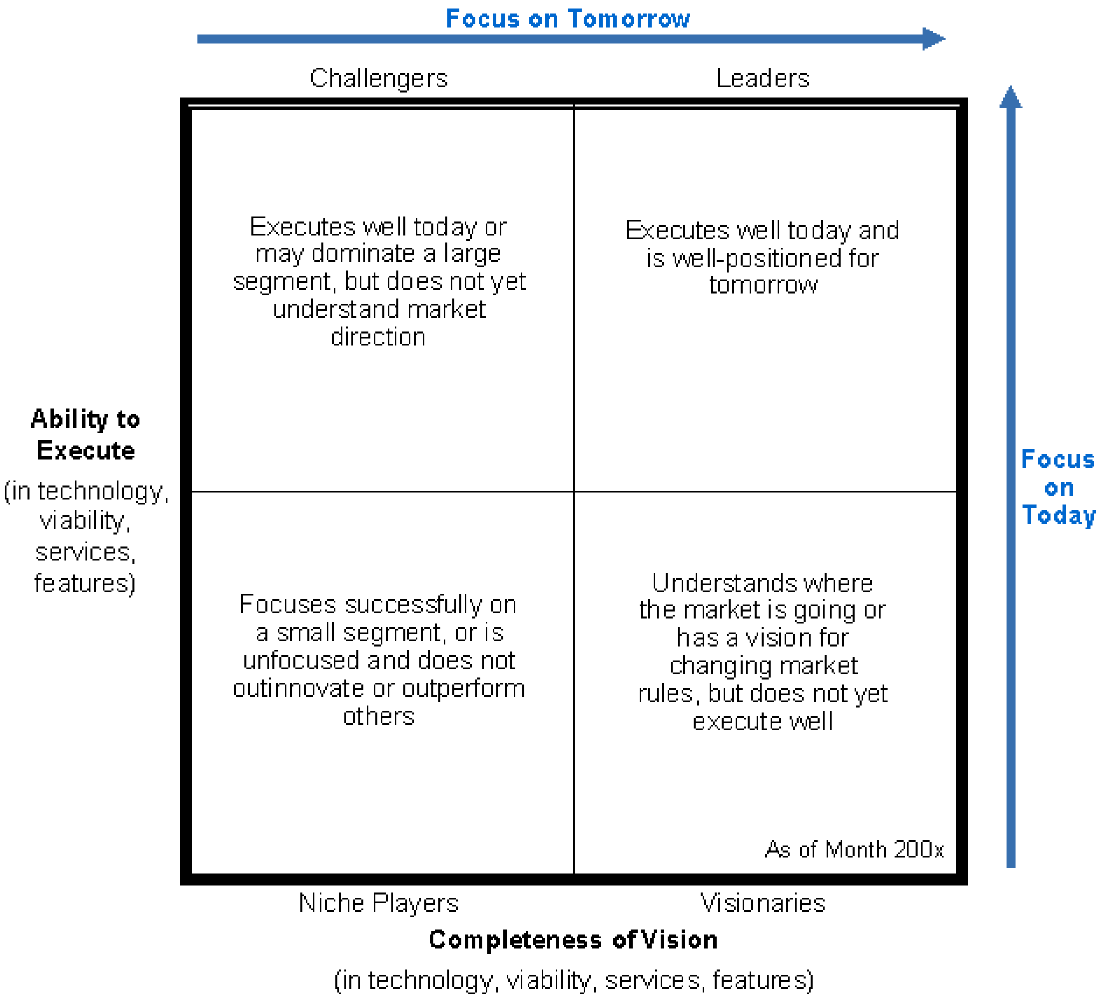
Workflow doesn’t work at the high end. Interfaces to other core transactional systems was difficult to achieve and difficult to maintain. “SAP for example is pretty tightly wound.”

CMS implementation would also be variable depending on company culture, particular attitudes toward centralized control. “[XCo] was very de-centralized and had set up some bizarre management incentives which set up various operations in competition with one another. So they did not share information internally. Compare [YCo], which is a tightly centralized organization for capital acquisitions. At their headquarters they run something like a battlefield fortress. If staff don’t comply with established processes they are terminated or you are reassigned to buying roofing for warehouses. So that’s another aspect; you have very different company cultures. If a company is very centralized, so that if you don’t comply you hit the road – you are going to have a very different implementation. If a corporation is decentralized, it may be important to the people in Chicago to pretend that they are in charge of the operations in China. That doesn’t make any sense, if you are in China you need local managers.”

He summed up the dilemma for CMS: “It’s hard to make a lot of money in the basic transactional stuff that a programmer can do with Access. Then on the document management side, you’ve got MS Word which has really gotten to be very good in terms of managing documents and templates. So CMS had two big hurdles: industry-unique characteristics and the difficulty of integrating with core operating systems.”

A contract manager in the healthcare industry had migrated through a series of applications for contract management and followed developments in the CMS market over the last 10 years. For a number of years he worked with a medical records specialist provider that was able to manage the legacy contracts migration problem for the customer and understood the information requirements for the domain. But this system was quite limited, and most contracting activity was taking place outside the system. For example, there was no place to store notes or correspondence. When he looked again at the CMS market in 2007, he was troubled by the fact that so many of the earlier applications had "morphed into different products". He also noted that some of the public companies seemed focused on shareholder value, not their products, while many vendors were no longer around. In 2011 when he was in the market again he found that there were lots of vendors in the market, some with niche products, but demos took a lot of time, and were not all that informative. He had contacted [one of the five focus vendors] but they did not seem interested, probably because he would have been a relatively small account. He was considering offerings from the legal case management market, and was also looking at one company that promised automated data abstraction and at another that offered data abstraction by lawyers working in India.

Appendix 6.1 Magic Quadrants)



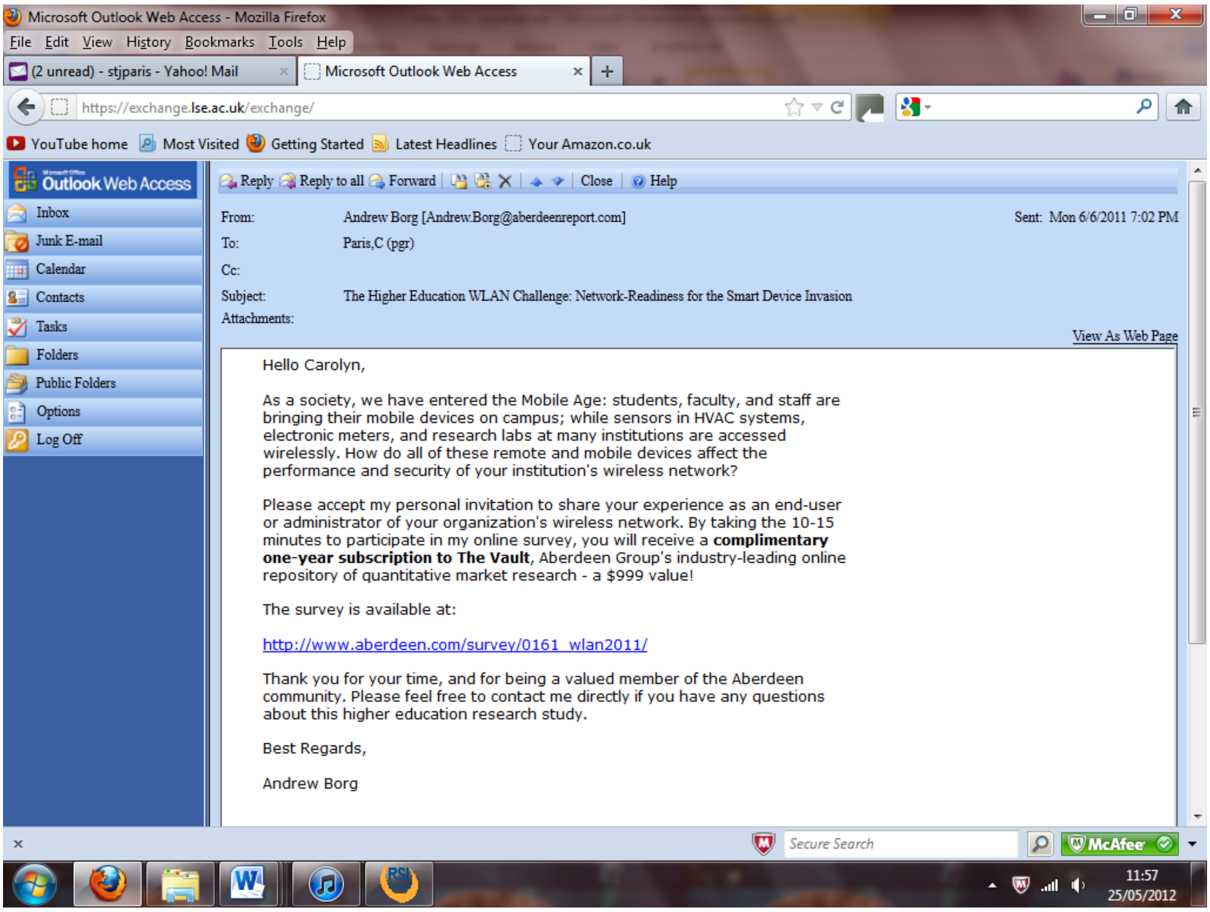
Magic Quadrant template from Gartner Inc. (2008a; with permission; see footnote 2)

[Excerpts from Gartner Magic Quadrant for Telecom Expense Management removed as copyright is owned by Gartner Inc.]

Appendix 6.2 Aberdeen marketing communications and categories

Because I had registered to obtain materials on Aberdeen's website, I was on their mailing list for marketing communications. In June 2011, I received 8 invitations to participate in surveys, 11 invitations to webinars, 34 offers of complimentary research reports, 3 invitations to conferences, and 4 weekly research recaps. Screenshots included with permission of Aberdeen Group.

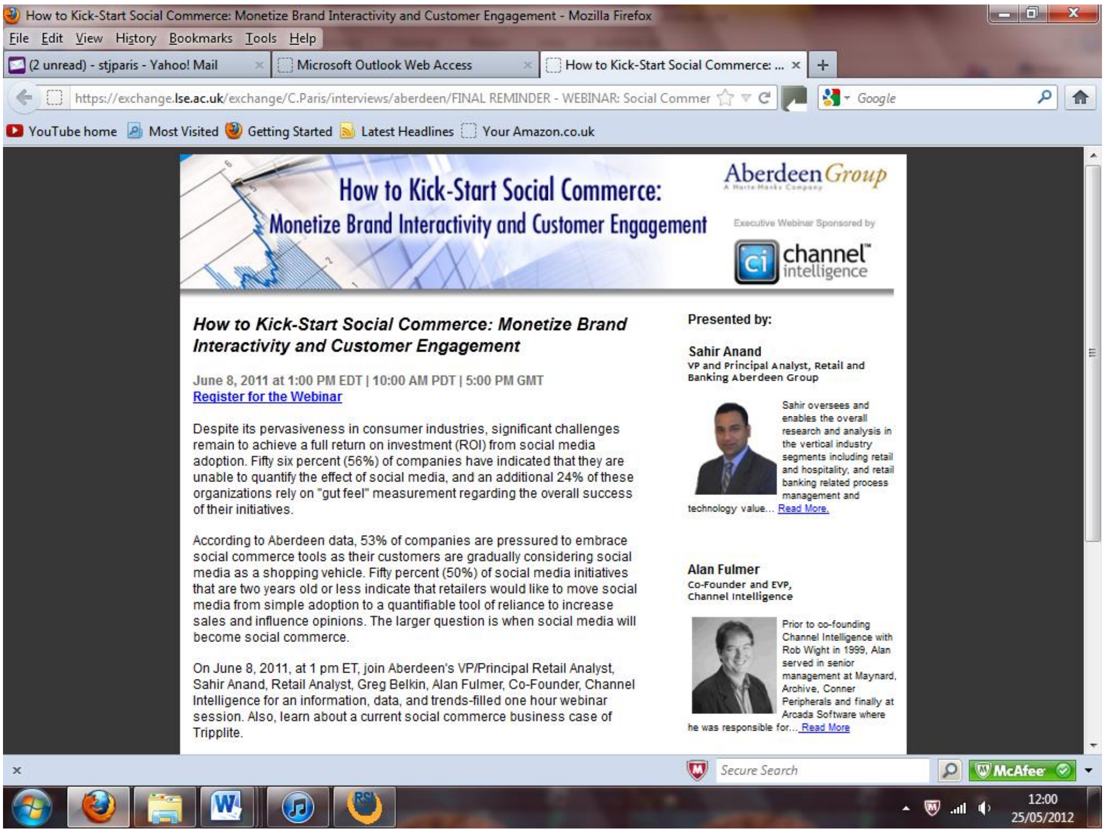
Screenshot of invitation to participate in a survey:



Survey invitations for June 2011:

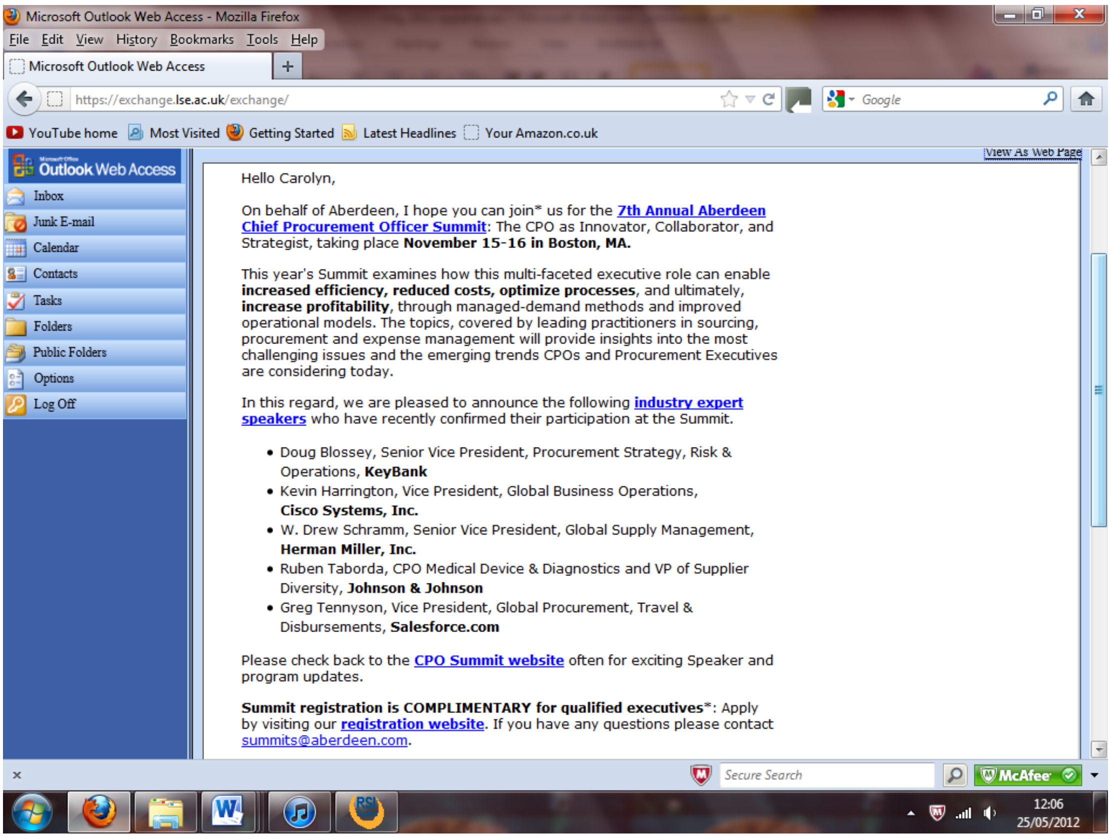
June 6, 2011 – The Higher Education WLAN Challenge: Network-Readiness for the Smart Device Invasions
June 7, 2011 – 360 Degree Customer View: Maximize Up-Sell and Cross-Sell Potential
June 7, 2011 – Dynamic Procurement Management: CPO as Innovator, Collaborator and Strategist
June 9, 2011 – Integrated Transportation Management
June 13, 2011 – Effective Disclosure Management
June 15, 2011 – Enterprise Mobility Management 2011
June 20, 2011 – Can Your Organization Afford To Hire The Wrong Talent?
June 27, 2011 – Sales and Operations Planning: Key Lever for Enabling Business Profitability for the Chief Supply Chain Officer

Invitation to a webinar:

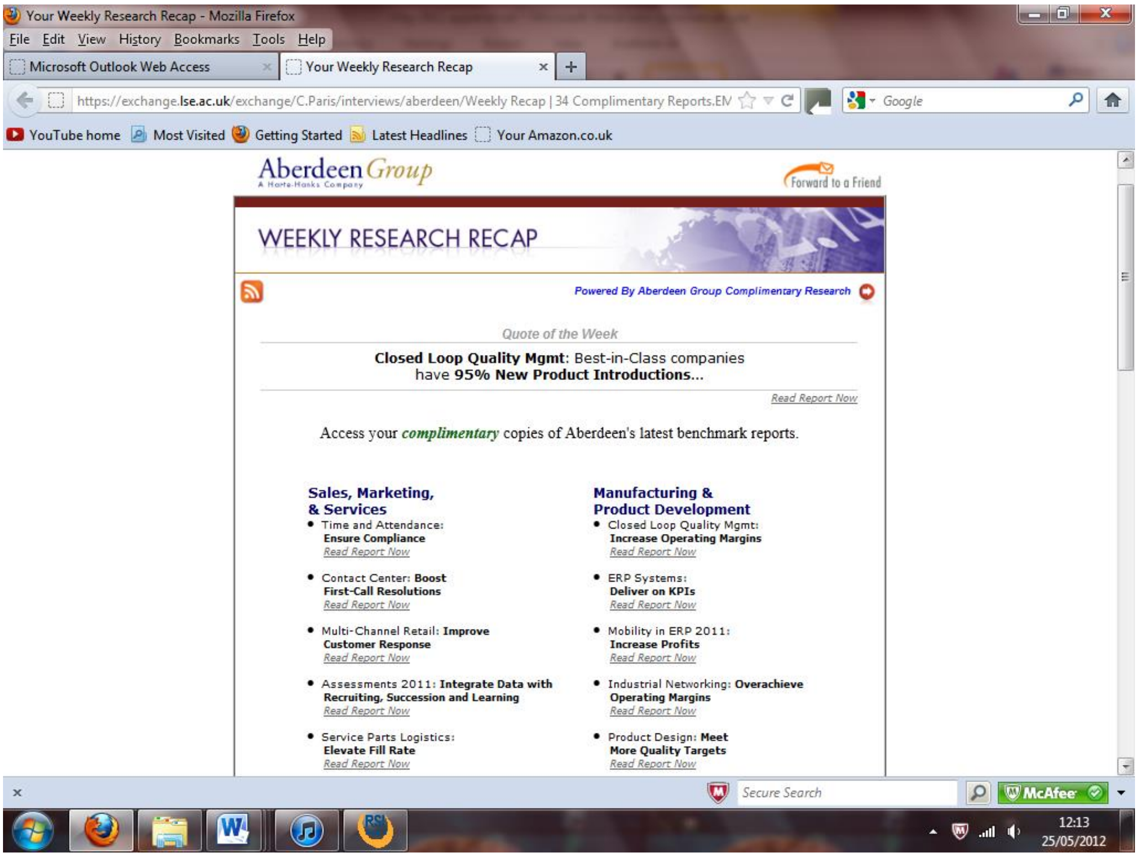


Offers of a complimentary report:

Invitation to a conference:



Weekly research recap:



The Weekly Research Recap, Powered by Aberdeen Group Complimentary Research, divides research reports into four categories: Sales, Marketing, and Services; Supply Chain, Procurement and Sourcing; Manufacturing and Product Development; and Information Technology and Communications.

As of May 2012, Aberdeen's research categories (as listed on its website) were: Business Intelligence, Communications, Enterprise Resource Planning, Financial Management and GRC, Global Supply Management, Human Capital Management, IT Infrastructure, IT Security, Manufacturing, Marketing Effectiveness and Strategy, Networking and App. Performance, Product Innovation and Engineering, Retail & Consumer Markets, Sales Effectiveness & Strategy, Service Management, and Supply Chain Management.

Appendix 6.3 Gartner blog on the contract lifecycle

Finishing up this year's iteration of the MarketScope for Contract Management (which is soon to go into final editing – hurrah!) has really made me think long and hard about what makes a contract a contract – and hence, what makes a contract management system a contract management system. I can certainly say this year that I have expanded my view, and it's about time. I've been too easily swayed by the "contract lifecycle management" rhetoric that has defined the industry that I cover.

Please indulge me with a personal example. Yesterday morning, I reviewed and signed a contract with a ski area, authorizing them to rent my ski condo when I am not using it. I've had this arrangement for many years and it provides a wonderful means to offset some of the costs of owning this property, and it keeps the condo spotlessly clean. I've had a long history negotiating contracts – I was employed in my teens in my family business as a rental manager for an apartment complex – so naturally, I changed some of the terms that I didn't care for. The ski area home owner manager immediately called me to question the changes. I think it's fairly safe to say that they rarely if ever have condo owners attempt to negotiate their rental agreements!

Many contracts are handled without any expectation of negotiation. Mobile phone agreements. Non-disclosure agreements. Leases. When I worked in purchasing, I had my terms and conditions printed on the back of the hard-copy purchase order forms. And here at Gartner – I bet that the only thing that gets negotiated on our subscription contracts is the price and type of subscription. The point is – why should we tell everyone they need a "lifecycle management" solution when the lifecycle of many contracts consists of send, sign and file? It's time we recognize in the contract management applications industry that there is a variety of contract types, and one that is signed 'as is' is no less a contract than one that is heavily negotiated. The logical conclusion of this assertion is that 'simple' contract management functionality is necessarily really simple, but perhaps right-sized to a contract type that we all know and love. (Wilson 2008; with permission of Gartner Inc.; see footnote 2)

Appendix 6.4 I-Many financial overview (in millions of dollars, except for employees and stock prices)

Year	Net revenues- Millions ($)	Net income (loss) - Millions ($)	Stock-holders equity - Millions ($)	Assets - Millions ($)	Goodwill - Millions ($)	Cash Millions ($)	Employees	Stock price high ($)	Stock price low ($)
1995	$1.2	$(2.2)	$(4.3)	$.8	-	$.3	n/a		
1996	$3.4	$(.5)	$(4.8)	$2.3	-	$.3	46		
1997	$7.5	$.3	$(6.3)	$4.7	-	$1.9	67		
1998	$13.5	$1.9	$5.3	$11.6	-	$5.1	n/a		
1999	$19.4	$(5.2)	$.2	$27.2	-	$15.3	167		
2000	$36.5	$(24.2)	$68.8	$85.4	$10.1	$50.6	348	$27.38	$7.75
2001	$56.1	$(21.2)	$75.3	$92.0	$34.8	$36.0	373	$22.75	$1.86
2002	$54.7	$(27.5)	$66.2	$84.6	$30.1	$36.0	358	$9.36	$1.08
2003	$39.4	$(39.7)	$29.2	$49.6	$8.5	$21.9	198	$1.72	$0.68
2004	$38.4	$(7.3)	$25.9	$44.2	$8.7	$17.7	176	$1.68	$0.68
2005	$32.6	$(9.3)	$18.4	$38.5	$8.7	$16.8	164	$1.77	$1.28
2006	$29.6	$(15.8)	$11.5	$37.0	$8.7	$17.2	185	$2.43	$1.36
2007	$40.6	$(9.8)	$4.6	$47.7	$8.7	$28.6	199	$3.34	$1.64
2008	$34.4	$(15.6)	$(8.7)	$31.2	$9.8	$9.3	167	$3.17	$0.13

Appendix 6.5 Excerpts from I-Many agreement with Procter and Gamble

[Excerpts from the strategic relationship agreement with Procter & Gamble dated May 2000 are available as Exhibit 10.23 to I-Many's S-1 filed with the US Securities and Exchange Commission June 30, 2000.]

Appendix 6.6 I-Many strategic acquisitions

Date, type of transaction and consideration	**Company/asset**	**Capabilities, contribution**	**Rationale**
May 2000; strategic alliance incorporating product license, warrants and royalty payments	Procter and Gamble	Joint development of consumer packaged goods purchasing capability	Expand into new vertical – food and consumer products industry (purchasing)
October 2000; joint venture	Distribution Market Advantage	To jointly develop a food service market portal	Vertical expansion in food service
October 2000; consulting contract	Hale Group	Obtain advice on the food service industry needs	Vertical expansion in food service
November 2000; acquisition; $11.1 million in cash and stock and with possible earn-out of $ $4.6 million	Chi-Cor: Trade Funds Management System, Deductions Management System and SettleLink.net, "the first Internet-based exchange for collaborative trade funds and deductions management"	Trade promotions, deductions, and online portal for B2B settlement; 70 customers "in a variety of vertical markets, including consumer packaged goods, chemicals, electronics, building products, pharmaceuticals and apparel makers; $3.5 million in revenues	"Rapidly expand its presence in the consumer product goods (CPG) market, fortify its position in the healthcare industry, and fuel its penetration into additional vertical markets"
January 2001; acquisition; $1.1 million cash and stock	Vintage Software	Competing product sold to mid-market pharmaceutical companies	Market consolidation
March 2001; acquisition; $2.8 million cash and stock	Intersoft International	Markets software to companies and brokers in the food service industry	Expansion in the food service industry
April 2001; acquisition; $12 million cash and stock	BCL Vision, based in London	Global collection and dispute management solutions	"opportunity to extend into markets such as financial services, telecoms, publishing, high-tech, industrial products, and chemicals, where BCL has already established a strong presence" as well as international expansion

I-Many strategic acquisitions, cont.

Date, type of transaction and consideration	Company/asset	Capabilities, contribution	Rationale
April 2001; marketing alliance; Accenture received warrants at $9.725 with opportunity to earn more based on revenues from Accenture clients	Accenture	I-Many to be Accenture’s preferred provider of automated contract management solutions for one year; Accenture to be I-Many’s preferred business integration provider	Marketing partner
August 2001; acquisition; $16 million stock and warrants	Provato	Contract management and compliance solutions	Focus on “contract management”, contract management capabilities
March 2002; acquisition; $97 million cash and stock with possible $3 million earnout	Menerva Technologies Inc.	Buy-side contract management	Building out the offering to include contract management capabilities and the buy-side
March 2002; asset acquisition; $3.4 million cash and stock, plus possible $2 million earnout	NetReturn, LLC	Government pricing compliance software	Extension of pharmaceutical compliance offerings
July 2003; planned asset sale; $20 million; DEAL TERMINATED DECEMBER 2003	Neoforma (purchaser)	I-Many’s health and life sciences business; pro forma revenues for I-Many would drop to $3 million per quarter from $10 million per quarter	Focus on non-healthcare markets; monetize healthcare business
April 2004; acquisition; $1.2 million cash and possible earnout	Pricing Analytics	Pricing optimization or pricing strategy software	Product offering enhancement
December 2004; planned merger; approximately $70 million ($1.55 per share); DEAL VOTED DOWN BY I-MANY STOCKHOLDERS IN MARCH 2005	Selectica	Contract management and pricing engine	Industry consolidation

I-Many strategic acquisitions, cont.

Date, type of transaction and consideration	**Company/asset**	**Capabilities, contribution**	**Rationale**
October 2005; marketing partnership	xoomworks.com	Procurement and finance professional services company	European implementation partner
November 2005; advisory relationship	Liolios	Investor relations advice	Improve communications with investors, financial media and target markets
4Q 2007; accelerated product development agreement with a customer	Pfizer	Accelerated product development for a customer	Specialist product development in core offering; delivered in 2008
January 2008; asset acquisition; $2.2 million cash	Global Healthcare Exchange	Claimright software business and customers	Purchase of competing software development project and incorporation of its functionality into I-Many products
May 2008; acquisition; $5.1 million cash	Edge Dynamics	"a leading provider of channel demand management solutions for the life sciences industry"	Consolidation of product offerings in the health care segment[50]
March 2009; marketing partnership	CSC	Global IT services	"Together, I-many and CSC are working to help pharmaceutical and biotechnology companies prepare for Medicare Part D compliance audits."

[50] "According to Hussain Mooraj, research director at AMR Research (Boston), 'Pharma companies sometimes spend more in rebates and chargebacks than they do in R&D, yet their confidence in how well they are managing it, and how well they are maintaining regulatory compliance, remains low.' The addition of Edge Dynamics technology will help I-many customers reduce more of these risks and associated costs. For example, Edge's chargeback solution can enable I-many CARS® to verify chargebacks against channel sales data, and identify missing chargebacks and negative chargebacks. In addition, by incorporating Edge Dynamics products and data into its own solution, I-many will be able to provide customers with more insight on product demand and the actual movement of products from the factory to the patient."

I-Many strategic acquisitions, cont.

Date, type of transaction and consideration	**Company/asset**	**Capabilities, contribution**	**Rationale**
February 2010; strategic alliance	Polaris Contracting Solutions, a leading management consulting firm providing pharmaceutical and medical device companies with health care law compliance, consulting services and solutions	Business process outsourcing for an outsourced government pricing solution	Improve product offerings for government pricing
May 2010; strategic partnership	Alliance Life Sciences Consulting Group	"asset-based solutions to address the revenue and customer management challenges that pharmaceutical manufacturers face today"	More depth in pharma offerings

Press release on the acquisition of Chi-Cor:

[See I-Many press release dated November 6, 2000, filed as Exhibit 99.1 to Form 8K filed with the US Securities and Exchange Commission November 8, 2000.]

Appendix 6.7 Excerpt from I-Many investor conference call at time of sale of company in 2009

[See transcript of the I-Many investor conference call of April 29, 2009, filed as Exhibit 99.1 to Form 8K filed with the US Securities and Exchange Commission May 1, 2009.]

Appendix 6.8 I-Many business description at year end 2008 and when acquired in June 2009

At year end 2008 I-Many management had defined their business broadly, consistent with the CMS organizing vision (I-Many Annual Report on Form 10K for 2008).

> We provide software and related professional services that allow our clients to manage important aspects of their contractual relationships, including:
> Contract compliance management for verification of compliance and accuracy of orders, shipments, invoices, chargebacks, rebates and payments, both against contractual documents and correlated by the physical movement of product through channels, to ensure error-free operations and proper performance-based incentives
> Contract creation, repository, actionable terms tracking, date and event monitoring and reporting
> Cash collection, deductions management and dispute resolution, often based on analysis of agreed to contract terms and conditions
> Visibility into key aspects of the existing contract portfolio to include key performance measurements for existing contracts, related transactions against those contracts and operational aspects of the contracting process, and, decision support for planned contracting activity to optimize chosen key performance indicators such as revenue, profitability and market share with new additions to the contract portfolio
> Support for distribution relationships to enable fee for service calculations and insight into the actual movement of product through the channel for the optimization of inventory levels, and
> Evaluation of the effectiveness of contracts and business operations.

But the new owners laid out a rather narrower brief.

> An investment in I-Many offers LLR the chance to partner with a valuable franchise and a core team of capable executives. Together, LLR Partners and I-Many will work to leverage the company's *domain knowledge and technical capability for the benefit of I-Many's existing customers and prospects in pharmaceutical development/manufacturing, medical devices and other industries where increased regulatory oversight and the need for enhanced compliance requires leading edge solutions for enhanced data management, data processing and business intelligence*. (I-Many press release April 29, 2009) (emphasis added)

Appendix 6.9 I-Many segment reporting

Segment reporting for 2000-2002 was in three categories: life sciences, consumer packaged goods and food services (representing the Procter and Gamble market), and other. For 2003-2004, the categories were health and life science, and other. Starting in 2005, “other” was renamed “industry solutions”.

Year	Net revenues – Millions ($)	Net income (loss) - Millions ($)	Health and life science revenues - Millions ($)	Health and life sciences as % of revenues	Consumer packaged goods and food services (CPG) - Millions ($)	CPG as % of revenues	Other (industry solutions starting 2005)- Millions ($)	Other (industry solutions) as % of revenues
1995	$1.2	$(2.2)	n/a	n/a	n/a	n/a	n/a	n/a
1996	$3.4	$(0.5)	n/a	n/a	n/a	n/a	n/a	n/a
1997	$7.5	$0.3	n/a	n/a	n/a	n/a	n/a	n/a
1998	$13.5	$1.9	n/a	n/a	n/a	n/a	n/a	n/a
1999	$19.4	$(5.2)	n/a	n/a	n/a	n/a	n/a	n/a
2000	$36.5	$(24.2)	$36.1	99%	$0.3	1%	$0	0%
2001	$56.1	$(21.2)	$44.9	80%	$9.9	20%	$0	0%
2002	$54.7	$(27.5)	$37.4	68%	$11.8	21%	$5.5	10%
2003	$39.4	$(39.7)	$26.0	66%	n/a	n/a	$13.4	34%
2004	$38.4	$(7.3)	$27.9	73%	n/a	n/a	$10.5	27%
2005	$32.6	$(9.3)	$24.6	76%	n/a	n/a	$8.0	24%
2006	$29.6	$(15.8)	$21.9	74%	n/a	n/a	$7.7	26%
2007	$40.6	$(9.8)	$31.4	77%	n/a	n/a	$9.2	23%
2008	$34.4	$(15.6)	$29.1	85%			$5.3	15%

Appendix 6.10 I-Many revenue classification

Revenues were split between products and services through 2006, and then categorized as recurring, services and licenses.

Year	Net revenues - Millions ($)	Net income (loss) - Millions ($)	Products - Millions ($)	Products as % of revenues	Services - Millions ($)	Services as % of revenues	Recurring - Millions ($)	Recurring as % of revenues	Licenses - Millions ($)	Licenses as % of revenues
1995	$1.2	$(2.2)	$0.3	27%	$0.9	73%	n/a	n/a	n/a	n/a
1996	$3.4	$(0.02)	$2.1	63%	$1.3	37%	n/a	n/a	n/a	n/a
1997	$7.5	$0.3	$5.0	67%	$2.5	33%	n/a	n/a	n/a	n/a
1998	$13.5	$1.9	$8.5	63%	$5.0	37%	n/a	n/a	n/a	n/a
1999	$19.4	$(5.2)	$9.2	48%	$10.1	52%	n/a	n/a	n/a	n/a
2000	$36.5	$(24.8)	$15.6	43%	$20.8	57%	n/a	n/a	n/a	n/a
2001	$56.1	$(21.2)	$30.0	54%	$26.0	46%	n/a	n/a	n/a	n/a
2002	$54.7	$(27.5)	$30.8	56%	$23.9	44%	n/a	n/a	n/a	n/a
2003	$39.4	$(39.7)	$14.3	36%	$25.1	64%	n/a	n/a	n/a	n/a
2004	$38.4	$(7.3)	$11.2	29%	$27.1	71%	n/a	n/a	n/a	n/a
2005	$32.6	$(9.3)	$6.2	19%	$26.3	81%	n/a	n/a	n/a	n/a
2006	$29.6	$(15.8)	$4.0	13%	$25.6	87%	n/a	n/a	n/a	n/a
2007	$40.6	$(9.8)	n/a	n/a	$13.5	33%	$19.7	49%	$7.3	18%
2008	$34.4	$(15.6)	n/a	n/a	$10.6	31%	$20.5	60%	$3.3	10%

Appendix 6.11 Selectica financial overview (in millions of dollars, except for employees and stock prices; Selectica's financial reporting year ends March 31 (i.e. fiscal year 2003 runs from April 2002 through March 2003))

Fiscal Year ended March 31,	Net revenues - Millions ($)	Net income (loss) - Millions ($)	Stockholders' equity - Millions ($)	Assets - Millions ($)	Goodwill - Millions ($)	Cash and short term invest-ments - Millions ($)	Employees	Stock price high ($)	Stock price low ($)
1997 (partial year)	$.1	$(.3)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1998	$.2	$(3.1)	$.9	$1.4	$.1	$.5	n/a	n/a	n/a
1999	$3.4	$(7.5)	$.7	$3.2	$.1	-	92	n/a	n/a
2000	$16.1	$(30.8)	$214.1	$242.4	-	$215.80	439 (139 in India)	n/a	n/a
2001	$53.9	$(49.9)	$182.5	$219.8	$12.6	$137.20	753 (364 in India)	$86.50	$4.40
2002	$47.2	$(26.4)	$153.4	$174.4	$10.0	$126.10	524 (243 in India)	$6.32	$2.40
2003	$35.6	$(29.7)	$113.1	$137.1	n/a	$109.20	456 (235 in India)	$4.42	$2.13
2004	$40.0	$(8.8)	$112.0	$126.4	n/a	$97.30	320 (140 in India)	$5.55	$2.69
2005	$31.1	$(14.7)	$97.7	$107.6	n/a	$93.30	270 (139 in India)	$5.60	$3.16
2006	$23.4	$(17.5)	$78.3	$85.9	n/a	$74.00	170 (81 in India)	$3.72	$2.48
2007	$14.7	$(20.9)	$49.9	$63.6	n/a	$57.50	129 (66 in India)	$2.88	$1.61
2008	$16.0	$(23.9)	$27.3	$40.2	n/a	$35.20	67 (6 in India)	$2.07	$1.20
2009	$16.4	$(8.4)	$17.3	$33.3	n/a	$23.50	51 (0 in India)	$1.56 ($31.20) *	$.29 ($5.80) *
2010	$15.2	$(4.6)	$12.0	$22.5	n/a	$17.20	58	$10.00	$3.80
2011	$14.5	$(1.5)	$10.7	$20.6	n/a	$17.0	51	$6.30	$4.19

*In February 2010, the board approved a one-for-twenty reverse stock split.

Appendix 6.12 Selectica segment reporting (revenues in millions of dollars)

Date	Segment description	Revenue breakdown by segment
Original S-1 filed December 10, 1999	A single segment: internet selling software (ISS) for electronic commerce	n/a
2000 10K	Same as above	n/a
2001 10K	Same as 2000	n/a
2002 10K	Same as 2001	n/a
2003 10K	Same as 2002	n/a
2004 10K	A single segment: configuration, pricing management and quoting solutions for ecommerce	n/a
2005 10K	Same as 2004	n/a
2006 10K	One business segment, in which they develop, market, sell and support software that helps companies with multiple product lines and channels of distribution to effectively configure, price, quote new business and manage the contracting process for their products and services	n/a in 2006 but broken out by 2007: Sales execution $22.9 Contract lifecycle management $.6
2007 10K	The business is focused towards delivering software and services under two operating segments (1) Sales Execution, (SE) and (2) Contract Lifecycle Management, (CLM). The SE segment provides products that enable customers to increase revenues and reduce costs through web-enabled automation of quote-to-contract business processes. The CLM segment provides products that enable customers to create, manage and analyze contracts in a single, easy to use repository.	Sales execution $12.9 Contract lifecycle management $1.9
2008 10K	The business is focused towards delivering software and services under two operating segments (1) Sales configuration, (SCS) and (2) Contract management, (CM). The SCS segment provides products that enable customers to increase revenues and reduce costs through web-enabled automation of quote-to-contract business processes. The CM segment provides products that enable customers to create, manage and analyze contracts in a single, easy to use repository.	Sales configuration $10.2 Contract management $5.8
2009 10K	The business is focused towards delivering software and services under two operating segments (1) contract management, and (2) sales configuration.	Sales configuration $6.5 Contract management $9.9
2010 10K	Same as 2009	Sales configuration $5.7 Contract management $9.5
2011 10K	The Company operates as one business segment and therefore segment information is not presented	n/a

Appendix 6.13 Selectica customers

Year	Revenues-Millions ($)	% revenues for 5 (3) largest customers	% revenues for 10 largest customers	Customers > 10% of revenues
1999	$3.4	85%	96%	BMW 60%, Olicon 10%
2000	$16.1	53%	76%	LVMH 12%, 3Com 10%, Fireman's Fund 10%, Samsung 12%
2001	$53.9	55%	67%	Samsung 17%, Dell 16%, Cisco 14%
2002	$47.2	32%	50%	A 11%
2003	$35.6	53%	65%	A 14%, B 25%
2004	$40.0	78%	88%	B 20%, C 39%
2005	$31.1	67%	86%	C 23%, D 14%, E 12%, F 11%
2006	$23.4	67%	80%	C 23%, D 22%
2007	$14.7	61%	75%	C 11%, G 30%, H 12%
2008	$16.0	52% (3 largest 45%)	65%	G 25%, H 12%
2009	$16.4	(3 largest 33%)	n/a	G 18%
2010	$15.2	(3 largest 33%)	n/a	G 15%
2011	$14.5	(3 largest 28%)	n/a	G 16%

Appendix 6.14 Selectica revenue classification

Year	Net revenues- Millions ($)	Net income (loss) - Millions ($)	License revenues- Millions ($)	License revenues as % of revenues	Services- Millions ($)	Services as % of revenues
1999	$3.4	($7.5)	$1.7	50%	$1.8	50%
2000	$16.1	($30.8)	$9.2	57%	$6.9	43%
2001	$53.9	($49.9)	$23.9	44%	$30.0	56%
2002	$47.2	($26.4)	$16.7	35%	$30.5	65%
2003	$35.6	($29.7)	$10.2	29%	$25.4	71%
2004	$40.0	($8.8)	$16.9	42%	$23.1	58%
2005	$31.1	($14.7)	$9.1	29%	$22.0	71%
2006	$23.4	($17.5)	$4.4	19%	$19.0	81%
2007	$14.7	($20.9)	$1.4	10%	$13.4	90%
2008	$16.0	($23.9)	$4.6	29%	$11.4	71%
2009	$16.4	($8.4)	$3.6	22%	$12.9	78%
2010	$15.2	($4.6)	$3.2	21%	$12.0	79%
2011	$14.5	($1.5)	$2.4	17%	$12.1	83%

Appendix 6.15 Ariba financial overview (in millions of dollars, except for employees and stock prices; Ariba's financial reporting year ends September 30 (i.e. fiscal year 2003 runs from October 2002 through September 2003))

Fiscal year ended Sept. 30,	**Net revenues-Millions ($)**	**Net income (loss) - Millions ($)**	**Stockholders' equity - Millions ($)**	**Assets- Millions ($)**	**Goodwill- Millions ($)**	**Cash- Millions ($)**	**Employees**	**Stock price high ($)**	**Stock price low**
1997	$0.8	$(4.7)	$14.5	$16.8	n/a	$15.5	n/a	n/a	n/a
1998	$8.4	$(11.0)	$10.0	$19.2	n/a	$13.9	n/a	n/a	n/a
1999	$45.4	$(29.3)	$122.2	$170.0	n/a	$98.1	386	$99.32	$30.50
2000	$279.0	$(792.8)	$3498.2	$3815.9	$3287.1	$280.2	1680	$168.75	$36.87*
2001	$408.8	$(2681.0)	$925.9	$1288	$877.8	$217.9	1124	$141.52	$1.42
2002	$229.8	$(638.7)	$311.0	$624.6	$176.5	$157.2	836	$7.82	$1.30
2003	$236.7	$(106.3)	$216.9	$459.1	$181.0	$127.1	845	$4.7	$1.30
2004	$245.8	$(25.2)	$646.4	$933.9	$574.7	$111.3	1686	$24.00	$7.27*
2005	$323.0	$(349.6)	$329.5	$590.6	$328.7	$111.4	1506	$17.5	$5.40
2006	$296.0	$(47.8)	$333.0	$586.9	$326.1	$138.8	1676	$10.89	$5.70
2007	$301.7	$(15.0)	$351.1	$583.6	$326.1	$145	1669	$11.18	$7.15
2008	$328.1	$(41.1)	$391.0	$627.5	$406.5	$86.8	1740	$18.58	$8.26
2009	$339.0	$8.2	$434.1	$668.2	$406.5	$143.1	1632	$14.00	$6.00
2010	$361.1	$16.4	$499.0	$721.7	$406.5	$200.8	1804	$19.06	$10.74

*2 for 1 stock splits were made in November 1999 and March 2000; in July 2004 there was a 6 for 1 reverse stock split.

Appendix 6.16 Ariba strategic transactions

Date, type of transaction and consideration	Company/asset	Capabilities, contribution	Rationale
January 2000; $465 million stock acquisition	TradingDynamics, Inc.	“a leading provider of business-to-business Internet trading applications”	B2B ecommerce applications (business-to-business Internet trading applications, including business-to-business auction, request for quote ("RFQ"), reverse auction, and bid/ask-style exchange mechanisms) – purchased for product offerings and R&D teams
March 2000; $2.3 billion stock acquisition	TRADEX Technologies	“a leading provider of solutions for Net Markets”	B2B ecommerce applications – purchased for product offerings and R&D teams
August 2000; $607 million stock acquisition	SupplierMarket.com	“a provider of online collaborative sourcing technologies”	B2B ecommerce applications that allow buyers and suppliers of direct and indirect materials to locate new trading partners, negotiate purchases and collaborate on the Internet– purchased for product offerings and R&D teams
December 2000; sale of interest by subsidiary for $40 million	40% interest in Nihon Ariba sold to Softbank	Partner for Japanese business	International expansion partner
January 2003; $3.3 million cash acquisition	Goodex	“a privately-held European sourcing services provider”	“The acquisition was made to allow the Company to expand its sourcing services and to implement customers’ strategic sourcing business processes.”
January 2004; $10 million cash acquisition	Alliente	“Alliente provided procurement outsourcing services to companies based on Ariba technology.”	Consolidation
April 2004; $81 million cash acquisition	Softface	“a spending performance management company offering data enrichment solutions complementary to Ariba’s products”	Consolidation

Ariba strategic transactions, cont.

Date, type of transaction and consideration	**Company/asset**	**Capabilities, contribution**	**Rationale**
July 2004; $549.5 million stock and cash merger	Freemarkets	"FreeMarkets provided companies with software, services and information for global supply management."	"Through our merger with FreeMarkets and acquisition of Alliente, we have enhanced the Ariba Solutions Delivery organization during the past year both by adding professionals with strategic sourcing expertise, business process re-engineering expertise, specific commodity expertise and best practices expertise, and by adding a procurement outsourcing capability."
December 2007; $103.2 million cash and stock acquisition	Procuri	"Procuri is a provider of on-demand supply management solutions."	Consolidation, especially into on-demand space
November 2010; sale of sourcing services business for $51 million cash	Accenture	Sourcing services including business process outsourcing	Concentrate on supplier network
January 2011; $150 million cash and stock including a deferred payment portion	Quadrem	Supplier network located in Europe	Grow supplier network
May 2012; announced $4.3 billion cash acquisition by SAP	SAP	Dominant ERP vendor	SAP to acquire supplier network and strategic move into the cloud

Appendix 6.17 Ariba revenue classification

Year ended September 30,	Revenues- Millions ($)	Net income (loss)- Millions ($)	License- Millions ($)	License as a % of revenues	(subscription and maintenance starting 2004)- Millions ($)	S&M (S&M) as % of revenues	Services and other (starting 2004)- Millions ($)	S&O as % of revenues
1999	$45.4	$(29.3)	$26.8	59%	$18.6	41%	n/a	n/a
2000	$279.0	$(792.8)	$198.8	71%	$80.2	29%	n/a	n/a
2001	$408.8	$(2681.0)	$269.3	66%	$139.6	34%	n/a	n/a
2002	$229.8	$(638.7)	$98.4	43%	$131.4	57%	n/a	n/a
2003	$236.7	$(106.3)	$103.1	44%	$133.6	56%	n/a	n/a
2004	$245.8	$(25.2)	$65.7	27%	$95.7	39%	$84.5	34%
2005	$323.0	$(349.6)	$47.8	15%	$121.8	38%	$151.8	47%
2006	$296.0	$(47.8)	$23.9	8%	$126.6	43%	$145.5	49%
2007	$301.7	$(15.0)	$18.2	6%	$140.6	47%	$142.8	47%
2008	$328.1	$(41.1)	$0	0%	$187.2	57%	$140.9	43%
2009	$339.9	$8.2	$0	0%	$222.2	66%	$116.8	34%
2010	$361.1	$16.4	$0	0%	$240.8	67%	$120.4	33%

From 2008 10-K: "These different revenue streams also carry different gross margins. Revenue from subscription and maintenance fees tends to be higher-margin revenue with gross margins typically around 75% to 80%. Subscription and maintenance fees are generally based on software products developed by us, which carry minimal marginal cost to reproduce and sell. Revenue from labor-intensive services and other fees tends to be lower-margin revenue, with gross margins typically in the 20% to 40% range. Our overall gross margins could fluctuate from period to period depending upon the mix of revenue. For example, a period with a higher mix of license revenue versus services revenue would drive overall gross margin higher and vice versa."

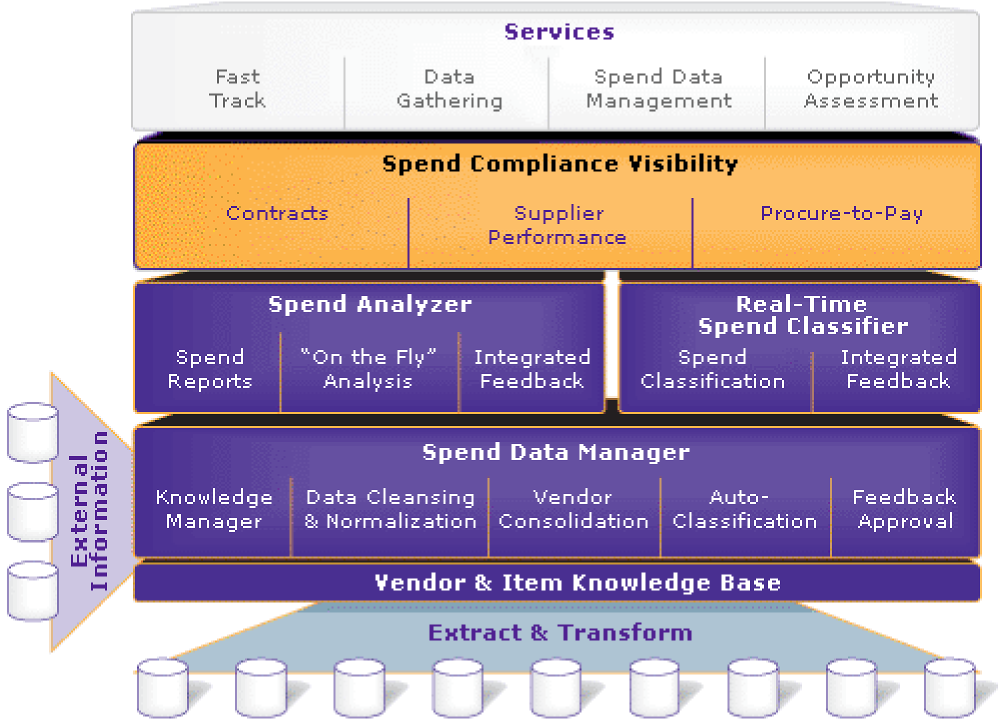
Appendix 6.18 Ariba 2010 business description

[In lieu of excerpts, see Sections entitled "Ariba Collaborative Business Commerce Solutions", "Ariba Network", and "Ariba Services" in Ariba's Annual Report on Form 10K for 2010, filed with the US Securities and Exchange Commission November 23, 2010.]

Appendix 6.19 Emptoris spend analysis solution from June 2009 website: granularity and scale (Courtesy of International Business Machines Corporation, © International Business Machines Corporation)

Emptoris Spend Analysis Solution

Emptoris Spend Analysis is a robust software solution that may be deployed quickly and flexibly to meet your unique requirements.



Spend Analyzer

The Spend Analyzer provides reports, dashboards, and multi-dimensional **analysis** for users to quickly and dynamically analyze their spend data to drive better business decisions.

Capabilities	Benefits
Instantaneously slice, dice, and analyze spend across multiple dimensions	Identify opportunities to negotiate new contracts in high spend categories where currently none exists
Empower hundreds of users	Reduce off-contract "maverick" spending
Analyze spend along dozens of dimensions, including commodity, cost center, GL account, geography, time, payment terms, UNSPSC code, supplier diversity status, and more	Discover areas to maximize purchasing leverage through demand aggregation and supplier consolidation
Ask system questions to identify new savings opportunities	Instantly identify all suppliers currently providing needed goods and services
Micro-analyze 100's of savings opportunities simultaneously	Select suppliers to participate in sourcing activities based on enriched supplier attributes (e.g., preferred or minority-owned vendor, credit risk and performance rating)
Refine analysis on-the-fly (without writing reports or complex queries)	Improve negotiating position by leveraging all spend with a supplier, not just spend related to one negotiation
Rapidly drill down to transaction and line item details	Understand how much spend is with poor performing suppliers and identify opportunities to move spend from poor performing suppliers to good performing suppliers
Create reports and cross tabs on-the-fly	Track spend against low and high performing suppliers to develop focused supplier development strategies for high spend/low performing suppliers
Leverage 50 standard reports from a central dashboard & easily add new reports, as needed	Ensure that actual spending across the enterprise matches contractual levels and terms
Analyze 100+ million transactions from dozens of data sources in a single, integrated view	Reduce off-contract “maverick” spending
Track user adoption by frequency and depth of analysis	
Gain visibility into supplier performance	
Control violations and alignment between contract terms and actual spending	

Spend Data Manager

The Spend Data Manager leverages Emptoris knowledge bases to deliver automated enrichment and categorization that is both **accurate and granular**. The Spend Data Manager can be leveraged in two ways. It is offered as a service with Emptoris Spend Analysts using the software on your behalf and returning the enriched spend data directly to your database or making it available via the Spend Analyzer. It is also offered as software; we train your team to use it, load the appropriate knowledge bases, and empower you to manager your spend data directly.

Benefits	Capabilities
Achieve high accuracy in your spend classification Improve insight with enriched vendor and item information leveraging Emptoris knowledge bases Empower in-house resources to frequently enrich and categorize your spend data Adhere to corporate data security policies to keep spend data on premise	Multiple auto-classification algorithms to classify all types of spend—direct, indirect, and MRO, including Bayesian, natural language processing and nearest neighbor Continuous improvement through closed-loop feedback mechanisms and learning, including feedback driven rules and machine learning Taxonomy independant classification to support your business needs, including: UNSPSC, eClass, eOTD, proprietary, and other taxonomies Automatic web crawling to integrate external information from, for example, supplier catalogs Vendor knowledge base Item knowledge base, based on UNSPSC

Real-Time Spend Classifer

The Real-Time Spend Classifier ensures more **accurate categorization** immediately at the point-of-entry by integrating with transactional procurement or purchase order systems (e.g., SAP, Oracle, Ariba Buyer, home-grown purchasing systems).

Benefits	Capabilities
Classify spend accurately at point-of-entry (e.g., line items in requisitions and purchase orders)	Web service that integrates with your transactional purchasing system (e.g., SAP, Oracle, Ariba Buyer) for real-time classification
Continuously improve accuracy of spend classification	Multiple auto-classification algorithms to classify all types of spend
Reduce misclassified and "other" spend	Taxonomy independant classification
Improve spend visibility to identify more savings opportunities	Vendor knowledge base
	Item knowledge base, based on UNSPSC

The **Emptoris Compliance solution** builds upon Emptoris Spend Analysis to deliver additional value, such as spend and contract visibility and procure-to-pay contract monitoring. As well, Emptoris offers the following value-added services to help its customers make the most of their investment in Emptoris Spend Analysis and ensure that it delivers against their business objectives.

FastTrack

FastTrack implementations provide the necessary education, knowledge transfer, and program design to get Emptoris Spend Analysis deployed quickly—typically in three months or less—and in a manner that ensures rapid adoption. In addition to delivering software implementation and user training, FastTrack looks at your spend analysis program holistically to ensure that you will be able to realize your business objectives. In pursuit of that goal, FastTrack may include:

- Analysis of current "as-is" state, including inventory of available systems and data
- Collection and synthesis of reporting needs across various stakeholders
- Development of rapid implementation plan, leveraging spend analysis best practices
- Development of data gathering requirements to maximize the value for purchasing, sourcing, and compliance initiatives

Data Extraction

With individual customers **aggregating spend data** from over 110 sources, Emptoris understands that data gathering can be a hurdle for many companies looking to improve their spend visibility. Under the Emptoris Data Extraction service, we work with you to ensure your data is properly extracted, transformed and loaded into the Spend Data Manager in a consistent and timely manner.

Opportunity Assessment

This value-added service, offered as part of our **consulting services**, helps you leverage spend data analysis to identify and prioritize sourcing opportunities, leveraging the Spend Analyzer and other secondary inputs. This includes opportunity modeling, presentation and report development, opportunity prioritization assistance, and program planning. The service is designed to transfer knowledge and expertise, so opportunity assessment can become an internal core competency within your team.

Customer Success with Emptoris Spend Analysis

Emptoris customers have delivered substantial value to their businesses with Emptoris Spend Analysis. In the area of sourcing and supply management, it commonly enables 12% cost reduction through more informed strategies, as a result of being able to:

- Identify and prioritize sourcing initiatives
- Aggregate demand across business units and geographies
- Rationalize suppliers
- Monitor for and obtain supplier rebates
- Plan post-merger procurement integration

Emptoris Spend Analysis also enables companies to monitor spending across the enterprise and:

- Reduce maverick spend
- Increase contract compliance
- Ensure budget compliance
- Reduce e-procurement bypass
- Reduce purchasing card bypass

Our customer's results speak for themselves:

$350 million saved

A Global 1000 grocery retailer needed to reduce its not-for-resale costs as a percentage of sales across 1,400 stores. They used Emptoris Spend Analysis to identify new savings opportunities and save $350 million—which was vouched for by finance as hard, bottom-line cost savings. The analyzed over $4 billion that spanned across:

- 3.7 million transactions
- 33 currencies
- 25,000 vendors records
- 42,000 material master items

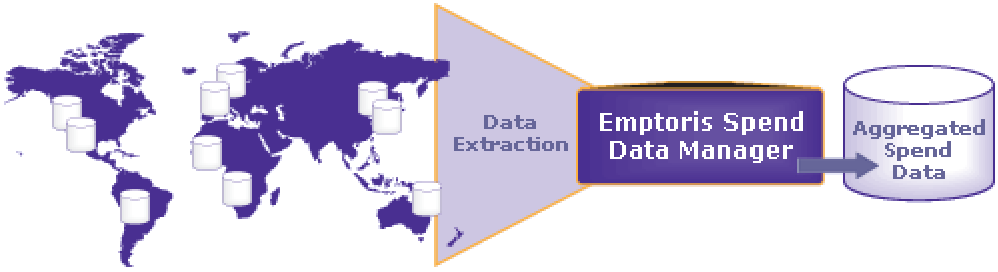
$40 Million Saved In Year 1

A chemical company with one global instance of SAP business data warehouse thought their spend data was "beyond repair." They needed to turn it into useful information to meet aggressive savings targets. They turned to Emptoris Spend Analysis to improve the quality of the information in their data warehouse. They accurately and granularly classified 95% of their spend and saved $40 million in the first year alone. They analyzed $6.4 billion that included:

- 3.7 million transactions
- 33 currencies
- 25,000 vendors records
- 42,000 material master items

Data Aggregation for Complete Coverage of Enterprise Spend

Enterprises today are looking for visibility across all their spend enterprise-wide regardless of source system, language, or currency. Doing so empowers them to aggregate demand, improve compliance across business units and geographies, improve volume-driven leverage during supplier negotiations, and more.

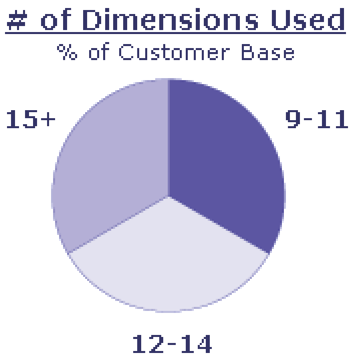


Whether you have a single integrated data warehouse or spend data scattered across dozens of systems, Emptoris can help you achieve visibility across all your spend. Emptoris customers aggregate spend data from numerous systems, including:

- PeopleSoft
- SAP
- Oracle
- ACH
- JD Edwards
- Homegrown A/P
- P-Card
- EFT systems
- GEAC
- Ariba Buyer
- HR systems
- T&E systems
- VAR/Vendor feeds
- Purchase Order

Moreover, our customers' visibility extends beyond just vendor and commodity to provide additional insights and dimensions of **analysis**. Emptoris leverages all the detail in your spend transactions and integrates external item and vendor information. Over a third of our customers analyze their spend data along more than 15 different dimensions, which often include:

- Vendor
- Commodity
- Time
- Geography
- General ledger
- Cost center
- Supplier diversity status
- Preferred supplier status
- Spend range
- On/off contract
- ISO certified supplier



Learn how the Spend Data Manager and Data Extraction empower customers to achieve visibility into all their spend.

Case in point:

Global food company aggregates data from 19 SAP systems in 10 countries and languages

A global food leader had spend scattered across 19 SAP systems in 10 countries and in 10 languages. They had no way to pull this together and get a comprehensive view of their spending. Emptoris partnered with them to aggregate, normalize, and cleanse the spend data from all these source systems. Over the course of a 90-day FastTrack implementation, the following was achieved:

- 1.2 million transactions representing $1.9 billion in spend was aggregated
- 64,000 vendors were grouped and consolidated into to 32,700 "families" of related companies.
- Spend was mapped to 14 dimensions (e.g., vendor, commodity, vendor status, geography, etc.)
- 95% of spend was accurately categorized across 400 unique commodity codes and 185,000 uniquely identified items

Learn More:

Emptoris invites you to learn more about the Emptoris enterprise spend analysis solution through the following content:

On Demand Webcasts

Building a Business Case for a Spend Analysis System at Your Company

In this webcast, hosted by Paul Teague, Editor-in-Chief of Purchasing Magazine, hear Mitch Plaat, Vice President of Procurement at Con-way Inc. and Bill DeMartino, Director of Spend Analysis at Emptoris, share their insights on how to get a new spend analysis initiative funded at your company.

Books and Whitepapers

"Spend Analysis: The Window into Strategic Sourcing" – Co-authored by byKiritPandit and Dr. HaralambosMarmanis, this comprehensive book on spend analysis provides a complete overview of spend analysis best practices and technologies, including dozens of case studies of spend analysis implementations at leading global companies.

"High Performance Through Procurement: The Role of Technology" – Co-authored Emptoris and Accenture, this whitepaper highlights the processes and technology that businesses employ to become procurement masters.

For additional data about how companies benefit from Emptoris technology, visit our**newsroom**.

Accurate Spend Categorization

In order to make the most of their spend visibility, companies need it to be both accurate and granular. By accurate, we mean that each dollar, euro, yen, etc. of spend is assigned to the correct item in your chosen taxonomy, be it UNSPSC, eClass, proprietary, or another taxonomy. By granular, we mean that each transaction is categorized to the lowest level of detail possible. Being more granular can mean the difference between knowing what you've spent on "Information Technology" (common level 1) vs. "Notebook Computers" (common level 4).

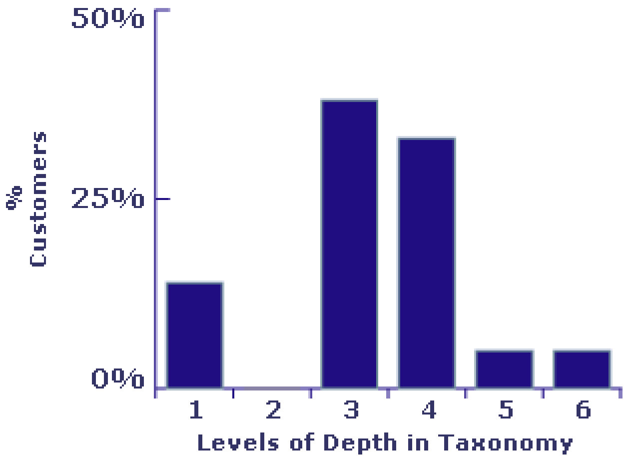
How granular do you want your spend visibility to be? Emptoris customers achieve deep granularity enabling their sourcing and finance professionals to make more informed business decisions.

Item: Laptop Computer

Category:

Level 1 - Information Technology
Level 2 - Computer Equipment and Accessories
Level 3 - Computers
Level 4 - Notebook Computers

Taxonomy Granularity



To achieve accurate and granular categorization, companies need robust data enrichment and classification software. And, Emptoris delivers. The Emptoris difference includes:

- Multiple auto-classification algorithms to classify all types of spend
  - Bayesian
  - Natural language processing
  - Nearest neighbor
- Continuous improvement through closed-loop feedback mechanisms and learning
  - Feedback driven rules
  - Machine learning
- Taxonomy independant categorization to support your business needs
  - UNSPSC
  - eClass
  - eOTD

    - Proprietary taxonomies
- Automatic web crawling to integrate external information from, for example, supplier catalogs
- Vendor knowledge base
- Item knowledge base, based on UNSPSC
- Domain & category expertise

Learn how the Spend Data Manager empower customers to achieve accurate and granular spend visibility.

Learn More:

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In this webcast, hosted by Paul Teague, Editor-in-Chief of Purchasing Magazine, hear Mitch Plaat, Vice President of Procurement at Con-way Inc. and Bill DeMartino, Director of Spend Analysis at Emptoris, share their insights on how to get a new spend analysis initiative funded at your company.

Books and Whitepapers

"Spend Analysis: The Window into Strategic Sourcing" – Co-authored by byKiritPandit and Dr. HaralambosMarmanis, this comprehensive book on spend analysis provides a complete overview of spend analysis best practices and technologies, including dozens of case studies of spend analysis implementations at leading global companies.

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Appendix 6.20 Upside company description

2000	a leading provider of electronic billing solutions for the business-to-business marketplace
2001	Upside Software provides integrated enterprise solutions that help streamline financial and business operations for companies of any size.
2002	Upside Software provides integrated enterprise solutions that help streamline financial and business operations for companies of any size. The company's web-based solutions focus on electronic billing, contract management, expense claim management and time-based resource booking management and are based on Microsoft technologies.
2003	Upside Software provides the leading Contract Management Software solution in the market – UpsideContract – as well as other integrated business solutions to handle Invoice and Billing Management, Project Management, and Travel & Entertainment Expense Management. UpsideContract and UpsideContract-LITE are well suited to Enterprise (e.g. Fortune 500, Global 2000), Public sector (Federal, State/Provincial, Municipal and Health Care) and the Small and Medium (SME) sector customers. Through improved business processes and leveraged business intelligence, Upside Software's customers can reduce operating costs and improve customer and supplier relationships. The company's Corporate and ASP implementations are delivered to customers in as little as 3 days and provide a full return-on-investment (ROI) in less than one year. Upside Software is a profitable company with a very mature and comprehensive Contract Management Software product. The company has extensive experience delivering real value to a large number of public- and private-sector customers of every size including small and medium enterprises and large global customers (ranked in the Fortune 20).
2004	Upside Software provides the leading Contract Management Software solution in the market – UpsideContract – as well as other integrated business solutions to handle Sourcing & Procurement, Invoice and Billing Management, and Project & Resource Management. Upside Software's products are well suited to Enterprise (e.g. Fortune 500, Global 2000), Public sector (Federal, State/Provincial, Municipal and Health Care) and the Small and Medium Enterprise (SME) sector customers. Upside Software's customers realize significant cost savings and improve customer and supplier relationships. The company's Corporate and ASP implementations are delivered to customers in as little as 3 days and provide a full return-on-investment (ROI) in much less than one year. Upside Software is a profitable, growing company with a very mature and comprehensive product suite. The company has extensive experience delivering real value to customers of every size and in many industry verticals.
2005	Same as above except now "most" industry verticals.
2006	Same as 2005.

Upside company description, cont.

2007	Upside Software is the worldwide leader in Contract Lifecycle Management (CLM) solutions. Customers around the globe use UpsideContract and other integrated business solutions to confidently perform Contract Management, Sourcing & Procurement, and Invoice & Billing Management activities throughout their organizations. Upside Software's products address the needs of Enterprise (e.g. Fortune 500, Global 2000), Public sector (Federal, State/Provincial, Municipal and Health Care), and Small & Medium Enterprise (SME) customers. Customers realize significant cost savings while improving customer and supplier relationships. Upside Software's solutions are deployed in as little as 3 days and typically provide a full return-on-investment (ROI) in under a year. Founded in 2000, Upside Software is a profitable, growing company with an advanced, yet mature, and comprehensive product suite. The company has extensive experience delivering real value to customers of every size and in most industry verticals
2008	Upside Software is the worldwide leader in Contract Management Software solutions around the globe. Upside Software's products address the needs of Enterprise (e.g. Fortune 500, Global 2000), Public sector (Federal, State/Provincial, Municipal and Health Care), and Small & Medium Enterprise (SME) customers. Customers realize significant cost savings while improving customer and supplier relationships. Upside Software's solutions typically provide a full return-on-investment (ROI) in under a year. Founded in 2000, Upside Software is a profitable, growing company with an advanced, yet mature, and comprehensive product suite. The company has extensive experience delivering real value to over 200 customers of every size and in most industry verticals globally.
2009	Same as 2008.
2010	Same as 2008.
2011	Upside Software is the worldwide leader in Contract Lifecycle Management (CLM) solutions with hundreds of deployments in about 180 countries. Upside's award winning product suite, including their UpsideContract solution, offers a fully automated contract management process that starts from collaborative contract creation, negotiation and award, and includes risk, performance, compliance and deliverable tracking and management, financial processing (e.g. invoices and payments), and on-going event monitoring and management. UpsideContract also includes a wizard-like request entry function, amongst the best Microsoft Word integration, and extensive security and business intelligence features.

Appendix 6.21 Ariba on marketing, training and support (2008 10K)

[See sections entitled "Marketing" and "Customer Service, Training and Support" in Ariba's Annual Report for 2008 on Form 10-K filed with the US Securities and Exchange Commission on November 19, 2008.]

Appendix 6.22 Pictures of the contract lifecycle and contract management (Upside)

[Images removed as copyright is owned by Upside.]

Appendix 6.23 Upside's UpsideLive

[Images removed as copyright is owned by Upside.]

Appendix 6.24 Mentions of IACCM and analysts in press releases (Emptoris and Upside)

Emptoris press release dates and mentions of IACCM or analysts
October 2001 - Forrester
July 2002 - AMR
November 2002 - AMR
September 2003 - AMR, Aberdeen
May 2004 - Aberdeen
January 2005- Aberdeen
February 2005- Gartner
November 2005 - Forrester
July 2006 - Forrester
November 2006 - Gartner
February 2007 - Forrester
August 2007 - Gartner
February 2008 - AMR
March 2008- Gartner
March 2008 - IACCM
March 2008 - IACCM
April 2008 - Gartner
June 2008 - Forrester
June 2008 - Gartner
July 2008 - IACCM
August 2008 - Forrester
December 2008 - Gartner
January 2009 – AMR, Gartner

Upside press release dates and mentions of IACCM or analysts
December 2001 – Goldman Sachs
April 2002 – Goldman Sachs, Gartner
September 2002 - Gartner
December 2002 - Gartner
February 2003 - AMR
June 2003 - IACCM
July 2003; August 2003 (twice); September 2003 – Gartner, Aberdeen
November 2003 – IACCM, Aberdeen, Gartner
February 2004 (twice) – Aberdeen, Gartner
May 2004 - Aberdeen
October 2004 - Aberdeen
July 2005 - Aberdeen
April 2006 - Aberdeen
June 2006 - Aberdeen
January 2007 - Aberdeen
February 2007 - Aberdeen
April 2007 - IACCM
March 2008 - IACCM
April 2008 - IACCM
May 2008 - AMR
August 2008 - Forrester
October 2009 - AMR
April 2010 - Forrester
May 2010 - AMR
January 2011 – Gartner, Forrester
March 2011 - Gartner
June 2011 - Forrester

Appendix 6.25 Targeted web ads (Ariba, March 14 and March 22, 2011)

[Images of targeted web ads for Ariba (by Google) removed as they may contain copyrighted material owned by other organizations.]

Appendix 6.26 Sales and marketing and research and development expenditures for I-Many, Selectica and Ariba

I-Many sales and marketing expenses and research and development expenses (in millions of dollars):

Year	Net revenues- Millions ($)	Net income (loss)- Millions ($)	S&M- Millions ($)	S&M % of revenues	R&D- Millions ($)	R&D % of revenues	Stockholders equity- Millions ($)
1995	$1.2	$(2.2)	$.3	22%	$1.0	86%	$(4.3)
1996	$3.4	$(0.5)	$.4	13%	$1.3	40%	$(4.8)
1997	$7.5	$0.3	$1.2	16%	$1.5	20%	$(6.3)
1998	$13.5	$1.9	$3.7	27%	$2.3	17%	$5.3
1999	$19.4	$(5.2)	$6.6	34%	$8.2	42%	$.2
2000	$36.5	$(24.8)	$21.6	59%	$12.8	35%	$68.8
2001	$56.1	$(21.2)	$21.0	37%	$14.8	26%	$75.3
2002	$54.7	$(27.5)	$21.3	39%	$17.2	31%	$66.2
2003	$39.4	$(39.7)	$16.1	41%	$16.7	42%	$29.2
2004	$38.4	$(7.3)	$9.0	23%	$11.9	31%	$25.9
2005	$32.6	$(9.3)	$8.6	26%	$11.3	35%	$18.4
2006	$29.6	$(15.8)	$9.2	31%	$12.6	43%	$11.5
2007	$40.6	$(9.8)	$10.1	25%	$15.6	39%	$4.6
2008	$34.4	$(15.6)	$8.9	26%	$13.6	40%	$(8.7)

Selectica sales and marketing expenses and research and development expenses (in millions of dollars):

Year	**Net revenues- Millions ($)**	**Net income (loss)- Millions ($)**	**S&M- Millions ($)**	**S&M % of revenues**	**R&D- Millions ($)**	**R&D % of revenues**	**Stockholders equity- Millions ($)**
1999	$3.4	($7.5)	$4.4	424%	$3.9	115%	$.7
2000	$16.1	($30.8)	$17.0	106%	$7.3	45%	$214.1
2001	$53.9	($49.9)	$50.7	92%	$21.8	39%	$182.5
2002	$47.2	($26.4)	$25.2	53%	$15.3	32%	$153.4
2003	$35.6	($29.7)	$19.4	54%	$13.2	37%	$113.1
2004	$40.0	($8.8)	$14.5	36%	$13.5	34%	$112.0
2005	$31.1	($14.7)	$11.9	38%	$12.4	40%	$97.7
2006	$23.4	($17.5)	$6.7	29%	$8.8	38%	$78.3
2007	$14.7	($20.9)	$6.9	46%	$7.4	50%	$49.9
2008	$16.0	($23.9)	$6.7	42%	$5.0	31%	$27.3
2009	$16.4	($8.4)	$6.3	38%	$4.2	26%	$17.3
2010	$15.2	($4.6)	$4.5	30%	$3.3	22%	$12.0
2011	$14.5	($1.5)	$4.4	30%	$4.5	31%	$10.7

Ariba sales and marketing expenses and research and development expenses (in millions of dollars):

Year ended September 30,	**Revenues- Millions ($)**	**Net income (loss)- Millions ($)**	**S&M- Millions ($)**	**S&M % of revenues**	**R&D- Millions ($)**	**R&D % of revenues**	**Stockholders equity- Millions ($)**
1997	$.8	$(4.7)	$2.2	275%	$1.9	238%	$14.5
1998	$8.4	$(11.0)	$10.3	123%	$4.5	54%	$10.0
1999	$45.4	$(29.3)	$33.9	75%	$11.6	26%	$122.2
2000	$279.0	$(792.8)	$207.2	74%	$39.0	14%	$3498.2
2001	$408.8	$(2681.0)	$269.7	66%	$90.9	22%	$925.9
2002	$229.8	$(638.7)	$81	35%	$64.4	28%	$311.0
2003	$236.7	$(106.3)	$80.4	34%	$53.8	23%	$216.9
2004	$245.8	$(25.2)	$74.3	30%	$54.1	22%	$646.4
2005	$323.0	$(349.6)	$83.3	26%	$47.2	15%	$329.5
2006	$296.0	$(47.8)	$78.1	26%	$50.1	17%	$333.0
2007	$301.7	$(15.0)	$93.9	31%	$51.2	17%	$351.1
2008	$328.1	$(41.1)	$110.8	34%	$48.9	15%	$391.0
2009	$339.9	$8.2	$103.7	31%	$43.3	13%	$434.1
2010	$361.1	$16.4	$120.8	33%	$46.0	13%	$499.0