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CONTRACT DESIGN AS A FIRM CAPABILITY: AN INTEGRATION OF LEARNING AND TRANSACTION COST PERSPECTIVES

NICHOLAS ARGYRES
Boston University School of Management

KYLE J. MAYER
University of Southern California

Our aim is to unpack contract design capabilities for detailed commercial contracts, to draw out implications for the locus of such capabilities within the firm, and to examine implications for exploiting those capabilities as a potential source of competitive advantage. We argue that developing contract design capabilities involves learning how much and what kinds of detail to include in a contract. We further argue that knowledge about the management of these trade-offs resides differentially in managers, engineers, and lawyers regarding different types of contractual provisions.

Interorganizational arrangements such as strategic alliances and long-term or repeated contracting have become important mechanisms through which firms exchange products, services, and knowledge (e.g., Lane & Lubatkin, 1998; Larsson, Bengtsson, Henriksson, & Sparks, 1998; Mowery, Oxley, & Silverman, 1996; Pisano, 1989). Because many of these exchanges are quite intricate and promise to significantly enhance the financial performance of the partner firms, the ability to manage them for superior exchange performance can be crucial (Anand & Khanna, 2000; Dyer & Singh, 1998). While organizational economists have studied the determinants of efficient contract design choices (for a review, see Shelanski & Klein, 1995), they have not considered the possibility of heterogeneity in firms' contract design capabilities. Similarly, there has been little effort in the management literature to unpack contract design capabilities, even though strategy scholars have recently emphasized, more broadly, the importance of a firm's "alliance capability" in determining the performance of its alliance relationships, and therefore of the firm overall (Kale, Dyer, & Singh, 2002). We aim to advance a distinctly managerial perspective on capabilities for designing detailed commercial contracts.

One reason contract design processes and capabilities have been neglected in the strategy and organization literature to date may be that scholars have been influenced by Macaulay (1963), who emphasized noncontractual relations in business. Along this line, organization scholars have tended to emphasize the ways in which legal formalisms can inhibit cooperative behavior (e.g., Ghoshal & Moran, 1996; Sitkin & Bies 1993). Similarly, scholars of interorganizational relations have tended to elevate the importance of trust in cementing those relationships and have questioned the value of detailed contracts (Gulati, 1995, 1998; Ring & Van de Ven, 1992, 1994). Nonetheless, we observe firms making efforts to devise detailed contracts to assist in the management of many kinds of interorganizational relationships, especially within high-technology industries such as aerospace (Crocker & Reynolds, 1993), computer software and services (Kalnins & Mayer, 2004), and biotechnology (Lerner & Merges, 1998), as well as in other domains such as business format franchising (Bercovitz, 2002).[1]

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[1] While legal scholars study contracting issues extensively, like organizational scholars, they have not tended to discuss firm-level contract design capabilities per se. Contract law in the United States does recognize that parties to a contract can have differential competencies, and it contains several doctrines that are often applied by

In this paper we propose a framework for understanding key dimensions of a firm's capabilities with regard to designing contracts to aid in the governance of the firm's interorganizational relationships. Our framework is meant to apply to contracts that govern complex transactions, by which we mean transactions that involve solving problems whose solutions require combining the knowledge sets of multiple individuals within each of the contracting firms (Heiman & Nickerson, 2002; Nickerson & Zenger, 2004; Simon, 1962). In these transactions contract design can play an important role in facilitating joint problem solving aimed at creating and preserving value in the transaction. Such transactions can be contrasted with highly routinized, "spot market" transactions, for which contracts are of little help in guiding interaction and problem-solving activity of the parties. In spot market transactions the parties typically do not need to refer to a contract to understand their obligations in the transaction. Contracts governing such exchanges, if they exist at all, serve mainly to provide a legal mechanism for enforcing the exchange.

Our framework is built on a *dual alignment principle,* which assumes that key contract terms are designed to cope with transaction attributes along the lines already theorized by transaction cost and agency theories of contract. The more novel assumption is that the capabilities for designing these various terms reside differentially in different kinds of employees—managers and engineers versus lawyers—within the firm. The dual alignment principle we propose is that a firm will experience better contract performance if it aligns the use of various contract terms with transaction attributes following established transaction cost theory, but also if it develops contract design capabilities among the appropriate groups of personnel, given the types of terms that tend to be prominent in the firm's contracts. Thus, achieving superior exchange performance over time requires aligning the use of various contract terms to transaction attributes, and then developing and exploiting contract design capabilities to design those contract terms effectively.

Our theoretical contribution, then, is aimed primarily at developing the second, less well understood half of the dual alignment principle. We seek to understand the loci of firms' contract design capabilities in order to understand which groups within a firm—managers, engineers, or lawyers—tend to act as repositories of knowledge with respect to various types of contract terms. This is important, because as theoretical research on organizational learning suggests, understanding where a firm's capabilities reside is a prerequisite to understanding how the firm can further develop those capabilities for competitive advantage (e.g., Nonaka & Takeuchi, 1995; Zollo & Winter, 2002). Pursuing this line of reasoning, we contrast those aspects of a firm's contract design capabilities that offer more potential for the development of a competitive advantage with those that offer less such potential.

We structure the paper as follows. In the next section we draw on the economics of contracts literature to develop the first half of our dual alignment principle. We then describe the second half of this principle, which involves assigning the design of different contract term types to different personnel in the organization (managers and engineers versus lawyers) having the knowledge to effectively draft them. The design of detailed contracts typically requires interaction among the different groups of personnel, but certain groups possess knowledge that makes them better suited for leading the design of particular categories of contract terms. We ground our propositions in a variety of literature and also use a number of examples from actual contracts to illustrate our arguments. These contracts come from three real firms whose names we were asked to disguise: "Aerostar," a large aerospace firm; "Softstar," a small software firm; and "Compustar," a large computer hardware and IT services firm. The Aerostar contracts are lengthy (some over 100 pages) joint development agreements for the design of new jet aircraft engines; these contracts last for many years. The Softstar contracts are small software devel-

courts—usually to protect the weaker or less sophisticated party to a transaction—including unconscionability, excuse, impossibility, promissory estoppel, and quasi-contract (Beatty & Samuelson, 2001). Legal scholars' main concern, however, has been to analyze these doctrines and their application in court decisions in terms of fairness, good faith, or efficiency—usually for the purpose of giving advice to courts and attorneys—rather than to inquire into the determinants of contract design capabilities from the perspective of the firm or its managers (e.g., Burton & Anderson, 1995; Goldberg, 1988, 1997; Michaelman, 1967; Posner, 1977; Shavell, 2004).

opment contracts for the design of system BIOS for personal computers; these projects tend to last about three to six months. The Compustar contracts cover a variety of IT services (e.g., system design, system upgrades, help desk operations, data migration) and are typically small, discrete projects.[2] We conclude with some implications for future research.

ALIGNING CONTRACT TERMS WITH TRANSACTION ATTRIBUTES

In this section we outline the main determinants of the degree of detail in a contract aimed at managing an ongoing interorganizational relationship.[3] These determinants are those emphasized in established economic theories of contracts. The relationships between these determinants and the extensiveness of contract terms of various types together constitute the first stage of the dual alignment principle. Because economic theories of contracts assume rationality (to one degree or other) of the parties and analyze only equilibrium contract designs, they do not address differential contract design capabilities across firms. Economic theories of contracting have, however, analyzed the ways in which certain contract terms are aligned with transaction attributes, and they are therefore important in establishing the first half of our dual alignment principle. Figure 1a illustrates some of the key alignments suggested in those theories.

Transaction cost theory implies that when parties are bilaterally dependent—as when their joint activities are interrelated in ways that create asset specificity—contractual partners will make greater efforts to identify potential contractual hazards and to incorporate safeguards into their contracts (Klein, Crawford, & Alchian, 1978; Williamson, 1975, 1985). Such safeguards could take many forms but might include provisions for dispute resolution to prevent or adjudicate conflicts, for "hostages" to be exchanged, and for longer contract duration to enhance commitment (Joskow, 1985; Williamson, 1983, 1985). Detailed explication of the roles and responsibilities of the parties may serve a safeguarding function by reducing ambiguity about contractual obligations and thereby reducing the scope for opportunistic actions seeking to take advantage of any ambiguity for private gain.

Greater interdependence will also lead to provision for information sharing and communication between the parties, in order to prevent potentially damaging contingencies from upsetting the relationship (Williamson, 1991). In addition, when partners are bilaterally dependent, the partner with greater impact on the relationship may require key decision rights in order to participate in the exchange (Grossman & Hart, 1986; Hart & Moore, 1990). Accordingly, in Figure 1a bilateral dependency is associated with more extensive explication of roles and responsibilities of the parties to a contract, more discussion of communication procedures, more explicit provision for decision rights and dispute resolution, and/or more extensive contingency planning.[4]

A second important transaction attribute emphasized in transaction cost and property rights theories is appropriability (Teece, 1986; Williamson, 1991). In transactions where property is created or exchanged that is not well protected by legal devices such as patents, contractual safeguards will again be required in order to facilitate the exchange. Greater contingency planning and more provision for dispute resolution can help serve as safeguards here as well. Explicit provision of decision rights over intellectual property may also be needed to induce participation by the partners. Correspondingly, in Figure 1b appropriability problems are associated with greater demand for extensive contingency planning, dispute resolution, and/or decision rights clauses.

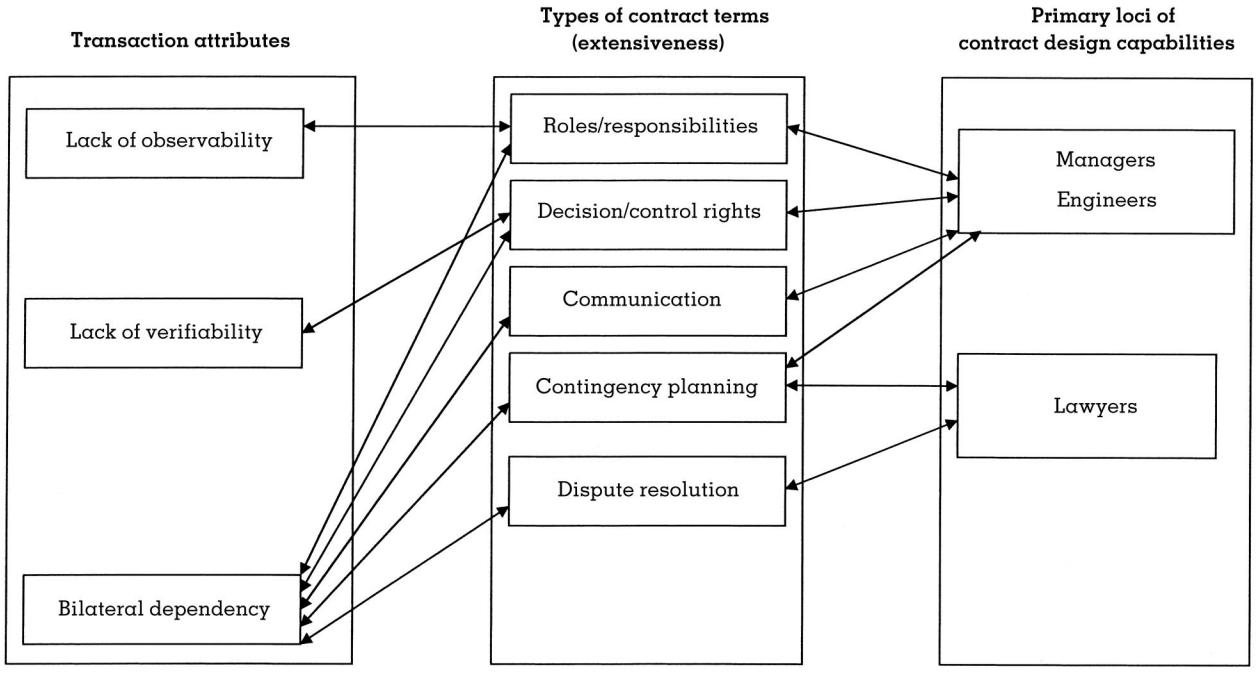
A third key attribute of transactions according to transaction cost theory is uncertainty. When transaction environments are more uncertain, there are a greater number of contingencies that could disturb the relationship, which, in turn, implies a demand for more safeguards (Williamson, 1975, 1985). Research suggests, how-

[2] These IT service contracts do not include any large IT outsourcing deals.

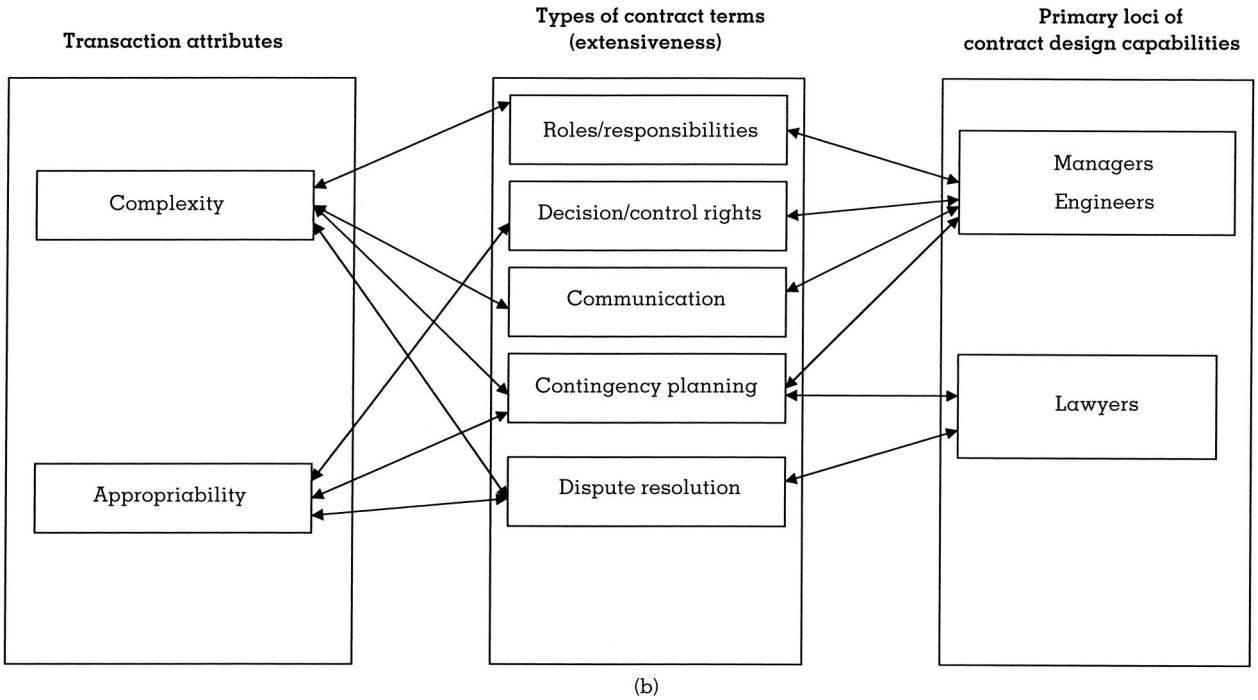
[3] Notice that our framework is not designed to explain the design of contracts for one-time transactions, such as real estate deals, merger/acquisition agreements, publishing contracts, and so forth.

[4] Which particular type of contractual provision will be affected most by an increase in dependency will depend on the precise nature of the dependency and industry context, about which contracting theories have yet to speak in sufficient detail.

FIGURE 1
A Dual Alignment Principle for Contract Design



(a)



(b)

ever, that when uncertainty in the environment is high because of unpredictability and "dynamism" (Dess & Beard, 1984; Duncan, 1972), partners may wish to remain more flexible and to avoid committing to intricate, longer-term governance arrangements (Balakrishnan & Werner-

felt, 1986; Klein, 1989; Teece, 1992). Therefore, whereas Williamson (1985) emphasizes the impact of behavioral uncertainty on governance choice, the more robust determinant of contractual detail related to uncertainty may be the complexity involved in the underlying problem that the project in question is aimed at solving. This complexity arises from humans' limited understanding of nature (Knight, 1921; Shackle, 1970; Slater & Spencer, 2000), rather from "behavioral uncertainty" alone (Williamson, 1985).

We therefore follow Nickerson and Zenger (2004) in identifying transaction complexity with those transactions in which the knowledge sets of multiple individuals and groups within the contracting firms must be combined for the key underlying problem to be solved. As the underlying problem to be solved in a project becomes more complex, contractual partners seek to reduce this complexity through more explicit description of the parties' roles and responsibilities in the contract and more provision for communication procedures. Moreover, because technological "glitches" (e.g., Hoopes & Postrel, 1999) and related disturbances are more likely to arise when problems are complex, more contingency planning may also be required. In Figure 1b, therefore, complexity is associated with greater contract detail regarding task description, contingency planning, and communication.

Two related transaction attributes emphasized in economic theories of contracting are observability and verifiability. These attributes are particularly featured in the agency (e.g., Holmstrom, 1979; Jensen & Meckling, 1976) and modern property rights theories (Aghion & Tirole, 1994; Grossman & Hart, 1986; Hart & Moore, 1990) of economic organization, which are related to transaction cost theory.[5] When one partner—the "agent"—to a contract undertakes a task, the inputs to which are not observable, problems of potential shirking arise. To prevent such problems, contracts may include provisions for monitoring agents' actions, which often take the form of extensive descriptions of roles and responsibilities. This is because such descriptions provide a benchmark against which an agent's actions can be judged to involve shirking or not. Potential shirking may also be addressed through the payment structure of a contract, such as by including incentive arrangements of some kind. Therefore, in Figure 1a lack of observability is associated with a greater demand for extensive description of roles and responsibilities. Finally, the literature on incomplete contracting emphasizes that even if a task undertaken by an agent is observable, it may not be verifiable in a court of law. In these cases contracts must make provisions for decision rights over the disposition of assets at stake in the relationship (Grossman & Hart, 1986; Hart & Moore, 1990).

We have been involved in a stream of empirical research on contract structure in the IT, software, and biotechnology industries—research seeking to test a number of these arguments. Among the findings are that lack of observability leads to less detailed task descriptions (Argyres, Bercovitz, & Mayer, 2007; Mayer, 2006), less effort to plan for contingencies that might arise during the project (Mayer & Bercovitz, 2006), and a lower likelihood of including an early termination provision (Mayer, Weber, & Macher, 2007). Interdependence also leads to more task description and contingency planning (Argyres et al., 2007) but does not significantly affect the use of early termination provisions (Mayer et al., 2007) or extendability provisions (Mayer et al., 2007). Uncertainty driven by the need to innovate reduces the likelihood of using early termination provisions (Mayer et al., 2007) and more task description (Argyres et al., 2007). In addition, as the parties work together over a longer period, their contracts tend to contain more detailed task descriptions and more contingency planning (Mayer & Argyres, 2004) and are more likely to contain an extendability provision (Mayer et al., 2007).

Drawing in part on economic theories of contracts and associated empirical findings such as these, we now turn to developing the second stage of the dual alignment principle between contract design capabilities and types of contract terms.

ALIGNING CONTRACT DESIGN CAPABILITIES WITH CONTRACT TERM TYPES

In this section we explain how contract design capabilities, which reside differentially in different types of employees, are matched with var-

[5] For example, transaction cost theory treats observability under the category of "information impactedness" (Williamson, 1975).

ious categories of contract terms. This is shown in Figure 1b.

Capabilities for Designing Roles and Responsibilities Terms

Economic theories of contracting, with their emphasis on rationality, implicitly or explicitly assume that all firms know how to design contract terms that specify roles and responsibilities of the parties (e.g., Joskow, 1985; Llewellyn, 1931; Macneil, 1978). However, when parties are bilaterally dependent and when the contract involves complex technology or other kinds of task complexity, properly specifying roles and responsibilities is not always a trivial matter (e.g., Mayer, 2006). On the one hand, a lack of clarity regarding each side's contractual obligations can lead to the breakdown of the relationship because of genuine misunderstandings and/or to opportunistic behavior by either party (Mayer & Argyres, 2004). On the other hand, excessively detailed specifications of roles and responsibilities can lead to lengthy negotiations that can damage the relationship and can inhibit adaptation to new, unanticipated circumstances that may arise during the course of the contractual relationship (Ghoshal & Moran, 1996).

Balancing these kinds of trade-offs regarding the specification of roles and responsibilities is a key challenge and constitutes a major function of a firm's contract design capabilities. In any but the most basic exchanges, important knowledge regarding what roles and responsibilities to include in the contract often resides outside the legal department of the firms involved. Specifying roles and responsibilities often requires in-depth knowledge of the technology involved in the task. Lawyers are often ill-equipped to draft these specifications on their own because they lack sufficient knowledge of the relevant technology and processes. This knowledge usually resides with engineers and managers and can be costly to communicate to an outsider, especially if it is partly tacit (e.g., Polanyi, 1962; Teece, 1981; Winter, 1987).

In addition, lawyers often lack an ongoing relationship with the contracting partner. If two parties work together repeatedly, relationships between those directly involved in the task will often develop. These relationships are more likely to develop between engineers and managers of the partner firms because of the interaction that is often required to complete the task and the likelihood that they have broadly similar skills, objectives, and training. The knowledge gained as these working relationships develop can help the parties understand the types of detail that should be included in a given contract to ensure that expectations are aligned. Lawyers are less likely to be an integral part of the relationships that develop at the operating level and, thus, are less likely to have the knowledge possessed by the managers and engineers about what is likely to occur during the execution of the project.[6]

Now corporate legal departments may have *some* familiarity in these areas of technology and industry norms and may have personal relationships with their counterparts in partner firms. In most cases, however, the knowledge of managers and/or engineers involved in a technically complex transaction will be more important to crafting effective roles and responsibilities provisions. Indeed, an important task of lawyers regarding roles and responsibilities is to ensure that the appropriate set of functional managers has been involved in the negotiations. Clearly, this is a dimension of contracting that transcends any individual or department and involves the ability of the organization to integrate expertise that resides in various functional areas—legal, engineering, marketing, and so on.

In practice, however, much of the knowledge regarding how to design roles and responsibilities provisions in contracts resides in managers and engineers and may never be articulated for the benefit of other employees, including the firm's lawyers (Mayer & Argyres, 2004). For example, early contracts between Softstar, the computer software firm we studied, and one of its major customers, a producer of computer hardware and electronics, contained relatively little detail regarding the technical specifications of the software to be developed for the customer and the precise nature of the deliverables to be supplied by Softstar. In an interview,

[6] A related issue is that lawyers may be less familiar with certain industry-wide norms of behavior. Engineers, in particular, often belong to professional societies that have informal norms that influence their professional interactions. These norms may influence the level of detail and types of provisions that are common in contracts within an industry (Suchman, 2003).

Softstar managers reported that this led to problems, because the customer began to demand that Softstar develop more of the specifications. Softstar engineers and managers had understood, however, that specification development was the customer's responsibility. The parties clarified the issue in later contracts by including clauses that required the customer to provide full specifications in exchange for more information about the characteristics of the software to be provided by Softstar. Eventually, managers and engineers began to write clauses like the following, drawn from Softstar Contract #10 from 1996:

> The [supplier chip designation] and the [second supplier chip designation] chipset registers will be modified according to design characteristics as specified in the specifications furnished by [Customer], listed in the External Documentation section of this contract. . . . Support for the [supplier and product name] controller will be provided. BIOS modifications will include: creating a devnode for the [supplier] controller; describing the [supplier] controller to the PCI BIOS (bus number, device number, IRQ mapping); routing of a PCI IRQ to the [supplier] controller during POST. . . . The programmable I/O ranges of the [supplier chip designation] chipset will be configured to support the [Customer] custom gate array. It is not necessary to configure the [product name] audio controller and modem because the [product name] is fixed I/O and the modem is PnP ISA.

This is the kind of highly technical clause that lawyers would not learn to write on their own, in most cases. Engineering knowledge was crucial, and, indeed, significant learning on the part of managers and engineers was needed to arrive at such a clause. These kinds of learning experiences involve exploring the trade-offs from including more or less technical detail in the contract. The more important repository of such learning is therefore likely to be the firms' engineers involved in drafting the clause, not the lawyers.

Managerial knowledge can also be crucial in the design of contract terms describing partner roles and responsibilities. For example, managers may use their superior knowledge of transaction characteristics to specify the precise number and skill requirements of supplier personnel they require to work on the project. One example of this kind of contract detail from our sample includes the following provision regarding human resource allocations by the supplier, which in this case was Compustar:

> One (1) Technical Lead from [Compustar], with good experience in four (4) disciplines involving the migration effort . . . to be involved in the duration of the project. Two (2) C programmers from [Compustar] with experience in the four (4) disciplines involved in the migration effort, capable of providing direction for multiple simultaneous conversion efforts, beginning at project inception and to be involved for approximately the first thirty (30) days of the project.

Thus, managers and engineers, by virtue of their in-depth knowledge of their firm's technology and processes and, if applicable, the relationship between the firms, are better equipped to develop knowledge about and to draft complex contractual provisions concerning roles and responsibilities of the partners. Thus, we propose the following.

> *Proposition 1: Managers and engineers, not lawyers, will be the primary repositories of a firm's contract design capabilities with regard to the allocation and description of roles and responsibilities.*

Capabilities for Designing Decision and Control Rights

A second key dimension in which contract design capabilities can develop involves the allocation of decision and control rights between parties.[7] Once again, economic theories take for granted that all firms have adequate capabilities for designing contractual provisions that optimally incorporate these rights. Yet allocation of decision and control rights in a contract is often less than straightforward, and, over

[7] Decision and control rights are closely related to roles and responsibilities, since in many cases one party's responsibility ("duty") under the contract (say, to perform a particular service by a particular time) is the other party's right (e.g., the right to receive this service by the given time). We make a distinction between roles/responsibilities on the one hand and decision/control rights on the other, for two reasons. First, many contracts specify decision or control rights that are not merely the mirror image of the other party's responsibilities. This is the case for rights to terminate a contractual relationship, for example. Second, whereas carrying out one's responsibilities specified under contract is usually necessary to avoid breach of contract, many decision and control rights need not be exercised in order to fulfill a contractual obligation. Termination rights are again an example here, as are unilateral rights to extend a contract.

time, firms can learn valuable lessons from past failures or successes.

Decision and control rights in contracts can take many forms. One decision right—the right to terminate an agreement prematurely—has been described as the most intensely negotiated provision in many alliance contracts (Lerner & Malmendier, 2003; Somers, 2003). Another often-contested control right is the right to ownership or use of intellectual property developed during a transaction. If the project is likely to involve the creation of new technology or knowledge, then planning how to allocate it ex ante can save conflict ex post. Disputes over intellectual property often lead to legal problems and, indeed, have led to the increased importance of a relatively new legal specialty—intellectual property law. Some contracts also allow the buyer the option of extending the contract under certain conditions, which can influence the supplier's incentives.

Lawyers can play a significant role, along with managers and engineers, in constructing terms related to the allocation of decision and control rights. In part this is because knowledge of real or intellectual property law must be combined with knowledge of contract law in order to craft effective decision and control rights provisions. Such knowledge helps the parties define the property at stake in the transaction, as well the rights to it under various contingencies.

Moreover, there are sometimes important legal ramifications of decision and control rights allocations that are not present with respect to technical descriptions of roles and responsibilities. For example, if a contract calls for payment upon completion of a task, rather than milestone payments or payment by the hour, and the contract gives the customer the right to an acceptance period (i.e., the project is not considered complete until the customer tests the product for an agreed upon period), the supplier cannot formally report the revenue from the customer until the end of the acceptance period. When firms are trying to recognize revenue in a desired quarter, acceptance periods can be a problem, because while engineers often believe their job is complete once the product has been delivered, the revenue cannot be legally recognized until the end of the acceptance period. Another way of structuring the contract, such as including a warranty, would result in immediate revenue recognition upon delivery. Decision and control rights thus come with legal ramifications that engineers and managers alone may not fully appreciate. In these cases lawyers serve as an important repository of knowledge, especially regarding the extent and types of detail to include in decision and control rights provisions.

One example from our sample of contracts regarding how contract design knowledge develops among lawyers comes from Compustar's contract template for IT consulting services. The firm's lawyers have had a large role in developing this template, which has historically included quite detailed clauses regarding ownership rights to the work product it develops during the course of a contract. For example, Contract 195 from 1991 includes the following provisions:

> [Customer] recognizes that Consultant [i.e. Compustar] may have pre-existing property rights in certain materials, products, courseware, etc. which Consultant uses in performing this contract. [Customer] does not intend to abrogate or take away such rights. However, the extent Consultant, in performing this contract, produces some new work product, including without limitations notes, reports, documents, drawings, computer programs (source code, object code, and listings), derivatives of pre-existing copyrighted works of Consultant, customer lists, inventions, creations, works, devices, masks, models, work-in-progress, and deliverables ("Work Product"), all such Work Product shall be the property of [Customer]. Therefore, Consultant agrees to assign and does hereby expressly assign to [Customer] all right, title and interest in and to the Work Product of this contract. During and after this contract, Consultant will assist [Customer] in every reasonable way, at [Customer's] expense, to secure, maintain and defend for [Customer's] benefit all copyrights, patent rights, mask worn rights, trade secret rights and other proprietary rights in and to the Work Product.

Two years later, in 1993, the template made simultaneously broader and more specific claims to the intellectual property to which Compustar could claim ownership. It also restricted the assets to which the customer could claim ownership to those specifically mentioned in the "Statement of Work"—a portion of the contract laying out the details of the parties' roles and responsibilities. The 1993 template (Contract #254) used the following clauses in place of the 1991 clauses:

> [Compustar] and [Customer] agree that all rights, title and interest in any Deliverables identified in

> Statement of Work are owned by [Customer]; and [Compustar] assigns to [Customer] its rights, title and interest in these items. The ideas, concepts, methodologies, processes, tools (including computer hardware and software where applicable) that [Compustar] suppliers, together with methods and techniques that [Compustar] uses to produce Deliverables under a Statement of Work, are collectively defined as the "Consulting Methodology" of [Compustar]. All rights, title and interest in and to the Consulting Methodology used in performance of a Statement of Work remain the property of [Compustar].

This change in the template suggests some innovation on the part of Compustar's attorneys, who, according to our interviews, were responsible for adding the category of "Consulting Methodology" to the contract and including the firm's preexisting work within that category. This change suggests that Compustar attorneys were exploring ways of better protecting the firm's proprietary technology in its contract templates and that their knowledge in this area was developing over time.

While we argue that lawyers play an important role in designing decision and control rights allocation provisions, managers and engineers clearly have important roles as well. This is because managers and engineers typically will have a better understanding of how different allocations affect the production or service delivery processes—especially the costs and benefits of those processes and how they will be shared between the contracting partners. Therefore, we do not propose that lawyers necessarily have a more important role than managers and engineers in developing decision and control rights provisions. Instead, we propose that lawyers represent a more important locus of knowledge for decision and control rights design than for design of the kinds of roles and responsibilities provisions discussed above.

> *Proposition 2: Lawyers will be a more significant repository of contract design capabilities with regard to the allocation of decision and control rights than with regard to the allocation of roles and responsibilities.*

Capabilities for Developing Dispute Resolution Terms

Another dimension of contract design capability is the ability to determine how to deal with disputes that could arise during the execution of the contract. Dispute resolution is, of course, a central function of such complex governance structures as hierarchies, detailed contracts, and "hybrid forms" according to transaction cost theory (Williamson, 1985, 1991). But, once again, writing dispute resolution provisions into a contract is not necessarily a simple matter for complex or high-technology transactions. Some contracts include clauses that call for arbitration led by third parties specified in the contract if disputes arise. These correspond to Macneil's (1978) category of "neoclassical" contracts; Williamson (1985) treated them as forms of "trilateral governance." Other contracts, however, including some in our sample, call for arbitration but do not identify the third party or outline the procedure. Contracts vary significantly in the degree of detail in provisions that specify dispute resolution procedures.

Some of the variance in dispute resolution provisions may reflect the fact that firms may adjust contract terms over time as they learn about trade-offs involving the degree of detail in such clauses. (Other forces, however, such as bargaining power and/or relative specific investment, may influence the evolution of these terms as well.) Moreover, because lawyers oversee the development of many clauses involving such issues as auditing and arbitration clauses, this suggests that dispute resolution may be another dimension in which lawyers play a very important role, in large part owing to their greater knowledge regarding various arbitration mechanisms and their legal implications.

Managers and engineers, however, play a role in dispute resolution to the extent that they contribute to crafting the roles and responsibilities provisions in such a way that disputes are less likely to occur. This is arguably the primary way in which managers' and engineers' superior knowledge about the nature of the task to be completed and, in the case of repeated interaction, the nature of the partner firm is brought to bear on dispute resolution. Managers and engineers often prefer, however, to leave contentious issues such as dispute resolution to lawyers, because extensive discussion of them may in-

hibit the development of strong working relationships between those employees of the partner firms who are involved in completing the task. In fact, leaving contentious issues to lawyers may even create a bond between employees from the two firms based on common frustration in working with lawyers. Often, then, firms will ask their lawyers to emphasize the drafting of dispute resolution clauses in a contract while assigning the managers and engineers to negotiate the specific roles and responsibilities of the parties.

The evolution of auditing clauses in the Aerostar contracts is suggestive of the development of contract design capabilities with regard to dispute resolution clauses and how these capabilities tend to reside in attorneys. Auditing clauses assign rights to either party to audit the accounts of the other party in order to verify claims about cost or revenue impacts of engineering changes. The number and specificity of such auditing clauses increased significantly from the 1970s contracts to the 1980s contracts. The original clauses were brief, giving each party general rights to audit its collaborators' cost and revenue information. The later clauses were more specific in mentioning the precise kinds of records that parties could audit, such as "production records, sales records, inventory levels and purchase orders and other relevant documentation" (Aerostar Contract #4). The identification of these categories was largely driven by the attorneys, with assistance from managers. Later clauses were also more likely to mention the name of an outside auditing firm that could be used to perform the auditing and to limit the scope of audits in some cases, both of which tapped the knowledge of attorneys more than managers or engineers. Finally, later clauses tended to invoke arbitration rules, about which lawyers' knowledge was superior. Here is a sample clause from one of the later contracts:

> The Arbitration Court shall be composed of three (3) arbitrators, one of whom will be named by each party. The third arbitrator, who shall act as chairman, shall be determined by the other two. The arbitrators will select the site of arbitration. Arbitration shall be conducted under the rules of Conciliation and Arbitration of the International Chamber of Commerce.

The increased specificity of the arbitration clauses over time showed how Aerostar was able to learn to craft more detailed dispute resolution clauses, based on the knowledge that mostly developed among its attorneys and those of its contractual partners. Considering the arguments laid out above, we offer the following proposition.

> *Proposition 3: Lawyers will be more significant repositories of contract design capabilities with regard to dispute resolution than with regard to the allocation of roles and responsibilities.*

Capabilities for Developing Contingency Planning Terms

While roles and responsibilities deal with actions that must be carried out in order for the project to be completed, contingency planning involves anticipating and making provisions for problems that may or may not occur during the execution of the project. On the one hand, some contracts specify the deliverables and payment arrangements but do not address future contingencies explicitly. This is often the case for simpler projects that are to be completed relatively quickly. Such contracts typically fall into Macneil's (1978) category of "classical" contracts. On the other hand, contracts falling into Macneil's categories of "neoclassical" and "relational" usually contain explicit planning for future contingencies. The transaction cost and modern property rights theories of contracting assume that contingency planning always occurs (whether or not it leads to actual provisions in the contract) but is unavoidably incomplete (Grossman & Hart, 1986; Williamson, 1985). However, contingency planning can be a difficult and costly activity in designing complex contracts, and it is also subject to learning and capability development.

Knowing what to plan for and what not to plan for can be critical in designing a contract. Too much time spent on irrelevant contingencies slows down the negotiation process and can give a firm a reputation for being bureaucratic, legalistic, and difficult to work with. Too little time spent on important contingencies can result in conflict during the execution of the project, which can, in turn, cause premature termination of the project and/or the relationship. This, we argue, is a critical area of contracting expertise and represents a key aspect of con-

tract design capabilities. Moreover, it is a dimension in which, once again, contract design capabilities are likely to be shared among lawyers, managers, and engineers.

Lawyers often play a key role in contingency planning because they are trained to look ahead and plan for contingencies that might upset a transaction and hurt their client's interests. However, they are unlikely to possess knowledge to effectively plan for the specific operational contingencies likely to arise during a particular project. Lawyers are effective at planning to protect the company's general interests or at identifying common issues that exist across a wide variety of transactions. These kinds of skills typically don't require an in-depth knowledge of the specific operational and technical aspects of a given project. Managers and engineers, however, are usually most effective at identifying the key technical issues most likely to cause problems during the execution of the project. Thus, lawyers add the most value when they provide guidelines within which managers and engineers can work and adapt to the specifics of each project.

A common type of contingency planning provision in complex contracts involves the specification of engineering change processes. Customer requirements may change during a project owing to changes in technology, regulation, the actions of a competitor, or the customer's strategy. Engineering changes not anticipated by the parties beforehand will often be required, and disputes can arise over which parties will bear the costs of these changes. Our sample includes contracts containing more or less detailed engineering change process provisions. Other types of contingency planning provisions can involve more specific issues that might arise. For example, Softstar, the computer software supplier we discussed earlier, included a clause in one of its contracts that specified who was to bear the costs of revising the product if Microsoft released a new version of Windows before the project was completed (Softstar, Contract #10). The decision to deal with this contingency ex ante arose because of a dispute over this issue that had occurred during a previous project. The idea for such a clause arose from managers and engineers, who were prodded to think along these lines by the lawyers.

One way these distinct capabilities can manifest themselves in a way that is likely to lead to a contract design capability is for firms to have lawyers focus on contingency planning in contract templates, while managers and engineers focus on the specific contingencies that might arise for each transaction. This allows lawyers to incorporate the legal issues that would affect all transactions, while managers and engineers can insert specific contingencies related to the specific technical and operational issues of the project. In this way firms can efficiently incorporate legal constraints as well as specific issues that managers and engineers believe may arise during the transaction.

Contingency planning is a diverse area to which lawyers and managers and engineers all have something to contribute. Since each group has knowledge about specific and relevant areas, we offer the following proposition.

> *Proposition 4: Lawyers will be a more significant repository of contract design capabilities with regard to contingency planning in designing contract templates, while managers and engineers will be more significant repositories of contingency planning capabilities with respect to the specifics of each individual project.*

Capabilities for Developing Communication Terms

Once the parties to a contract have agreed on the task requirements and associated roles and responsibilities of each side of the transaction, assigned the relevant decision and control rights, and planned for contingencies, they must determine how they plan to communicate with one other during the execution of the project. Communication is vital to executing a successful contract, and the literature on interorganizational relationships has long emphasized its importance in determining the success of such relationships. For example, in Van de Ven and Walker's (1984) study, frequent communication emerged as important for establishing mutual understanding about the terms of the relationship. Ebadi and Utterback (1984) found that more frequent communication resulted in greater success in interorganizational projects that required innovation. And Williamson (1991) em-

phasized information sharing between contractual partners as a key aspect of "hybrid" interorganizational forms that function well.

While it might be tempting to presume that communication issues are relatively straightforward in contract design and execution, in fact, the complexity of many transactions can make these issues challenging. Managers and engineers are likely to play a dominant role in developing contractual clauses regarding communication, because developing such clauses first and foremost requires a detailed knowledge of the technical and economic attributes of the project. This is consistent with the literature on media choice in intraorganizational communication, for example, which suggests that deep knowledge of task characteristics (e.g., task ambiguity; cf. Daft & Lengel, 1986) is important for appropriate media choice and degree of communication formalization (for a survey, see Fulk & Boyd, 1991). Managers and engineers are also the individuals who directly experience the impacts of poor communication and are therefore more likely to think of solutions. Lawyers usually lack this detailed knowledge and partner-specific operating experience and therefore have less to contribute to this aspect of the contract.

Our sample of contracts contains several examples where contractual partners explained that they initially underspecified the manner in which they would communicate with each other, and where managers and engineers found it necessary to add contractual detail to later contracts in order to address these shortcomings. For example, Softstar's early contracts with one of its customers suffered because Softstar received requests for engineering changes from multiple personnel within the customer's organization, and these personnel did not communicate well with one another. As a result, clauses were developed in later contracts that required all changes to be made in writing. When this new clause led to unanticipated delays by the customer in requesting changes, yet another clause was added to later contracts requiring timely requests. Thus, managers and engineers sometimes made several iterations of changes before arriving at a desirable communication structure. Lawyers played little role in this learning process.

Another provision related to communication comes from the Compustar IT contracts. Compustar added a section entitled "Project Reporting and Performance" to the contract template. This section was written entirely by managers and clarified exactly how often Compustar was required to update the customer with different types of information (e.g., technical problems, schedule issues, external concerns). The section also included the requirements for any milestones in the contract. Given the importance of effective communication and the fact that it requires a detailed knowledge of the technological and operational specifics of the project, we offer the following proposition.

> *Proposition 5: Managers and engineers, not lawyers, will be the primary repositories of a firm's contract design capabilities with regard to providing for communication between parties.*

CONTRACT DESIGN CAPABILTIES, CONTRACT PERFORMANCE, AND COMPETITIVE ADVANTAGE

Our discussion of the development of contract design capabilities suggests that firms that align their contract terms with transaction attributes, and then align contract design capabilities with contract term types, will tend to experience more successful contractual relationships than firms that are misaligned in either way.[8] We particularly emphasize the con-

[8] One question that arises is whether contract design capabilities are merely equivalent to general managerial capabilities or skills and, hence, of limited interest as a special category. It seems clear, for example, that each of the contract term types corresponds to tasks that managers carry out in managing their subordinates within the firm's hierarchy. Contract design capabilities, however, involve managing a relationship in which neither party has the authority to dictate to the other, unlike typical manager-employee relationships. Knowing how to direct subordinates within the firm's organizational structure to get things done is arguably a different skill from knowing how to draft a contract for a complex transaction with an independent firm. In part this is because contract design capabilities revolve fundamentally around the ability to manage along each of the various dimensions using written language—often with high degrees of detail. Internal memoranda also constitute an important tool for managing subordinates within a hierarchy and, to the extent that managerial capabilities are involved in developing this kind of written material, may overlap with contract design to some extent. Internal memoranda, however, are not subject to the same high standard of legal accountability as are contracts between independent par-

tract capabilities–contract terms portion of this dual alignment principle because this portion has not been discussed in the literature. Specifically, firms achieve this portion of the alignment when they accord managers and engineers a predominant role in designing contract terms related to roles and responsibilities, communication, and project-specific contingency planning, while utilizing lawyers more prominently in designing terms related to dispute resolution, assignment of decision and control rights, and generic (non-project-specific) contingency planning. This suggests the following proposition.

> *Proposition 6: Firms that allocate contract design tasks to managers, engineers, and lawyers according to the dual alignment principle are more likely to develop superior contract design capabilities than firms that do not, and to experience better contract performance as a result.*

A critical implication of our arguments is that for firms engaged in a large number of contracts, contract design capabilities can become a key source of competitive advantage. We have argued that firms learn to design more effective contracts over time, as they remedy early inadequacies in contract detail when writing later contracts, and that this knowledge resides in lawyers and/or managers and engineers differentially, depending on the type of contractual provision in question. This implies that acquiring contract design capabilities for detailed contracts is not a trivial exercise, nor is it simply a matter of hiring the appropriate lawyers, either internally or through the retention of outside counsel.

Moreover, we have argued that the knowledge required to craft certain kinds of contractual provisions involves technical and operational knowledge that lawyers are not likely to possess—knowledge that is often firm specific or even transaction specific. Indeed, one can view contract design capabilities as one arena in which a firm develops firm-specific knowledge—knowledge that may be highly cospecialized with other capabilities of the firm. In fact, we have suggested that contract design capabilities rest on some of the same knowledge as other firm capabilities, such as production capabilities. Therefore, contract design capabilities may be one component of a bundle of firm-specific capabilities the firm possesses. Bundles of such capabilities, resting on firm-specific knowledge, have of course been emphasized as perhaps the most important source of competitive advantage, especially for firms in knowledge-intensive industries (e.g., Conner, 1991; Grant, 1996; Kogut & Zander, 1996). Furthermore, the ability to effectively manage relationships with contractual partners has been identified as a potential source of "relational rents" (Dyer & Singh, 1998).[9]

This suggests, more specifically, that contract design capabilities with respect to some types of contract terms may offer more opportunities for developing valuable firm-specific contracting knowledge than others. In particular, those contract term types that require more knowledge of the firm's technologies, technical capabilities, and management processes for their development offer greater potential for developing firm-specific contract design capability to enhance performance. We make this suggestion because, as we argued above, knowledge of the firm's technology and processes are critical for problem-solving activities aimed at creating new value (and preventing the loss of existing value) in the design of a transaction and of the contract that governs it. In the previous section we described, for example, how the knowledge of managers and engineers, on the one hand, contributes to the crafting of effective roles and responsibilities assignments, contingency plans, and clear communication channels to facilitate quick progress and adaptation to potential contractual disturbances. Lawyers, on the

ties, since courts generally forbear from enforcing them (Williamson, 1991). In addition, when managing subordinates, superiors often rely heavily on oral communication and commands, tools that are less potent when dealing with independent firms, since oral contracts are more subject to vagaries in court enforcement.

[9] We do not argue that superior contract design capabilities are sufficient, or even necessary, for a firm to sustain an overall competitive advantage over rivals, even in contracting-intensive industries. This is because a firm may possess superior capabilities in other areas that compensate for any lack of contract design capabilities. Moreover, we conjecture that contract design capabilities can be an important complement to other capabilities of the firm. For example, contract design capabilities may complement production capabilities in software development.

other hand, tend to contribute more generic knowledge, which, while also valuable, is less firm specific and less tacit. While individual lawyers do differ in their skill levels, legal knowledge (e.g., with regard to the design of dispute resolution or control rights clauses) is more widely available for purchase on the market than tacit, firm-specific knowledge of internal processes and technology. Generic legal knowledge is therefore less likely to form the basis of a competitive advantage (Barney, 1991; Peteraf, 1993). Perhaps the parties whose knowledge is the least firm specific are the firm's outside attorneys.

Our analysis therefore suggests that roles and responsibilities, contingency planning, and communication are the types of contract terms that will benefit the most from tacit, firm-specific knowledge of the firm's technologies and management processes. The other types of contract terms—dispute resolution and decision/control rights—might require some knowledge of the technologies at stake, but less so than for the other term types. Note that contingency planning is one area in which tacit, firm-specific knowledge of firm technologies and processes can be especially valuable when combined with generic legal knowledge. This suggests that an important contributor to achieving superior contract design capability with regard to contingency planning is the ability to combine generic legal knowledge with tacit, firm-specific knowledge. However, knowledge of the firm's technology and processes is more critical for planning for the kinds of project-specific contingencies that are most likely to derail the transaction. Our discussion of contract design capability and competitive advantage therefore implies the following proposition.

> *Proposition 7: Contract design capability with regard to roles and responsibilities, communication, and contingency planning terms offers greater potential for the development of competitive advantage than contract design capabilities for dispute resolution and decision/control rights.*

Note that Proposition 7 is of particular interest because the literature on the economics of contracts has focused to date on the contract terms that we argue hold *less* potential for the creation of competitive advantage—namely, decision/control rights and dispute resolution procedures (and payment terms).

CONCLUSION

Here we have sought to develop a framework for understanding contract design capabilities as potential contributors to the performance of a firm's contractual relationships, deriving implications for the roles of managers, engineers, and lawyers in the development of such capabilities. We have argued that exchange performance requires aligning contract design capabilities, which reside in different groups of employees within the firm (or outside attorneys), in a discriminating way with the various types of contract terms that are needed to deal with contractual hazards in a project. We have also argued that firms' contract design capabilities evolve as their managers, engineers, and lawyers learn to manage these trade-offs for different types of contractual provisions. Whereas lawyers are likely to be the primary repositories of capability for some types of provisions, managers and engineers play more important roles in others. It is in these latter areas, we argued, where the most opportunities lie for developing competitive advantage from contract design capabilities.

One implication of our arguments that seems worthy of future research regards interindustry differences in the evolution of firms' contract design capabilities. One would expect firms' contract design capabilities to evolve in directions that are in part determined by the relative importance of the five categories of contract terms in firms' specific industries. For example, allocation of control rights over intellectual property is complex and is often a very critical aspect of biotechnology alliance contracts, whereas communication processes are less important in these contracts (Lerner & Merges, 1998). In software contracts of the kind that Softstar has often entered, the communication requirements are much more complex. Accordingly, one might predict greater emphasis on developing lawyers' contract design capabilities in some industries and more emphasis on managerial and engineering contract design capabilities in other industries. This conjecture merits further exploration.

To this point we have discussed contract design capabilities as if they reside at the level of the firm, rather than being dispersed among teams of managers and engineers. It is likely, however, that firms must make conscious efforts to synthesize or aggregate team-level contract design capabilities at the firm level—that is, to transform individual- or group-level knowledge into a true organization-level competence. This aggregation problem highlights one of the key functions of contract templates—their role in codifying knowledge about contracting for general use within the firm. This, in turn, implies that since the firm's internal legal department tends to have experiences, and to have maintained contacts, with multiple groups of managers within the firm, a critical role it plays is to develop contract templates for general use within the firm, and thus to help aggregate some of the team-level capabilities that are dispersed throughout the organization. Understanding how firms coordinate and aggregate contract design capabilities at the individual or department level also seems important for future research.

Future research should also seek to develop more systematic ways of coding contractual clauses, as a precursor to empirical testing of hypotheses regarding contracting capabilities. Lerner and Merges's work (1998) represents a fruitful effort in this direction, although their focus was exclusively on decision and control rights allocation. By offering a broader framework, we hope our research will prove useful for the econometric study of contracts and contracting capabilities.

Another useful avenue for future research is to investigate the extent to which contract design knowledge is cospecialized with other knowledge or resources within the firm. We have argued that all five categories of contract terms draw on knowledge held by more than one group within the firm. For example, the design of decision and control rights may rely most on the legal knowledge of lawyers, but even these clauses often reflect input from managers and engineers. This is because managers and engineers are often in a better position to identify the most critical decisions or assets over which the firm must retain control from more peripheral decisions or assets around which concessions can be made. On the other end of the spectrum, while the design of roles and responsibilities terms relies most on the knowledge of managers and engineers, such terms often require interaction with lawyers to ensure that the obligations made by the managers and engineers do not put the firm in a difficult legal position. Fully unpacking the extent to which contract capabilities reside in groups versus individuals and the extent to which they are cospecialized is an important topic for future research.

One important conceptual limitation of this paper is that it focuses on the design of contracts and therefore does not address other aspects of commercial contracting. For example, we do not address capabilities in managing an exchange during contract execution, including, for example, capabilities involved in actually adapting a contractual relationship under some unanticipated contingency, taking the written contract as given. In transaction cost terms, our analysis has addressed capabilities associated with ex ante alignment of the parties' expectations and incentives, rather than those associated with ex post adaptation. We also have not addressed negotiation and bargaining capabilities that are useful for offensive attempts to capture value from a contractual partner. Treatments of other capabilities surrounding commercial contracting are needed to complement our own treatment of contract design capabilities and to help fill out the managerial perspective on commercial contracting that we seek to advance.

Finally, we note that the study of contracting capabilities is closely related to the theory of the firm. For example, firms that lack contract design capabilities in critical dimensions may seek to vertically integrate a transaction with an asset specificity level below the usual threshold (assuming that contract design capabilities are not positively correlated with capabilities for managing internal transactions). Conversely, firms with better contracting capabilities may be more likely to outsource such transactions. Studying contract design capability as a "shift parameter" in the transaction cost economics model is novel and requires us to continue to gather insights from the learning/capabilities-based view of the firm and from transaction cost and related economic theories.

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Nicholas Argyres (nargyres@bu.edu) is an associate professor of strategy and policy at the Boston University School of Management. He received his Ph.D. in economics from the University of California, Berkeley. His research interests include strategy and organization structure; vertical integraion, contracting, and interorganizational arrangements; information technolgy and organization; and organizational politics.

Kyle J. Mayer (kmayer@marshall.usc.edu) is an associate professor of strategy in the Management and Organization Department at the Marshall School of Business, University of Southern California. He received his Ph.D. in business administration from the Haas School of Business, University of California, Berkeley. His research, drawing largely on transaction cost, resource-based, and learning perspectives, examines interorganizational relationships, contracts, and vertical integration.