A Case Study in Collaborative Technology and the Intentionally Relational Contract: Building Information Modeling and Construction Industry Contracts

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I. INTRODUCTION

Technology is redefining relationships. And in long-term commercial transactions, where relationship is the coin of the realm, emerging technologies often foster intense collaborations. Thus may commence a new era for relational contract.[1]

This article explores how collaborative technologies may be expanding opportunities for relational contract in commercial

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1. In a broad sense, relational contract refers to the socio-economic perspective emphasizing that exchange transactions involve the behavioral norms of invariably complex and contextually sensitive relationships as they develop over time. *See infra* notes 96-99 and accompanying text. As so understood, relational contract encompasses such disparate legal fields as commercial law, employment law, domestic relations, and business organizations, with the unifying thread being the importance placed on understanding the relationships involved more than any legal principles reflected in the common law, statutes, regulations, or legal treatises. *See generally* IAN R. MACNEIL, THE NEW SOCIAL CONTRACT (1980) [hereinafter MACNEIL, THE NEW SOCIAL CONTRACT]; Ian R. Macneil, *Values in Contract: Internal and External*, 78 NW. U. L. REV. 340 (1983) [hereinafter Macneil, *Values in Contract*]. As discussed in greater detail in Part III.A, when applied in a narrower sense to the realm of enforceable agreements, a relational contract analysis incorporates many distinctly relational factors and values into the law of legally binding exchange transactions, including custom and usage, adaptability in the face of evolving circumstances, and devices for managing and preserving interdependent exchange associations. The approach contrasts with traditional contract analysis, with its overarching interest in agreed risk allocation and its theoretical commitment to principles of consent, promise, and intent. Depending on the context, this article uses the term "relational contract" both in its broad, socioeconomic sense and as a legal theory for structuring and analyzing binding agreements. The main purpose here, however, is to examine how collaborative technologies may encourage relational contract in the second, narrower sense.

transactions, especially in the form of what may be called the intentionally relational contract. That is, a flexible, negotiated agreement designed essentially for the management, preservation, and success of an interdependent relationship that the parties establish for a common goal in a context of uncertainty and change over time.[2] In this regard, the digital world sometimes plays a key role by fostering and rewarding interdependence, adaptability, and reciprocity among otherwise autonomous, self-interested actors in the marketplace.

Unlike traditional legal doctrine, relational contract comfortably accommodates arrangements in which the parties to a commercial exchange aspire to rise above individual opportunism to manage an endeavor collectively and to share the risks and rewards of the venture.[3] The intentionally relational contract stands in contrast to the more conventional notion of a commercial agreement, which intends, as much as possible, to allocate risks associated with a discrete transaction between the parties through contractual terms that attempt to anticipate and govern all reasonably foreseeable contingencies. As an example, the joint venture or strategic alliance formed for a specific endeavor is one of the most highly relational contracting structures widely in use today, while a simple purchase order from a buyer to a seller often exists at the discrete end of the spectrum.[4]

This article presents a case study involving the most important technology affecting contractual relations in the construction industry. In brief, building information modeling ("BIM") is reshaping contractual relationships in the industry by facilitating and encouraging a previously unimagined degree of collaboration among design professionals, builders, specialty trade subcontractors, suppliers, manufacturers, and owners and operators.[5] The result could be a truly transformative shift toward the intentionally relational contract in the building sector.

Part II of this article explores BIM, primarily from a construction law perspective rather than from a technical one.

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2. Part III.A provides a more complete exposition on relational contract theory and the intentionally relational contract in the construction industry context.

3. *See infra* notes 96-102 and accompanying text.

4. *See infra* notes 7-12, 17-25 and accompanying text.

5. *See infra* notes 49-72 and accompanying text.

Then, Part III develops the thesis that as BIM becomes prevalent in the construction industry, project participants will pursue a more highly collaborative project delivery system that could foster a truly relational contract framework throughout the industry based on principles of integrated project delivery.[6] But first, these introductory comments pause to suggest the potentially broader influence of the underlying phenomenon by which collaborative technology can lean toward relational contract.

The essential inquiry is not simply whether new technologies promote collaboration in the construction industry and other areas of commerce; rather, it is whether their effects on contracting practices might be transformative. Does an intentionally relational contract structure offer any compelling advantages for digitally based collaborations, and are collaborative technologies therefore producing more highly relational commercial exchanges? Given that the relational construct offers a dynamic understanding of interdependent exchanges, might not the proliferation of technologies that facilitate commercial teamwork and strategic alliances therefore support the broader hypothesis of a reciprocal association between collaborative technologies and relational contract?

The remainder of this introduction briefly discusses a few examples that seem to support this hypothesis. Whether the collaborative aspects of the technologies involved in any of these situations are in fact leading toward relational contracting practices in a significant way is a matter for much further analysis at a later date. For the modest purposes of setting the stage for the featured case study, it is enough at this point to mention a few illustrations that suggest the possibility.

A simple example appears in the pharmaceutical industry, where technology sharing plays a major role in the development and distribution of new products.[7] Today, the field of biotechnology sometimes creates firms with narrow, unique expertise that can benefit from the efficiencies of strategic alliances.[8] Relational contract often facilitates the integration of the distinct strengths of a biotech firm's research innovations

6. The common attributes of integrated project delivery are explained in Part III.B.1.

7. *See* Sean Nicholson et al., *Biotech-Pharmaceutical Alliances as a Signal of Asset and Firm Quality*, 78 J. BUS. 1433, 1433 (2005).

8. *Id.* at 1434.

and intellectual property with a major pharmaceutical company's financial, marketing, and product development capacities.[9] This is true because "[b]iotechnology companies rely heavily on strategic alliances with pharmaceutical companies to finance their research and development (R&D) expenditures."[10] Cooperation between pharmaceutical and biotech companies increasingly involves alliances that introduce governing structures allowing for shared risk and shared decision making.[11] Unquestionably, these features are intentionally relational.[12]

Technological advances are also presenting more opportunities for relational contracting structures between commercial buyers and their suppliers. For example, with the assistance of scanner technology, a retailer and its supplier can make joint decisions by analyzing real-time, in-store sales data.[13] In a similar way, developments in data interchange can create "reciprocal interdependency" between a buyer and a supplier leading to "higher incentives for both parties to safeguard the relationship."[14] One attribute of relational contracts particularly relevant to this context is that they help the parties cope with uncertainty by allowing some critical terms of the exchange to be determined during the course of the ongoing relationship without the need to amend written contracts.[15] Technology motivates a retailer and its supplier to behave in this way, for example, when the parties allow the nature and quantity

9. *See* Leslie Gladstone Restaino, *BioPharma Collaborative Agreements: Choosing the Right Deal Structure*, METRO. CORP. COUNS., Nov. 2007, at 47, 47.

10. Nicholson et al., *supra* note 7, at 1433.

11. Restaino, *supra* note 9, at 47.

12. While biotech-pharmaceutical alliances spring from advanced technology, they do not necessarily arise because the technologies involved require or facilitate teamwork. That is, the contracting parties may work together the old-fashioned way, without using the technology to collaborate. In that sense, these alliances provide less support for the hypothesis than the other examples cited in this introduction.

13. *See, e.g.*, Marianne M. Jennings, *The True Meaning of Relational Contracts: We Don't Care About the Mailbox Rule, Mirror Images, or Consideration Anymore—Are We Safe?*, 73 DENV. U. L. REV. 3, 13 (1995) (discussing an example of the real-time data exchange between Wal-Mart and one of its suppliers that dictates the quantity of product needed to replace purchases made the previous day).

14. *See* Basuki Y. Iskandar et al., *Adoption of Electronic Data Interchange: The Role of Buyer-Supplier Relationships*, 48 IEEE TRANSACTIONS ON ENGINEERING MGMT. 505, 506 (2001) (internal quotation marks omitted).

15. *See* Charles J. Goetz & Robert E. Scott, *Principles of Relational Contracts*, 67 VA. L. REV. 1089, 1090-92 (1981).

of product shipments to be determined based on a computerized analysis of changing sales data.[16]

While these two indications of the relational influences of technology lend some support to the hypothesis, the manufacturing industry provides a much closer analogy to developments in the construction sector. The "formalized production network" represents a technologically advanced approach to manufacturing collaborations.[17] Manufacturers of heavy equipment, together with their key component suppliers, frequently use three-dimensional computer modeling to help coordinate and manage the design and manufacturing process.[18] The technology can result in a "digital prototype" of the product.[19] An example is Boeing's much-studied 787 project, in which suppliers participated in an integrated design and manufacturing process.[20] Indeed, modeling technology used in sophisticated equipment manufacturing is an antecedent to the BIM process, and it fosters and facilitates interdependent collaborations in much the same way.[21] Reportedly, the commercial arrangements between the manufacturer and the suppliers in such situations manifest many relational contract characteristics.[22] Due to the nature of the manufacturing industry, "companies must increasingly look outside their organization for new ideas and technologies. . . . [S]purred by the rapid pace of technological innovation, research partnerships and joint ventures have consequently flourished."[23] Industry literature highlights this movement by references to "ad hoc

16. *See* Jennings, *supra* note 13, at 13.

17. *See* Matthew C. Jennejohn, *Collaboration, Innovation, and Contract Design*, 14 STAN. J.L. BUS. & FIN. 83, 88 (2008).

18. *See* NAT'L COUNCIL FOR ADVANCED MFG., THE NETWORK-CENTRIC INNOVATION IMPERATIVE: HOW MANUFACTURERS WORK WITH THEIR SUPPLIERS TO DEVELOP NEW PRODUCTS 27-28 (2006), *available at* http://www.atp.nist.gov/eao/netcentric_nov06.pdf.

19. *Id.* at 28 (internal quotation marks omitted).

20. *Id.* at 61-69; Jennejohn, *supra* note 17, at 92-93, 122-26.

21. *See* Peter E. D. Love et al., *Design Error Reduction: Toward the Effective Utilization of Building Information Modeling*, 22 RES. ENGINEERING DESIGN 173, 173-74 (2011).

22. *See* NAT'L COUNCIL FOR ADVANCED MFG., *supra* note 18, at 6-9; Jennejohn, *supra* note 17, at 117-26.

23. NAT'L COUNCIL FOR ADVANCED MFG., *supra* note 18, at 47. As an industry document, the National Council for Advanced Manufacturing report is concerned primarily with matters of public policy, including deregulation. *See id.* at 6-9. For that reason, the report does not directly address contracting practices.

partnerships," "strategic partners," and "long-term, collaborative supplier relationships" that are "closely managed" and designed to align the incentives of multiple participants.[24] As the discussion of integrated project delivery in Part III illustrates, the intentionally relational contract provides a structure for lawyers to translate these business concepts into contractual terms.[25]

Software projects provide another especially apt example of collaborative technologies having the potential to draw commercial parties into highly relational exchanges. Often, heavily interdependent relationships contribute to the design and marketing of a program or application.[26] Indeed, computer game developers have been known, contrary to standard firm behavior in the marketplace, to "open[] a portion of their proprietary digital content for transformation by the public," thereby "allowing digital consumer networks to generate new derivatives that can possibly be reintegrated into the firms' innovation process."[27] This is an intentionally relational arrangement.

For me, however, the story that best evokes the relational alchemy of digital technology comes from the world of computer animation. Walter Isaacson's biography of the computer industry's most volatile creative genius, Steve Jobs, describes the business relationship behind *Toy Story*, the blockbuster film that revolutionized the animated movie genre.[28] According to this account, after a successful preliminary contract in which Jobs's Pixar licensed its innovative animation system to Disney, Jobs wanted to produce a film in partnership with Disney.[29] Reportedly, the negotiations were extended, tough, and contentious.[30] In the language of contract theory, the process yielded an exchange far more transactional and discrete

24. *Id.* at 7.

25. *See infra* notes 182-96 and accompanying text.

26. *See generally* Reina Y. Arakji & Karl R. Lang, *Digital Consumer Networks and Producer-Consumer Collaboration: Innovation and Product Development in the Video Game Industry*, J. MGMT. INFO. SYS., Fall 2007, at 195.

27. *Id.* at 197.

28. *See* WALTER ISAACSON, STEVE JOBS 284-92 (2011). The commercial arrangement emerged from dealings between Jeffrey Katzenberg, who led Disney's film division, and Jobs, then serving as CEO of Pixar during a period in which he was famously ostracized from Apple. *Id.*

29. *Id.* at 284.

30. *See id.* at 285.

than relational. Pixar was financially unstable, while Disney was the industry giant.[31] In keeping with the rational self-interest model of transactional contracting, the result was predictable. "Disney would own the picture and its characters outright, have creative control," and simply pay a percentage of ticket revenues to Pixar.[32] Other deal points were equally protective of Disney, who "had the option (but not the obligation) to do Pixar's next two films and the right to make (with or without Pixar) sequels using the characters in the film."[33] Disney even had the right to "kill the film at any time with only a small penalty."[34]

Viewed through a lens of contract theory, the initial arrangement was static and tightly controlled by a set of discrete and comprehensive terms mostly designed to maintain Disney's dominance and to manage the company's risks. All Pixar had to offer was imagination and its whiz-bang animation technology. But as the relationship evolved after *Toy Story*'s spectacular success, the terms of the written agreement became less significant and relational norms took hold.[35] In particular, leaders at Disney apparently came to believe that achieving the full creative potential of Pixar's animation required an intimate understanding of the technology. As a result, a reincarnated deal implemented such values as pervasive cooperation, the flexibility to respond to unanticipated developments, reciprocity, strategies to deter opportunistic behavior, and a commitment to preserve the relationship.[36] Pointing to these features, a relational theorist might readily conclude that the real contract between Pixar and Disney was governed by relational factors rather than by the written agreement fashioned at the beginning of the exchange. Relational theory emphasizes that contracts "grow and change as the parties perform over time."[37]

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31. *See id.*

32. *Id.*

33. ISAACSON, *supra* note 28, at 285.

34. *Id.*

35. *See id.* at 289-91.

36. *See id.* at 291-92. All which are characteristic of relational contract. *See generally* Macneil, *Values in Contract*, *supra* note 1 (describing the various features of the relational contract).

37. Stewart Macaulay, *Relational Contracts Floating on a Sea of Custom? Thoughts About the Ideas of Ian Macneil and Lisa Bernstein*, 94 NW. U. L. REV. 775, 793 (2000).

And the contractual relationship between Pixar and Disney did indeed grow and change.[38] Eventually, and with a considerable boost from Pixar's successful IPO, the result was a completely restructured deal that reflected how the working arrangement had matured.[39] Although Disney already had a binding, and highly favorable, contractual right to make two sequels, the new commercial structure essentially reflected an equal partnership, with each company providing half of the financing and each taking half of the profits.[40] Perhaps even more amazing, and much to Pixar's advantage, Disney agreed to co-branding so that the resulting films no longer seemed to be Disney movies made with the help of a creative outside contractor.[41]

Anecdotal? Certainly. Apocryphal? Perhaps. But if the *Toy Story* enterprise could have achieved equal success without these relational contract enhancements, Disney should have been eager to maximize its profits by exploiting this fantastic technology within the original contract structure. But as things turned out, the animation process was not simply a marvelous tool for a film producer to use, but the medium that gave life to an interdependent and dynamic commercial exchange.[42]

To summarize, in limited ways such as in the situations just discussed, collaborative technologies sometimes seem to go hand-in-hand with intentionally relational contract norms. These narrow examples, of course, cannot show that collaborative technologies will transform contracting practices for entire classes of exchanges or throughout any particular industry. But they can suggest that when a collaborative technology becomes powerful enough to reshape a commercial exchange, it may also move traditional contracting structures toward the more highly relational end of the spectrum.

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38. Isaacson reports that Jobs exercised unusual restraint in leaving the creative process to Pixar's John Lasseter and Disney's production staff, but he insisted on "help[ing] manage the relationship with Disney." ISAACSON, *supra* note 28, at 287. Apparently, Jobs instinctively adhered to relational contract theory.

39. *See id.* at 291-92. This time, Jobs dealt directly with Disney's CEO, Michael Eisner. *Id.*

40. *Id.* at 292.

41. *See id.*

42. I have not undertaken an independent review of the contractual arrangements described in Isaacson's intriguing book, and I make no claims here about the extent to which the collaborative nature of the computer animation technology in fact contributed to intentionally relational contracting practices in that instance.

The task at hand is to explore, in much greater detail, how a highly collaborative and powerful technology might promote a transformative shift toward relational contracting practices in the construction industry. The peculiar significance of BIM lies in the unique benefits that digital simulation offers in the context of the built environment. Achieving the full capacity of the technology requires intensive teamwork involving a diverse group of designers, technical experts, specialty consultants, trades, and project managers, each serving limited and highly specialized functions critical to achieving the project owner's objectives. While the remainder of this article concerns the construction industry alone, the issue lying just beneath the surface continues to be whether emerging collaborative technologies may be similarly poised to transform contracting practices in other segments of the economy.

II. BIM TECHNOLOGY

Over the past few years, BIM technology has started to transform building design and construction in ways that both encourage greater collaboration and reward greater trust among project participants.[43] Traditional design, including conventional computer-aided design and drafting ("CADD"), merely depicts or represents the project design using lines and other graphic devices.[44] By contrast, a BIM model digitally simulates the real project.[45] The model can be loaded with details contemplated for the completed project.[46] BIM digitally replicates the physical and functional characteristics of a building, facilitates the process of sharing that information, and permits decisions about the project to be implemented within the model, beginning with the design concept and continuing

43. *See generally* Howard W. Ashcraft, *Building Information Modeling: A Framework for Collaboration*, CONSTRUCTION LAW., Summer 2008, at 5; Bruce R. Gerhardt, *The Context of the Evolution of Design and Electronic Tools*, CONSTRUCTION LAW., Summer 2008, at 19; Timothy M. O'Brien, *Successfully Navigating Your Way Through the Electronically Managed Project*, CONSTRUCTION LAW., Summer 2008, at 25; Charles M. Sink, *Notes from the Editor: Building Information Modeling*, CONSTRUCTION LAW., Summer 2008, at 3.

44. *See* Ashcraft, *supra* note 43, at 6.

45. *See* Michael T. Callahan, *What is Shared Design? What is Delegated Design?*, *in* SHARED DESIGN § 1.04 (Michael T. Callahan ed., 2011).

46. *Id.*

throughout the project's lifecycle.[47] It allows the design and construction team to build the project virtually, and after construction it serves as a continuing, interactive database for the operation, maintenance, and alteration of the project.[48]

The distinction is a matter of genus, not degree. Conventional design uses static components, devoid of embedded information, that merely represent design concepts and building features.[49] BIM components, however, are virtually intelligent—packed with information beyond the graphic display.[50] For example, while a wall depicted on a drawing is nothing more than lines that represent the wall, a wall in a BIM system is a digital imitation of the actual wall to be constructed.[51] The BIM wall can incorporate all of the components and attributes of the physical wall, including material specifications, structural, mechanical, thermal, and acoustical design information, along with the pertinent relationships associating the wall and its components with other objects in the model.[52] Thus, the wall in the model possesses a digital awareness of both its own characteristics and its relationships to the rest of the model. If, for example, the BIM wall "is supposed to extend from the foundation up to Level 1," then when "either of those parameters is changed, the height of

47. *See* NAT'L INST. OF BLDG. SCIS., UNITED STATES NATIONAL BUILDING INFORMATION MODELING STANDARD VERSION 1-PART 1: OVERVIEW, PRINCIPLES, AND METHODOLOGIES 21 (2007), *available at* http://www.wbdg.org/pdfs/NBIMSv1_p1.pdf.

48. *See* Ashcraft, *supra* note 43, at 5-6. A BIM system uses a single database or related databases to integrate details from all aspects of a project to establish a computable representation of the project. *See id.* BIM allows for integration of different data types to provide a project model that diminishes conflict errors, reduces design time, and can be used throughout the lifecycle of the facility. *Id.* If project design is fully coordinated by a project architect, as is often the case with commercial buildings, thorough integration would logically be accomplished through the project architect's use of the technology, but BIM can also be used in a more limited way by an individual project participant who develops a model solely for that participant's scope of work. *See* John Boktor et al., *State of Practice of Building Information Modeling in the Mechanical Construction Industry*, 30 J. MGMT. ENGINEERING 78, 78-79 (2014) (discussing the use of BIM by the mechanical trades).

49. *See* Ashcraft, *supra* note 43, at 6.

50. Benton T. Wheatley & Travis W. Brown, *An Introduction to Building Information Modeling*, CONSTRUCTION LAW., Fall 2007, at 33, 33 ("The objects in a BIM model are 'intelligent' in the sense that objects in the model are embedded with information about its physical and functional characteristics, as well as its relationship to all other objects in the model.").

51. Ashcraft, *supra* note 43, at 6.

52. *See* Callahan, *supra* note 45, § 1.04.

the wall will automatically adjust to match. This increases design efficiency and reduces the potential for errors."[53]

When used to its fullest, BIM presages unprecedented teamwork in the design and construction process.[54] The technology allows design consultants, trade contractors, manufacturers, and suppliers to engage in an iterative data exchange with the project architect or other principal designer and, at least in some measure, with each other.[55] As a result, BIM invites more meaningful and extensive collaboration among the project participants than has previously been possible in the construction industry.[56] Design consultants, cost engineers, pre-construction experts, trade contractors, suppliers, and manufacturers all can share the model and supply additional information to be incorporated into it over the course of the design and construction processes.[57] And as changes are made, the model itself can identify potential conflicts if one feature of the project clashes with another.[58]

To illustrate further, and continuing for the moment with the example of a wall, the components of the BIM wall hold dynamic information, supplied by many different members of the design and construction team, about such interdependent features as windows and doors, load-bearing elements, conduits, and materials and equipment in, behind, below, and above the wall.[59] Once all of this information relating to the wall is in the

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53. Ashcraft, *supra* note 43, at 6.

54. But not everyone agrees that BIM necessarily leads to greater collaboration. *See* Love et al., *supra* note 21, at 174 ("Despite the benefits that have been extolled by using BIM, the predicted industry-wide productivity improvements have yet to be realized.").

55. *See* Callahan, *supra* note 45, § 1.04.

56. *Id.*

57. *See id.* Because of liability and proprietary concerns, many project architects and engineers will only share the model on a limited basis so that proposed changes to the model must be submitted to the lead design professional. *See* Dwight A. Larson & Kate A. Golden, *Entering the Brave, New World: An Introduction to Contracting for Building Information Modeling*, 34 WM. MITCHELL L. REV. 75, 86-87 (2007). Other participants may develop their own models to use in executing their distinct activities. *See* Boktor et al., *supra* note 48, at 79; Ashcraft, *supra* note 43, at 9.

58. *See* Ashcraft, *supra* note 43, at 6 ("This parametric architecture allows the model to adjust to design changes without having to individually adjust every individual element. . . . This increases design efficiency and reduces the potential for errors."); *see also* Larson & Golden, *supra* note 57, at 80 ("In the process, the parties can identify a number of system conflicts and other issues that would otherwise remain undiscovered until the project is constructed. They can then address those issues far more efficiently and inexpensively than they could during construction.").

59. *See* Ashcraft, *supra* note 43, at 6.

model, the virtual wall is part of the digital model.[60] Alter the location, dimensions, or other attributes of a window or a door once, and the change flows through from a floor plan, to an elevation, to a mechanical drawing, and wherever else the model references the wall.[61] And when a new component is added to the project subsequently, the digital wall, with all of its embedded information, is there to relate or react as the actual wall would.[62]

BIM's three-dimensional capabilities also allow the design and construction team to analyze the project from different perspectives and through different phases of the development process.[63] The model allows project participants to tour the project both in space and time.[64] The team can explore the project during site preparation or demolition and as construction is scheduled to progress during distinct activities.[65] The model will simulate conditions as they are to occur during construction—foundation, structural and mechanical work, finish details, and more.[66] BIM also accommodates fourth and fifth dimensions in the forms of cost information and scheduling data.[67] And it can even facilitate simulated activities inside the model.

All of these features yield extraordinary benefits during the entire design and construction process and throughout the life cycle of the project.[68] For example, as design activities progress, BIM accelerates and improves clash detection by

60. *See id.*

61. *See id.*

62. *See id.*

63. *See* Larson & Golden, *supra* note 57, at 80.

64. Love et al., *supra* note 21, at 174 ("BIM uses parametric three dimensional (3-D) Computer-Aided-Design (CAD) technologies and processes to design and construct a facility. It can also incorporate 4-D and 5-D dimensions where 4-D includes a time dimension and 5-D time-based costs.").

65. *See* Ashcraft, *supra* note 43, at 6.

66. *See id.*

67. *See* Larson & Golden, *supra* note 57, at 79; Love et al., *supra* note 21, at 174.

68. *See* Larson & Golden, supra note 57, at 76 ("[The benefits] include improved spatial program validation; a greatly-enhanced ability to visualize and comprehend designs, complicated details, and sequences; more effective coordination and detection of system clashes; better quality design and design detailing; greater dimensional precision; improved productivity; better capability to optimize budget and schedule options; better tools for field teams; greatly-enhanced communication and collaboration among owners, designers, contractors, and suppliers; more efficient fabrication; an increased ability to modularize and prefabricate building components; improved quality and safety; reduced project delivery time; and improved as-built documentation.").

identifying conflicts within the model long before those problems would otherwise produce surprises in the field.[69] Thus, if a mechanical design feature is inconsistent with the structural design, the model should flag the problem so that it can be resolved promptly.[70] Of equal importance, proposed changes can be played out in the model and evaluated for functionality, constructability, alternative solutions, schedule impacts, and pricing.[71] Finally, the completed model replaces conventional as-built drawings to be used for reference, operations, maintenance, repair, and renovation throughout the project's useful life.[72]

These tremendous advantages assure that BIM will eventually supplant traditional design processes.[73] And as BIM becomes prevalent, in order to take better advantage of the technology, the industry will inevitably move toward greater coordination and collaboration among the major project participants. A greater number of participants will be able to use the model to understand and analyze the project, to integrate details into it, and to help execute the specialized tasks required to complete the project. The transition to a comprehensive application of BIM technology will produce previously unimagined incentives for project architects and engineers, specialty design consultants, prime contractors and their main subcontractors, suppliers, and manufacturers to work together through the model. One result may be a further blurring of the already cloudy line between design and construction functions.[74]

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69. *See* Michael Tardif, *BIM Me Up, Scotty*, AM. INST. ARCHITECTS (Dec. 1, 2006), http://info.aia.org/aiarchitect/thisweek06/1201/1201rc_face.cfm ("The clarity of the information reported by model checkers and the relative ease with which it can be obtained fosters a collaborative climate for resolving design problems, with the added benefit of reducing both actual and perceived risk of professional liability for errors and omissions.").

70. *See* Larson & Golden, *supra* note 57, at 80.

71. *Id.* at 79.

72. Ashcraft, *supra* note 43, at 6 ("The BIM is meant to be a living document that owners can use to manage their facilities, as well as build them. BIM's potential for facility management perhaps is its most important role, but one that is just beginning to be explored.").

73. O'Brien, *supra* note 43, at 25 ("Almost certainly, BIM will, in due course, fundamentally transform the architecture, engineering, and construction (AEC) industry.").

74. *See* 5 PHILIP L. BRUNER & PATRICK J. O'CONNOR, JR., BRUNER AND O'CONNOR ON CONSTRUCTION LAW § 17:70 (2002) ("The common perception that a design professional, such as an architect or engineer, performs all the design services for a given project is more myth than reality. Most projects of any scope contain design elements performed by a number of participants to the construction process.").

To the extent the members of the design and construction team take advantage of BIM's powerful and comprehensive simulation capacity, they will collectively secure substantial efficiencies that will contribute to project quality, cost control, and schedule management.[75] The next Part of this article explores how BIM's collaborative characteristics may move the construction industry into a more highly relational model of contract.

III. BIM AND THE INTENTIONALLY RELATIONAL CONTRACT

A. Relational Contract and the Construction Industry

Although relational theory decidedly influences contract scholarship, it plays a far more modest role in applied contract law.[76] In a practical sense, express contracts and the many legal issues they generate remain heavily tethered to traditional theories that often run contrary to relational concepts.[77] Yet, in the contemporary theoretical literature, purely traditional contract notions are much out of favor.[78] In that realm, relational contract regularly spars with economic analysis for the advantage.[79] At times, however, the relational and economic approaches nearly converge.[80] In scholarly debates, the economists often seem to have the edge because they effectively use economic analysis to rationalize traditional contract law and to justify many judicial and legislative decisions in the contract

75. BIM is not without its challenges, and others have already written at length about the practical legal issues that the BIM revolution entails. *See* Travis W. Brown & Joe R. Basham, *Building Information Modeling*, *in* SHARED DESIGN, *supra* note 45, §§ 4.01, 4.05–.06; Larson & Golden, *supra* note 57, at 82-104; Ashcraft, *supra* note 43, at 9.

76. *See* Melvin A. Eisenberg, *Why There Is No Law of Relational Contracts*, 94 NW. U. L. REV. 805, 805 (2000). The reference is to contract law in the narrow sense of the body of law governing legally enforceable promises.

77. *See id.* at 812-13; Jay M. Feinman, *Relational Contract Theory in Context*, 94 NW. U. L. REV. 737, 737-40 (2000).

78. *See, e.g.*, Elizabeth Mertz, *An Afterword: Tapping the Promise of Relational Contract Theory—"Real" Legal Language and a New Legal Realism*, 94 NW. U. L. REV. 909, 909-11 (2000) (criticizing many traditional notions).

79. *See generally* Ian R. Macneil, *Relational Contract Theory: Challenges and Queries*, 94 NW. U. L. REV. 877 (2000); Eric A. Posner, *A Theory of Contract Law Under Conditions of Radical Judicial Error*, 94 NW. U. L. REV. 749 (2000).

80. *See generally* David Campbell, Commentary, *The Incompleteness of Our Understanding of the Law and Economics of Relational Contract*, 2004 WIS. L. REV. 645; Goetz & Scott, *supra* note 15.

field.[81] Relational theory, by contrast, more often can only challenge the main principles of contract law and many of the appellate opinions and statutes that apply and govern contract law.[82] To help introduce the argument that collaborative technologies may advance the cause of relational contract, at least in the construction industry, the discussion that follows briefly contrasts the relational perspective with the traditional and economic perspectives.[83]

Traditional contract law—often distinguished as either classical or neoclassical—presents a promise-based perspective on contract pursuant to which the responsibilities and rights of the parties depend on formulaic legal logic or somewhat more elastic legal principles.[84] Under both of these traditional approaches, fixed axioms (the classical version) or more flexible legal principles (the neoclassical alternative) order the law of obligations. In either case, contract disputes require courts, lawyers, and scholars to apply these rules or principles to selected exchanges. The process does not necessarily invoke an understanding of human behavior or a holistic consideration of the context that gives rise to a particular issue. In other words, traditional contract law, whether classical or neoclassical, is scarcely relational. The Restatements embody these contractual

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81. *See* William C. Whitford, Commentary, *Relational Contracts and the New Formalism*, 2004 WIS. L. REV. 631, 633-35 (praising Professor Robert Scott's economic analysis of contract for incorporating certain relational concepts, while at the same time criticizing Scott for subsequently moving away from those same principles).

82. *See* Feinman, *supra* note 77, at 744-48.

83. The text uses broad strokes to present some of the main theoretical distinctions. An article primarily dedicated to the future of relational contract in the construction industry cannot hope to provide a comprehensive review of competing contract theories. On that subject, a rich body of literature already exists.

84. Traditional contract analysis assigns central roles to such factors as the contracting parties' bargain, consent, and freedom of choice. *See* Randy E. Barnett, *Conflicting Visions: A Critique of Ian Macneil's Relational Theory of Contract*, 78 VA. L. REV. 1175, 1200-06 (1992); Eisenberg, *supra* note 76, at 805-08. *See generally* Randy E. Barnett, *A Consent Theory of Contract*, 86 COLUM. L. REV. 269 (1986) (providing an overview of several contact theories). The leading relational theorists argue that the traditional devotion to these concepts fails to give effect to the actual norms that govern the behavior of contracting parties in most situations. *See* Feinman, *supra* note 77, at 740-43; Macaulay, *supra* note 37, at 778-80; Ian R. Macneil, *Relational Contract: What We Do and Do Not Know*, 1985 WIS. L. REV. 483, 485-91. Any exposition on relational contract must rely heavily on the scholarship of Ian Macneil, who is generally recognized as the founder and leading proponent of the theory. *See* Feinman, *supra* note 77, at 737; Macaulay, *supra* note 37, at 775-76.

perspectives.[85] The Uniform Commercial Code, as Professor Ian Macneil explained long ago, also exists essentially within the neoclassical model, although it makes significant concessions to the relational perspective.[86]

Economic theories of contract, while also mindful of promissory considerations, deviate from the traditional perspectives primarily by focusing on incentives and adopting some version of the rational self-interest principle. Although the law and economics literature offers many highly developed variations on the theme, the core concept involved asserts that human institutions, including contract law, must largely respond to the kinds of incentives studied by economists.[87] An economic analysis of contract is not invariably opposed to the relational perspective, but it also is not necessarily or distinctly relational.

One recent development in the economic analysis of contract deserves special attention here because it deals extensively with collaborative commercial exchanges. "Braiding" theory refers to a practice "in which parties weave informal and formal elements of contract together to overcome uncertainty."[88] Among other things, the theory notes that in today's transactional exchanges, digital technology can take center stage as the contracting parties build more complex and iterative collaborations.[89] The braiding literature envisions contracting practices that can promote such goals as inducing the parties to make "efficient, transaction-specific investment[s]" that provide "a framework for iterative collaboration and adjustment of the parties' obligations under conditions of continuing uncertainty" and controlling opportunistic behavior.[90] The resulting "[c]ontracting for innovation" presents an especially interesting economic

85. *See* Feinman, *supra* note 77, at 738-39.

86. *See* MACNEIL, THE NEW SOCIAL CONTRACT, *supra* note 1, at 72-73 (discussing how U.C.C. § 2-207 treats the battle-of-the-forms issue).

87. *See* Posner, *supra* note 79, at 750-58. But economic analysis sometimes blends peacefully with relational contract theory. *See* Goetz & Scott, *supra* note 15, at 1089-92.

88. Nicholas J. Houpt, *Financing Innovation: Braiding, Monitoring, and Uncertainty*, 62 SYRACUSE L. REV. 337, 338 (2012). *See generally* Ronald J. Gilson et al., *Braiding: The Interaction of Formal and Informal Contracting in Theory, Practice, and Doctrine*, 110 COLUM. L. REV. 1377 (2010) (providing an overview of the theory).

89. *See* Houpt, *supra* note 88, at 338. *See generally* Gilson et al., *supra* note 88 (repeatedly using the phrase "iterative collaboration" in the context of braiding theory).

90. Ronald J. Gilson et al., *Contracting for Innovation: Vertical Disintegration and Interfirm Collaboration*, 109 COLUM. L. REV. 431, 472 (2009).

perspective on modern contract.[91] As illustrated later, some aspects of braiding theory comport well with the aura of the intentionally relational contract that is already faintly perceptible within the construction industry.[92]

Note that both the traditional and the economic theories commonly depict a contractual arrangement essentially as a discrete transaction between the parties, justified on the basis of choices that the parties freely make and governed by a combination of the express terms that the parties consensually adopt and a more or less coherent legal regime that applies generally to obligations voluntarily undertaken.[93] A contract, within its four corners, governs a particular transaction arising between the parties at a specific time.[94] Moreover, the contract is the product of promises either expressly made by the parties or implied from the circumstances of the discrete transaction.[95] While a broader relationship may exist or develop between the parties by reason of past occurrences, context, the future course of unanticipated events, and other non-promissory considerations, under traditional and economic theories, the relationship as so defined plays little or no role in the legal or socioeconomic understanding of contract.

By contrast, relational theories assign a central role to the overall context that generates the dynamic and interdependent relationship between the parties.[96] As a result, a relational perspective focuses much more on customs, usage, and behavioral considerations and much less on legal rules and principles, consent, expressed or presumed intent, and the language the parties used to establish the arrangement at its

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91. *Id.* at 435.

92. *See infra* notes 103-20 and accompanying text. While there is far more to the braiding theory than noted here, this limited treatment must do for the purposes of this article, which does not address the inquiries at the heart of braiding theory, such as the "decrease in the proportion of economic activity coordinated within firms and [the] corresponding increase in the proportion of economic activity conducted through contract in the market." Gilson et al., *supra* note 90, at 436-37. This article simply proceeds from the proposition that construction projects in the normal course of events take place through contract in the market much more frequently than through the vertically integrated firm.

93. Again, this is a relational characterization. *See* Macneil, *Values in Contract*, *supra* note 1, at 382-85.

94. *See* RESTATEMENT (SECOND) OF CONTRACTS § 1 (1981).

95. *Id.* § 4.

96. *See* Macneil, *Values in Contract*, *supra* note 1, at 346.

inception.[97] The relational conscience winces when, by reason of legal constraints, "the paper deal controls the real deal."[98] What is most important to the relational theorist is not a promise or set of promises exchanged between the parties, but the characteristics or norms of the observable relationship between the contracting parties. These relational considerations can only be understood by taking into account a range of contextual and behavioral factors, many of which may have preceded or postdated any formal expression of an agreement.[99]

Relational principles may go even further by recognizing "the potential for the relationship itself to generate internal norms that become part of the obligations of the parties."[100] In this spirit, relational theory comfortably adjusts contractual obligations in response to changes in the circumstances encountered by the parties after they sign the written agreement.[101] Thus, a relational theorist instinctively accepts the notion that the parties, courts, or others involved in analyzing or resolving contract problems must often resort to considerations completely outside of any agreements, commitments, or other expressions of intent the parties may have made *ex ante*. Contractual obligations need not derive from promises made or intentions definitely expressed. Indeed, under relational principles, the import of a contract may be determined just as readily by reference to what the parties most likely would have intended had they thought of a particular problem in advance.[102]

From a theoretical perspective, exchanges in the construction industry already reside within the relational range of the discrete-relational spectrum.[103] That is, arrangements

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97. *See* Ian R. Macneil, *The Many Futures of Contracts*, 47 S. CAL L. REV. 691, 731-32 (1974).

98. Macaulay, *supra* note 37, at 795.

99. Both the Restatement (Second) of Contracts and the Uniform Commercial Code take context into account in several ways, such as through the concept of good faith and the approach to contract interpretation, but they do not do so in ways that are essentially relational. *See* Ian R. Macneil, *Contracts: Adjustment of Long-Term Economic Relations under Classical, Neoclassical, and Relational Contract Law*, 72 NW. U. L. REV. 854, 865-86 (1978).

100. Richard E. Speidel, *The Characteristics and Challenges of Relational Contracts*, 94 NW. U. L. REV. 823, 827 (2000).

101. *See id.* at 831-37 (discussing a case in which the Ohio Supreme Court analyzed a truly relational contract).

102. *See* Whitford, *supra* note 81, at 643.

103. *See* Carl J. Circo, *The Evolving Role of Relational Contract in Construction Law*, CONSTRUCTION LAW., Fall 2012, at 16, 20-24.

among contracting parties in the industry, and the actual behavior of the parties, tend to reflect many characteristics consistent with relational contract theory.[104] In particular, construction industry dealings frequently evince a common understanding that relational factors often are, and should be, more important than legal rules or principles, form contracts, and negotiated terms.[105] Practicing lawyers as well as scholars have concurred on this observation.[106] This does not, however, mean that the industry has generally adopted intentionally relational contracting practices but only that relational norms inform many of the industry's common contract terms and conditions.

The relational perspective manifests in many ways, some of which do not primarily involve formal contract terms.[107] For example, customs play a large role in construction projects. Some customs concerning the manner in which the industry structures relationships are so well understood and so completely developed that they implicitly define risk allocation. This is particularly true with reference to what those in the industry often call project delivery systems.[108] Thus, when a project uses the design-bid-build format, experienced participants understand that those who execute the design on site must rely on the design documents the owner provides and therefore do not assume the risk of design errors.[109] Some customs tied to project delivery systems are so deeply ingrained that they practically become synonymous with the risk allocation patterns of distinct segments of the industry, as in the

104. *See id.* at 24.

105. *See* Macneil, *supra* note 79, at 881 (identifying four core propositions of relational contract theory); Macneil, *Values in Contract*, *supra* note 1, at 347 (listing ten contract norms recognized by relational contract theory).

106. *See, e.g.*, Ian R. Macneil, *Whither Contracts?*, 21 J. LEGAL EDUC. 403, 415 (1969); Allen L. Overcash, *Will the New Contract Forms for Integrated Project Delivery Make Conflict Obsolete? (Or Are We Still Lost in Our Contract Obsession?)*, J. AM. C. CONSTRUCTION LAW., Winter 2009, at 19, 19-21, 23-24; Jay M. Feinman, *Economic Negligence in Construction Litigation*, CONSTRUCTION LAW., August 1995, at 34, 37-38.

107. The characteristics mentioned in the text repeatedly appear in lists of relational norms or principles. *See* Eisenberg, *supra* note 76, at 817-18; Circo, *supra* note 103, at 16-17.

108. Project delivery systems are explained in much greater detail in Part III.B.2.

109. *See* Ross J. Altman, *Project Delivery Systems*, *in* CONSTRUCTION LAW 57, 64-68 (William Allensworth et al. eds., 2009).

case of the design-build, construction management, and build-operate-transfer project formats.[110]

Risk allocation also flows from other customs and standard practices. Design professionals expect to take responsibility for the consequences of certain errors, but not for all consequences of every error.[111] A general contractor who uses a trade contractor's price proposal to calculate a competitive bid for the project expects the trade contractor to honor the proposal without regard to technical rules of offer and acceptance.[112] And disparate risk expectations turn on whether the project architect or engineer provides what the industry recognizes as performance specifications, which call for objectively measurable results while leaving important design details undetermined, as contrasted to design specifications, which allow much less room for contractor interpretation and discretion.[113]

Similarly, common-sense lessons learned from past exchanges between the parties and expectations based on anticipated future dealings between them often determine how the participants to a construction project conduct themselves. In other words, construction is a relationship business in which the parties often draw on anecdotal lessons when applying general principles to particular circumstances.[114] Low bidders with bad performance records frequently fail to win awards. A contractor's willingness to absorb unanticipated expenses may

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110. *See id.* at 71-87.

111. *See* JUSTIN SWEET & MARC M. SCHNEIER, LEGAL ASPECTS OF ARCHITECTURE, ENGINEERING AND THE CONSTRUCTION PROCESS 293-96 (7th ed. 2004).

112. This expectation received judicial recognition in *Drennan v. Star Paving Co.*, in which California Supreme Court Justice Roger Traynor famously held that a subcontractor was contractually bound to a proposal submitted to the general contractor once the contractor had relied on it for the purposes of calculating the contractor's own bid, even though the subcontractor attempted to withdraw before the contractor had formally accepted the proposal. 333 P.2d 757, 759-60 (Cal. 1958) (en banc). One could object that the general contractor's expectation derives from the contract law principles articulated in *Drennan*, but a relational scholar might respond that the legal protection afforded this expectation required more than a little relational activism from Justice Traynor to stretch existing legal doctrine. The underlying point is that the relational expectation of the general contractor probably preceded and informed the legal analysis that gave birth to this line of cases. In other words, *Drennan* may be a relational opinion, but it does not prove that the contract law principles relied on in the case are themselves relational.

113. *See* SWEET & SCHNEIER, *supra* note 111, at 399.

114. *See* Ross J. Altman, *Participants in the Design and Construction Process*, *in* CONSTRUCTION LAW, *supra* note 109, 17, 29-32.

vary based on how the owner or the owner's representative responded to an earlier problem on the job. An inspecting architect who is able to influence awards on future projects may persuade a contractor to perform tasks that go beyond the defined scope of work on a current project. Provided that the project is progressing on time and within budget, owners and their inspecting architects or engineers may overlook deviations from agreed plans and specifications that technically breach the construction contract.

Other relational characteristics commonly demonstrate the heavy emphasis that the industry places on planning for an unpredictable future. It is on this basis that fixed-sum prices routinely include substantial contingencies not associated with any line-item cost.[115] Under a similar rationale, completion schedules typically build in float time not attributable to any specific activity on the schedule.[116]

Related considerations contribute to a practical realization that most projects will present circumstances that the written agreements cannot completely anticipate and that will require a considerable degree of mutual reliance, flexibility, and trust over time.[117] For these reasons, everyone involved in a typical project expects that a contractor who depends on the design provided by the owner will accommodate certain design changes, but those same parties may protest vehemently when the changes go too far.[118] Further, design professionals tolerate repeated requests for clarification, but they expect and often receive additional compensation when the requests become unreasonably burdensome.[119]

One can even find instances in which the evolving relationship itself may generate new obligations that the parties ought to honor in a spirit of good faith and fair dealing. An inspecting engineer who has undertaken no express responsibility for safety issues may be expected to intervene for

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115. *See* Stephen A. Hess, *Pricing Construction Contracts*, *in* CONSTRUCTION LAW, *supra* note 109, at 219, 241-43.

116. *See* Mark J. Groff & Jon M. Wickwire, *Construction Scheduling*, *in* CONSTRUCTION LAW, *supra* note 109, at 311, 316-17.

117. *See* Overcash, *supra* note 106, at 22-24.

118. *See* Alan Winkler, *Changes*, *in* CONSTRUCTION LAW, *supra* note 109, at 431, 450-52.

119. *See* Carl J. Circo, *Architect's Contract Administration*, *in* CONSTRUCTION LAW, *supra* note 109, at 343, 348.

the protection of workers when an inspection discloses dangerous conditions not apparent to those who lack the necessary professional expertise.[120]

All these relational characteristics evident within the industry create an environment in which design and construction exchanges are relational contracts in a socioeconomic sense even if not as a matter of the formal rules of contract law that govern them or the express terms that the parties negotiate. The success of a construction project and the ability of the project participants to work out problems and adjust to ever-changing circumstances frequently depend in practice more on the implied norms that characterize the relationships involved than on the terms of the written agreements the participants have signed or on common-law principles.

The relational aspects of industry practices are not, however, limited to the socioeconomic behavior of "living contracts"; there are also relational elements in "contracts-at-law," to borrow the terminology of Ian Macneil.[121] This is especially so in the private law that parties negotiate.[122] Common construction contracts display many highly relational terms. That is, construction lawyers and the industry organizations that promulgate common agreements governing the rights and obligations of project participants have developed some contract-drafting practices carefully designed to anticipate evolving circumstances and to define, manage, and preserve the ongoing relationships among project participants.[123] To a limited extent, these practices produce more or less intentionally relational contracts, although it would go too far to claim that many industry contracts fall predominately into this special category.

For example, and reflecting the importance that relational theory places on good faith as a relational norm, standard industry contract forms display a remarkable commitment to

120. *See, e.g.*, Caldwell v. Bechtel, Inc., 631 F.2d 989, 997 (D.C. Cir. 1980) ("The particular circumstances of this case . . . created a duty in [defendant engineering firm] to take reasonable steps to prevent harm to [plaintiff] from the hazardous conditions of the subway tunnels.").

121. *See* Macneil, *supra* note 79, at 901-07.

122. In a more limited way, contract law as applied by courts includes some distinct relational strains, but the judicial approach lacks a coherent commitment to relational contract principles. *See* Macaulay, *supra* note 37, at 780-90.

123. *See* Goetz & Scott, *supra* note 15, at 1092.

flexibility and openness to adaptation to unknown contingencies.[124] In a similar vein, most fixed-sum and guaranteed-maximum-price construction contracts include procedures that allow the owner to make unilateral modifications to the project plans and specifications in exchange for a process that allows the contractor to obtain an equitable adjustment to the price and completion schedule.[125] Many construction contracts also include procedures for monitoring performance to anticipate unpredictable complications.[126] And, as seen in other highly relational settings, the parties often rely on surety bonds to compensate for performance shortfalls.[127]

The dispute resolution processes found in most construction contracts also incorporate relational norms.[128] To begin with, these contracts regularly introduce third-party decision makers, particularly design professionals or inspectors, to propose initial, non-binding solutions when disagreements and adverse claims arise during the course of performance.[129] Standard dispute resolution provisions continue with non-binding mediation, often followed by binding arbitration, using mediators and arbitrators who have experience in the construction industry and who understand the customs and perspectives of industry participants.[130] More elaborate, but still fairly common, procedures use a tiered dispute resolution process that begins by referring problems to field personnel and, if necessary, on to higher executives up to the chief executive level before moving to non-binding mediation and ultimately arbitration.[131] Some contracts, especially those for the largest

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124. In this respect, construction industry forms embody well-recognized relational norms. *See id*. at 1092-95.

125. *See* Winkler, *supra* note 118, at 431-46.

126. *See* Circo, *supra* note 119, at 349-359.

127. *See* Deborah Griffin, *Insurance and Bonds*, *in* CONSTRUCTION LAW, *supra* note 109, at 531, 542-45. Arguably, this is an application of the principle that relational contracts sometimes rely on bonding arrangements in the face of complexity and uncertainty. *See* Goetz & Scott, *supra* note 15, at 1092-93 (discussing bonding agreements or arrangements for such purposes in a less literal sense).

128. *See* Macneil, *supra* note 99, at 866-68 (discussing the role that third-party dispute resolution processes can play in relational contracts and taking note of such processes in construction industry contract forms and in certain aspects of contracts between design professionals).

129. *See* James P. Groton & Stanley P. Sklar, *Dispute Resolution Processes*, *in* CONSTRUCTION LAW, *supra* note 109, at 559, 559-63.

130. *Id.* at 569-71.

131. *Id.* at 566.

and most complex projects, even establish standing dispute review boards vested with the ultimate authority to make binding decisions.[132] These boards are usually made up of industry professionals who are involved at the inception of the project so that they develop project-specific knowledge before any conflicts arise.[133] Most contracts also implement a preference to maintain rather than terminate the existing relationship by providing that even in the face of serious disputes the parties will continue to perform during the pendency of the dispute resolution processes.[134]

These contractual terms, and others commonly found in construction contracts, demonstrate that industry participants, their lawyers, and their trade organizations all recognize that the exchanges with which they deal are highly relational. Moreover, they show that thoughtfully negotiated contract terms can help to arrange those exchanges to enhance and promote relational norms.

This is not to say that contracting practices in the construction industry necessarily or even characteristically embrace the most important tenets of relational contract theory, let alone a coherent commitment to the intentionally relational contract. There is, for example, scant evidence that the industry adheres to the central value that relational theory places on "expectations, reciprocity, and a commitment to harmonize conflict and to preserve relationships, even when those values require some sacrifice of individualistic interests."[135] Opportunistic behavior remains a troubling hallmark of industry relationships. Indeed, relational contract proponents sometimes bemoan the variance between the relational contract notions they advocate and the typical contractual arrangements and behavior they routinely encounter in the industry.[136] And contracting

132. Jesse B. Grove & Richard Appuhn, *Comparative Experience with Dispute Boards in the United States and Abroad*, CONSTRUCTION LAW., Summer 2012, at 6, 6.

133. *See* Christopher T. Horner II, *Should Dispute Review Board Recommendations Be Considered in Subsequent Proceedings?*, CONSTRUCTION LAW., Summer 2012, at 17, 17-18.

134. *See* 5 BRUNER & O'CONNOR, *supra* note 74, § 18:5. Such provisions implement relational norms. *See* Macneil, *supra* note 99, at 877.

135. Circo, *supra* note 103, at 16; *see also* Macneil, *Values in Contract*, *supra* note 1, at 361-64 (discussing the "norms" associated with relational contracting).

136. *See, e.g.*, Overcash, *supra* note 106, at 22-23, 43; Alex Iliff et al., *The Shifting Sands of Contract Drafting, Interpretation, and Application*, CONSTRUCTION LAW., Spring 2012, at 31, 31.

practices among construction lawyers still largely reflect the promise-based bias of neoclassical contract, with its penchant for comprehensively negotiated and documented terms intended to establish for the parties discrete obligations, rights, and remedies over the entire term of their exchange.[137] Moreover, even the most prominent relational scholars recognize that neoclassical contract law principles, rather than relational ones, still dominate throughout the United States legal system.[138] In short, relational contract enjoys a degree of popularity among construction law commentators and practitioners, but it is still only modestly applied in practice.

The upshot of the incomplete recognition of relational contract in the construction industry is ambivalence. Project participants and construction lawyers regularly give lip service to relational aspirations. And much anecdotal evidence suggests that mediators and arbitrators often bring highly relational perspectives to bear when resolving construction industry disputes.[139] Even courts sometimes espouse approaches aligned with relational principles.[140] Practices, however, remain heavily linked to traditional notions of contract.

As the discussion that follows shows, BIM technology may move the industry from its idealistic flirtation with relational contract toward a commitment to the intentionally relational contract. To the extent that BIM provides a powerful incentive for project participants to collaborate for joint success, the industry's nascent interest in truly collaborative contractual structures may lead to more genuinely relational contract behavior. But this will be possible only if BIM's collaborative philosophy can overcome the industry's pragmatic commitment to contract perspectives and practices that give primacy to each firm's competing profit motives. If that should occur, negotiated contracts terms will certainly become more relational. And beyond that, project participants, mediators, arbitrators, and courts faced with construction industry disputes may even feel more empowered to adopt the contextual and holistic perspectives of relational contract theory. In short, BIM could

137. *See* Circo, *supra* note 103, at 19.

138. *See* Feinman, *supra* note 77, at 737; Macneil, *supra* note 99, at 889; Speidel, *supra* note 100, at 824.

139. *See supra* notes 128-34 and accompanying text.

140. *See supra* notes 112, 120 and accompanying text.

help transform the very construct of contract in the building sector.

B. Collaboration in the Construction Industry and the Movement Toward Integrated Project Delivery

1. BIM and the Industry's Nascent Interest in the Intentionally Relational Contract

An evaluation of BIM's potential for intentionally relational contracting practices requires a brief overview of alternative contracting structures by which participants in design and construction projects typically organize their commercial exchanges. The United States construction industry uses several distinct contract structures, generally known as project delivery systems, each of which allows for its own variations.[141] The discussion that follows contrasts the relational characteristics of the most common systems, with particular emphasis on the extent to which each one facilitates collaboration among the many participants involved in building a project.

For most of the past century, the conventional project delivery system for large segments of the United States construction industry has been design-bid-build, which is also referred to as design-award-build or design-bid-construct.[142] This structure generally reflects the independent and adversarial attitudes that characterize the distinct roles of the major project participants and that motivate the contracting parties to negotiate agreements that attempt to address all contingencies and to allocate all risks to specific participants.[143] As a result, contemporary design-bid-build contracting generally comports with the neoclassical and economic perspectives of contract, although notably seasoned with relational characteristics.[144]

What is most significant from a relational contract perspective is that the design-bid-build project delivery system divides the many commercial exchanges involved in a construction project into a series of distinct, bilateral contracts, each of which falls into one of two parallel lines. One

141. *See* Altman, *supra* note 109, at 58; SWEET & SCHNEIER, *supra* note 111, at 338-60.

142. *See* Altman, *supra* note 109, at 58.

143. *See* Overcash, *supra* note 106, at 21-24.

144. *See supra* notes 103-38 and accompanying text.

contracting line is for design activities, and the other is for construction activities.[145]

This bifurcation results because design-bid-build conceptualizes construction as occurring in two primary and sequential phases. First comes the design process, governed by a primary design contract between the project owner and the lead designer and implemented through a series of distinct consulting agreements between the lead designer and the design specialists, such as civil, structural, mechanical, and electrical engineers, and landscape, interior, and other architectural specialists.[146] Upon completion of the design process, the construction phase commences, governed by a primary contract between the project owner and a general contractor, who subcontracts much of the construction work to specialty trades, manufacturers, and suppliers.[147] Each of the bilateral consulting agreements or construction subcontracts deals with a distinct design or construction component of the project, and no express contractual arrangement concerns the overarching relationship among the many participants involved.[148] Thus, while the many bilateral contracts include limited relational aspects, design-bid-build has no mechanism to recognize and manage either the relationship between the design and construction teams or the multi-party relationships among the many participants who work with each other in a highly interdependent setting.

Overall, design-bid-build does not especially encourage project-wide collaboration, and in many respects it deters teamwork by allocating responsibilities and liability discretely to each participant. As a result, the structure leaves each participant to manage the associated risks in competition with

145. *See* SWEET & SCHNEIER, *supra* note 111, at 91.

146. *See id.*

147. *See id.*

148. *See* Bruce Merwin, *Contracting for Construction Projects*, *in* CONSTRUCTION LAW, *supra* note 109, at 97, 104-08. Many of the standard industry contracts, however, provide for common or coordinated provisions, often called general conditions, which may be incorporated into the major contracts and subcontracts. *See id.* But rather than comprehensively managing the de facto relations involved, general conditions primarily provide for consistent contract administration, for example by recognizing the roles that the lead design professional and general contractor play and coordinating some basic commercial terms, such as those concerning insurance and payment processes. *See id.* Rather than creating a single relational community for the many participants, general conditions customarily are simply incorporated into each separate bilateral contract and include explicit disclaimers of third-party relationships. *See id.*

other participants and to behave opportunistically in the face of unanticipated developments. In this way, design-bid-build projects tend to promote exchanges conceived more as discrete transactions than dynamic and flexible relationships among multiple partners working together toward a common goal. To be sure, relational characteristics exist in these contracts—for example, provisions to adjust for unforeseen site conditions and procedures that utilize common contract administration and claims management—but these are essentially isolated accommodations rather than expressions of a coherent philosophical commitment to the relational contract perspective.

The industry has long recognized that the design-bid-build delivery system does not necessarily reflect the way in which the built environment comes about when the process works best.[149] Particularly in light of the increasingly complex, specialized, and interrelated nature of construction projects, efficiency often demands a more integrative structure.[150] In many projects, even the early design process benefits from interaction between the design team and the construction, manufacturing, and supply communities that must implement the design concept.[151] For the past several decades, the industry has pursued alternative contracting structures better suited to this interactive world of design functions and construction activities.[152] But up to this point, none has proved ideal. The problem largely stems from the individualistic, profit-driven perspectives of the project participants, who quite logically concern themselves more with independent risk management than with the best interests of the project. What has been missing more than anything else is the incentive for true collaboration throughout the design and construction process.

One of the earliest and most successful alternative project delivery systems is design-build, in which the owner engages a single entity to take overall responsibility for both the design and the construction of the project.[153] This approach overcomes

149. *See* Altman, *supra* note 109, at 67-69; Carl J. Circo, *When Specialty Designs Cause Building Disasters: Responsibility for Shared Architectural and Engineering Services*, 84 NEB. L. REV. 162, 206-07 (2005).

150. *See* Carl J. Circo, *Will Green Building Contracts Transform Construction and Design Law?*, 43 URB. LAW. 483, 525 (2011).

151. *See* 5 BRUNER & O'CONNOR, *supra* note 74, § 17:70.

152. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:18.

153. *See* Altman, *supra* note 109, at 78-85.

some of the fundamental inefficiencies created when design functions must occur independently from—and often in competition with—construction.[154] It is more intentionally relational than design-bid-build with respect to the interactions of the primary design and construction participants because design-build eliminates the contractual barrier between design and construction.[155] Indeed, some design-build entities are joint ventures formed between design firms and general contracting companies for specific projects.[156] Instead of dividing the many relationships involved between parallel design and construction contracting lines, the design-build structure begins with the project owner on one side of the primary exchange and the lead designer and primary constructor, acting as one, on the other.[157]

Once the owner and the design-builder enter into the main contract, however, the design-builder still issues a series of bilateral contracts with design consultants, trade contractors, manufacturers, and suppliers, thereby producing a network of contracts that continues to emphasize independent risk management over comprehensive teamwork.[158] Moreover, the fundamental contractual arrangement between the project owner and the design-builder is not necessarily any more or less consistent with relational contract principles than is the traditional structure. The most important distinctions between design-build and design-bid-build lie more in how these alternative structures allocate risk than in how well they implement relational norms. For example, design-build provides a single point of primary responsibility to the project owner, and it often saves costs and accelerates the schedule by combining the lead design and construction roles.[159] At the same time, design-build deprives the project owner of some of the protections afforded by the design-bid-build structure in which the lead architect or engineer can provide to the owner

154. *See id.* at 80.

155. This is manifestly the case when the design-build contracting party is a joint venture organized for the specific project between a design firm and a construction firm that are otherwise independently owned and managed. Other design-builders, however, are established firms with both design and construction personnel and expertise, but operating under single management.

156. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:37.

157. *See* Altman, *supra* note 109, at 78.

158. *See id.* at 78-79.

159. 2 BRUNER & O'CONNOR, *supra* note 74, § 6:15.

professional representation and advice free from the conflicts of interest that exist when a single entity controls both design and the means and methods of construction.[160] Nothing about the design-build structure necessarily encourages collaboration among all of the other participants in the project who enter into discrete arrangements with the design-builder.

Another prominent project delivery system is construction management, in which a construction manager provides to the owner administrative oversight of most or all aspects of the project.[161] The construction manager, who operates independently from both the design team and the construction team, serves as the professional representative of and advisor to the owner.[162] This special role takes over part of the function of a traditional project architect and part of the function of a general contractor by coordinating the work of all design professionals and all trade contractors, manufacturers, and suppliers. In this way, the construction manager bridges the gap that exists between these design and construction functions in design-bid-build, but without the conflict of interest inherent in design-build.

In a limited sense, construction management contributes to a relational approach by introducing a participant whose function is, at least in part, to coordinate the interactions between the other participants for the benefit of the project as a whole. Construction management thereby recognizes that the complex, interdependent, and ongoing relationships between the many project participants can benefit from intense, centralized management. But coordination and oversight are not the same as project-wide collaboration and teamwork. A construction management project still suffers from the perverse incentives of the competing risk management objectives of independent actors

160. Altman, *supra* note 109, at 81.

161. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:12. Program management is a variant of this system in which the oversight is especially comprehensive, perhaps beginning with defining the owner's objectives, then assisting the owner with financing, and continuing throughout the design, construction, and commissioning process. *Id.* § 6:11.

162. *See* Altman, *supra* note 109, at 71-78. Two distinct construction management structures exist; in one, the construction manager acts as the owner's representative and advisor without undertaking any of the liability exposure of a general contractor, while in the other the construction manager takes some contractual responsibility to the owner to assure that the project is completed on time and within budget. *Id.*

operating under discrete, bilateral contracts focused on limited aspects of the work rather than the project as a whole.[163]

For a time, another alternative approach, known as partnering, infatuated segments of the industry.[164] Although it suffers from the critical deficiencies described below, partnering at least points toward the intentionally relational contract. The notion here is that project-wide efficiency and cooperation will result if all of the major participants in a project come together early in the process to explore with each other the opportunities for and advantages of teamwork and group decision making for the good of the project and the collective benefit of the participants. Partnering usually starts promptly after the primary contracts have been awarded, and it typically kicks off with a retreat or workshop among the primary participates to orient them toward team-building, open communication, and informal dispute resolution processes.[165]

Although the formula anticipates that the participants will concur in a written statement of working principles, which may be called a partnering agreement or charter, partnering relies more on group education and collective aspirational statements than on legally enforceable contractual commitments.[166] Discussions of project delivery systems sometimes treat partnering as a distinct system, but because the approach does not produce a unique or specific contractual arrangement, partnering is more properly understood as a variation available within one of the traditional project delivery systems rather than as a separate system.[167]

Partnering has been especially popular in public construction projects in which powerful government agencies can realistically hope to induce voluntary compliance through a collaborative structure.[168] The process can be effective, particularly when the project owner controls substantial business opportunities and the major players expect to work together in

163. *See id.* at 74-78.

164. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:17.

165. Groton & Sklar, *supra* note 129, at 565.

166. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:17.

167. *Id.* For this reason, a leading authority concludes that partnering "is a philosophical approach to the process of construction," rather than a distinct project delivery system. *Id.*

168. FRANK CARR ET AL., PARTNERING IN CONSTRUCTION: A PRACTICAL GUIDE TO PROJECT SUCCESS 77-79 (1999).

multiple projects.[169] In this sense, partnering is a workable relational device for projects and parties existing in a naturally collaborative setting.

Partnering agreements tend to be informal, non-binding statements of the parties' intentions to cooperate in good faith for the success of the project.[170] As one construction lawyer noted, the agreements often include "feel-good provisions but with no metrics or teeth."[171] For a theorist who is primarily interested in the behavior of contracting parties under nearly ideal conditions, partnering supports the main tenets of relational contract.[172] But because partnering's structure is largely extra-legal, its utility has been primarily limited to narrow segments of the industry. As a contractual development, what is most significant about partnering for purposes of the present discussion is its focus on collaboration among multiple contracting parties. Partnering, therefore, involves a relational approach to contracts, but not intentionally relational contracting.

Alliance agreements take the partnering concept beyond good will expressions into the realm of legally binding commercial incentives and consequences.[173] The underlying concept is much the same, but through an alliance agreement the parties back up their stated collaborative intentions with contractual processes and enforceable commitments.[174] One advocate characterizes alliancing as a movement away from the adversarial contracting approach common in the construction

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169. *Id.* at xviii-xix.

170. *See* Groton & Sklar, *supra* note 129, at 565.

171. Ava J. Abramowitz, *Implementing New Contracting Relationships to Create Successful Projects for All Parties in the Construction Process*, CONSTRUCTION LAW., Summer 2004, at 44, 45.

172. One practicing attorney described the process of crafting a partnership agreement in the following way:

> This entails more than just the semantic exercise of renaming your 'opponent' as a 'partner.' It requires a frank analysis of both the client's needs and abilities, as well as an exploration of other potential partners' desires to determine whether clear, shared goals based on mutual trust and candor may be developed as a framework for the project.

Kimberly A. Kunz, *Counsel's Role in Negotiating A Successful Construction Partnering Agreement*, CONSTRUCTION LAW., Nov. 1995, at 19, 19.

173. *See* Altman, *supra* note 109, at 88-89.

174. *See id.*

industry toward "the concept of cooperative or relationship contracting."[175]

Alliance agreements typically include mechanisms for the major participants to share in opportunities for cost savings, as well as in certain cost overruns and some of the other common risks involved in construction.[176] While the project owner takes responsibility for project costs, the other participants agree to put their profits at risk, in whole or in part, based on objective measures of project success.[177] This tactic incentivizes teamwork because all of the parties to the agreement will participate in project-wide economic impacts of scheduling delays or accelerations, cost savings, and overruns without regard to any participant's contribution to the causes of those impacts.[178] The owner and the other parties to the agreement may also commit certain decisions affecting the project to the collective wisdom of a group consisting of representatives of the owner, the lead project design professional, and the prime contractor or contractors.[179] Alliance agreements usually handle claims and disputes through a carefully structured, collective dispute resolution process, and they may establish restrictions against claims asserted through normal legal processes.[180] In these ways, an alliance agreement offers an excellent example of the intentionally relational contract in the construction industry, but the approach seems to have been adopted in the United States primarily in limited situations that are not well-suited to the individualized allocation of risk that characterizes conventional project delivery systems.[181]

The latest, and potentially the most collaborative, alternative project delivery system is integrated project delivery ("IPD"). This contracting structure shares many characteristics

175. Doug Jones, *Relationship Contracting in Australia: Partnering, Alliancing and Other Arrangements*, J. AM. C. CONSTRUCTION LAW., Winter 2010, at 83, 83.

176. *Id.* at 86-87.

177. *Id.* at 87.

178. *See id.*

179. *Id.*

180. These features are sometimes described as establishing a "no disputes" or "no blame" contracts. Jones, *supra* note 175, at 87-88.

181. Ashcraft, *supra* note 43, at 17-18 (noting that alliancing was initially developed for risky projects and has been used successfully in oil exploration and infrastructure projects). In other countries, including Australia and Japan, alliancing seems to have enjoyed more widespread success. *See* Jones, *supra* note 175, at 83, 86.

of the alliance format but on a more comprehensive basis.[182] As the name suggests, the central idea is to integrate the principal activities involved in the project so that fewer decisions are made by individual participants acting in isolation and influenced primarily by each participant's distinct economic and risk management motivations.[183] IPD operates primarily by infusing the contract structure with powerful incentives to reward teamwork and to deter decisions made without reference to the best interests of the project.[184]

While different versions of IPD are evolving, several common devices generally appear in the contractual structure.[185] First, rather than relying exclusively on a series of bilateral agreements, IPD calls for a multi-party umbrella contract to govern certain key arrangements and processes.[186] At a minimum, an IPD contract includes the project owner, the lead design professional, and the prime contractor.[187] Moreover, the structure generally allows for other key participants to join in the main agreement that establishes the overarching collaboration.[188] IPD agreements also incorporate a highly structured team management approach that gives each of the major participants a meaningful voice in decisions that are likely to affect such important matters as the project scope and definition, cost, and schedule.[189] As in the case of alliancing, all contracting parties agree to share certain risks, losses, and savings, and they all agree to consistent liability limits concerning some of the most important liability exposures

182. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:18.10 (Supp. 2009); *see also* Howard W. Ashcraft, Jr., *Negotiating an Integrated Project Delivery Agreement*, CONSTRUCTION LAW., Summer 2011, at 17, 17 (describing IPD); Joseph A. Cleves, Jr. & Richard G. Meyer, *No-Fault Construction's Time Has Arrived*, CONSTRUCTION LAW., Summer 2011, at 6, 6 (same); John W. Ralls, *Integrated Project Delivery*, CONSTRUCTION LAW., Summer 2011, at 3, 3 (same).

183. Design professionals sometimes refer to IPD not so much as a defined contracting structure but as a strategy used to coordinate the services of all project participants whose expertise should be incorporated into the design process. Viewed in this way, IPD is a way to implement a degree of collaboration that BIM uniquely facilitates. *See* Ashcraft, *supra* note 182, at 23. As used in the text, IPD refers to a more formal, contractual version of the strategy.

184. *See* Cleves & Meyer, *supra* note 182, at 6, 10.

185. *See id.* at 10-14.

186. *See id.* at 10.

187. *Id.*

188. *See id.* at 10-12

189. *See* Cleves & Meyer, *supra* note 182, at 10.

involved.[190] IPD agreements also feature stepped dispute resolution processes intended to deter adversarial claims.[191]

In its most advanced form, an IPD agreement even establishes a true joint venture in which the contracting parties form a limited liability business organization, typically a limited liability company, to serve as a special purpose entity by which the participants collectively undertake responsibility for many aspects of the project that a traditional project delivery system would have allocated entirely or primarily to individual participants.[192] Each participant, including the project owner, must still enter into distinct contracts for defined responsibilities, but those contracts will be with the LLC rather than with one of the other participants.[193] As a result, the participants who are members of the LLC will be bound by decisions made in accordance with the entity's governing documents and, to the extent provided in the IPD documents, each participant will be insulated from liability to the LLC or other members with respect to certain common risks of design and construction.

Partnering, alliance agreements, and IPD are best understood as progressive steps evidencing a shift in the construction industry toward relational ideals. All of these innovations have been motivated by the efficiencies that a pervasively collaborative perspective introduces in contrast to the more adversarial one inherent in traditional project delivery systems. Partnering and the alliancing approach, however, have only influenced limited segments of the industry in the United States, mostly in the areas of government work and extremely high-dollar private projects.[194] Judging from the extensive attention that professional journals have recently afforded to IPD, it may develop that this still-evolving project delivery system could have a much broader reach across the industry.[195] In fact, two of the industry groups most involved in

190. 2 BRUNER & O'CONNOR, *supra* note 74, § 6:18.90 (Supp. 2009).

191. *Id.*

192. *Id.* § 6:18.80 (Supp. 2009). While the participants could form any kind of limited liability, special purpose entity, a member-managed LLC is often discussed as the organization of choice. *See id.* For that reason, this article will continue to refer to the entity as an LLC.

193. *See id.*

194. *See supra* notes 168-69, 181 and accompanying text.

195. Part III.B.2 draws extensively from these professional journals.

promulgating standardized contract forms have introduced IPD contracts for general use, and those IPD forms appear to be attracting favorable attention from many important segments of the industry.[196]

If IPD takes hold as a major project delivery system, the construction industry could finally achieve a truly transformative commitment to the intentionally relational contract. But is there any reason to think that IPD has any greater chance to overshadow the industry's internecine past than did partnering or alliancing? Perhaps BIM will fuel the transformation.

2. BIM and IPD

It is not surprising that IPD is gaining traction as a project delivery system at the same time that BIM technology is overtaking the industry. While the two developments are distinct, each can optimize the advantages of the other. Indeed, industry experts who write about either one of these innovations often comment on the significance of the other.[197] With BIM, comprehensive collaboration becomes technically feasible among the members of the design and construction teams because computer modeling makes it both possible and collectively beneficial to incorporate the input of many members of the construction team whose expertise is necessary to complete and execute the design through the iterative modeling process.[198] But the most common project delivery systems hardly encourage that level of collaboration.[199] BIM, therefore, creates an especially compelling case for a more highly integrated system. Concurrently, IPD offers the most advanced contractual structure having the potential to incentivize teamwork and to manage the interdependent relationships essential to fully integrated collaboration.[200]

BIM technology, of course, can be used with any project delivery system, just as IPD can be used with or without BIM.[201]

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196. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:18.10 (Supp. 2009).

197. *See* Brown & Basham, *supra* note 75, § 4.04; Ashcraft, *supra* note 43, at 15; Cleves & Meyer, *supra* note 182, at 13.

198. *See* Ashcraft, *supra* note 43, at 5.

199. *See id.*

200. *See* Altman, *supra* note 109, at 88.

201. *See* Ashcraft, *supra* note 182, at 23; O'Brien, *supra* note 43, at 28-29.

But the two innovations complement each other to such an extent that the industry already recognizes them as natural allies.[202] In fact, members of the industry sometimes discuss BIM as a tool for IPD.[203] It is easy to see why. BIM's potential for project efficiency provides a nearly irresistible motivation for the principal project participants to collaborate; IPD offers powerful contractual devices to encourage that level of collaboration. And it is this reciprocal interplay that strongly suggests that, at least in the context of commercial construction, a highly collaborative technology can move an industry to embrace the intentionally relational contract. Some advocates of BIM even characterize it as much as an integrated project delivery system as a technology because of its tendency to foster integrative contractual relationships.[204]

A good way to explore the connection between BIM and the intentionally relational contract is to review how IPD uses relational contract norms to respond to four of the most important concerns that industry lawyers often raise about use of BIM technology.[205] Broadly categorized, these four concerns are: (1) risk management; (2) dispute avoidance; (3) control of and access to the model; and (4) protection of intellectual property.[206] The discussion that follows shows how IPD provides some uniquely appropriate, intentionally relational resolutions to these concerns. As a result, BIM and IPD may work together to move the construction industry further toward an intentionally relational contract model. Whether or not industry participants with the greatest bargaining position will make the concessions that IPD requires of them will depend largely on the extent to which experience with BIM shows that the fully collaborative application of the technology yields

202. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:18.15 (Supp. 2009) (discussing the logical connection between IPD and BIM); *see also* Ashcraft, *supra* note 182, at 23 ("Collaborative projects can be executed without building information modeling (BIM)—but why would you?").

203. *See* Cleves & Meyer, *supra* note 182, at 13.

204. Callahan, *supra* note 45, § 1.04.

205. BIM raises other issues not mentioned in the text because they are less relevant to BIM's collaborative attributes. These issues include challenges presented by data translation and model interoperability problems, risks of data misuse, whether BIM will alter the standard of care for design professionals, questions relating to professional licensing, and aspects of professional liability insurance coverage. *See* Ashcraft, *supra* note 43, at 9-10; O'Brien, *supra* note 43, at 32-34.

206. *See* Ashcraft, *supra* note 43, at 10-11.

benefits for them that outweigh the most communitarian features of IPD.[207]

a. Risk Management

Leading construction lawyers express their most significant apprehensions over the liability and other risk management issues presented by BIM.[208] There are many. Should the participant who initiates or coordinates the modeling process be liable for all defects in the model, including those resulting from the contributions of other participants or from the computer program itself?[209] Are all those who contribute to the model jointly liable for its content?[210] Who can rely on the model and therefore potentially have standing to assert damage claims against those who are responsible for it or raise defenses against those who are party to the IPD arrangement?[211] Should contractors, subcontractors, and suppliers who use BIM, either in collaboration with others or independently for their own purposes, be liable for design problems in the same way as design professionals?[212] Will BIM's multi-party design process complicate or unravel the venerable *Spearin* doctrine,[213] under which courts generally imply a warranty by the project owner that the plans and specifications furnished to the contractor are suitable for their intended purpose?[214] Does BIM blur the lines between design and construction to such an extent that an orderly division of responsibility will become practically impossible?[215] Who is responsible for managing BIM's powerful clash-detection potential, and who should be

207. For example, an owner with significant leverage will be unlikely to agree to share critical decision-making authority with participants with less bargaining power unless experience with BIM shows that the resulting gains in coordination and cooperation among the major participants tends to reduce project costs significantly.

208. *See* Brown & Basham, *supra* note 75, § 4.05; Ashcraft, *supra* note 43, at 9-15; O'Brien, *supra* note 43, at 29-34.

209. *See* Ashcraft, *supra* note 43, at 13.

210. *See id.* at 13-14.

211. *Id.* at 13.

212. *See id.* Contract provisions, whether or not based on IPD, can address these questions only to a limited extent, because tort law and professional licensing schemes are external to contractual terms. *See id.* at 11-13.

213. *See* United States v. Spearin, 248 U.S. 132 (1918).

214. *See* Brown & Basham, *supra* note 75, § 4.05; Ashcraft, *supra* note 43, at 13-14; O'Brien, *supra* note 43, at 31.

215. *See* Ashcraft, *supra* note 43, at 13.

responsible for the costs of resolving design and construction conflicts once they are identified?[216] Finally, how can industry insurance and bonding programs adapt to BIM's reliance on collective action?[217]

IPD offers five principal solutions to address these liability problems, all of which are distinctly relational and uniquely appropriate for BIM projects.[218] First, IPD contemplates a multi-party contract to allocate and manage risks consistently among the key participants. Second, it uses economic incentives to emphasize the sharing of risks and rewards from a project perspective rather than through individualized risk management. Third, it provides for a high degree of collective management of the project. Fourth, IPD features comprehensive liability controls. And fifth, it provides for pervasive claims management and dispute resolution processes to ensure that the parties will rarely, if ever, resort to adversarial procedures. The discussion that follows explores the first four of these IPD solutions to the risk management problem. Because the fifth one is so closely connected to a distinct legal concern that BIM presents, a separate discussion of IPD's approach to claims and disputes follows.

i. The Multi-Party Contract

The central device that IPD uses to reconceive risk management is its multi-party contract structure. As envisioned by its leading proponents, an IPD agreement should include not only the project owner, lead designer, and general contractor, but all of the other key participants whose expertise is essential for optimal exploitation of a comprehensive, computable model of the project.[219] This stands in stark contrast to the bilateral series of contractual arrangements of traditional project delivery systems, as well as the tri-party solution common for alliancing.[220] And IPD's legally enforceable structure is far

216. *Cf.* Brown & Basham, *supra* note 75, § 4.05 ("It is difficult to determine an adequate system of risk allocation when the architect's design comes head to head with the digital objects designed by various parties—all of which are then arranged and adjusted by a software program created by a multitude of programmers.").

217. *See* O'Brien, *supra* note 43, at 32-34.

218. *See supra* notes 96-102 and accompanying text.

219. *See* Ashcraft, *supra* note 182, at 19-20; Cleves & Meyer, *supra* note 182, at 11.

220. *See supra* notes 142-81 and accompanying text.

more effective than partnering, which uses an aspirational charter or statement of intent to induce the so-called partners to collaborate.[221] By joining the key participants in a single written agreement that governs the most important liability issues that arise among them, IPD permits the parties to establish project-wide relational tools. The multi-party approach could eventually also improve the prospects for development of insurance and bonding programs on a project-wide basis to cover some risks that are more difficult to address when insurance and surety bonds must be underwritten primarily for individual project participants.

ii. Economic Incentives

IPD's risk- and reward-sharing tools build on its interdependent, multi-party structure by aligning the owner's primary objectives (or the best interests of the project) with the economic interests of the other parties to the IPD agreement. While this can be done in different ways, the fundamental tactic ties participant profit collectively to objectively measurable project goals, such as cost targets, timely completion, and performance standards.[222] Especially for general contractors and trade contractors, profit primarily derives from the portion of the budgeted or anticipated compensation designated as fee, as contrasted to identifiable direct costs of performance.[223] By using formulae that in some way condition fees on meeting project-wide goals, IPD de-emphasizes the fault-based environment of traditional project delivery systems and combats opportunistic behavior.[224]

If, for example, total project costs exceed the budget that the parties collectively established as the target, the owner may still be obligated to pay each key participant its direct costs incurred in performance of its obligations, but all of those participants could have their fees reduced proportionately to

221. *See supra* notes 164-72 and accompanying text.

222. *See* Ashcraft, *supra* note 182, at 26-32; Cleves & Meyer, *supra* note 182, at 12-14. This shift does not completely align the parties' interests, as they may still negotiate how and when to settle on the relevant project goals, such as target cost. *See* Ashcraft, *supra* note 182, at 28-29.

223. *See* 6 BRUNER & O'CONNOR, *supra* note 74, § 19:76.

224. *See* Cleves & Meyer, *supra* note 182, at 10.

offset the overrun.[225] Similarly, if unanticipated circumstances require one of the participants to incur additional costs, that participant may recover those costs, but its right to profit on the additional work, and perhaps other participants' fees, may still depend on whether the project can be completed on time and within budget.[226] The manner and extent to which the participants share in losses may vary significantly, according to options that they negotiate in light of the circumstances of the specific project.[227] In keeping with these same principles, if the project is completed below the agreed budget, all of the participants may share in the savings.[228] In one variation, the incentive compensation system is the sole basis upon which a participant can receive a fee in addition to recovering its reimbursable costs.[229] Note that these arrangements do not take into account which of the participants may be at fault for causing additional costs, or precipitating or failing to plan for a particular unforeseen circumstance.

An IPD structure may also provide financial incentives if the project meets or exceeds performance specifications or other measures of project quality, or if it achieves other designated benchmarks.[230] Once again, the IPD incentive differs from bonuses that other delivery systems may offer because IPD success is more often determined on a project-wide basis rather than with respect to a specific participant's individual performance, and the financial reward may be distributed among all of the IPD participants under a predetermined formula rather than based on individual performance standards.[231]

The advertised objective of these financial incentives is to align all of the key players' financial interests with the project goals.[232] A critical question, which will require much more experience with IPD than the industry has had to date, is whether those affected by these innovative compensation schemes will embrace them. Will owners, for example, commit to reimburse additional costs incurred by a subcontractor

225. Ashcraft, *supra* note 182, at 27.
226. *Id.* at 29.
227. Cleves & Meyer, *supra* note 182, at 14.
228. *Id.* at 12.
229. *See id.* at 14.
230. *Id.*
231. *Id.*
232. Ashcraft, *supra* note 182, at 26.

because of problems attributable to that subcontractor or another participant, design errors, or ineffective management by a general contractor? Under what circumstances will other participants accept a structure in which all or a substantial portion of their profits depend on how well others both perform individually and cooperate as team members? The answers to these questions may depend on the extent to which BIM facilitates and reinforces collaboration and reduces the risk of expensive errors. Modeling promises these advantages through such attributes as the accelerated incorporation of the perspectives and expertise of the most important players, the opportunity to rehearse performance via simulation, and a powerful capacity for early clash detection.[233] If experience with the technology itself persuades the industry that the best interests of the project can equate to rational self-interest, IPD's contingent compensation options may help overcome generations of adversarial risk management.

iii. Collective Management

This risk allocation device operates by assuring key participants a voice in decisions that affect such critical measures of project success as cost, schedule, and quality. Once again, alternative IPD devices are available for this purpose.[234] But all of them allocate project management in ways radically different from traditional project delivery systems.

The old way was to vest most critical decisions exclusively in one participant or the other.[235] The owner, for example, could unilaterally direct changes to the work, with the affected participants having only a claim for extra compensation or additional time to perform.[236] Similarly, the project architect, in addition to making the basic design decisions, also made the decisions on matters of aesthetics, approved or rejected submittals and proposals from members of the construction team, and authorized or denied the contractor's applications for payments.[237] The general contractor solely controlled

233. *See supra* notes 54-72 and accompanying text.
234. *See* Ashcraft, *supra* note 182, at 21; Cleves & Meyer, *supra* note 182, at 10-12.
235. *See* Ashcraft, *supra* note 182, at 21.
236. Winkler, *supra* note 118, at 432-33.
237. Circo, *supra* note 119, at 348-62.

construction means, methods, and sequences.[238] The result was to distribute project management into distinct silos under the control of individual participants who frequently responded to competing financial interests.[239]

By contrast, an IPD agreement may commit many of the most critical decisions to a committee composed of top executives of the owner, the project designer, the contractor, and a selected group of subcontractors and consultants.[240] Similarly, the agreement may assign day-to-day decisions to a different team made up of on-site representatives of the same, or perhaps even a broader, group of participants.[241] One variation requires all decisions to be unanimous, while other IPD approaches leave ultimate decision-making authority on certain matters with the owner, but with extensive participation by other members of the management team and protections for those who dissent from the owner's decision.[242] Either way, to the extent that decisions are made collectively, no party to the IPD agreement will be liable to any other member for unanticipated consequences of those decisions.[243] Each team member is bound by group decisions on matters subject to team management.[244] In its most advanced form, IPD provides for the key participants to form an LLC to build the project so that project management is an entity function, the results of which no member of the LLC can challenge except in accordance with the entity's governing provisions.[245]

iv. Comprehensive Liability Controls

While contractual limits on liability are common in design and construction contracts, IPD gives those limits exponentially

238. Ross J. Altman, *Participants in the Design and Construction Process*, *in* CONSTRUCTION LAW, *supra* note 109, at 22-24.

239. The silo analogy has been used by other construction industry commentators as a criticism of the traditional arrangements. *See* Cleves & Meyer, *supra* note 182, at 10.

240. *Id.* at 10-11.

241. *Id.*

242. *See id.* at 11 (noting that some IPD agreements give the owner the power to make the decision if the management group cannot reach a unanimous decision, but with the other participants still having the right to resort to a dispute resolution process to challenge the owner's decision).

243. *See id.*

244. *See* Ashcraft, *supra* note 182, at 21.

245. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:18.45 (Supp. 2009).

greater force.[246] Under traditional delivery systems, liability caps and waivers benefit and bind only the two parties to the particular bilateral contract involved. But the complex, interdependent relationships among the multiple participants in a construction project give rise to expansive opportunities for claims, only some of which are governed by contractual risk allocation in a bilateral contract scheme. Suits by one participant against another frequently stretch either the limits of contract law, as in the case of third-party beneficiary claims, or the limits of tort law, as in the case of professional malpractice and negligent misrepresentation claims.[247] Many reside in the ill-defined boundary between contract and tort, as most dramatically represented by pure economic loss claims.[248]

To all of these difficult liability issues, IPD offers key participants the protection of consistent, reciprocal, negotiated liability limits that benefit all of the parties to the IPD agreement. These limits begin, as is true in traditional project delivery systems, with negotiated dollar caps for exposure to common claims made by one participant against another, along with waivers of certain other common claims.[249] The efficacy of these limits is greatly enhanced through IPD's multi-party and collective management structures. Additionally, to the extent that the participants accept a single building information model as the controlling expression of the project definition and its key performance criteria and standards, they may be more willing to rely on BIM technology itself as a collective risk management device.[250] In that way, perhaps, those participating in the BIM process may more readily accept significant limits on their ability to make claims against one another. In time, IPD's comprehensive liability controls may also contribute to the development of new project-wide insurance and surety bonding

246. *See* SWEET & SCHNEIER, *supra* note 111, at 294-96 (discussing contractual liability limits common in design contracts); *see also id.* at 592-93 (exploring typical waivers of consequential damage claims in popular construction contract forms).

247. *See* Circo, *supra* note 149, at 173-92.

248. *See* Carl J. Circo, *Placing the Commercial and Economic Loss Problem in the Construction Industry Context*, 41 J. MARSHALL L. REV. 39, 58-94 (2007); *see also* Vincent R. Johnson, *The Boundary-Line Function of the Economic Loss Rule*, 66 WASH. & LEE L. REV. 523, 557-61 (2009) (discussing the application of the economic loss rule when a plaintiff bases a tort claim on the breach of the defendant's obligation under a contract to which the plaintiff is not a party).

249. *See* Ashcraft, *supra* note 182, at 32-33.

250. *See* Brown & Basham, *supra* note 75, § 4.04.

programs that will better address certain liability exposures that benefit from external risk management.[251]

IPD ultimately manages the parties' risk exposure through dispute and claims processes designed to reduce the potential for adversarial legal proceedings.[252] The following discussion explains how that feature of IPD not only contributes to the overall risk management solution but also addresses a related but distinct concern that BIM presents.

b. Dispute Avoidance and Claims Management

Unless the main participants trust each other to behave collaboratively as unanticipated developments present potentially serious financial consequences, BIM technology will be little more than an exceptionally powerful digital design tool to help individual participants perform their respective responsibilities more efficiently. Pervasive teamwork using BIM and motivated by the best interests of the project requires a thoroughly collaborative project delivery system—not just cooperative and optimistic intentions as the project begins, but a commitment to project goals and to preservation of the relationships strong enough to withstand the profit-threatening challenges inherent in planning, coordinating, and executing the unpredictable enterprise that is building construction. Good intentions notwithstanding, independent economic actors will not meld into a project team at the level to which BIM aspires when disputes ultimately play out in a winner-takes-all context.[253]

Largely due to the expense, complexity, and unpredictability of construction litigation, the industry has had a long, but often unsatisfying, love affair with alternative dispute resolution processes.[254] For private projects, the parties early on tended to include binding arbitration procedures in their contracts, but in many ways construction arbitration has mirrored the problems of litigation as much as it has solved

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251. *See id.* § 4.06 (insurance, BIM, and IPD); Ashcraft, *supra* note 182, at 33 (insurance and IPD); O'Brien, *supra* note 43, at 33-34 (surety bonds and BIM).

252. *See supra* notes 128-34 and accompanying text.

253. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:18.10 (Supp. 2009) (decrying conventional contracting practices and perspectives that "reinforce self-protective behavior and instill mistrust").

254. *See* 1 BRUNER & O'CONNOR, *supra* note 74, § 1:6.

them.[255] The federal government turned to specialized administrative agencies and courts to handle disputes on many public projects, but it too failed to solve the industry's highly contentious nature.[256] The industry continued its search for better ways to manage disputes through such devices as mediation, stepped negotiations, dispute resolution boards, and partnering, all of which offer at least incremental advantages over the inherently adversarial nature of litigation and arbitration.[257] Alliancing and its progeny, IPD, are but the latest developments in this saga.

If IPD holds greater promise than the others, it is because it combines a pervasively collaborative contracting structure with the most effective alternative dispute resolution concepts. As a first step, IPD agreements typically include expansive reciprocal waivers by the parties that preclude some disagreements from ever making their way into any external forum.[258] And shared management processes may provide the exclusive means of resolving other matters because some important decisions made by a management group will bind all the members of the IPD team.[259] Claims and disputes not foreclosed in those ways will generally be subject to carefully controlled, stepped negotiations that traverse different levels of the parties' representatives, all the way up to the chief executive.[260] If those negotiations are unsuccessful, the process may next require the parties to present the matter to a mediator, and then to a neutral third-party or a dispute resolution board for a final, binding decision.[261] The net result can leave little, if any, opportunity for adversarial dispute resolution processes.

IPD's overall collaborative scheme encourages and facilitates this more holistic approach. Because all the participants who are most likely to be involved in significant problems should be parties to a unifying IPD agreement, many disputes will be subject to consistent procedures. And because each key participant should have a voice in project management, at least some claims and disputes can be resolved collectively

255. *See id.*
256. *Id.*
257. *Id.*
258. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 6:18.90 (Supp. 2009).
259. *See id.*
260. *Id.*
261. *Id.*

during the early stages of the project. To the extent that IPD's economic incentives instill confidence, trust, and teamwork, the parties may be especially willing to adopt and adhere to non-adversarial dispute resolution processes. IPD's approach to dispute avoidance and claims management, therefore, is exceptionally compatible with the highly collaborative environment which BIM facilitates and in which BIM can be most effective.

c. Controlling and Using the Model

Before BIM, a lead designer—either a project architect or a project engineer—would typically coordinate the overall design and could thereby maintain control over the design, at least up to a point.[262] In those days, the lead designer's ultimate control over the project's design derived from the process of issuing two-dimensional construction drawings and narrative specifications governing the work to be completed by the construction team.[263] The construction drawings and specifications in turn were key elements of the contract documents defining the scope of the project and each participant's distinct responsibilities.[264]

The lead designer's control was never complete, however, because traditional construction documents left many details to be supplied through shop drawings, field adjustments, and various post-design-phase inputs from suppliers, manufacturers, and specialty trades.[265] The additional design details in turn addressed limited aspects of the project as divided among the construction participants via a series of bilateral subcontracts. Those circumstances established fairly clear lines of responsibility for specific design activities and maintained the lead designer's central role, but they yielded relatively little integration and teamwork.

BIM can amalgamate far more data than conventional design methods allow.[266] This revolutionary feature thrives in

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262. *See* SWEET & SCHNEIER, *supra* note 111, at 162-64.

263. *See* Stephen A. Hess & Lawrence C. Melton, *The Design Undertaking*, *in* CONSTRUCTION LAW, *supra* note 109, at 131, 158.

264. *Id.* at 132-33.

265. Joyce K. Hackenbrach, *An Overview of Major Project Delivery Methods and Their Design Risk Allocation*, *in* SHARED DESIGN, *supra* note 45, § 3.03.

266. *See supra* notes 43-53 and accompanying text.

an iterative design environment in which inputs come from multiple project participants, including those not part of a traditional design team working under the direction of a lead design professional. Through such a comprehensively integrated process BIM can produce a computable simulation of the project that includes much more of the design data, material and product characteristics, construction information, and constituent building relationships that the physical project will possess upon completion. Used in this way, BIM allows for "one digital model that will serve as the single source of design, capturing all information needed to construct the building."[267] Alternatively, a more limited application of the technology occurs when the lead designer, specialty design consultants, the general contractor, and principal subcontractors develop multiple models for their own specific purposes.[268] Although BIM is currently being used primarily in this more limited way, some experts argue that, because the fully integrated version of modeling can deliver truly transformative benefits in clash detection and overall efficiency, the industry eventually must embrace that approach.[269] From a contractual perspective, this prediction leads to concerns over control and use of the model.[270] How can project delivery systems adapt to the unprecedented degree of shared design responsibility that BIM, applied in its most comprehensive form, presumes?

If key project participants are to collaborate fully using a single model, they must resolve several novel questions concerning control and use of the model. Who selects the BIM software, who inputs the basic data into the program to generate the model, and who may make changes to the model?[271] How should questions of interoperability be managed as two or more participants create or manipulate their own models or versions of the model and as different software applications exchange information with each other during the modeling process?[272] What procedures will best protect against the introduction of modeling errors, corruption of the model, or loss of data?[273]

267. O'Brien, *supra* note 43, at 28.
268. *See id.*
269. *See id.* at 28-29.
270. *See* Ashcraft, *supra* note 43, at 13.
271. *See* Brown & Basham, *supra* note 75, § 4.05.
272. *See id.* § 4.03.
273. *See* Ashcraft, *supra* note 43, at 10.

Might contractors be better positioned than design professionals to take the lead in utilizing BIM?[274] What role should the model play in governing performance by any of the parties; should the parties accept the model as one of the controlling contract documents, or is the model for information and reference only?[275]

Currently, BIM projects often proceed under one of the traditional delivery systems.[276] In those cases, the parties may address some of the control and use issues by adding a special BIM protocol to the standard contract structure. Two of the leading industry organizations have developed such BIM modifications for this purpose.[277] While accommodating BIM in this way is feasible for many of the same reasons that have already been discussed, none of the traditional project delivery systems provide ideal structures to facilitate the integrated teamwork best suited to realizing BIM's full potential.[278] Once again, IPD may offer a superior structure.[279]

Some of IPD's advantages in dealing with these questions stem from attributes that have already been addressed in this article.[280] After all, control of the model is, in the first place, an aspect of risk management, dispute avoidance, and claims management. Consider the risks associated with design liability. From a conventional project delivery system perspective, the design professional of record, because of the substantial liability exposure stemming from design services, logically wants to maintain control over the design, including the digital simulation of the project. As previously discussed, IPD offers solutions to liability concerns that are exceptionally well-suited for BIM projects, especially in the form of liability limits and claims management procedures applied consistently to all the major participants. Similarly, IPD's team approach to project management allows collective administration of the BIM protocol. IPD's project management structure, along with such IPD hallmarks as coordinated liability caps, reciprocal liability waivers, and claims management, can help to resolve many of

274. *See* O'Brien, *supra* note 43, at 26-27.
275. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 7:107.25 (Supp. 2009).
276. *See* O'Brien, *supra* note 43, at 28.
277. Brown & Basham, *supra* note 75, § 4.04.
278. *See* O'Brien, *supra* note 43, at 28-29.
279. *See* Ashcraft, *supra* note 43, at 15-16.
280. *See supra* notes 182-93 and accompanying text.

the liability risks associated with shared control and use of the model.

IPD also provides an especially attractive solution to two other issues that have most troubled industry commentators concerning the model's legal status—the extent to which participants should have the right to rely on the model and whether or not the model should be a contract document that defines the project and the obligations of the contractor and subcontractors to build in accordance with the design.[281] In other words, should the model have the same contractual status as the final plans and specifications have in a conventionally designed project? Unless the answer to this question is yes, individual participants will still need to rely either on their own modeling, or on traditional drawings and specifications and other construction documents that they must create, secure, or verify in some way apart from the model, leading to a considerable loss of BIM's potential efficiency.

IPD's relational risk management features, supplemented by its dispute avoidance and claims management devices, should make it more attractive for the parties to accept the model as the controlling expression of the design and the project definition to which all must conform. And those same IPD features provide a framework for collectively sharing the risks of errors in the modeling program itself or in any of the data incorporated into the model. Thus, under the IPD structure, the participants should be much more willing to accept the model as a contract document and to agree that all of the major participants can rely on the accuracy of the model. Especially in light of agreed liability limits and waivers, the key participants may, in effect, acknowledge collective responsibility for any problems stemming from the use of BIM technology. When the project delivery system motivates each participant to put the best interests of the project first, collective reliance on a single model likely represents a much smaller risk than the corresponding risk of errors that may result when individual participants must decide for themselves how to use the model to inform and direct their own activities.

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281. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 7:107.25 (Supp. 2009) (considering the status of the model as a contract document); Ashcraft, *supra* note 43, at 11-12 (discussing reliance).

Concerns about control and use of the model are not limited to matters of risk and claims management and project administration. Beyond those considerations, at least in traditional project delivery systems, the lead design professional also typically wants to control the model for quality-assurance purposes.[282] This is logical in those delivery systems because the project owner looks to the project architect or engineer (or to the design-builder in the design-build system) to provide construction documents sufficient to direct those who will execute the work. Additionally, in the design-bid-build system, the project architect or engineer generally inspects construction progress periodically and issues certificates for payment based on the determination that the work conforms to the design concept and any performance specifications or other objective criteria dictated by the design documents.[283] To a considerable extent, IPD can obviate these concerns, provided that the parties to the IPD agreement are sufficiently committed to a shared design process, an objective well-served by the other relational attributes of IPD.

d. Intellectual Property Issues

Closely related to the control and use questions are issues concerning property rights in the model and the data and objects incorporated into the model. Who owns the model itself and the data incorporated into the model and thereby holds the associated intellectual property rights?[284] Should or must different participants who wish to enjoy the full benefits of BIM create their own models to protect their own intellectual

282. Motivation to control the model can also be important for the related purpose of assuring aesthetic integrity, particularly in the case of a design that affects the architect's professional record and reputation. With or without IPD, a comprehensive BIM protocol should consider whether, or the extent to which, aesthetic concerns will trump collective management. For example, the parties might identify signature design elements of the project over which the lead designer will retain ultimate control.

283. *See* Circo, *supra* note 119, at 344-46, 360-61.

284. *See* Brown & Basham, *supra* note 75, § 4.05; Ashcraft, *supra* note 43, at 13. *See generally* Mary Jane Augustine & Christopher S. Dunn, *Consequences of Ownership or Licensing of the Project Drawings—If You Pay for It, Do You Own It?*, CONSTRUCTION LAW., Summer 2008, at 35 (discussing the intellectual property issues associated with project drawings).

property?[285] Who should have the right to use the model for purposes other than performing project responsibilities?[286]

In the same way that the BIM protocols being developed for traditional project delivery systems are exploring options to address the control and use questions, they are also providing possible solutions to the intellectual property issues. Intellectual property rights in the model for the project, or in a particular model developed for a limited purposes, may be assigned or controlled by contract.[287] Under one extreme, a project architect might insist on securing or locking down the model. Doing so not only ensures that no one else may change or manipulate the model, it also protects intellectual property rights in the model. Even in that case, however, the BIM protocol will almost certainly give various project participants licenses to use the design and data incorporated in the model for purposes of performing their work on the project.[288] The project owner will often want a copy of the model and a license to use it for operations and maintenance purposes.[289] The project architect and the owner may negotiate over whether and under what conditions the owner may also use the model in connection with future alterations or modifications of the project.[290]

Once again, when BIM is used in combination with IPD, the parties can deal with certain intellectual property rights issues more fully in keeping with the technology's collaborative capacity. If, for example, the parties to the IPD agreement form an LLC to design and build the project, the company, rather than any one member, can own the model, including all versions and adaptations of it. In that case, the members of the project management team can be given the authority to decide collectively on the nature and terms of all licenses and how to distribute or share any licensing fees. While this communitarian approach will not be suitable to all circumstances, when consistent with the nature of the project, it is a uniquely collaborative and relational option that the IPD structure facilitates nicely.

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285. *See* Ashcraft, *supra* note 43, at 10.
286. *See* Brown & Basham, *supra* note 75, § 4.05.
287. Ashcraft, *supra* note 43, at 10.
288. *See* Brown & Basham, *supra* note 75, § 4.05.
289. *See* Ashcraft, *supra* note 43, at 8.
290. *See id.*

C. Does IPD Provide the Intentionally Relational Delivery System that BIM's Collaborative Framework Requires?

IPD's advantages in risk management, dispute avoidance, and claims management are especially significant if the construction industry is to exploit BIM's full capacity. By giving prominence to such relational contract norms as true collaboration, the flexibility to respond to unanticipated developments, reciprocity, strategies to deter opportunistic behavior, and a commitment to preserve the relationship, IPD may enable the level of collaboration that is essential to take the greatest advantage of BIM technology.[291] And while other project delivery systems can accommodate protocols for dealing effectively with BIM's usage and control challenges and intellectual property issues, IPD can offer at least limited advantages on those matters as well. Whether or not IPD, as currently conceived by construction lawyers, is the ideal contractual framework for BIM projects remains to be seen as the industry gains more experience with BIM. But whatever the ultimate answer to that question may be, for the reasons described above, IPD seems to be superior to traditional project delivery systems for BIM projects. To the extent that is true, the opportunities and challenges presented by BIM's highly collaborative technology have, at this moment in the history of the construction industry, the potential to lead at least one important segment of commerce toward a greater commitment to the intentionally relational contract.

IV. CONCLUSION

If BIM propels the construction industry toward a more coherent application of relational contract, that alone will be a notable development.[292] But the more interesting question is whether other highly collaborative technologies may also lead to

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291. These are the same relational norms that eventually characterized the Disney-Pixar renegotiated deal described in the introduction of this article. *See supra* notes 28-42 and accompanying text.

292. A final caution is in order. Not all proponents of BIM claim that the industry will necessarily move rapidly to embrace BIM. *See* 2 BRUNER & O'CONNOR, *supra* note 74, § 7:107.19 (Supp. 2009) (denouncing the claim that BIM's superior technology is "so overwhelming that it will gain rapid, widespread adoption" because the industry "is highly resistant to change with well-entrenched modes of behavior that conflict with broad implementation of this technology").

a more general acceptance of relational norms in commercial transactions. If so, we may see a new generation of relational contract theory that could play an enhanced role in the law, led by refinements in the art of the intentionally relational, negotiated agreement and a significant move toward what theorists should recognize as relational contract law—contract law and contracting practices that are more consistent with how parties to interdependent exchange relationships actually behave.