Developing Meaningful Contract Terms for Electronic Communications on Construction Projects

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Technological advances in electronic communications for construction projects have leapt forward in the past decade, leaving those in the construction industry and their legal counsel scrambling to keep up. There are obvious and tantalizing benefits of embracing the concept of "enter once, use twice" that are fostered by electronic project data exchanges. Such exchanges allow secure transmission of project correspondence and records via internal and hosted websites, allow interactive development and exchange of designs using electronic tools like building information modeling (BIM) software, and enable real-time audio and visual discussion via electronic chatrooms, including transmitting photographs from the site, and group modification of virtual drawings or written records via electronic means, during the discussion. The speed with which these electronic communications can now take place, and the growing ease with which electronic information can be accurately conveyed and archived, make it unlikely that the trend toward fully paperless construction projects will slow. It is more likely that fully electronic project records exchange is inevitable but will bring with it some unique legal challenges, particularly because the best practices for use of electronic communications technology are only currently evolving.

Electronic communications technology is evolving for construction projects faster than case law or even legislation can meaningfully address,[1] so contract terms regarding electronic communications are of critical importance in establishing rights and responsibilities of the construction project team related to their use. Several industry groups have addressed this gap in legal authority by developing form contract documents that focus specifically on the means and methods by which parties will undertake their construction project's electronic communications. The ConsensusDOCS™ 200.2 (2007) Electronic Communications Protocol Addendum,[2] the American Institute of Architects AIA™ C106 (1997) Digital Data Licensing Agreement,[3] and the AIA™ E201 (1997) Digital Data Protocol Exhibit[4] are recently issued forms that address the process by which project electronic communications can be implemented, providing insight into emerging best practices about technology use for construction project communications. The ConsensusDOCS™ 301 Building Information Modeling Addendum and the AIA™ E202 Building Information Modeling Protocol Exhibit extend rules for electronic communication to building information models.

This overview examines these and other recently issued construction industry contract forms that address project electronic communications. It provides guidance about legal issues that the careful practitioner should address to increase the potential for project success using these powerful tools, including recommendations based on experience derived from a number of completed construction projects that have embraced communications technology and administration using a paperless (or substantially paper-limited) process.

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Electronic Communications Under EJCDC Documents: A Conservative Approach to Electronic Document Exchange

Current Engineers Joint Contract Documents Committee (EJCDC)[5] contract documents reflect a conservative approach to electronic communications in the construction industry. Section 3.06 of EJCDC Document 700, "General Conditions," for example, states:[6]

> 3.06 *Electronic Data*
>
> A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files

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will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long-term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

The EJCDC's stance reflects an underlying concern that the technology behind electronic communications is inherently unreliable. It is driven by fear of dramatically increased liability if parties rely on electronic information that might have been altered during transmission, or if the received information is used for purposes unintended by the sender. It solves these problems by denying any responsibility for the information being transmitted and requires the receiver to verify the accuracy of the received data. In addition, the EJCDC avoids the intellectual property or copyright issues that may arise from document reuse by simply making reuse at the user's sole risk.

The EJCDC's stance reflects an underlying concern that the technology behind electronic communications is inherently unreliable.

The net effect of the EJCDC's unwillingness to rely on electronic data, however, is to undercut the utility of electronic communications exchange. If a party cannot rely on electronically exchanged information, then it must duplicate all or some of the original efforts undertaken in creating the information, just to verify data accuracy. Repeating the work risks further error when recreating or reentering data that were previously created by another party, and, in any event, increases production cost without creating any new value.

The newest construction project software integrates project information from multiple sources—owner, contractor, trade contractor, and suppliers—into a single base for reuse by all those parties, both during project development and for the rest of the building's postconstruction operation and maintenance life. Where information in the project data store cannot be relied upon without verification, it restricts the desire to use this increasingly robust technology, thereby delaying its development and refinement. Thus, while the current EJCDC contract position on electronic document exchange reflects legitimate concerns, by comparison, the recent ConsensusDOCS and AIA approaches to electronic document communication better harness the benefits derived from greater reliance on electronic communications.

Fundamentals of an Electronic Communications Protocol

An electronic communications protocol must address at least three independent aspects of transmitting data electronically: information technology, information management, and information authority. Each of these aspects affects the others, and all must be addressed to avoid the fear of communication failures that has spawned contractual limitations on use of, and waivers of liability for, electronic communications.

Information technology is concerned with technology infrastructure. It is the hardware, software, and configuration backbone that supports electronic communications. For example, how many servers will be needed to store and exchange project records; what software will they run; will a client-server architecture or a thin-client approach be used;[7] will information exchange be via existing, general-purpose web browsers or created through discrete, project-specific connections; what form of electronic records retention will be used and how will it be managed; what Internet connectivity will be required; what printer configurations are needed; and what other equipment and processes will be necessary to ensure an efficient, reliable, and secure project system? These are only a few of the questions that must be answered by the information technology (IT) professionals who will create an electronic communications system for a construction project. Note that the substance of exchanged communications is not addressed at this technology level nor are determinations made about access, or what rights participants have, to use the shared information.

Information management is concerned with overall administration of the computer system established for the project and organization of the data on it. Issues such as individual access rights, timely updating of data, keeping track of changes in different versions of the same document as it is refined over time, and organization of key project information such as BIM models, plans, specifications, addenda, contracts, payment applications, RFIs, and responses, and other issues of communication management, are resolved at this level. Like information technology, information management is not concerned with communications content. Instead, it focuses on ef-

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ficiently organizing, providing access to, and preserving information within the communications system.

Information authority is concerned with who may create substantive, intellectual content; who may modify the intellectual content; who has rights to use the intellectual content of electronic communications; and the scope of the rights allowed. This level is the abstraction that is implemented in the prior two levels.

Although all three levels need to be addressed to best generate a useful electronic communications protocol for a project, *when* they are discussed during the life of the project and the *depth* to which they are discussed vary widely. The electronic communications documents developed by ConsensusDOCS and AIA are interesting examples that look at the same task of communications system development, but from different perspectives, with each making different presumptions about the best timing and scope of protocol development necessary to maintain electronic project communications.

The ConsensusDOCS Electronic Communications Protocol Addendum (ECP Addendum) uses a checklist approach to develop a prescriptive electronic communications protocol, leading the parties through a series of considerations, at all three levels, that should be addressed and incorporated into an electronic communications system.[8] In addition, the ConsensusDOCS document requires appointment of a specific, and potentially independent,[9] IT management coordinator and webmaster for the project. In contrast, the AIA documents make no presumptions about the specific system parameters that will be implemented or the personnel that will manage electronic communications once protocols are established. AIA's forms assume that this level of organization is best left to the parties based on their prior experience, their current needs, and the limitations of available software and hardware to achieve their specific project communications goals.

Both groups' forms reflect a recognition that construction project hardware and software are continuously evolving, and may be upgraded by companies that create it or modified by the parties periodically throughout the life of the construction project. Neither contract form requires third-party computer service provider involvement, although they do not prohibit it.

The AIA documents expressly address the use of protected intellectual property information through licensing provisions. The ConsensusDOCS form treats access rights created under the ECP Addendum as controlling, but relies on terms created by other contract documents between the parties to establish entitlement for use of copyright-protected information to the extent such terms are not inconsistent with rights created by the ECP Addendum.[10]

AIA utilizes an open-ended matrix[11] that defines how information will be exchanged, the file formats to be used, and the permitted uses of electronic information. ConsensusDOCS allows the parties to consider various options by requiring fill-in-the-blank responses to a variety of computer hardware, software, and related application issues related to their use.

Which approach is better? In actuality, both approaches have merit, and which is preferable for a specific project will depend upon the needs and sophistication of the parties—and there is some benefit that can be gleaned by using elements of both approaches. The performance specification approach used by the AIA documents focuses the parties on the functional aspects of communication and the communication matrix may be useful in a ConsensusDOCS project. Similarly, even if the ConsensusDOCS contracts are not being used, the Electronic Communications Protocol Addendum can serve as a reference to remind parties of issues that need to be addressed during predesign/preconstruction coordination meetings.

The salient points of the ConsensusDOCS ECP Addendum, contrasted with approaches taken in the AIA Digital Protocol documents and EJCDC forms, to the extent they differ, are summarized in the following sections.

The ConsensusDOCS Electronic Communications Protocol Addendum

Of the industry contracts currently available, the ConsensusDOCS 200.2 ECP Addendum is the newest and most detailed form document to examine specific aspects of project electronic documents exchange. The ECP Addendum defines "Electronic Communications" as the "use of computer technology to exchange Project information and documents electronically."[12] Its goal is straightforward. The ECP Addendum seeks to

> help facilitate uniform and secure transmittal of Electronic Communications, as well as maximize the interoperability and compatibility of system components and formats used to convey them, and to protect and preserve data exchanged via Electronic Communications . . . .[13]

It presumes that the ECP Addendum terms related to electronic communications will augment, rather than conflict with, existing contract documents, but establishes priority among project contract documents by fixing the ECP Addendum as controlling.[14]

Information management is concerned with overall administration of the computer system established for the project and organization of the data on it.

- The ECP Addendum addresses seven main aspects of electronic communications exchange:
- The *parties* that will participate and have right of access to Electronic Communications;
- Establishment of *information technology administrators*, who decide governing policies and coordinate compliance with technical protocols and procedures, and an IT management coordinator and webmaster, tasked with the day-to-day coordination of electronic communications issues and operation of the project website, if any;
- *System parameters*, including minimum hardware, software, transmission and access, security, translation, and test protocol requirements, as well as the process for handling upgrades or modifications to the computer systems and technology being used for the project;

The ConsensusDOCS 200.2 ECP Addendum is the newest and most detailed form document to examine specific aspects of project electronic documents exchange.

- The types of *contract documents* that will be exchanged electronically and be binding via electronic exchange;
- The process for *data compilation* of project records during performance of the project and the archiving of electronic records upon project completion;
- The designation of types of electronic document that may be modified by parties other than the party originally creating them and the *version and revision control* process for documenting changes to them; and
- The parties' *responsibility for compliance* with the system parameters set under the ECP Addendum, including liability for errors they create.

Parties

Section 2.0 of the ECP Addendum sets expectations about how much of the design and construction team is bound and/or permitted to use electronic communications technology on the project. This is not as transparent an issue as it might initially seem. It is great to say that everyone involved in the project will be bound by and participate using the ECP Addendum protocols, but the need for access and cost implications of such a decision often require a more limited or refined approach.

Sometimes the principal contracting parties will want to limit system users, because the expense to acquire hardware and software is prohibitive for the smaller subcontractors and subconsultants they want to involve on the project—not to mention the cost for training of their employees to use it correctly and to maintain such systems throughout the life of the project. The reality, however, is that duplicating data twice (or more) is inefficient, error prone, and therefore expensive, too. Electronic data exchange permits better tracking of when and with whom data are exchanged, establishes consistency in the method of data sharing/updating, and creates a faster information exchange process than paper transmission of records, all of which result in cost savings for each party and the project as a whole. Although existing technology capabilities of the parties may require limitations on an individual basis, investing in electronic communications as a workhorse to the greatest extent fiscally possible only makes good economic sense in the long run.

Where subcontractors, consultants, and suppliers will be required to conform their communications to ECP Addendum requirements, the parties that have direct contracts with them should make sure to attach a complete copy of the ECP Addendum to their respective subagreements and require compliance with it by express incorporation. In addition, each party that participates in electronic communications should be directed to identify a specific individual representative who will be responsible for implementing ECP Addendum requirements for that party, including communicating with the computer system management coordinator and webmaster appointed for the project, helping troubleshoot problems in his or her local system, and handling upgrades and modifications to the system during the course of the project.

There are limitations of the capability of computer hardware and software at present that also may have an impact on which parties exchange information electronically and the sort of information that is exchanged, even if the parties desire to have an entirely "paperless" project. For example, 2-D designs may still need to be generated on paper even though the parties want to use BIM design development to the greatest extent possible because the level of fine scaling required for a particular detail cannot be readily depicted yet with 3-D modeling software or read by two different softwares used to generate various elements of a BIM design model.[15] In other instances, the parties participating in certain types of electronic communications used on the project may be limited based on the amount of data that can realistically be handled by their project computer system. Even though the subcontractors could add shop drawings or other design information that they generate into a BIM computer model, for example, the project team may decide to limit contributors to the model, purely in an effort to deal with the fiscal constraints imposed by the cost to acquire and maintain sufficient hardware and software to share, read, modify, and store such a large amount of design data in a single file. The more 3-D (or greater

design data—4-D, adding scheduling information, and 5-D, with cost accounting added into the model) that the parties desire to share for a project, the broader the circle that has interoperability challenges that need to be considered as part of electronic communications protocol development.[16] Although the ECP Addendum begins to address system parameters related to virtual design model development by requiring the designation of a model facilitator[17] and identifying BIM software that will be used for the project,[18] it may be necessary to add additional contract terms specifically related to computer design modeling. Contract forms such as the ConsensusDOCS 300 (2008) BIM Addendum and the recently released AIA E202 (2008) BIM Protocol Exhibit will be a useful starting place for those who have not previously included BIM modeling as part of their electronic communications exchange.[19]

Just how many subcontractor and supplier tiers should be included in electronic records exchange? If they will be required to supply data to a BIM model or are needed to maintain currency of project information during a significant portion of the project construction phase, lean toward providing access—or mandating it.

IT Administrators/Management Team/Coordinator

The ECP Addendum places primary responsibility for shaping electronic communications exchange on three representatives designated, respectively, the project prime contractor, designer, and owner (the IT Management Team).[20] Lead management of information technology can be handled by the project owner, lead designer, prime contractor, construction manager, or an outside consultant hired by any of them—and any one of them can successfully manage the project website as well. Moreover, this management can be transferred from one party to another as the project's electronic communications needs change over the life of the project, such as transitioning from designer to contractor upon issuance of the building permit.

Often, it turns out that the party that has the best electronic communications technology at the front of a project ends up taking charge. It also depends partly on the type of documents being exchanged—if only designs are exchanged electronically, an ftp site can be built that the project lead designer runs in-house as the most cost-effective solution for the parties. For the contract drafter, the important question is: What sorts of information do you want to exchange electronically? Have the principal stakeholders in a project answer that, and determine management based on cost-effectiveness from there. Bear in mind, too, that it may be appropriate on a given project to have one party start with the responsibility for management of the project website or electronic communications, and have that responsibility transition to another party later in the project, or to have different parties be responsible for different parts of the project electronic communications system that will be implemented based on their unique expertise or specific needs to control information generated by design, costing, scheduling, or other software used on the project.

Management of information from an IT control standpoint on a project site is typically held 15% by the lead designer, 40% by the construction manager or general contractor, 15% by multiple prime contractors or subcontractors, 15% by outside consultants, and 25% by the project owner (yes, that's 110%—because there is often unnecessary overlap of management, and that is exactly what ConsensusDOCS was hoping to force people to address by raising issues of management in its ECP Addendum). The IT Management Team should use these percentages as a starting point and evaluate what will truly be needed for effective administration of electronic communications, shaping their decisions on procedures and practices consistent with the best interests of the project as a whole.

A practice recommended by ConsensusDOCS is the use of a coordinator to handle day-to-day technology issues occurring during performance of the project and a webmaster for the creation, operation, and maintenance of a project website (if one will be used for the project). For example, the host server isn't working—how will it be repaired and data integrity restored? A version change or upgrade is issued by the manufacturer of a software that is being used on the project—should it be loaded on everyone's computers, and how will that be accomplished to avoid reading errors resulting from having only some of the project team upgraded to the newest software version? The logical party to furnish the coordinator should be the party that handles the host server and is the project website host and thoroughly understands its operation. Recognize that this can be, and often is, an outside or third-party service provider. These outside consultants are something of a double-edged sword. They can certainly expand capabilities where parties lack technology in-house and can coordinate system operations once the system parameters are established. Nevertheless, they typically have no liability insurance, limited assets, and the exculpatory clauses in their contracts are a masterful waiver of every problem ever created since the beginning of time. If they will be used, also recognize that a problem that disables their host site so that the parties cease having access to their project data will likely have to be treated like a force majeure delay by the parties.

Just how many subcontractors and suppliers tiers should be included in electronic records exchange?

If multiple servers will be plugging in periodically to a project website or model, each party still will have IT issues of its own. It is fruitful to either make coordination with each party's IT staff the coordinator's duty or have the IT Management Team give some guidelines to the coordinator for how coordination issues will be handled.[21]

System Parameters

The heart of the new ECP Addendum is in section 4.0, "System Parameters," which requires the parties to make an identification of hardware, operating system, software, services, electronic processes, and their versions that will be necessary to effectively and reliably transmit and receive project-related electronic communications. For the lawyer approaching contract drafting regarding electronic records protocols for the first time, this will undoubtedly be the most daunting part of the ECP Addendum to understand. That is part of the reason for such an extended "laundry list" of possible system elements in this section—it helps to ensure that the parties do not forget to consider pertinent parts of the system that can radically alter the effectiveness or reliability of the electronic data being exchanged.

If multiple servers will be plugging in periodically to a project website or model, each party still will have IT issues of its own.

Often it is helpful to discuss the types of contract documents that will be transmitted electronically by reviewing (or adding to) the list identified in section 5.0 of the ECP Addendum, and then go back to section 4.0 as a cross-check to make sure that everything necessary to accomplish desired ends of document exchange are met by the system parameters. For example, needing accurate color resolution or density because the project's interior designer is halfway around the world working remotely during most of the project will not be accomplished unless suitable graphics cards and monitor resolution, color calibration, and other hardware features are adequately considered. Obviously, this will require the contract drafter either to have a baseline of knowledge about these various technologies and their applications or to work closely with IT staff who can educate the drafter about what is available, cost-effective, and necessary to accomplish project electronic communications ends.

By including specifications regarding permitted file formats, versions of software to be used, and transmission requirements, ConsensusDOCS was trying to eliminate some of the conflicts arising from data degradation errors and mismatch of technology (for example, loading a software program and finding it conflicts with the operation of another one, or that the software scrambles hardware operation, and similar problems).[22] Error-checking protocols also should help to eliminate data "gets there or doesn't" issues or, at a minimum, will mandate fail-safe reporting of failure to convey data fully, but such protocols have to be established to get that protection—don't assume project software automatically has it.

There are also layering issues in selecting design software and hardware for the project so that the information generated during design development can be subsequently linked into contractor construction databases seamlessly without reentering data. Knowing what is going to be done, thinking consciously not just about transferring information, but determining how the parties will be using the data and causing it to be read and modified by multiple softwares is something that has to be thoughtfully developed in advance for best results.

Electronic Contract Documents

Section 5.0 of the ECP Addendum identifies the types of documents parties can rely on as binding when they are exchanged electronically—either requiring everything to be exchanged electronically or identifying selected project and contract documents from a list of contract documents, to be conveyed (solely) by electronic means. When only certain documents are treated as binding, section 5.4 of the ECP Addendum specifies that any other sorts of documents exchanged by electronic means "will be transmitted at the originator's risk." By comparison, EJCDC flatly says that nothing exchanged electronically can be relied upon, and the party receiving the transmission is responsible for determining accuracy of content.[23] EJCDC does not work badly as one way to handle the issue—everyone checks all the electronic data they receive and uses it at their own risk. Because complicated documents are generated with contributions from multiple members of the project team, however, this realistically gets pretty difficult to accomplish.

A different approach to the problem of interoperability is taken by ConsensusDOCS, which implicitly acknowledges that not all hardware and software are completely reliable and compatible at present, and, therefore, only some documents may be prudent to treat as binding upon electronic transmission. Although it anticipates the increasing likelihood that all project electronic communications may be able to be accomplished with seamless integration and provides an option for everything exchanged electronically to be binding upon the parties, it also permits various types of typical project contract documents and records to be selected and treated as binding when conveyed by electronic means. This hybrid approach tacitly addresses EJCDC's reliability concern by allowing parties to treat as binding only those project records for which they have a reasonable

belief that the technology they use will generate them reliably, anticipating the growing sophistication and power of computer processes to augment project performance now and in the future.[24]

The AIA approach does not inherently limit reliance; however, it requires the parties to determine who can receive information and how they can use it. Thus, information may be relied upon as long as it is used for the agreed purpose. This creates great flexibility and specificity, but conceptualizing the project information flow requires a greater level of experience and IT sophistication. Less knowledgeable project teams or drafters may prefer the ConsensusDOCS checklist because it helps identify issues and pull coherent system parameters together.

The drafting committee for the ECP Addendum set out the laundry list of kinds of project records in an effort to trigger a cross-check of the section 4.0 system parameters. In other words, by providing a list of different types of records that can be exchanged electronically, it forces the parties to confirm whether they have adequate hardware, software, and other supporting technology to be able to accurately and securely exchange each type of project record. Over time and as the industry skews toward, and has more experience with, paperless projects (and as the strength and complexity of project management programs supplant reliability concerns), it is anticipated that this paragraph in the ECP Addendum will be significantly reduced or will simply require all project records to be exchanged via electronic means.

Data Compilation and Archiving

The responsibility to keep copies of electronically exchanged data for reference and use during the project is a critical obligation. Section 6.0 of the ECP Addendum, therefore, sets basic protocols for data compilation and archiving of project electronic records. In contrast, the Digital Data Protocol Exhibit is concerned only with the current transfer of project information and does not, therefore, discuss archiving.[25]

The ECP Addendum also directs the parties to examine and resolve the medium by which electronic records will be archived. This is not a trivial concern. The structures being constructed may survive longer than any digital communications medium currently being used. Magnetic media such as floppy disks degrade relatively swiftly, and computer technology is changing even faster. Who today still has a computer with an eight-inch floppy drive, let alone the IBM Displaywrite™ software that was probably used to create the file? In fact, the Rosetta Stone project, responsible for archiving all of humankind's languages, has concluded that no digital system available today is truly archival and, therefore, it is inscribing its texts on nickel sheets![26]

This thorny issue is one that, at present, does not have a good answer. In general, whatever media are used, the party responsible for archiving should have a responsibility to keep hardware and software adequate for reading saved project records in the foreseeably needed future (or certainly until the applicable statute of limitations or repose has lapsed). For more sophisticated developers and project owners having long-range or portfolio management and operations needs, some consideration should be given to adding provisions to the parties' communications protocols that include an obligation to convert project records to new media as they become available and reliable and to translate the information into data formats that can be accessed using contemporary software.

Less knowledgeable project teams or drafters may prefer the ConsensusDOCS checklist because it helps identify issues and pull coherent system parameters together.

Version/Revision Control

One of the most controversial areas of electronic data exchange arises because of the ease with which electronic documents can be modified. The concern is that these modifications cannot always be traced with equal ease, depending on the type of document involved.

Who can modify the project electronic documents? The industry is all over the map on this question—"mine is mine and you can't have my documents in modifiable form" all the way to "everyone contributes to a single database and everything is traceable so we don't worry about modifying really much at all" are equally prevalent. A lot depends, too, on the type of documents involved. Designers, with licensing, copyright, and liability concerns related to modification of their work, are most likely to want to restrict access to, or reject allowing modification by, parties other than the author of their drawings and plan details.

There are also ongoing concerns about the increasing number of parties having access to data stealing something created by another team member—like copying details from a designer's detail library, or reusing portions of the architectural designs for preparation of shop drawings, or duplicating proprietary checklists created for site management during construction for use on another project. This is not a good reason to preclude electronic project communications—this problem has been happening for decades with paper and 2-D CADD media. About the same level of piracy and copyright infringement will happen with more sophisticated communications and modeling technology.[27] The reality is, however, that version control is much easier to track with electronic technology, and even where software does not expressly identify changes and who authored them, the metadata imbedded in programs does so to an astonish-

ing degree, if this information is really needed. In short, concerns about liability for stealing or modifying data are *not* the monsters they are being made out to be.

The AIA contract forms further help to ameliorate these revision concerns by creating a specific copyright in data exchanged electronically. ConsensusDOCS also addresses this issue by requiring a party that modifies data to accurately identify revisions—manually, to the extent that computer software used does not do so automatically.[28]

In short, concerns about liability for stealing or modifying data are *not* the monster they are being made out to be.

Professional responsibility for final design content is another excuse some have used to avoid embracing electronic communications—particularly modeling technology and data exchange from information imbedded in a model. If all design and detailing are incorporated into a single model from everyone involved in the project, how does a designer ensure responsibility for stamping its own designs for building permit approval and occupancy attestation? Modeling technology is already robust enough that the parties can require contractually that the integrated model be turned on and off separately for each of the design components. Then it is possible to print out one designer's drawings and have them stamped, but thereafter pour those designs back into the model with the designs of others. At some point, we envision, local governments will appreciate the significant benefits of 3-D modeling (and the ease of code compliance checking that it facilitates) and mandate submission of project designs in this format.

Similarly, there is a better ability to track RFIs and other information exchange if it all happens in the project website with a search engine that permits tracking of issues by defined terms, than if each party can separately communicate in side bar with others and no system is in place for saving messages and data exchanged among them. Similarly, if someone modifies a written document, like a change order, for example, as it is being negotiated, current word processing programs already permit tracking of changes in that document (or, again, the ConsensusDOCS approach would force the party furnishing the modifications to plainly call them out).

Compliance

Whether to waive the right to make claims if you follow the protocol rules of the ECP Addendum was one of the most controversial provisions with which the drafting committee of the ConsensusDOCS 200.2 has dealt. (The EJCDC approach of "never rely, always verify" was found to be just as prevalent in current industry use as partial or complete waiver of claims arising from electronic technology as a means of transferring communications.) In the final analysis, however, the ConsensusDOCS ECP Addendum decided to foster further use of electronic communications by waiving liability for those electronic communications transmitted in conformity with the system parameters, with each party bearing the costs to fix problems occurring within their properly configured system components.

There remains, however, full responsibility for all harm that flows from failure to comply with the system parameters, including restoring or replacing every other parties' system components (including hardware and software) corrupted by transmissions not in compliance.[29] In addition, the substantive content of information or deliverables conveyed via electronic means remains the responsibility of the party that creates and transmits them.[30]

The AIA Electronic Communications Documents

The AIA documents are significantly shorter than the ConsensusDOCS ECP Addendum. They consist of two linked documents, one of which is a licensing agreement that addresses intellectual property (C106, Digital Data Licensing Agreement) and the other addresses the transmission of electronic information (E201, Digital Data Protocol Exhibit).

The Digital Data Licensing Agreement (DDLA) is only three pages long—including cover and signature pages. It provides that each party retains ownership to its created data,[31] that each party receiving data has a nonexclusive right to use the data for the project,[32] and that the receiving parties preserve confidentiality.[33] In a major shift from traditional electronic document transfer agreements, the only indemnification required is limited to modification or unlicensed use of information.[34] The DDLA has blank space for filling in a licensing fee,[35] which seems inconsistent with the more modern practice of freely exchanging project information. Recognizing the need for customization, the DDLA provides space for additional license conditions, if any.[36]

The Digital Data Protocol Exhibit (DDPE) specifies how information should be exchanged but does not grant rights to use that information. Information rights must be granted either in the contract documents or by a separate license such as the DDLA. The DDPE mirrors the DDLA's indemnification against modification or unlicensed use,[37] the confidentiality requirements,[38] and ownership of information.[39]

The heart of the DDLA is the project protocol table.[40] In a single location, this matrix succinctly specifies, by document type, the format for communication, the transmission method, who transmits the information,

who can receive the information, and its permitted use. It recognizes that data formats differ depending on the information transferred, and that universal rules are unworkable. The project protocol table's specificity forces the parties to plan their communications, rather than allow them to develop informally and inconsistently. Because the project protocol table encapsulates almost all of the key data transmission parameters, it can be used as a practical guide during the project. For example, this single sheet could be blown up and placed in a project trailer, provided to subcontractors or subconsultants, or kept in the principal parties' offices as an immediate reference for how electronic communications should occur. It was designed to be a document that is comprehensive, flexible, simple, and, most significantly, usable.

The AIA digital data documents do not dwell on IT specifics. In contrast with the ConsensusDOCS approach, they do not have hardware requirements. Instead, they focus on how the data are exchanged and used. The AIA approach presumes that the parties' IT professionals are best suited to determine what hardware and software should be used by their clients on a specific project. Moreover, it is the file format chosen, and not the computer that hosts the software, that determines whether information can be exchanged. In many instances, the data exchange will occur through Internet browsers or project portals where the transmitting and receiving parties' hardware will be irrelevant.[41] The AIA approach may require a higher level of technical sophistication, but it also offers precision where it is needed and substantial flexibility where it is not. And even if the parties choose to use another electronic document approach, the project protocol table will help plan communication flow.

Electronic Data Transfer Through Building Information Modeling (BIM)

Both ConsensusDOCS and AIA have acknowledged that using building information modeling (or BIM) software to create and implement project designs results in additional, specialized electronic communications protocol needs. They have responded to this concern by developing additional addenda that can be used in conjunction with the ECP Addendum or the DDLA.

ConsensusDOC's 301 (2008) Building Information Modeling (BIM) Addendum was designed to be used specifically in conjunction with the ConsensusDOC's EPC Addendum but can be used with other form or custom contracts on a stand-alone basis. The BIM Addendum sets out in greater detail the development of a BIM execution plan, which is one of a number of protocol processes that are anticipated to be developed under the EPC Addendum.

To ensure conformity of the two documents, the EPC Addendum can be annotated at section 3.3.6, to note that a model facilitator will be used for the project and identifying basic duties of the model facilitator, as well as at section 4.4.1.5, which identifies the types of software programs that are permitted for use in developing BIM models for the project. Care should be taken to harmonize the BIM Addendum's section 3, Information Management, with section 3.3 of the EPC Addendum, which designates an IT management coordinator, webmaster, and model facilitator, because these parties may, or may not be undertaking all of the duties identified as the obligations of the BIM Addendum's information manager.

AIA's Building Information Modeling Protocol Exhibit, AIA E202 (2008), takes a less mechanistic and more process-oriented approach to information management. Like the BIM Addendum, the BIM Protocol Exhibit requires a model manager to manage model administration and clash detection.[42] Consistent with current practice, it recognizes that the "Model" may refer to components, a single model, or a federated set of models.[43] Like the BIM Addendum, it also requires archiving, access management, and similar administrative tasks.[44] And like the BIM Addendum, it requires specification of model standards, including naming conventions and graphic standards.[45]

AIA's Building Information Modeling Protocol Exhibit, AIA E202 (2008), takes a less mechanistic and more process-oriented approach to information management.

The BIM Addendum attempts to specify a consistent standard for model completeness. The BIM Protocol Exhibit, however, assumes that different persons may be responsible for different pieces of the BIM and that their responsibilities may change as the project progresses. Thus, it defines a model element[46] as a portion of the BIM that responds to a specific CSI Uniformat™ code. This approach was chosen because it is consistent with standards for cost estimation and scheduling, and thus supports higher-level uses of the model. It also makes the model information easier for contractors to use. The BIM Protocol Exhibit also defines a model element author[47] who is responsible for the content of a model element. Finally, it uses levels of development (LOD) to express the completeness of a model element at a specific project phase.[48] Each LOD states the model content requirements and the authorized uses applicable to that LOD. By specifying an LOD for a specific model element, the team can express the amount of information contained in the model element and how that information should be used, at any specific phase of project completion. This reflects real practice where elements of a

model do not proceed uniformly, but the users need to know whether the information, at some moment in time, is sufficiently complete that they can "proceed with confidence."

This granular approach is organized in the model element table. The model element table parses the building information model substantively using CSI Uniformat[49] codes and chronologically by project phase. Moreover, it specifies the LOD each Uniformat section must achieve within the phase.[50] Thus, to a fine level of detail and in relation to project phase, you know how much information should be in the model, who is responsible for that information (source of truth), and how it can be used. Even if you choose not to use the BIM Protocol Exhibit, you should consider requiring a process similar to the model element table to clarify what is needed, when it is needed, and who is responsible for the information. Note, too, that the BIM Protocol Exhibit anticipates using the BIM for more than design and conflict checking, including sophisticated 4-D and 5-D applications (adding to three-dimensional design modeling, scheduling, and cost estimating from or linked to the same integrated model).[51]

In general, the AIA and ConsensusDOCS forms are designed to be used with other forms produced by those organizations. It is possible to "mix-and-match," but care must be taken to ensure that provisions written assuming specific follow-on documents are properly integrated. For example, in the BIM Protocol Exhibit, the architect is presumed to be the model manager. If this BIM Protocol Exhibit is used in conjunction with the ConsensusDOCS EPC Addendum, then care must be taken to modify the first sentence of section 3.3.6 of the EPC Addendum, removing the IT management coordinator's right to appoint the model facilitator for the project and consistently designating the architect instead. In general, it is better to use a document set consistently and graft concepts from the other set, if that matches the project's needs.

Tracking the Evolving Capabilities and Challenges

Although there are now multiple different approaches to electronic communications management in form contract documents, the most detailed of these documents still leave many concerns that must be addressed on a project-by-project basis through custom contract modification. The result is that the careful practitioner typically will want to establish electronic communications requirements in a hybrid of performance and prescriptive specifications. The parties' contracts will need to explicitly specify the obligation and responsibility for information authority. They will also likely need to specify how the information will be used and the minimal requirements for interoperability, such as the necessary software, versions, and file types that will be used.

It is possible, however, for further details regarding electronic communications to be addressed either in project manuals or developed jointly by the parties through electronic communications or BIM workshops early in the life of the project. This approach has led to a wide range of project-specific protocols for electronic communications and permits a level of experimentation that will hopefully further refine industry best practices.

As a baseline, a project owner should be required to identify technology deliverables desired for the project and set basic standards to help ensure interoperability of project communication system components. The project team, during contracting or the initial design phase, can then shape administrative and supervisory policy, and this can be fleshed out by IT staff, which will finalize selection of technology based on project needs.

Electronic communications on construction projects are only going to continue to grow in sophistication. What the construction industry will be expecting is that lawyers understand electronic communications sufficiently to help shape the contract documents governing the protocols for their use on a particular project. Hopefully, the legal profession will not have to become complete technogeeks to accomplish this goal. Instead, construction lawyers should expect that they will need to keep track of the evolving capabilities and challenges created by this technology, either through active participation in industry groups that monitor its development or by learning about it from their clients and technology providers, or by tapping all of these resources, so that they can help the industry harness the tremendous advantages that can be gleaned through its use.

Endnotes

1. The Electronic Signatures in Global and National Commerce Act, 15 U.S.C. §§ 7001–7006 (2006), also known as the E-Sign Act, is an example of recent legislative efforts that have begun to address electronic communications issues, although not specifically in the area of construction project communications. The E-Sign Act provides for legal validation of electronic records, electronic signatures, and certain electronic transactions and requires consumers to be given written disclosure and to make written consent electronically before their electronic communications are binding. It is based, in part, on the Uniform Electronic Transactions Act (UETA) created in 1999 by the National Conference of Commissioners on Uniform State Laws, which sought to provide a legal framework for use of electronic records and signatures in business transactions. Almost every state in the United States has adopted a form of UETA: Ala. Code §§ 8-1A-1 *et seq.* (2007); Alaska Stat. §§ 09.80.010 *et seq.* (2008); Ariz. Rev. Stat. Ann. §§ 44-7001 *et seq.* (2008); Ark. Stat. Ann. §§ 25-32-101 *et seq.* (2007); Cal. Civ. Code §§ 1633.1 *et seq.* (2007); Colo. Rev. Stat. §§ 24-71.3-101 *et seq.* (2008); Conn. Gen. Stat. §§ 1-266 *et seq.* (2007); Del. Code Ann. tit. 12AS, §§ 101 *et seq*. (2009); D.C. Code Ann. §§ 28-4901 *et seq*. (2008); Fla. Stat. §§ 668.50 *et seq.* (2008); Haw. Rev. Stat. §§ 489E-1 *et seq.* (2008); Idaho Code Ann. §§ 28-50-101 *et seq.* (2008); Ind. Code §§ 26-2-8-101 *et seq.* (2008); Iowa Code §§ 554D.101 *et seq.* (2008); Kan. Stat. Ann. §§ 16-1601

et seq. (2007); KY. REV. STAT. §§ 369.101 *et seq.* (2008); LA. REV. STAT. ANN. §§ 9:2601 *et seq.* (2008); ME. REV. STAT. ANN. tit. 10, §§ 9401 *et seq.* (2008); MD. COM. LAW CODE ANN. §§ 21-101 *et seq.* (2008); MASS. GEN. LAWS Ann. ch. 110G (2008); MICH. COMP. LAWS §§ 450.8321 *et seq.* (2008); MINN. STAT. §§ 325L.01 *et seq.* (2008); MISS. CODE ANN. §§ 75-12-1 *et seq.* (2008); MO. REV. STAT. §§ 432.200 *et seq.* (2008)`; MONT. CODE ANN. §§ 30-18-101 *et seq.* (2007); NEB. REV. STAT. §§ 86-612 *et seq.* (2008); NEV. REV. STAT. §§ 719.010 *et seq.* (2007); N.H. REV. STAT. ANN. §§ 294-E:1 *et seq.* (2008); N.J. REV. STAT. §§ 12A:12-1 *et seq.* (2008); N.M. STAT. ANN. §§ 14-16-1 *et seq.* (2008); N.C. GEN. STAT. §§ 66-311 *et seq.* (2007); N.D. CENT. CODE §§ 9-16-01 *et seq.* (2007); OHIO REV. CODE ANN. §§ 1306.01 *et seq.* (2008); OKLA. STAT. tit. 12A, §§ 15-101 *et seq.* (2008); OR. REV. STAT. §§ 84.001 *et seq.* (2007); PA. CONS. STAT. 73, §§ 2260.101 *et seq.* (2008); P.R. LAWS ANN. tit. 10, §§ 4081 *et seq.* (2008); R.I. GEN. LAWS §§ 42-127.1-1 *et seq.* (2009); S.C. CODE ANN. §§ 26-6-10 *et seq.* (2008); S.D. CODIFIED LAWS ANN. §§ 53-12-1 *et seq.* (2008); TENN. CODE ANN. §§ 47-10-101 *et seq.* (2008); TEX. BUS. & COM. CODE ANN. §§ 43.001 *et seq.* (2008); UTAH CODE ANN. §§ 46-4-101 *et seq.*; VT. STAT. ANN. tit. 9, §§ 270 *et seq.*; V.I. CODE tit. 11, §§ 1-101 *et seq.*; VA. CODE §§ 59.1-479 *et seq.* (2008); W. VA. CODE §§ 39A-1-1 *et seq.* (2008); WIS. STAT. §§ 137.01 *et seq.* (2007); WYO. STAT. §§ 40-21-101 *et seq.* (2008). Four states, Georgia, Illinois, New York, and Washington, have not adopted the uniform act but have statutes pertaining to electronic transactions: GA. CODE ANN. § 10-12-1; 5 ILL. COMP. STAT. 175/1-101 (2008); N.Y. STATE TECH. LAW §§ 301 *et seq*. (2008); WASH. REV. CODE § 19.43 *et seq.* (2008). For a general legal primer on electronic business transactions, *see* JOHN G. KELLY, LEGAL E-BUSINESS GUIDE (Association of Legal Administrators, 2002).

2. The complete text of ConsensusDOCS LLC's ConsensusDOCS 200.2, *Electronic Communications Protocol Addendum*, is available at www.consensusdocs.org/catalog/html.

3. The American Institute of Architects' AIA C106-2007, *Digital Data Licensing Agreement*, is available at www.aia.org/contractdocs/index.htm.

4. The American Institute of Architects' AIA E201-2007, *Digital Data Protocol Exhibit*, is available at www.aia.org/contractdocs/index.htm.

5. The authors understand that EJCDC is continuing to evaluate appropriate contract language for the exchange of electronic documents and may be modifying the quoted language.

6. Engineers Joint Contract Documents Committee, *Standard General Conditions of the Construction Contract*, C-700 (2007). This document is available from the American Council of Engineering Companies at http://store.acec.org/.

7. In a client-server architecture, a program on a central computer (server) processes information based upon requests from a local workstation (client). Although the local workstation (client) is a full-fledged computer, it is only performing part of the computing workload. In a thin-client architecture, the local workstation is a terminal for the central server and functions as a display device, not as a computing platform. The choice of architecture has significant implications for the type of hardware and cabling required and can affect the speed of processing, depending upon the type of work being done.

8. ConsensusDOCS 200.2 § 1.3 (2007) provides that the Electronic Communications Protocol Addendum [hereinafter ECP Addendum] supersedes contrary language in the parties' contracts.

9. ConsensusDOCS 200.2 §§ 3.32 and 3.42 provide for payment within 20 days to the IT management coordinator and Webmaster, respectively, which implies that they may not be employees of one of the parties themselves.

10. Section 1.3 of the ECP Addendum provides, in pertinent part, "To the extent the terms and conditions of the Parties' respective Project Agreements, including, but not limited to, copyright . . . requirements, conflict with this Addendum, this Addendum shall control." *See also* § 4.10, ECP Addendum, however, which provides that proprietary or copyrighted information included within electronic communications "shall remain the property of the contributing Party or [third party service provider]" and that a limited license to use such property solely for purposes of the specific project is created, including for archival purposes.

11. AIA Document E201, art. 3, Project Protocol Table.

12. ECP Addendum § 1.1.

13. *Id.*

14. *Id.* § 1.3.

15. Most BIM models will not attribute information for all items, but will include a cross-reference to a section detail that is automatically recorded with a section-cut symbol on a plan or model. If elements of the section change, then software will usually update the section detail; although, if the section detail is hand drawn, it must be updated manually. For more information on BIM modeling, *see* WILLEM KYMMELL, BUILDING INFORMATION MODELING, ch. 3, *Software Tools*, at 93–136 (McGraw-Hill 2008).

16. The term "interoperability" deals with the ability of different software programs to share electronic information such that they can fully read and/or modify the data being exchanged. For a discussion regarding the challenges of interoperability specifically related to BIM use, see EASTMAN, ET AL., *supra* note 15, ch. 3, *Interoperability*, at 65–90. The National Building Information Modeling Standard website and its repository of data regarding building SMART initiatives to help foster greater interoperability of BIM software and protocols is located at www.buildingsmartalliance.org/nbims/.

17. ECP Addendum § 3.3.6.

18. *Id.* § 4.4.1.5.

19. *See also* U.S. Army Corps of Engineers, Building Information Modeling Requirements Attachment F (v. 1-4-08), which addresses a number of specific issues pertinent to development of an electronic design model and subsequent construction, using it as a primary means of communicating project design information.

20. ECP Addendum § 3.1. Note, too, that though the ECP Addendum presumes the project owner, lead designer, and lead contractor will have the greatest interest in administration of electronic communications, this, like the other provisions of this form, can be readily adapted to add other critical parties that can contribute their prior experience and expertise to the IT Management Team.

21. For general information about extranets and websites for construction project use, *see* Paul Wilkinson, Construction Collaboration Technologies: The Extranet Evolution (Taylor & Francis, 2005); Douglas Simpson & Mark Tamminga, The Lawyer's Guide to Extranets: Breaking Down Walls, Building Client Connections (Association of Legal Administrators, 2003). For information about coordination of project electronic mail exchange, Internet usage, and related software issues, *see* Nancy L. Flynn, The ePolicy Handbook: Designing and Implementing Effective E-Mail, Internet and Software Policies (AMACOM 2001).

22. It is possible, for example, to have an operating system conflict with an accounting software package, so that it functions much like moving the parentheses in an algebra equation, resulting in some data simply not being expressed because they are internally contradictory or having the wrong math result because the computer hardware forces the software to read in a sequence different from what the software presumes will be set. Desiring to avoid this sort of problem is yet another reason why a single coordinator was suggested by ConsensusDOCS. Ideally, such a person will have substantial experience in selecting hardware and watching for this sort of conflict in software, as well as being adept at securing programming patches from the manufacturer where needed, or being able to write them for project-specific problems the manufacturer has not yet addressed.

23. *See*, *e.g.*, EJCDC Document 700, § 3.06(A) & (B).

24. Appendix A to the AISC's Manual of Practice, which treats the BIM model as a contract document, is another example of the growing trend in the construction industry towards reliance on electronic communications.

25. Archiving is discussed in the Building Information Protocol Exhibit as the BIM is viewed as a deliverable, as well as a process. *See* AIA Document E202, § 2.4.4 (2008).

26. *See* www.rosettaproject.org.

27. For an overview of security issues and options related to creating access to electronic information and documents, *see* American Bar Association Section of Antitrust Law, Data Security Handbook (ABA, 2008).

28. ECP Addendum § 7.2.1.

29. *Id.* § 8.2.

30. *Id.* § 8.3.

31. AIA Document C106-2007, § 2.3.

32. *Id.* § 2.1.

33. *Id.* § 2.5.

34. *Id.* § 2.4.

35. *Id.* art. 3.

36. *Id.* art. 4.

37. AIA Document E201-2007, § 2.5

38. *Id.* § 2.2.

39. *Id.* § 2.3.

40. *Id.* art. 3.

41. For example, a properly designed website does not care (and probably doesn't know) whether it is being accessed by a PC, a Macintosh, a Unix, or a Linux workstation. Moreover, the rise of software as a service (SaaS) may further depreciate the importance of hardware specification.

42. AIA Document E202-2008, § 2.4.

43. *Id.* § 1.2.1.

44. *Id.* art. 4.

45. *Id.* § 2.3. The document does not state *what* those standards should be, although it references the National Building Information Modeling Standard (NBIMS). At present, the NBIMS is not sufficiently developed to substitute for delineated requirements. Although this may seem pedantic, the ability to successfully exchange information in a BIM modeling environment is dependent upon clear and consistently followed conventions that are usable to designers, contractors, subcontractors, and vendors.

46. AIA Document E202-2008, §1.2.3 and art. 4.

47. *Id.* § 1.2.4.

48. *Id.* art. 3.

49. UniFormat is a standardized description, by numerical code, of construction information, based on the physical parts or "elements" of a facility, characterized by their functions, and includes cost items such as contingency. It is used by contractors, estimators, and specification writers to organize their information logically, thoroughly, and consistently. It is published by the Construction Specifications Institute and supported by the National Institute of Standards and Technology. *See* www.uniformat.com/support-files/nistir-6389.pdf.

50. AIA Document E202-2008, art. 3.

51. *See id.* §§ 3.2.2.2 and 3.2.2.3.

