BUILDING INFORMATION MODELING

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About 10 years ago, I had the good fortune to be hired as in-house counsel for a large international architectural and engineering firm. On the first day on the job, I attended a meeting with approximately 20 of the top people in the firm. I vividly remember telling my wife that night how lucky I was, because I sat in a room all day long with people so smart that I did not understand a single thing that they said. It took about two months for me to realize the reason that I did not understand what was said during that first meeting was that there was "nothing said." Designers, being dreamers, tend to talk in catchy buzz-phrases only to predict that the revolution, generally with its genesis in the speaker's mind, is just around the corner.

Not too long ago I was approached to deliver this talk with regard to Building Information Modeling. As I listened to the invitation, my first thought was this was a repeat of that first vivid meeting, ten years ago. To me, Building Information Modeling sounded like another pie-in-the-sky concept, filled with buzz-words, sales people, and unfulfilled ambition. However, as I peeled away the layers of the topic, I began to see a movement—I do not know what else to call it—that could actually transform the design, construction, ownership, and maintenance experience. The purpose of this paper is not to predict the future. Instead, I will try to define what Building Information Modeling is, and attempt to identify the potential legal issues which might arise in the event that this "movement" gains traction in the industry. It is possible that our current laws and statutory schemes do not contemplate the issues that might arise with Building

Information Modeling. As such, the potential exists for absurd results to be reached if current law is applied to these issues. Hopefully, these issues can be identified, and compared with the current status of the law, so that industry professionals can plan for the necessary changes in order to provide an environment where Building Information Modeling will succeed. Said differently, every journey begins with a single step.

1. Building Information Modeling

"Building Information Modeling ("BIM") is the latest rebranding of a 25-year-old idea that architects should create intelligent 3D models instead of paper drawings to communicate design ideas and guide construction."[1] Specifically, BIM is "an integrated model of a building that does not consist of the independent line and arcs of drawings, but of objects, accurate in 3D, described by properties, and related to their surroundings."[2] The advantage of this technology is that "these models can be visualized, audited, analyzed, priced, and automated."[3] However, the construction industry and lawyers representing design professionals, contractors, and subcontractors, will have to deal with the following issues if BIM is to succeed:

a. Definition of professional services and the design process;

b. Ownership and control of the digital information;

c. Conformity of completed construction to the model;

d. Relationships of the various parties with concurrent design and construction authority;

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[1] Ken Sanders, FAIA, *Why building information modeling isn't working . . . yet*, Architectural Record, Sept. 1, 2004 at 181.
[2] John Mitchell, *Reorganizing Around BIM, at* www.linemag.org.
[3] *Id.*

e. Risk that goes with any investment by the stakeholders; and

f. Payment for the creative efforts, control of information, and assumed or assigned risks.[4]

The construction industry has the resolve to address these concerns to change the way buildings are designed and constructed to the more efficient BIM concept. For example, "[i]n early June 2005, fifteen independent software developers in Norway dramatically challenged traditional assumptions with a live and lively pass-around of 3-D building data."[5] They used the International Alliance for Interoperability's (IAI) open, consensual Industry Foundation Class organizational structure for building data as the "honest broker."[6] In that study, "[t]he software had the embedded capability to save the work they were doing, not only in their own proprietary systems, but also as .ifc files."[7] They were convincing in their ability to move a project swiftly and without friction from one program to the next across a wide range of functions. These included architectural design; structural, mechanical, electrical engineering; and even permitting, bidding, facilities management and emergency response. During the course of the project, "the data model passed smoothly through a string of programs that had nothing in common except the ability to save as an .ifc file."[8]

2. Standard of Care

(1) Will the standard of care change?

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[4] AIA Practice Management Digest, *Preparing for Building Information Modeling*, *at* www.aia.org.
[5] *Software Breakthroughs Will Lead To Building Smarter*, Engineering News, June 13, 2005, at 72.
[6] *Id.*
[7] *Id.*
[8] *Id.*

(2) What constitutes a failure to perform in accordance with the industry standard of care relative to BIM?

(3) Will this be an opportunity for those bringing claims against design professionals to change the standard of care?

(4) Will the standard of care turn to strict liability if the model is viewed as a product rather than a professional service?

Breach of the design professional's contract with the owner and professional negligence are the most common and obvious claims against design professionals. Under the American Institute of Architects (AIA) document B-151 1997, a design professional's services "shall be performed . . . with professional skill and care."[9] This standard of care language is common in design services contracts, and although not specifically detailed, is sufficient to establish a contractual duty to provide services that meet the professions standard of care. This standard has also been applied to architectural services by Texas courts, which require the architect to use the skill and care in the performance of his duties commensurate with the requirements of the profession."[10]

First, for the non-design professionals, it is important to understand that price is at least partially a function of risk. Therefore, in theory, any increase in risk to a party to the construction process will only serve to increase the cost of that party's services. As a result, there is ultimately no benefit in shifting the risk.

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[9] AMERICAN INSTITUTE OF ARCHITECTS, THE ARCHITECT'S HANDBOOK OF PROFESSIONAL PRACTICE (12TH ED.), ABBREVIATED STANDARD FORM OF AGREEMENT BETWEEN OWNER AND ARCHITECT, B-151 (1997), art. 1.2.

[10] *See generally IOI Sys, Inc. v. City of Cleveland*, 615 S.W.2d 786 (Tex. App.—Houston[1st Dist.] 1980, writ ref'd n.r.e.).

While I do not see any overt change in the standard of care, I can see mistakes being made during the contract process or by those subscribing to and participating in a BIM process, which could be interpreted as acceptance of some risk which is outside the standard of care.

3. Ownership of Data/Copyright

Copyright law protects the "expression" of ideas. In other words, copyright will not protect an idea until you actually place that idea on the drawing board. With regard to BIM, what constitutes an architectural work will be the topic of much debate to come. For now, federal law defines "architectural work" for the purposes of copyright as follows:

> An architectural work is the design of a building as embodied in any tangible medium of expression, including a building, architectural plans, or drawings. The work includes the overall form as well as the arrangement and composition of spaces and elements in the design, but does not include individual standard features.[11]

At least one commentator suggests that this means that you cannot copyright, as an architectural work, a door or a window, but the relationship of the door to the window in a floor plan may be protectable.[12] In addition, "keep in mind that plans do not have to be 100% complete in order to be protected. All that is required is an "original work of authorship" that is "fixed in any tangible medium of expression."[13] However, in BIM, not only is the door/window relationship of value, but, the interactive relationship of data sets from the various process stakeholders is, perhaps, of even greater value.

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[11] 17 U.S.C. §101.
[12] Sam Muir, *A Foyer To Architectural Copyrights*, Stamped, Sealed and Delivered, A Risk Management Publication for Architects and Engineers, First Quarter 2006.
[13] *Id*; 17 U.S.C. §102.

a. AIA Documents

The AIA Standard Form of Agreement between the Owner and Architect currently provides the following language with regard to the Ownership of an Architect's Instruments of Service:

> 1.3.2 Instruments of Service
>
> 1.3.2.1 Drawings, specifications and other documents, including those in electronic form, prepared by the Architect and the Architect's consultants are Instruments of Service for use solely with respect to this Project. The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service and shall retain all common law, statutory and other reserved rights, including copyrights.
>
> 1.3.2.2 Upon execution of this Agreement, the Architect grants to the Owner a nonexclusive license to reproduce the Architect's Instruments of Service solely for purposes of constructing, using and maintaining the Project, provided that the Owner shall comply with all obligations, including prompt payment of all sums when due, under this Agreement. The Architect shall obtain similar nonexclusive licenses from the Architect's consultants consistent with this Agreement. Any termination of this Agreement prior to completion of the Project shall terminate this license. Upon such termination, the Owner shall refrain from making further reproductions of Instruments of Service and shall return to the Architect within seven days of termination all originals and reproductions in the Owner's possession or control. If and upon the date the Architect is adjudged in default of this Agreement, the foregoing license shall be deemed terminated and replaced by a second, nonexclusive license permitting the Owner to authorize other similarly credentialed design professionals to reproduce and, where permitted by law, to make changes, corrections or additions to the Instruments of Service solely for purposes of completing, using and maintaining the Project.
>
> 1.3.2.3 Except for licenses granted in Subparagraph 1.3.2.2, no other license or right shall be deemed granted or implied under this agreement....
>
> 1.3.2.4 Prior to the Architect providing the Owner any Instruments of Service in electronic form or the Owner providing to the Architect any electronic data for incorporation into the Instruments of Service, the Owner and the Architect shall by separate written agreement set forth the specific

> conditions governing the format of such Instruments of Service or electronic data, including any special limitations or licenses not otherwise provided in this Agreement.[14]

This language provides many of the protections which are critical to maintaining the standard of care. For example, look at the phrase "instruments of service." This phrase highlights that the plans, in and of themselves, are not products. Rather, they are physical manifestations of the services provided by the professional, but what about data sets which can be extracted from those instruments, and their intersection with the prohibitions against re-use? These are critically important question ns that must be addressed in the future.

4. Communication and Assumption of Risk

Initially, it will be very important to critically define the scope and boundaries of each party's responsibilities, and to identify their work product. For example, one question that will need to be answered is "what is the signed and sealed version of the plans in an electronic world?" The follow-up question is how does the architect keep those plans "locked down," or, is that even a desirable outcome where the overarching goal is one of speed and efficiency.

Owners, architects, engineers, and contractors, the stakeholders, must communicate more efficiently and do so on a platform that allows for seamless transition of data from one stakeholder to another. It is the ability to transfer design information seamlessly throughout a building project that promises to save all parties involved, from

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[14] AMERICAN INSTITUTE OF ARCHITECTS, THE ARCHITECT'S HANDBOOK OF PROFESSIONAL PRACTICE (12TH ED.), STANDARD FORM OF AGREEMENT BETWEEN OWNER AND ARCHITECT, B-141 (1997), art. 1.3.2.

owners to contractors, time and money.[15] Further, while the general destination might be clear, the road to interoperability in the construction industry is anything but a straightaway. One commentator suggests that "[l]eaders of the IAI, which has led the charge and established software standards, acknowledge that opinions vary on how to move interoperability from research into practice."[16]

Model-generated graphics are helping construction professionals visualize, validate, and explore complex sequences with each other before the job starts and the clock begins ticking. This is good news, because it may allow for a more meaningful question and answer process, where all of the stakeholders are essentially allowed a virtual test run of the project, to identify the issues addressed in this paper as well.

5. Scheduling

How does Building Information Modeling affect scheduling? Plans and specifications require the following if a project is to proceed on schedule:

1) assured resources;

2) work scheduled in the most logical sequence, and

3) assigned work that is well within the crew's capability.[17]

As many of you will attest, on the majority of jobs only 50% of tasks are completed in the week assigned. The reasons for this statistic vary, however. One leading cause is the fact that the assignment, when made, failed to meet those three criteria set out above. Planning failures can be traced, and a recurrence of these failures

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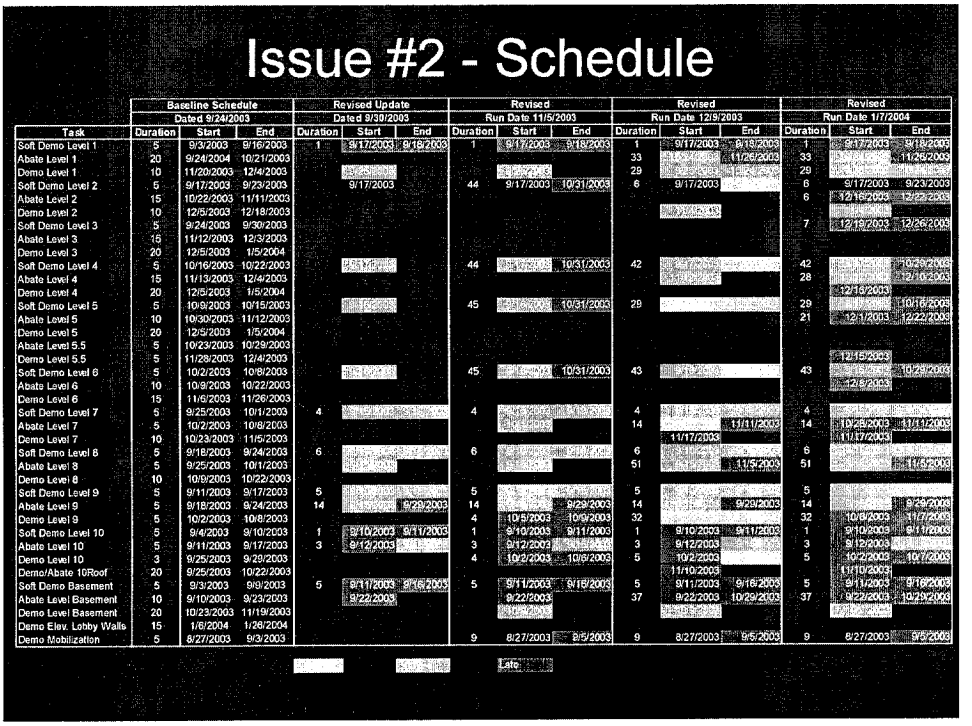
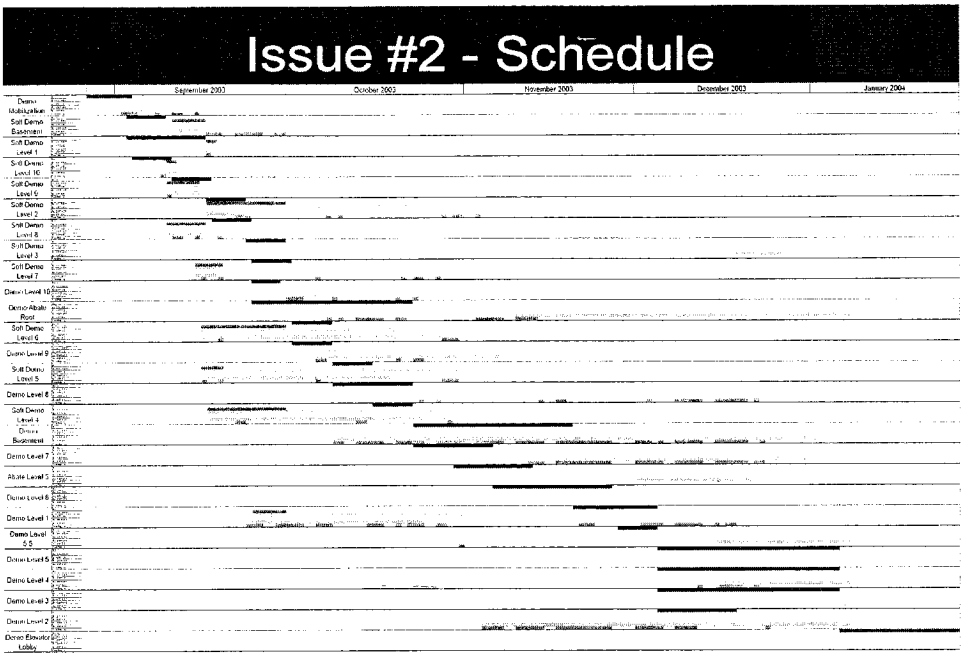
[15] Andrew Roe and Peter Reina, *Learning to Share is Tougher Than Anyone Anticipated*, Engineering News, Aug. 13, 2001 at 41.
[16] *Id.*
[17] Gregory A. Howell, *Think of the Queue Behind You*, Engineering News, July 17, 2000, at 111.

prevented through BIM. Commentators suggest that "[t]he completion rate can be improved to around 85% by assuring that those criteria are met before assigning tasks."[18]

In reviewing the schedule, we look to the original start date, which is usually before the date of the subcontract. We also look at the start date/buyout date of other subcontractors whose tasks were on the critical path ahead of our client's work. We also compare the schedule for the areas we actually work in, versus the schedule for areas where our client is supposed to work. Finally, we look at what the contractor is telling the owner. One very real benefit of a process like this is accountability. A transparent job-centric dialogue, involving all of the stakeholders stands a very good chance of preventing the fine art of claims manufacturing.



[18] *Id.*



BIM offers the ability to begin construction sooner, and in turn, allows project team members to surpass previous scheduling goals. With BIM, the models are started before they are designed, which means that the design team can spend more time designing and less time in the process of drawing. The ability for the designer and the client to understand the schedule from the early stages of the project, and the opportunity to work with other project participants simultaneously, will have a direct correlation to minimizing delay claims.

The probability for virtually "gaming" the project may, in and of itself, justify a focus on BIM. However, the many spin-off benefits, such as adjusting to a work-style which the workforce is comfortable with—i.e., video games—is but one example. Imagine if organizations could talk across vertical and horizontal industry groups through design data in formats that are shared in common. Normally, this data is decentralized

and inaccessible, but with BIM, that can change. It is important to note that the key prerequisite to achieving this change is creating new partnerships between owners, designers, and builders; developing organizational cultures and educational programs that support them; and inventing new delivery processes to leverage them.[19]

6. Insurance

Because I am too unfamiliar with BIM, I cannot really identify all of potential impacts BIM might have on the insurance coverage issue. However, there are certain issues that can be spotted, such as contract risks or other exclusions. These warrant an explanation.

a. Breach of Contract and Tort Claim Implications on Insurance

One of the greatest sources of confusion, both among our clients, and attorneys suing design professionals, is the misconception that the typical Errors and Omissions policies do not provide insurance coverage for breach of contract claims. This is incorrect, and in fact, we much prefer to defend a breach of contract claim than a negligence, or tort, claim because of the more predictable and manageable nature of damages for breach of contract.

The language the policy of one carrier reads as follows:

What We Do Not Insure (Exclusions)

This insurance does not apply to the following:

> **CLAIMS that are related to liability assumed by you under any "contract." This exclusion does not apply if you would have been liable in the absence of that "contract" due to your error, omission, or negligent act.**

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[19] *See* Ken Sanders, FAIA, *Why building information modeling isn't working . . . yet*, Architectural Record, Sept. 1, 2004 at 9.

"Contract" means any agreement, whether express or implied, in fact or in law, written or oral, including but not limited to, hold harmless and indemnity clauses, warranties, guarantees, certifications or penalty clauses.

Of course, typically, design services will be the subject matter of a contract between you and your client. Here, the definition of "contract" is key. "Contract" in this context is defined as an agreement to perform services, where absent those written provisions, a claimant could establish the typical tort elements of duty, breach, causation, and damages. This is called a "contort" because it is really a hybrid of the contract and tort claims, where the duty arose because the design professional agreed to perform professional services on behalf of the claimant. But the elements of that breach are exactly the same as tort elements, i.e., duty, breach, causation, and damages. In this situation, the policy provides coverage for a breach of contract claim, and in most scenarios such a claim is preferable to a negligence claim, because of the typical availability of other helpful clauses in the contract, and potentially more narrow damages.

However, to the extent that a designer provided warranties or guarantees to your client, any claims arising from a breach of those warranties or guarantees will not be covered, and typically indemnities provided by designers to their clients will also not be covered. This is the reason why owners and jurisdictional authorities try to get designers to sign "certifications" and other onerous documents. Such documents may give rise to warranties and guarantees, which in the event of a claim are much easier to prosecute and may give rise to a wider array of remedies to the claimant than those afforded by the contract.

While these issues are somewhat basic, a re-iteration and understanding of them are essential to spotting and dealing with issues that can arise from BIM.

b. Other Exclusions

Typical architectural/engineering Errors and Omissions policies will contain a number of other exclusions, such as those for fraudulent or dishonest acts, intentional acts, claims for harassment or discrimination, claims for punitive or exemplary damages, or claims for actual construction work performed by you (excluding drilling, testing or other laboratory activities.) In many instances, these sorts of claims will be included in with the more traditional tort or breach of contract claims discussed above. In response to these sorts of claims, you will probably receive a "reservation of rights" letter from you carrier, letting you know that those claims in the lawsuit are not covered by the policy. However, because pursuant to the typical policy the carrier has a duty to defend and indemnify, and because these claims are not capable of being separated, the carrier will likely pay for the defense of all of the claims, and settle them as well. Does the interactive nature of BIM, which presumably calls for a more intimate involvement of the design team—the construction process, violate these terms?

Perhaps the widespread use of BIM might usher in an era of new "Team" policies, where carriers will underwrite various forms of risk, such as Builder's Risk, professional errors and omissions, and construction liability, to insure all of these risks of a project without the risk of one stakeholder assuming the risk of another by virtue of inappropriate contracting.

7. Prevention of Delay Claims

Delays are very common in construction projects and can be very expensive to everyone involved. As a result of the frequency of these hiccups in the completion of a construction project, design professionals, contractors, and subcontractors must, from the very beginning of the project, recognize the warning signs of potential claims and initiate the documentation process from that moment forward.

With BIM, design professionals can electronically incorporate manufacturer's products into a project's construction documents. From here, the next logical step would be the creation of shop drawings, which could be used to create instructions on how to implement the design on-site. Each step of the process would be preserved, and as a whole, the process may greatly reduce mistakes, errors, omissions, and construction delays in general, and help drive the scheduling process. As mentioned earlier, this process may also make it more difficult for serial claim-makers.

8. Corruption of Files

What liability are you exposed to if it takes three days to get your drawings into a system? What if you transmit a computer virus to another team member corrupting their data? What happens if you miss the evaluation date because of a slowdown of the system? Of immediate importance to this discussion is the protection of electronic project documents. But also of critical importance are accounting systems, contracts, insurance policies, software registration codes, correspondence, contact lists, photographs and employee records. In today's world, incidents of data theft and vandalism are on the

rise and worries about fire and destruction by natural disasters, such as the Katrina disaster, have been joined by real concerns and similar losses, from terrorists.[20]

While the definition of "security" is ever changing, for the first time, electronic contracts and other digital documents can now have the same legal status as hardcopy contracts, if properly e-signed. The current law on electronic signatures holds "that for an electronic signature to be valid, it must be authentic and be accompanied by a valid reason for its use.[21] E-signatures are but one avenue that the construction industry can take to provide security to BIM. Another is the use of parameters in software that restrict modifications. As the BIM movement progresses, the security measures necessary to safely implement BIM's intent will follow. Finally, how does a designer "lock down" the design, if it must by its very nature be capable of change in order to participate in the BIM process?

For example, in December of 2003, Autodesk announced the integration of its parametric modeling program Revit into AutoCAD to form AutoCAD Revit. AutoCAD Revit offers both building information modeling and CAD. According to Autodesk, "AutoCAD Revit provides architects and interior designers with an easier transition to the productivity benefits of building information modeling while maximizing the value of their investment in AutoCAD."[22] Revit claims that it can be used with multiple users working one design simultaneously and gives users the ability to see real time drawings

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[20] For a detailed discussion on protecting your electronic data, *see* Tom Sawyer, *Protecting Electronic Data Becomes A Burning Issue*, Engineering News, Nov. 5, 2001, at 19.
[21] Matthew Phair, *New Laws, Technologies Push Signing on the Dotted Screen*, Engineering News, Feb. 26, 2001, at 47.
[22] Matthew Phair, *New Dimensions in Design,* Building Design and Construction, May 1, 2004, at 16.

and changes with 100% consistency in drawings and schedules, virtually eliminating uncoordinated documents.[23] While problems associated with multiple users and real time changes seem solvable through software tools and parameters, the legal ramifications will require further thought before BIM can reach its full potential.

9. Warranties Drawn From Information

How does BIM affect warranties? There is a duty on the design professional to fulfill the specified contractual obligations, but there is rarely an explicit warranty stated for the design—that is, a guarantee of a specific outcome. Most design professionals realize the potential risks associated with any explicit warranty of the design, and few, if any, grant such a guarantee.

Implied warranties for "habitability" or "good and workmanlike manner" often apply to the finished products. Owners can seek to hold contractors to these types of warranties, in certain circumstances, even if the contract language is not explicit. Courts in the United States regularly and uniformly hold that implied warranties do not arise from professional services.[24] The theory for these findings is that professional services, which consist of advice, judgment, opinions, or similar professional skills, should not be converted to guarantees of performance.[25] Again, however, what happens if the BIM "group," including design professionals, is seen as having provided an outcome based warranty?

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[23] William J. Angelo, *Construction Nears Access to Parametric CAD*, Engineering News, April 3, 2000, at 25.
[24] *City of Mounds View v. Walijarvi*, 263 N.W.2d 420, 423 (Minn. 1978); *RCDI Const., Inc. v. Spaceplan/Architecture*, 148 F. Supp. 2d 607 (W.D.N.C. 2001).
[25] *See, e.g.*, TEX. BUS. & COM. CODE § 17.49(c) (Vernon 2000) (denying a claim of action under the DTPA for breach of warranty associated with professional services). *See also Murphy v. Campbell*, 964 S.W.2d 265, 268 (Tex. 1998).

10. GSA Mandates and MasterFormat 2004

One of the biggest issues facing the proliferation of BIM is the development of industry standards. However, big owners like the General Services Administration (GSA) are beginning to require 3D models as deliverables.[26] The GSA asked for feedback on using Industry Foundation Classes (IFCs), the standards for electronic-data exchange created by the IAI. IFCs are "a set of definitions for building elements (e.g., walls, doors, and floors) and their properties and relationships (e.g., doors are built into walls), which were developed to ease the sharing of digital design information among different, propriety software programs."[27] The GSA recently completed nine projects using BIM, and will require the 3D technology on all projects by 2007."[28]

In addition, the GSA has endorsed MasterFormat 2004, a master list of numbers and titles for organizing specifications, contracting and procurement requirements, as well as other data. As the construction industry's "Dewey Decimal System," "MasterFormat standardizes communication of information critical to engineers, architects, specifiers, contractors, and suppliers in meeting owner's requirements, schedules and budgets."[29] MasterFormat 2004 was "designed to reduce costly changes or delays in projects due to incomplete, misplaced, or missing information, which could lead

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[26] Nadine Post, *E-Construction as the Norm Is Still 10 to 15 Years Away*, Engineering News, Feb. 20, 2006, at 15.
[27] Deborah Snoonian, P.E., *GSA Asks For Guidance On Using Digital Building Models for Design and Construction; Standards: World's Largest Building Owner Poised To Spur the Adoption of Interoperability Standards*, Architectural Record, May 1, 2005, at 283.
[28] Debra K. Rubin, *Federal Construction Spending Mired In Budget Uncertainties After Katrina; Agencies Set Capital Plans But Gulf Reconstruction May Take Priority*, Engineering News, Nov. 14, 2005, at 33.
[29] Karl Borgstrom, *Masterformat 2004: A Major Step Forward for Construction Project Delivery*, Consulting-Specifying Engineer, Jan. 1, 2005 at 23.

to an estimated 5 to 10 percent savings in construction costs."[30] The GSA plans to require Masterformat 2004 for all construction put-in-place starting the fiscal-year 2006.[31]

11. Conclusion

BIM presents a number of potential benefits . . . and challenges. This movement will require true collaboration, not just in words, but in deeds as well. From a legal perspective, a thorough understanding of current legal principles will be necessary for all stakeholders, as these new paradigms are applied to their activities. Thus, when an anomaly, such as an absurd legal outcome, can be identified as a potentiality, proper steps can be taken to see that the potential does not become a reality.

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[30] Dan Merriman, *MasterFormat 2004 Edition, A Re-tooled Classic is Now Available*, Nov. 10, 2004, at http://www.csinet.org.

[31] Tudor Hampton, *Revised Code May Force Construction Firms to Change Project Manuals,* Engineering News, May 2, 2005, at 13.