

12-31-2020

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Recommended Citation

Palachuk, Geoffrey F. (2020) "The New Decade of Construction Contracts: Technological and Climate Considerations for Owners, Designers, and Builders," *Seattle Journal of Technology, Environmental & Innovation Law*. Vol. 11 : Iss. 1 , Article 7.

Available at: <https://digitalcommons.law.seattleu.edu/sjteil/vol11/iss1/7>

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The New Decade of Construction Contracts: Technological and Climate Considerations for Owners, Designers, and Builders

Geoffrey F. Palachuk *

I. INTRODUCTION

Who “owns” the effects of climate change on a construction project? Construction project participants like owners, design professionals, general contractors, and subcontractors use the term “ownership” to allocate responsibility for an issue during the project. Those issues can vary greatly. Attorneys may frequently disagree about who owns a particular delay to the schedule critical path, the float within a schedule, a particular change in scope, or the disruptions to ground conditions during construction, just to name a few examples. But who owns the effects of climate change? What impact will new technologies have on the risk allocation or foreseeability of certain events arising on construction projects? How might the interplay of those issues affect contract negotiations or allocation of liability among project participants?

The most recent data shows ninety-seven percent of actively publishing scientists agree that human beings are causing the global climate to change.¹ What was once called “global warming” is now known colloquially as climate change. It has eliminated eighty-nine percent of the baby

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¹ *Do Scientists Agree on Climate Change?*, NASA, <https://climate.nasa.gov/faq/17/do-scientists-agree-on-climate-change> [<https://perma.cc/L8NU-PBST>] (last visited Feb. 4, 2020); see also *List of Worldwide Scientific Organizations*, GOVERNOR’S OFF. OF PLAN. AND RSCH., <https://www.opr.ca.gov/facts/list-of-scientific-organizations.html> [<https://perma.cc/7VJX-DY5Q>] (last visited Nov. 19, 2020) (listing scientific associations that have provided official statements on climate change or have adopted the position that human action has caused climate change).

corals in the Great Barrier Reef,² ninety-five percent of the thickest sea ice in the Arctic,³ and will eliminate one-third of the world's remaining glaciers within the coming decades.⁴ As such, although a room of lawyers will rarely reach a consensus on any issue, all should agree that climate change is a serious problem affecting communities and construction projects throughout the country. Those impacts will only continue to worsen as time goes on.

Some view climate change as the greatest existential threat to humankind. So, when developers, design professionals, and construction managers are drafting a construction contract for their next big project—when they are negotiating specific scopes of work or revising specific provisions—are they worried about climate change? In short, they probably should be.⁵ Are there ethical considerations that project participants should be evaluating climate resiliency provisions of their contracts? Again, probably yes. Lobbyists and legislators should also be considering the nuances of climate change laws, administrative regulations, and guidelines for builders and developers at various state and local levels. That lattermost group should be particularly cognizant of the practical effect of implementing those changes—where the proverbial rubber meets the road.

And what about new technology? “A lot of legal technology and [artificial intelligence (AI)] is currently being built to emulate human tasks,” and commenters in the construction industry have opined that “the negotiation and creation of contracts could be almost completely automated” by the year 2040.⁶

² Sophie Lewis, *Climate Change Has Caused an 89% Decrease in New Coral in the Great Barrier Reef, Study Finds*, CBS NEWS (Apr. 3, 2009, 5:06 PM), <https://www.cbsnews.com/news/great-barrier-reef-dying-climate-change-caused-decrease-in-new-coral-study-says/> [<https://perma.cc/XYB2-MWXS>].

³ Lorin Hancock, *Why Are Glaciers and Sea Ice Melting?*, WORLD WILDLIFE FUND, <https://www.worldwildlife.org/pages/why-are-glaciers-and-sea-ice-melting> [<https://perma.cc/YLQ4-7ZK7>] (last visited Feb. 4, 2020) (“Even if we significantly curb emissions in the coming decades, more than a third of the world’s remaining glaciers will melt before the year 2100. When it comes to sea ice, 95% of the oldest and thickest ice in the Arctic is already gone.”).

⁴ *Id.*

⁵ For a discussion on the risks of climate change for the standard of care imposed on design professionals specifically, see generally Stephan F. Andrews and Andrew P. Selman, *Climate Change and its Impact on the Standard of Care for Design Professionals*, BRITISH COLUMBIA SOC’Y LANDSCAPE ARCHITECTS (2019), <https://www.bcsla.org/sites/default/files/resources/files/climate-change/downloads/Climate%20Change%20and%20Impact%20on%20Standard%20of%20Care%20for%20Design%20Professionals.%20%202019.pdf> [<https://perma.cc/4YEF-VZKZ>] (discussing the risks of climate change for the standard of care imposed on design professionals).

⁶ Aebra Coe, *Forget the Robots, This Tech Will Turbocharge Legal Industry*, LAW360 IN-DEPTH (Feb. 11, 2020, 8:04 PM), https://www.law360.com/construction/articles/1243096/forget-the-robots-this-tech-will-turbocharge-legal-industry?nl_pk=027a54af-a795-4edc-a0f7-f8257668c6d2&utm_source=newsletter&utm_medium=email&utm_campaign=construction

[<https://perma.cc/8X3M-DSB8>].

In the age of artificial intelligence⁷ (AI), drones, exoskeletons,⁸ blockchain, digital twins, GPS, BIM, and RFID—enough new tech to make a Silicon Valley executive squirm—wouldn't it make sense for companies in the construction industry to consider (or reconsider) their applicable standard of care, release language, warranties, scope of employment contracts, potential non-disclosure agreements, contractual indemnity provisions, and the applicable risk-allocation statutes for their current projects? The answer is unequivocally “Yes.” Of course, they should also be considering their potential exposure to liability and evaluating ways to limit downstream liability, both before and after implementing those technologies.

At the outset, this article provides a snapshot of the most-used current and developing technologies for large construction projects around the country. Additionally, at the intersection of that new technology, climate change imposes new and unpredictable risks on project participants in the construction industry and beyond. This article also provides an overview of the issues existing at the intersection of the construction industry and the impending effects of climate change. The analysis discusses some of the emerging technologies of this decade and illustrates how companies can use (or might already be using) various technologies to enhance or optimize their production, while also considering the risks associated with those advancements.

The discussion below is divided into three sections, each of which will provide considerations for the primary triad of project participants: Owners, Designers,⁹ and Contractors. **Section II** discusses the various technologies available to construction project participants and the risks surrounding those technologies. **Section III** evaluates how climate change

⁷ John McCarthy is widely recognized as the “father” of Artificial intelligence (AI), broadly defining the term as “the science and engineering of making intelligent machines.” See generally Andy Peart, *Homage to John McCarthy, the Father of Artificial Intelligence*, ARTIFICIAL SOLS. (Oct. 29, 2020), <https://www.artificial-solutions.com/blog/homage-to-john-mccarthy-the-father-of-artificial-intelligence> [<https://perma.cc/S62E-A8TR>]. For example, voice recognition (e.g. Siri or Alexa) and facial recognition (e.g. for laptops and smart phones) are two predominant forms of artificial intelligence that might be available to the majority of Americans. See generally *id.*

⁸ For an introduction of exoskeleton technology, see generally Alan Ferguson, *Exoskeletons and Injury Prevention*, SAFETY & HEALTH MAG. (Sept. 23, 2018), <https://www.safetyandhealthmagazine.com/articles/17370-exoskeletons-in-the-workplace> [<https://perma.cc/V3KK-VXQW>] (providing an introduction on exoskeleton technology); see also Tom Sugar et al., *Hip Exoskeleton Market – Review of Lift Assist Wearables*, WEARABLE ROBOTICS ASS'N (2018), <http://www.wearablerobotics.com/wp-content/uploads/2018/05/J12434-Hip-Exoskelton-Report-FINAL4.pdf> [<https://perma.cc/3BT4-MZ7Q>].

⁹ For other issues that are specific to design professionals, and especially design professionals in Washington state, see generally STANTON P. BECK & GEOFFREY F. PALACHUK ET AL., ARCHITECT AND ENGINEER LIABILITY: CLAIMS AGAINST DESIGN PROFESSIONALS (forthcoming 2020); see also JENNIFER M. BEYERLEIN & GEOFFREY F. PALACHUK, STATE-BY-STATE GUIDE TO DESIGN AND CONSTRUCTION CONTRACTS AND CLAIMS (forthcoming 2021).

will impact not only contracts, negotiations, and project delivery, but also risk-allocation and claims management among project participants. **Section IV** evaluates the most critical considerations for parties and practitioners drafting construction contracts or navigating these waters with their clients.

II. WHAT TECHNOLOGIES ARE AVAILABLE FOR PROJECT PARTICIPANTS, AND HOW CAN THOSE TECHNOLOGIES OPTIMIZE PROJECT DELIVERY?

A. *Blockchain Technology*

This section discusses the difference between private and public blockchain technologies, how companies in the construction industry can utilize blockchain technology, and the potential risks presented by the use of blockchain networks. Many construction companies and design professionals on projects already utilize private blockchain technology for file storage and access across multiple disciplines, various project locations, or different project phases.

Blockchain technology is not just Bitcoin: “[a] blockchain is, in the simplest of terms, a time-stamped series of immutable records of data that is managed by clusters of computers not owned by any single entity. Each of these blocks of data (i.e. blocks) are secured and bound to each other using cryptographic principles (i.e. chain).”¹⁰

That first definition, above, should be further divided into “public” versus “private” blockchain networks. “A public blockchain is one that anyone can join and participate in, such as Bitcoin. Drawbacks might include substantial computational power required, little or no privacy for transactions, and weak security. These are important considerations for enterprise use cases of blockchain.”¹¹ Probably the two most well-known public blockchain networks are Bitcoin and Ethereum, which are cryptocurrencies with open source computing codes viewable by anyone with internet access. For obvious reasons, construction project participants probably don’t utilize—and really shouldn’t be utilizing—public blockchain networks. The open source computing codes and accessibility creates numerous risks for security, intellectual property, data privacy, client and vendor information, accounting records, protection of employee information, etc. Certain public agencies might have networks that contain public records, but that does not mean the network hosting those documents

¹⁰Ameer Rosic, *What is Blockchain Technology? A Step-By-Step Guide for Beginners*, BLOCKGEEKS <https://blockgeeks.com/guides/what-is-blockchain-technology/> [<https://perma.cc/K8UB-CVDB>] (last visited Feb. 13, 2020).

¹¹*Types of Blockchain Networks*, IBM, <https://www.ibm.com/blockchain/what-is-blockchain> [<https://perma.cc/VB46-D4NS>] (last visited Feb. 13, 2020) [hereinafter “*Blockchain Networks*”].

is a public blockchain network. Similarly, many private companies in the construction industry might already be utilizing private blockchain networks. And they may not even realize it.

A private blockchain network . . . is a decentralized peer-to-peer network, with the significant difference that one organization governs the network. That organization controls who is allowed to participate in the network, execute a consensus protocol[,] and maintain the shared ledger. Depending on the use case, this can significantly boost trust and confidence between participants. A private blockchain can be run behind a corporate firewall and even be hosted on-premises.¹²

Businesses that use private blockchain technology usually seek a “permissioned blockchain network,” which imposes restrictions on those “allowed to participate in the network, and only in certain transactions.”¹³ For access to these networks, “participants need to obtain an invitation or permission to join.”¹⁴

Blockchain technology can, of course, be immensely useful and help optimize collaboration and project delivery. But companies need to be cognizant of the particular types of technology they are using, along with who has access to the network: both which project designees from particular disciplines *have access* to that information, and which project designees have the ability to *change or alter* that information. If programmers are involved with particular projects or disciplines too, then companies should discuss those issues and the potential risks with their attorneys.

Indeed, any company using private blockchain network systems or decentralized servers should be discussing those systems and their company’s internal practices with their project delivery teams, information technology (IT) professionals, insurers, and attorneys. Some companies are uncertain whether they are using blockchain systems, or what it means to have “decentralized servers.” Such confusion is frankly commonplace across various industries, because blockchain technologies are not yet ubiquitous – it remains highly stigmatized,¹⁵ and probably for good reason. Even privately permissioned blockchain networks could be part of a larger consortium blockchain, which could implicate multiple organizations and various responsibilities for maintaining the network(s).¹⁶ Any pre-selected

¹² *Id.*

¹³ *Id.*

¹⁴ *Id.*

¹⁵ In the coming decades, commentators will probably look back on blockchain with greater consensus about whether the technology ultimately provided positive change, negative change, or no change, and whether innovations have rendered the technology (or its alternatives in the same conceptual space) unhelpful or obsolete. Time will tell.

¹⁶ *Blockchain Networks*, *supra* note 11.

organizations could ultimately “determine who can submit transactions or access the data.”¹⁷ That obviously creates risks.

Separately and additionally, both companies and practitioners should understand whether these systems are following the parties’ contract documents. And, for example, who bears the risk of maintaining participants’ or their employees’ data? What about when those folks leave the project? Some companies require revisions to project documents—often times requests for information (RFIs)—to be made within the system. Are local copies provided for revisions, and are those local copies stored in these systems? Does such storage, revising, uploading, sharing, etc. comport with the parties’ contract documents? For global projects, legal practitioners and project participants could face language and translation barriers, software divergence, connectivity failure, file corruption, or inaccessibility for particular project teams. All these conditions might result in lost profits or time inefficiencies for certain teams or services, which companies should consider.

This exemplifies the sheer volume of technical information that is exchanged on average in construction projects. Hence, there is a constant exchange of dialogue, information[,] and deliverables between the stakeholders. For example, the design teams are composed ad-hoc for construction projects, and they belong to multiple firms trying to work towards producing a coherent design through collaborative work. The fact that the design teams do not co-locate for the project and they are contracted only with the client and not among themselves leaves collaboration and coordination to informal relationships and tacit understandings between the team members.¹⁸

For those systems that provide notices based upon computerized algorithms, global positioning satellites (GPS), or recognition of weather events “near” projects, moreover, companies and practitioners should remain skeptical whether those systems comply with the contract documents or perform their tasks in a sufficiently site-specific manner. As a simple example, if systems provide weather notices based on recognition of weather events in San Francisco, but the project is located in Sonoma, how comfortable are the parties relying on that data? Would the weather be the same that day? Would one party’s recorded weather delays be sufficiently documented for the contractor (e.g.) to feel certain it could seek and receive extra time for a weather-related delay? And, of course, are those notices compliant with the requirements of the contract documents? Project

¹⁷ *Id.*

¹⁸ A.S. Erri Pradeep et al., *Leveraging Blockchain Technology in a BIM Workflow: A Literature Review*, CAMBRIDGE CTR. FOR SMART INFRASTRUCTURE & CONSTR. (July 5, 2019) <https://www.icevirtuallibrary.com/doi/pdf/10.1680/icsic.64669.371> [<https://perma.cc/7TJ3-M29V>].

participants could even consider how to draft their contracts to provide more leniency—or rigidity—for these types of potential uncertainties.

To summarize, the emerging dangers of blockchain networks are growing, and some exist already, such that companies should be wary about which systems they utilize. Project participants should be cognizant about the systems that will make the most sense to optimize their performance and profits, while also uncovering where potential risks might arise. The shortsighted benefits might not outweigh the downstream risks when companies consider project delivery, closeout, warranty, the potential claims-handling process, or future litigation. Issues such as insurance coverage, data breach, intellectual property, privacy, authorship, ownership, and allocation of potential liability (just to name a few) should all raise red flags in the minds of companies considering decentralized servers without rigid permissions and clearly defined contractual terms. Companies should also be skeptical of who has access to the networks. At first blush, access should probably be limited. But on the other hand, critical participants leave projects all the time; employees retire, people move to different companies, and the institutional knowledge of the project often leaves with them. Nevertheless, companies must brace for the logistics of new parties needing access to the servers. What happens if litigation ensues, and the attorneys need access to specific project files that are subject to specific network permissions or restrictions? What if the primary document custodian or the employee with complete network access leaves the project or company? What if an audit is contractually required or court-mandated, within a specific timeframe? On the whole, companies must weigh the benefits of the available blockchain networks against the considerable risks imposed by utilizing those technologies.

B. Business Information Modeling (BIM)

Construction projects across the country have seen a considerable rise in contract provisions *requiring* Building Information Modeling (BIM).¹⁹ BIM was originally a “3D model-based process that is object-oriented” and was intended to “capture data about the objects incorporated into the design, from dimensions, to manufacturing information, to warranty and maintenance requirements.”²⁰ BIM is now 4D modeling, which

¹⁹ THE CONTRACTOR’S GUIDE TO BIM, ASSOCIATED GENERAL CONTRACTORS OF AMERICA, 3 (2nd ed. 2006) (“BIM is a ‘data-rich, object-oriented, intelligent and parametric digital representation of the facility, [component, or project,] from which views and data appropriate to various users’ needs can be extracted and analyzed... to improve the process of delivering the facility, [component, or project].”).

²⁰ Nancy Greenwald, Exec. Dir. Constr. Inst., Univ. of Hartford, & Erik Sanford, VDC/BIM Dir., Dimeo Construction Co., The New Toolbelt: BIM, Blockchain and Smart Contracts, A.B.A. Forum on Construction Law Midwinter Meeting (Jan. 23, 2020).

includes a time and scheduling component: “4D Building Information Modeling (4D BIM) is a process to the intelligent linking of a 3D digital model with time or schedule-related information. It provides precise and useful construction project information for teams. It’s gaining momentum in the industry by providing both tangible and intangible benefits...”²¹ Proponents of 4D BIM modeling indicate that its benefits for project participants include, at minimum: (a) “risk mitigation due to improved team coordination and communication;”²² (b) “conflict detection;”²³ (c) “improved delivery time and cost savings;”²⁴ and (d) “improved quality.”²⁵

Over the years, the construction industry has sought to implement BIM with goals such as decreasing project costs, increasing productivity, maximizing quality, and reducing project delivery times.²⁶

Building information modeling (BIM) offers the potential to achieve these objectives. BIM simulates the construction project in a virtual environment. With BIM technology, an accurate virtual model of a building, known as a building information model, is digitally constructed. When completed, the building information model contains precise geometry and relevant data needed to support the design, procurement, fabrication, and construction activities required to realize the building. After completion, this model can be used for operations and maintenance purposes.²⁷

BIM has become ubiquitous in large commercial construction projects. Indeed, some of the largest (or at least, *tallest*) projects in the world, like the \$1.2 billion Jeddah Tower (formerly known as “Kingdom Tower”) project in Jeddah, Saudi Arabia, are utilizing BIM technology.²⁸ Three-

²¹ *4D BIM Planning and Scheduling Simulation of Construction Sequence*, SRINSOFT, INC. <https://www.srinsofttech.com/4d-bim-planning-scheduling-sequencing.html> [<https://perma.cc/D6YS-4JKV>] (last visited Feb. 21, 2020).

²² *Id.*

²³ *Id.*

²⁴ *Id.*

²⁵ *Id.*

²⁶ Salman Azhar, *Building Information Modeling (BIM): Trends, Benefits, Risks, and Challenges for the AEC Industry*, AM. SOC’Y OF CIV. ENG’RS (June 15, 2011) <https://ascelibrary.org/doi/10.1061/%28ASCE%29LM.1943-5630.0000127> [<https://perma.cc/L9KS-YDH3>].

²⁷ *Id.* (citations omitted).

²⁸ See *Pinnacle Implements BIM for Kingdom Tower – A Super Tall Skyscraper under Construction in Saudi Arabia*, PINNACLE INFOTECH, <https://pinnacleinfotech.wordpress.com/2016/05/02/pinnacle-implements-bim-for-kingdom-tower-a-super-tall-skyscraper-under-construction-in-saudi-arabia/> [<https://perma.cc/NP4U-MJSW>] (last visited Nov. 19, 2020). For more information about that project, specifically, see *World’s Tallest Building Will Be Kingdom Tower*, MGS ARCHITECTURE <https://www.mgsarchitecture.in/architecture-design/projects/515-world-s-tallest-building-will-be-kingdom-tower.html> [<https://perma.cc/WK7G-46B8>] (last visited Nov. 19, 2020) (“At over 1,000 meters (3,280 feet) and a total construction area of 530,000 square meters (5.7 million square feet), Kingdom Tower will be the centerpiece and first construction phase of the Kingdom City development on a 5.3 million-square-meter site in north Jeddah.”).

dimensional BIM has evolved to 4D (time scheduling) and 5D (projections of costs and quantities over time).²⁹ What's next? 6D BIM, of course:

6D BIM provides for additional information related to operation and facility maintenance[,] which gives a better understanding of the whole-life-cost of asset along with the cost of construction. This additional data may contain information on component manufacturers, installation and maintenance details, decommissioning data and energy performance throughout its life span. Thus, the pre-planned O&M eases better facility management in terms of cost and sustainability.³⁰

The utility and functionality of BIM continue to expand and evolve, creating huge upside potential for companies seeking to utilize the most advanced technologies for their projects.

As technology improves, the design and construction process industry standards will evolve. For example, the Conceptual Planning Phase of Article 4 in the 2015 Consensus DOCS BIM Addendum for Lifecycle Building Information Modeling includes BIM Use references for 4D budgeting and 5D schedule development, [civil information modeling] (CIM) surveying, site planning, existing conditions modeling (including 3D laser scanning of as-built conditions), and programming review—all tools that significantly aid best-value analysis on IPD [integrated project delivery], public-private partnership (P3), design-build, and other interactive types of project delivery. Analyzing conceptual project data directly via 3D Model in this way is a powerful tool to help make informed decisions about early project design and foster thinking about the structure from the perspective of life-cycle, rather than simply initial construction cost.³¹

A company should recognize, first and foremost, whether it currently utilizes (or wants to utilize) BIM models. The majority of large to mid-sized architectural firms—over seventy-five percent by 2020—have adopted BIM technology.³² In practice, those firms use the system for their designs and then turn the model over to the general contractor. As a standard practice, most designers then have contractors sign BIM/digital media agreements that disclaim liability for the digital medium and require the

²⁹ See generally Harika Singh & Keyuri Patel, *Benefits of 4D and 5D BIM to Construction Projects*, TRUE CADD, <https://www.truecadd.com/news/benefits-of-4d-5d-bim-to-general-contractors-across-construction-projects> [https://perma.cc/PC7V-Y294] (last updated Feb. 5, 2020).

³⁰ *Id.*

³¹ BECK ET AL., *supra* note 9 (citing Kimberly A. Hurtado, *BIM Comes of Age: The New Consensus DOCS BIM Addendum (2015) for Lifecycle Building Information Modeling*, 36 CONSTR. LAW. 37, 42 (No. 4, Fall 2016)).

³² Greenwald, *supra* note 20, at 7.

contractor to rely upon the stamped drawings. Contractors then take the model (e.g., Revit) and input that model into the contractor's own system. Similarly, then, engineers like mechanical, electrical, and plumbing (MEP) consultants also use their own models and systems. All the designs are thereafter combined into one.

But are BIM models a company preference or contractual requirement? Sometimes neither; sometimes both. What is the specific language of the BIM contract requirements? What happens if someone breaches those provisions? Such questions can obviously impact entire project teams and delivery strategies/models. Most contractors have their own BIM protocols or agreements that outline their standard practices and expectations. As such, owners and designers should be discussing these issues with their attorneys and evaluating the following: (a) whether they use and/or prefer BIM models; (b) what possible claims might arise with their preferred alternative or integrated project delivery methods; (c) what specific contract language should they include or omit; (d) how such inclusions or omissions might affect day-to-day (or project-to-project) delivery; and (e) the economic effects of utilizing one alternative versus another.

Several risks exist for contracting parties that utilize BIM. The first and most apparent risk relates to the proprietary information and intellectual property (usually copyrights), themselves.³³ Ownership and obligations for protection of that data, information, or intellectual property, should all be clearly delineated and accounted for within the parties' contracts.

Another contractual issue to address is who will control the entry of data into the model and be responsible for any inaccuracies. Taking responsibility for updating building information model data and ensuring its accuracy entails a great deal of risk. Requests for complicated indemnities by BIM users and the offer of limited warranties and disclaimers of liability by designers are essential negotiation points that need to be resolved before BIM technology is used. It also requires more time spent inputting and reviewing BIM data, which is a new cost in the design and project administration process. Although these new costs may be dramatically offset by efficiency and schedule gains, they are still a cost that someone on the project team will incur. Thus, before BIM technology can be fully used, not only must the risks of its use be identified and allocated, but the cost of its implementation must be paid for as well.³⁴

³³ Azhar, *supra* note 26.

³⁴ *Id.* (citations omitted).

While BIM seeks a collaborative approach in project implementation, project participants are often working in “silos”—design professionals work separately, frequently in other states or countries from their construction professional counterparts. Information included in the model usually mirrors the needs of that creator’s or team’s workflow. But the integrated concept of BIM, along with the silo effect, blurs the level of responsibility and enhances all participants’ potential risk. “Consider the scenario in which the owner of the building files suit over a perceived design error. The architect, engineers, and other contributors to the BIM process look to each other in an effort to determine who had responsibility for the matter raised.”³⁵ Disagreements abound, with a project still to deliver, and someone will either assume liability or potentially face the blame later. And yet, the ability to prove fault to a factfinder has been hindered. If the claims do not resolve prior to litigation, each design professional could possibly find themselves either contributing to a resolution or facing potential liability through arbitration or trial. This remains a scary proposition for most design professionals.

To mitigate these risks, parties must seek a collaborative, integrated approach to project delivery, while also clearly delineating the parties’ responsibilities and legal obligations under the terms of their respective contracts (especially design professionals). The parties can collaboratively allocate the potential risks associated with using BIM among all the project participants, depending on their various uses or contractual scopes. Model management, authorship, ownership, schedule development, phasing, critical path monitoring, and level-of-development requirements should all be considered—but not just once: in pre-contract negotiations, during the pre-design phase, within the pre-construction phase, and throughout project delivery. Project participants should frequently reconsider those issues with their insurers and attorneys to make sure they are protected from the inception of the pre-design phase through completion of the project, and through any applicable warranty period or statute of repose.

C. Digital Twins & Digital Delivery

1. Background

Digital twins and digital delivery methods can be useful tools for owners, architects, engineers, and even construction management and project delivery teams.

³⁵ *Id.* (citations omitted).

In essence, a digital twin is simply a “digital replica of a physical entity” that utilizes “real-time data collected by sensors [in order to] create predictive simulations to better understand how the [project component] will perform in the moment and into the future . . .”³⁶ For construction projects, a digital twin³⁷ can allow several important entities—particularly the owner and design professionals—to retain the institutional knowledge of the building, design, construction, and other teams, even after the specific individuals with the most knowledge have completed their scope of work, left the company, or retired. Digital twins also create potential backstops for clash detection and defect analysis for designers, and could create economical tools for experts, arbitrators, judges, and jurors when project disputes arise.

Digital delivery or integrated digital delivery (“IDD”) utilizes digital data to monitor, or reconcile, the as-built conditions during project delivery.³⁸ Like most digital delivery methods, IDD proponents emphasize increased optimization “to connect various industry parties involved in the projects with common shared platform for easy collaboration.”³⁹ The typical IDD platform “allows the integration of the entire project delivery process from design, off-site fabrication, assembly on-site and eventually, operations and maintenance of buildings.”⁴⁰ As discussed above, 6D BIM is a tool for operations and maintenance (O&M) “whole-life-cost” analyses. This shared platform and integration allows for greater collaboration, easier access, enhanced accuracy, reduced waste, and increased productivity.⁴¹

³⁶ Daryl Patterson & Bill Ruh, *Global Infrastructure Initiative, Digital Twins: Taking Modular Construction to the Next Level*, GLOB. INFRASTRUCTURE INITIATIVE (Sept. 2019) <https://www.globalinfrastructureinitiative.com/article/digital-twins-taking-modular-construction-next-level> [<https://perma.cc/FW3W-EV65>].

³⁷ *What Are Digital Twins?*, CONSTRUCTIBLE (Apr. 10, 2019) <https://constructible.trimble.com/construction-industry/what-are-digital-twins> [<https://perma.cc/3D7V-B8ZE>] (“By amassing data from several sources, and integrating that information into a 3D model, construction teams are able to gain acute insight into every component [of the project, or a particular component of the construction project]. With the aid of digital twin capabilities, BIM [Building Information Modeling] models are evolving to become ‘living,’ automatically updated representations of physical assets they represent.”).

³⁸ See, e.g., Alexa Mitchell, *How Digital Data is Transforming Project Delivery for Highway Construction*, WSP INSIGHTS (Sept. 2018), <https://www.wsp.com/en-US/insights/how-digital-data-is-transforming-project-delivery-for-highway-construction> [<https://perma.cc/CDX8-S2FQ>] (“To put it simply, it is the effective use of digital data to design, construct, inspect and record as-built conditions during the delivery of a construction project. Typical technology used for digital project delivery include 3D surveys (light detection and ranging, also known as ‘LiDAR’), 3D engineered models, automated machine guided construction equipment, mobile devices and GIS applications, paperless workflows, and most recently unmanned aircraft systems (UAS) more commonly known as ‘drones.’ The same technology used to design the project can be used for building and inspecting the work.” *Id.*)

³⁹ *Integrated Digital Delivery (IDD)*, TEKLA, <https://www.tekla.com/sg/integrated-digital-delivery-idd> [<https://perma.cc/EBF9-2TNR>] (last visited Feb. 7, 2020).

⁴⁰ *Id.*

⁴¹ *Id.*

In response to increasing economic, social and environmental pressures, private and public sector developers are challenging the design and construction industry to deliver faster, greener and more efficient infrastructure solutions . . . Digital delivery is truly transformative, giving project teams the opportunity to not only transform the way we design and create our built environment, tackling long-standing productivity challenges in the design and construction industry, but also crucially deliver the faster, smarter, better buildings that our communities and the future demand.⁴²

Relatedly, the American Institute of Architects (“AIA”) defines integrated project delivery (“IPD”) or “collaborative design,” as a form of project delivery “that integrates people, systems, business structures[,] and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction.”⁴³ Many project participants who seek greater flexibility or the heightened potential for costs savings and value engineering look favorably on the IPD method. Moreover, collaborative design can be “applied to a variety of contractual arrangements” beyond the standard trinity of “owner, architect, and contractor.”⁴⁴ While no *standard* form AIA construction contract incorporates IPD as a term for project delivery, the AIA provides a whole suite of IPD documents from 2008.⁴⁵ The AIA C191-2009 is a standard form multi-party agreement for IPD; the AIA C195-2008 is the standard form single purpose entity agreement for IPD; the AIA C196-2008 is the standard form agreement between a single purpose entity and owner for IPD; the AIA C197-2008 is the standard form agreement between a single purpose entity and non-owner member for IPD; the AIA C198-2010 is the standard form agreement between a single purpose entity and consultant for IPD; and the AIA C199-2010 is the standard form agreement between a single purpose entity and contractor for IPD.⁴⁶ For an entrée into IPD for a commercial project, parties could also utilize their C401 (architect/consultant) and A401 (contractor/subcontractor) agreements, alongside B195-2008 (owner/architect)

⁴² Dale Sinclair, *Digital Delivery: Transforming the Design Process*, AECOM, <https://www.aecom.com/without-limits/article/digital-delivery-transforming-the-design-process/> [<https://perma.cc/Q8MZ-MSY8>] (last visited Feb. 7, 2020).

⁴³ AIA NAT’L & AIA CAL. COUNCIL, *Integrated Project Delivery: A Guide* (2007), abstract, <http://content.aia.org/sites/default/files/2017-02/Integrated%20Project%20Delivery%20Guide.pdf> [<https://perma.cc/SUVX-D2NX>].

⁴⁴ *Id.*

⁴⁵ See generally AM. INST. OF ARCHITECTS, *Integrated Project Delivery (IPD) Family*, <https://www.aiacontracts.org/contract-doc-pages/27166-integrated-project-delivery-ipd-family> [<https://perma.cc/Y9U8-TA4C>] (last visited Feb. 21, 2020).

⁴⁶ See *id.*

and A195-2008 (owner/contractor) agreements, with the A295-2008 General Conditions. All of those standard form agreements are more than ten years old and should be heavily revised and negotiated before execution.

2. Liability Coverage

Contractors might require—or be advised to acquire—“contractor’s professional liability” policies that replicate the typical policies procured by design-builders. Although most design professionals maintain “[g]eneral [l]iability coverage as part of a ‘commercial package policy’ or ‘business owner’s policy,’”⁴⁷ their coverage might not extend to certain IPD products or operations.⁴⁸ Thus, design professionals could find themselves contractually subject to situations where they assume responsibility for contractor means and methods. Contractors could also find themselves subject to professional liability exposures that are not covered by their builder’s risk insurance or other commercial liability policies.⁴⁹ Utilizing IPD in conjunction with multi-party agreements among various team members further blurs the lines for traditional risk assessment and risk allocation, both during project delivery and through the claims-handling process. As two commenters recently noted, “[i]t is unclear at this point in time how courts will construe provisions of multi-party agreements—and specifically, the extensive waivers and unusual limitations on risk typically found in such agreements. With so many unknowns, present insurance coverage options have been difficult to define.”⁵⁰

This is true. Companies should involve their attorneys early-on in the IPD negotiations process. Some might even advise those companies to involve their insurers in pre-IPD negotiations so the parties can consider their coverage options, and weigh the risks against the potential benefits of collaborative IPD design.⁵¹ After all, the goal for these project participants is to “foster a collaborative environment that will reduce the number

⁴⁷ See, e.g., Timothy Esler, *Insurance for IPD*, FENNER-ESLER INSURANCE (2020), <https://www.fenner-esler.com/insurance-for-ipd/> [<https://perma.cc/KAG5-8U9B>].

⁴⁸ See generally AIA TR., *Project-Based IPD Insurance Coverage*, <https://www.theaiatrust.com/ipd-insurance/> [<https://perma.cc/GU5H-44HY>] (last visited Oct. 5, 2020).

⁴⁹ Esler, *supra* note 47. (“[T]he design professional may find themselves being contractually subject to situations where they are assuming responsibility for areas traditionally outside their purview. For instance, ‘contractor means / methods.’ In short, this is hardly considered professional in nature and therefore typically excluded from the professional liability policy because it is more aptly covered by a General Liability policy. In the same vein, the contractor’s involvement in parts of the design development could subject them to professional liability exposures that are not covered by their traditional insurance programs. Thus the contractor will likely have the need for ‘contractor’s professional liability’ which already exists as a fairly mature insurance product utilized by Design Builders.”) (internal brackets omitted).

⁵⁰ Jessica Courtway, Assoc., Greensfelder, Hemker & Gale, P.C. & Anthony Colonna, Senior Vice President, Innovative Constr. Sol., Skanska USA Bldg. Inc., The New Tool Belt: Wearables, Augmented & Virtual Reality, Integrated Project Delivery and A.I., Am. Bar Ass’n F. on Constr. L. Mid-winter Meeting (Jan. 23, 2020).

⁵¹ Esler, *supra* note 47.

of claims and disputes amongst the parties,”⁵² while also ensuring those parties are insured and protected from such claims and disputes that sometimes arise.

3. Public Works Projects

Companies working on public works projects must be wary of trying to adopt IPD agreements, as collaborative design agreements may “conflict with certain federal, state, or local procurement laws that mandate selection of the lowest responsible bid for a public contract.”⁵³ Indeed, a majority of states lack legislative authorization for parties that wish to enter into collaborative design contracts; thus, IPD is not an option for those public works projects. But some commenters hope that “with the continued, successful use of IPD in the private sector, public agencies will adopt these practices.”⁵⁴ For now, practitioners and legal scholars must simply wait and see.

4. Spearin Doctrine

Finally, it is imprudent to discuss collaborative design without also mentioning the *Spearin* Doctrine, established in *United States v. Spearin*, 248 U.S. 132 (1918).⁵⁵ The *Spearin* Doctrine has evolved over the last one hundred years to become both a sword and shield for owners

⁵² *Id.* at 20.

⁵³ *Id.* at 21 (citing Nida Azhar et al., *Factors Influencing Integrated Project Delivery in Publicly Owned Construction Projects: An Information Modelling Perspective*, 77 *PROCEDIA ENG'G* 213, 213-21 (2014)).

⁵⁴ *Id.*

⁵⁵ For example, the *Spearin* Doctrine has been broadly adopted by the majority of states, like Ohio and Washington, as a defense where a contractor fails to comply with the design specifications. *See Dugan & Meyers Constr. Co. v. Ohio Dep't of Adm. Servs.*, 113 Ohio St. 3d 226, 231, 864 N.E.2d 68, 73 (2007) (acknowledging robustness of *Spearin* Doctrine but declining to extend the doctrine to delay damages for plan changes); *see also* *Weston v. New Bethel Baptist Church*, 23 Wash. App. 747, 598 P.2d 411 (1978) (holding designer cannot be liable where plans are not followed); *McGuire v. United Bhd. Of Carpenter & Joiners of Am., Local No. 470*, 50 Wash. 2d 699, 314 P.2d 439 (1957), *abrogated by* *Malstrom v. Kalland*, 62 Wash. 2d 732, 384 P.2d 613 (1963) (absolving architects of liability based on contractor's failure to follow plans and specifications). As the counterbalance to that rule, the Washington Supreme Court has also held: “Contractors have no right to depart from working plans made part of the contract. If they do so, it is at their peril, and they become guarantors as to the strength and safety of the structures.” *Valley Constr. Co. v. Lake Hills Sewer Dist.*, 67 Wash. 2d 910, 915-16, 410 P.2d 796 (1965). The *Spearin* Doctrine leaves open the question of who might be liable for uncertain subsurface conditions, which might predicate a differing site condition claim. Some jurisdictions, like Georgia, have squarely placed that risk upon the general contractor. *Am. Demolition, Inc. v. Hapeville Hotel Ltd. P'ship*, 202 Ga. App. 107, 413 S.E.2d 749 (1991) (holding that where “[a] contract . . . contained no changed conditions clause, unequivocally limited the contract payment to a sum certain, and contained an inspection clause [that] [i]t is clear from these provisions that the contract imposed the risk of uncertainty of subsurface conditions on [the contractor].”). Note, however, the contract in *American Demolition* incorporated a modified version of AIA A201-1987 General Conditions where the parties struck the changed conditions clause.

and designers on construction projects, by implicating “implied” warranties of project participants, which are predicated on the project plans and specifications.

The first general rule stated in *Spearin* is: “[where a contractor] agrees to do, for a fixed sum, a thing possible to be performed, he will not be excused or become entitled to additional compensation, because unforeseen difficulties are encountered.”⁵⁶ This maxim has been expanded in the last hundred years to capture issues like differing site conditions; it will also underpin issues like delegated design in the coming decades. In some jurisdictions, contractors can also use the doctrine to provide an implied warranty regarding the sufficiency of a design.⁵⁷

In more recent years, the Federal Circuit and Court of Federal Claims, which handle the majority of construction disputes in the United States, have afforded robust protections for owners and designers under the *Spearin* Doctrine. According to those courts, *Spearin* dictates that where a general contractor deviates from the plans and specifications, that contractor accepts the risks associated with its deviation, and the owner’s or designer’s warranty becomes void.⁵⁸ This has become the second rule under *Spearin*—another sword and shield for project participants. For example, “Washington law requires only that the design be sufficient for the intended purpose . . . [*Spearin*] holds only that a design must be ‘defective’ for there to be a breach of the implied warranty. Later federal cases which have applied *Spearin* have stated that under the implied warranty of design, the owner warrants only that if the design is followed, a satisfactory result will follow.”⁵⁹ An owner’s implied warranty does not mean plans will be free of any errors—the warranty is underpinned by “reasonableness,” not perfection.⁶⁰ Washington courts have limited the *Spearin* Doctrine for defensive purposes; thus it is not “a weapon of offense” to be used

⁵⁶ *United States v. Spearin*, 248 U.S. 132, 136 (1918).

⁵⁷ *Id.* An implied warranty also flows from the owner based on the “sufficiency” of the plans and specifications, and the Court in *Spearin* held that a contractor would not be liable to an owner for loss or damage resulting solely from insufficiencies or defects in the plans and specifications. *Id.* (“But if the contractor is bound to build according to plans and specifications prepared by the owner, the contractor will not be responsible for the consequences of defects in the plans and specifications.”).

⁵⁸ *Mega Constr. Co. v. United States*, 29 Fed. Cl. 396, 418 (1993) (finding that a contractor will be precluded from recovery if it “failed to comply *fully* with the specifications.”) (emphasis added); *Metric Constr. Co. v. United States*, 80 Fed. Cl. 178, 186 (2008) (“[Owner’s] implied warranty of its specifications is generally voided if the contractor does not follow those specifications . . . Even if a specification is defective, however, contractors must be reasonable in their conduct during construction.”); *Dillingham Const., N.A., Inc. v. United States*, 33 Fed. Cl. 495, 501 (1995), *aff’d*, 91 F.2d 167 (Fed. Cir. 1996) (“[The specifications] do not ‘independently create, limit, or remove a contractor’s obligations,’ [rather,] ‘[i]t is the obligations imposed by the specification which determine the extent to which it is ‘performance’ or ‘design’ not the other way around.”) *Id.* (citing *Blake Const. Co. v. United States*, 987 F.2d 743, 746 (Fed. Cir. 1993)).

⁵⁹ *Donald B. Murphy Contractors, Inc. v. State*, 40 Wash. App. 98, 102, 696 P.2d 1270 (Wash. App. 1985) (citations omitted).

⁶⁰ *Id.*

by contractors against owners.⁶¹ A recent decision by the Washington State Court of Appeals confirmed the rule adopted by the courts mentioned above, and held that a contractor asserting the *Spearin* Doctrine as an affirmative defense can be relieved from liability only by proving the alternate proximate cause of the allegedly defective plans and specifications *solely* caused the contractor's breach.⁶² As a corollary to the second *Spearin* rule, however, at least one court in New York found that a party could not claim noncompliance with plans or specifications if that party failed to test for compliance under the required ASTM⁶³ tolerances (in that case, for concrete), or if the testing that occurred illustrated general compliance (in that case, for flatness and levelness).⁶⁴

Under the IPD delivery method discussed above, any application of the *Spearin* Doctrine becomes more nuanced.⁶⁵ With the collaborative design method, "the owner is merely one of several team members having a meaningful say and/or control in the project's design."⁶⁶ Consequently, some commentators agree that parties should account for the implied warranty afforded by the *Spearin* Doctrine within their IPD agreements.⁶⁷

D. Smart Contracts

Smart contracts are now emerging as self-governing electronic modes to trigger performance. Still in their relative infancy, smart contracts are not terribly *smart*.⁶⁸ "A smart contract is a 'computable contract'

⁶¹ *Dravo Corp. v. Mun. of Metro. Seattle*, 79 Wash. 2d 214, 221, 484 P.2d 399 (1971). ("The doctrine relied upon by [contractor] is, by its terms, a defensive weapon, not a weapon of offense. [Contractor] seeks to use it to obtain additional compensation for performing its contract. We are convinced that the doctrine has no application in these circumstances.")

⁶² *Lake Hills Investments LLC v. Rushforth Constr. Co., Inc.*, 472 P.3d 337, 346 (Wash. Ct. App. 2020) ("To be relieved of all liability for its breaches, [the contractor] had to prove [the owner's] defective designs 'solely' caused the plaintiff's damages."); see also Geoffrey F. Palachuk, *Washington Appellate Court Reaffirms Rule That Contractors' Defense of Deficient Plans or Specifications Must be the Sole Cause of the Breach in Order to Shield Contractors From Liability*, ADVISE & CONSULT, INC. (Sept. 24, 2020), <https://www.myconstructionexpert.com/blog/contractors-defense-deficient-plans/> [<https://perma.cc/UDE6-5YDM>].

⁶³ ASTM International, formerly known as American Society for Testing and Materials, is an international standards organization that publishes widely testing standards for construction projects in the United States. See *About Us*, ASTM INT'L, <https://www.astm.org/ABOUT/overview.html> [<https://perma.cc/L2EA-VU43>] (last visited Oct. 30, 2020).

⁶⁴ See *Pioneer Valley Concrete Serv., Inc. v. JAG I, LLC*, No. 1:10-CV-1311, 2013 WL 6230105, at *17 (N.D.N.Y. Dec. 2, 2013).

⁶⁵ See generally David J. Hatem, *Design Responsibility in Integrated Project Delivery: Looking Back and Moving Forward* (Jan. 2008) (unpublished manuscript) (on file with Donovan Hatem LLP).

⁶⁶ Courtway & Colonna, *supra* note 50, at 20.

⁶⁷ *Id.* at 20. (citing Joseph A. Cleves Jr. & Lisa Dal Gallo, *Integrated Project Delivery: The Game Changer*, A.B.A. (2012).

⁶⁸ For another, similarly contrarian view of this foolhardy emerging technology, see David B. Black, *Blockchain Smart Contracts Aren't Smart and Aren't Contracts*, FORBES, (Feb. 4, 2019),

with self-executing steps written into lines of code.”⁶⁹ Commentators have likened smart contracts to vending machines: “[o]nce the customer enters money into the vending machine and makes a selection, the transaction cannot be interrupted, and the machine automatically delivers the desired product . . . [t]he smart contract becomes a self-executing mechanism for enforcing the terms of the contract.”⁷⁰

These “smart” contracts are embedded within blockchain network platforms, meaning the same myriad of legal issues related to blockchain technologies are implicated. Smart contracts ultimately do not circumvent or eliminate the need for carefully-drafted contracts. In fact, smart contracts actually add another step to the process.⁷¹ “Perhaps the best way to think of smart contract technology is as a useful tool for automating and recording specific contractual processes rather than as embodying a complete contractual agreement.”⁷² But the contractual processes and performance obligation metrics must be programmed—by a programmer who likely isn’t an attorney, and who likely hasn’t consulted with the companies’ attorneys—leaving greater room for error. That programming element also negates and leaves no room to consider (or argue) the contracting parties’ intentions, different possible interpretations of the relevant contract terms, and the like. Those downstream hurdles might complicate the claims-handling process and the potential for dispute resolution.

Assume a supplier wants to set up a smart contract for execution and delivery of crushed surfacing based course (CSBC) for a paving contract. Once initial payment is received by a supplier, that supplier could automatically order materials through the provisions of its smart contract (depending on the variable CSBC material quantity ordered), which might make good sense. Discrete processes could benefit from smart contracts, especially for lower-tier materials/supplies on small projects, or discrete project materials like CSBC. As another example, “verification of a delivery and release of payment could be facilitated through a smart contract process,”⁷³ so long as the parties have no concerns about quality assurance or quality control. Both these illustrations could work for the CSBC on the paving contract, as one example, for both material quantity purchase and delivery.

But applying this technology to most construction projects today appears to be a risky proposition. Owners and designers should remain

<https://www.forbes.com/sites/davidblack/2019/02/04/blockchain-smart-contracts-arent-smart-and-arent-contracts/#3b5faf6b1e6a> [<https://perma.cc/7URB-A2T2>]. Commentators on both sides of the debate agree that Mr. Black’s article is worth the read. See Greenwald, *supra* note 20, at 26.

⁶⁹ Greenwald, *supra* note 20, at 22.

⁷⁰ *Id.* at 23.

⁷¹ *Id.* at 25.

⁷² *Id.* at 26.

⁷³ *Id.*

wary of self-governing contracts and automatic performance triggers. While many companies are enticed by the prospect of optimizing specific processes, risk-allocation considerations and potential downsides to implementing smart contracts cannot be overstated. Companies should consider the requirements for individual project- or company-specific programming, the skills required to accurately and effectively program the contract code, the issues related to non-performance, the consequences of ambiguous terms or performance, and the relative impossibility of interpreting those contracts (to name a few). Some are certainly big risks, which leave minimal room for legal argument if disputes arise.

Companies that seek to implement “smart” contracts for their construction projects should discuss these issues with their attorneys. Failure to consider the risks and to seek advice on the front-end of the project could be disastrous mid-project or during the claims process. These considerations are especially important if a network of self-executing systems remains active and the parties are required to respond to those issues in real time.

E. Artificial Intelligence and Unmanned Aerial Vehicles

In a similar vein, artificial intelligence (AI) has taken rapid steps toward predictive analytics, machine learning, and optimization of legal research and technology.⁷⁴ Today, drones, or “unmanned aerial vehicles,” have become commonplace on projects. Some predict that drones might replace helicopters for surveying, expand building inspection functionality and responsibility, enhance model creation, and monitor schedule progress.⁷⁵

Drones are fascinating. Consider how this technology advanced in the last decade. In recent years, the construction industry has been one of the top-three commercial spaces for drone-usage.⁷⁶ Drones only recently became available for public use, but now they are frequently utilized for large construction projects. The Federal Aviation Administration (FAA)

⁷⁴ Take, for example, “Blue J Legal,” which holds itself out as “a market leader in developing legal technology powered by machine learning,” that is also “building the next generation of legal research: faster, more targeted, and data-backed...” *About Us*, BLUE J. LEGAL, <https://www.bluejlegal.com/about> [<https://perma.cc/Q7GQ-WY49>] (last visited Feb. 7, 2020).

⁷⁵ John Farrell, *Artificial Intelligence in Construction: Time for Alternative Insurance?*, KENNEDYS LAW LLP (Oct. 24, 2018), <https://kennedyslaw.com/thought-leadership/article/artificial-intelligence-in-construction-time-for-alternative-insurance/> [<https://perma.cc/2A7S-G4QL>].

⁷⁶ Mike Danielak, *The Benefits of Employing Drones in Construction*, CONSTR. DIVE (Feb. 14, 2018), <https://www.constructiondive.com/news/the-benefits-of-employing-drones-in-construction/516713/> [<https://perma.cc/99DB-HVHC>]. (“The 2017 Drone Market Sector Report found that construction (design, building inspection or monitoring) is in the top three uses for commercial drone-based services, behind aerial photography, surveying and mapping, and geographic information systems (GIS).”)

has struggled to keep up with the technology and its various uses.⁷⁷ “Construction drone uses are particularly attuned to any new regulation, given the rapid expansion of drone flights across the industry.”⁷⁸ Drones can be a valuable tool for large projects, whether for project management, as tools for design specifications, for comparative analysis (e.g., “as designed” vs. “as built” or defect analysis), or to document project delivery, and so on.

What contract provisions would be required to carve out potential owner or designer liability in the face of AI advancements in predictive analytics and machine learning? Who potentially “owns” the liability associated with using these technologies? The party who most benefits or profits from their use? Perhaps the general contractor. What obligation or specific legal duty would architects and engineers possess if they utilized AI and predictive analytics? Perhaps they could better collaborate with consultants and subconsultants regarding clash detection, but that enhanced collaborative ability should not impose a greater professional legal duty upon those designers. On a large enough scale, however, would use of these technologies heighten or lower, relatively, the standard of care for those professionals? What licensing and ethics requirements would apply to professional designers’ use of such technology? What happens if someone’s drone causes injury to project personnel, bystanders, or property? What about the privacy concerns for the images and information captured by drones—either incidentally or intentionally?

Courts have not yet answered the majority of these questions, but they probably will—and soon. In the face of such imminent technological issues and the potential exposure to liability, project participants should have their proverbial guards up; they should also analyze the best methods to protect their companies from liability and stay ahead of this changing legal landscape.

There are potential impacts on various disciplines during project delivery, along with constantly changing legislation—which differs among states—and emerging contract and insurance exclusions that companies need to consider. Irrespective of those legislative changes, the potential liability implications could be severe, nuanced, and largely uncharted legal waters (i.e., with unpredictable risks). Given the influx of drones on construction projects and relative uncertainty surrounding the legal implications of this technology, most project participants require drone insurance. Moreover, most companies have specific coverage inclusions as part of their commercial general liability (CGL) policies or

⁷⁷ See Stephanie Loder & Jeff Rubenstone, *Proposed FAA Drone Rules Prompt Industry Pushback*, ENG’G NEWS-REC, (Jan. 15, 2020), <https://www.enr.com/articles/48492-proposed-faa-drone-rules-prompt-industry-pushback> [<https://perma.cc/APM8-AZ5M>].

⁷⁸ *Id.*

through adders to their policies. Similar to the insurance issues for wearable technologies discussed below, general contractors, subcontractors, and even suppliers should ensure their insurance policies cover the use of various AI technologies, including drones, because the duty to defend or the insurer's indemnification obligation "could hinge on a single definition."⁷⁹

Workplace injuries related to the use of AI technology are the most obvious area of concern. Many companies might lack proper coverage without specifically negotiating various AI technology and insurance provisions. In *Philadelphia Indemnity Insurance v. Hollycal Products*, for example, an insurer denied coverage after a drone crashed into a bystander, based on the "aircraft exclusion" contained in the commercial liability insurance policy.⁸⁰ There, the court rejected the injured party's arguments that the drone was "unmanned and operated remotely" and was "not capable of transporting persons or cargo."⁸¹ Instead, the court found the insurer had no duty to defend or indemnify the insured for the personal injury to the bystander because the drone fell squarely within the "ordinary definition of an aircraft," and thus held that the aircraft exclusion applied.⁸² The holding in *Philadelphia Indemnity Insurance* might apply to a construction project where an insurer has no duty to defend or indemnify the insured, and the insured company might end up paying out-of-pocket if the claimant establishes liability. Without the benefit of the insurer, this technology suddenly creates a large financial risk.

F. Cybersecurity

Alongside other technological considerations, companies should also consider how they might deal with a cybersecurity breach, ransomware, or otherwise. Another separate article could be written about cybersecurity considerations; this subsection provides a brief snapshot of the potential considerations for construction project participants.

Contractors, construction managers[,] and owners worry about cyber-crime, and with good reason. Their complex projects, with myriad data exchanges among partners and subs, regulators and suppliers, software and systems—and now the internet of things—are tempting targets for hackers. The specific risks are too many to name and evolve constantly. They run the gamut from stolen or locked data to

⁷⁹ Courtway & Colonna, *supra* note 50, at 23.

⁸⁰ *Philadelphia Indem. Ins. Co. v. Hollycal Prod., Inc.*, No. EDCV18768PASPX, 2018 WL 6520412, at *2 (C.D. Cal. Dec. 7, 2018).

⁸¹ *Id.*

⁸² *Id.* at *12.

financial theft, sabotage, and destruction of hardware and equipment.⁸³

Before a breach occurs, companies should implement policies related to time-sensitive legal obligations and retention of necessary third parties (e.g., forensics); scaling up incident response work for in-house legal counsel or risk management teams after an attack; policies regarding coordination on crisis communications and public relations; attorney review of contractual obligations; and possible engagement of a public relations team to limit brand damage occurring during or after a cybersecurity breach. Again, these systems should be in place *before a breach occurs*. Project participants should view these engagement processes in terms of minutes, not days. The need for prompt action should not only be driven by potential lost profits, but also the need to protect sensitive employee and personnel information, customer data, copyrights and trade secrets, account information, and the like. Restoration of services is critical, along with preservation of evidence. The state of Washington has strict data breach laws that need to be reviewed by an experienced cybersecurity attorney. Compliance with those laws would be essential to any effective response to threats or breaches.

Other considerations might include whether cybersecurity insurance makes sense for particular companies or projects and whether such insurance should also cover loss-of-use and/or business interruption.

G. Wearables

The construction industry will continue to see a drastic uptick in the use of wearable technology (wearables) in the new decade. Wearables are generally carried or worn, and the technology tracks data about the user or site, which can be also used later.⁸⁴ Wearables can include sensors for proximity, acceleration, gyroscopic motion, biomechanical detection, or GPS.⁸⁵ They can then provide data about movement, location, chemiresistive detection, and weather patterns—even the wearer’s vital statistics like heart rate and metabolic rate.⁸⁶

⁸³ Tom Sawyer & Jeff Rubenstone, *Construction Cybercrime Is on the Rise*, ENG’G NEWS-REC, (May 8, 2019), <https://www.enr.com/articles/46832-construction-cybercrime-is-on-the-rise> [<https://perma.cc/S2V7-EAV9>].

⁸⁴ David P. Galbraith, *Construction Wearables’ Futuristic Features are More Feasible Than You Think*, CONSTR. DIVE (June 26, 2019), <http://www.constructiondive.com/news/construction-wearables-futuristic-features-are-more-feasible-than-you-thin/557715/> [<https://perma.cc/AXV5-TEYJ>].

⁸⁵ Shruti Rameshwar Acharya, *The Sensors that Make a Difference in Wearable Tech*, IOT FOR ALL (Feb. 20, 2019) <http://www.iotforall.com/sensors-that-matter-wearables/> [<https://perma.cc/S36W-E5JX>].

⁸⁶ *Id.*; see also David P. Galbraith, *supra* note 84.

In general, “[w]earable technology presents the opportunity to improve safety, reduce injuries, improve efficiencies[,] and enhance quality of life for construction workers.”⁸⁷ But how are project participants utilizing wearables on projects today?

The construction industry is ripe for commercial application of wearables. Many of the issues that consume the time and attention of managers in the construction industry, such as safety, personnel management, and compliance, are areas where wearables can shine. For example, wearables can be used to detect and warn of safety hazards in dangerous environments; track the comings and goings of personnel at hectic construction sites; and provide reliable, high-quality data that can prove regulatory compliance (and identify areas for improvement).⁸⁸

Common types of wearables⁸⁹ include vests that track employees, fatigue monitoring hard hats, boots that provide data to cloud technology, smartwatches, and exoskeletons.⁹⁰ For contractors and skilled trades, researchers hope to utilize wearables and AI to better understand wear-and-tear injuries, reduce risk for employees, and increase productivity and longevity by providing ergonomic guidelines or training for modified movements.⁹¹ AECOM and Trimble recently collaborated on “the world’s first use of Microsoft HoloLens ‘mixed-reality’ technology for engineering and construction.”⁹² The companies also announced a pilot program to apply the technology to projects on three continents.⁹³

Through a lightweight headset, HoloLens technology adds holograms of 3D objects into a user’s view, allowing interaction with these virtual objects as if they were present. Trimble’s innovative

⁸⁷ *Id.*

⁸⁸ Courtway & Colonna, *supra* note 50, at 3 (citing Gailbraith, *supra* note 84).

⁸⁹ *See id.* (citing Rachel Novotny, *Wearable Technology in Construction to Watch For in 2019*, ESUB CONSTR. SOFTWARE (Apr. 17, 2019), <https://esub.com/top-construction-wearables-watch-2018/> [<https://perma.cc/B493-ALFK>]; Ifeoma Ajunwa, *Algorithms at Work: Productivity Monitoring Applications and Wearable Technology As the New Data-Centric Research Agenda for Employment and Labor Law*, 63 ST. LOUIS U. L.J. 21, 38 n.142 (2018)).

⁹⁰ BOSS Editorial Team, *How Exoskeletons are Changing Construction: The Wearable Tech Benefiting the Construction Sector*, <https://thebossmagazine.com/exoskeletons-construction/> [<https://perma.cc/3M5Y-Y9JE>] (last visited Aug. 30, 2020).

⁹¹ Laurie Cowin, *Wearables’ ROI is in Safety and Insurance, Expert Says*, CONSTR. DIVE (Aug. 29, 2018), <https://www.constructiondive.com/news/wearables-roi-is-in-safety-and-insurance-expert-says/531004/> [<https://perma.cc/NQ9C-6NES>].

⁹² Press Release, AECOM, *AECOM and Trimble Pioneering Use of Mixed-Reality Technology for Engineering and Construction* (June 13, 2016), <https://www.aecom.com/press-releases/aecom-trimble-pioneering-use-mixed-reality-technology-engineering-construction/> [<https://perma.cc/P2AB-RQVP>].

⁹³ *Id.*

mixed-reality solutions allow AECOM to feed 3D engineering models into the HoloLens world, including models of large or complex projects.

....

With Trimble solutions, AECOM designers and engineers can view a complex structure as if it were a 3D model placed on a table, or zoom in for a 1:1 view that simulates what it would be like to move through its structural framework.

This shared experience allows team members to physically point out potential difficulties or unforeseen conflicts in an evolving design. Trimble's solutions allow participants to log observations and create a group action plan during the session.⁹⁴

For those who cannot envision a setting of the HoloLens mixed-reality technology in practice, imagine a team of engineers wearing bulky black-lensed headsets, manipulating their views, bringing up specifications, identifying interstitial spaces, or running clash detection—in real time—with a shared 3D model. Sounds pretty incredible, right? A dozen years ago, that type of technology was only utilized by Tony Stark or the Agents of S.H.I.E.L.D. thanks to Hollywood magic.⁹⁵

Practical advantages for wearables are potentially limitless. But legal nuances exist. For example, if a skilled tradesman or tradeswoman is fired for cause, the employer could use his or her wearable technology to gain a better insight into the justification (or pretext) for that employee's termination.⁹⁶ Workplace accidents could certainly benefit from the data provided by wearables, but risks exist for both employees and employers when utilizing wearables and reviewing a workplace accident in retrospect.

The benefit for workers should not be understated. "Wearable technology can be used to warn employees who work in hazardous conditions about potential health risks, such as exposure to toxic fumes. . . . If employees are required to work after the technology reveals a health risk, the employer's liability for a workplace injury would increase significantly"⁹⁷ Employers should be wary of issues that might arise under the Health Insurance Portability and Accountability Act of 1996 (HIPAA)

⁹⁴ *Id.*

⁹⁵ Iron Man, Agents of S.H.I.E.L.D., and Tony Stark are characters owned by Marvel Comics and created by Stan Lee, Larry Lieber, Don Heck, and Jack Kirby. The *Iron Man* movie franchise, part of the Marvel Cinematic Universe, served as a catalyst for the entire *Avengers* movie franchise that concluded in 2019. See generally IRON MAN (Marvel Studios 2008); AVENGERS ENDGAME (Marvel Studios 2019).

⁹⁶ See Allen Smith, *How to Limit Wearable Technology's Legal Risks*, SHRM (May 29, 2018), <https://www.shrm.org/resourcesandtools/legal-and-compliance/employment-law/pages/wearable-technology-legal-risks.aspx> [https://perma.cc/S2PL-63CR].

⁹⁷ *Id.*

and the nondisclosure requirements under the Americans with Disabilities Act (ADA), for example. Companies should also understand the type of information collected and what data, if any, is shared during or after their projects.⁹⁸ On the other hand, improved employee health and wellness could result in lower insurance premiums—which might have the greatest impact on the construction industry.⁹⁹

Of course, claims related to negligence and products liability could see immense changes from the use of wearables on construction projects. As commentators have recently noted: “If mandatory usage has the potential to impose liability on a construction company [through negligence or products liability], wearables are no panacea; but making safety features optional entails hazards of its own.”¹⁰⁰ Take just one¹⁰¹ example from Oklahoma, where a manufacturing employee sustained injuries from a transfer car that was programmed to move forward once its frontal proximity sensor detected a metal target.¹⁰² The employee sought to “trick” the sensor into false movement by placing a metal rod in front of the proximity sensor, and the plaintiff suffered injuries when the transfer car pinned him between the car and a steel beam.¹⁰³ The proximity sensor manufacturer obtained dismissal on summary judgment.¹⁰⁴ There, the court found the cause of the plaintiff’s injury was “directly attributable to the use of the metal rod to cause the sensor to do something it was not doing. Simply put, if [the employee] had done nothing to circumvent the limitations of the sensor, he would not have been injured.”¹⁰⁵ The court held the misuse of the proximity sensors created an intervening act that broke the causal connection.¹⁰⁶ The court also found that his employer had operated the proximity sensors “in conditions exceeding [the] temperature limitations” of the technology,¹⁰⁷ which negated the potential liability of the product manufacturer. As noted by several commentators, employers should utilize uniform policies to reduce the potential for liability that might arise

⁹⁸ Courtway & Colonna, *supra* note 50, at 4-5.

⁹⁹ *Id.* at 5 (citing Cowin, *supra* note 91).

¹⁰⁰ *Id.* at 7 (citing James A. Henderson, Jr. & Aaron D. Twerski, *Optional Safety Devices: Delegating Product Design Responsibility to the Market*, 45 ARIZ. ST. L.J. 1399 (2013); Kenneth S. Abraham & Robert L. Rabin, *Automated Vehicles and Manufacturer Responsibility for Accidents: A New Legal Regime for A New Era*, 105 VA. L. REV. 127 (2019)).

¹⁰¹ For a more thorough discussion of the *Lee* case, cited *infra*, see Courtway & Colonna, *supra* note 50; see also *Transfer Machines*, AM. L. PROD. LIAB. 3d § 112:114.

¹⁰² *Lee v. Carboonyx, Inc.*, No. CIV-12-102-KEW, 2014 WL 198342 (E.D. Okla. Jan. 14, 2014).

¹⁰³ *Id.* at *2.

¹⁰⁴ *Id.* at *7.

¹⁰⁵ *Id.* at *6.

¹⁰⁶ *Id.* at *7.

¹⁰⁷ *Id.*

from employees that ignore safety warnings.¹⁰⁸ Employers should, generally, keep procedures in place to ensure that employees promptly respond to warnings and only use products for their intended purposes.¹⁰⁹

In the context of employee wearables, consent issues also might arise. For example, in New York, a local union sued an employer over its use of GPS technology in company vehicles.¹¹⁰ The company argued it sought to use the GPS technology to optimize efficiency and track vehicle mileage.¹¹¹ The union argued the company was employing GPS technology for “‘big brother’ monitoring purposes.”¹¹² During the arbitration, the critical issue was whether the company’s “need to continuously upgrade the technology it employ[ed]” outweighed the union’s concerns of monitoring employees or using the data for disciplinary purposes.¹¹³ The arbitrator ruled against the union and in favor of the employer, and the Southern District of New York confirmed the arbitrator’s ruling.¹¹⁴ Another court in New York issued a similar ruling nearly a decade later, finding that limousine taxicab owners who knew their employers installed GPS devices, and which did not record information about the drivers’ personal lives, did not have a reasonable expectation of privacy under either the New York or United States Constitutions.¹¹⁵ Notwithstanding, these rulings do not provide employers carte blanche to monitor their employees using GPS devices or otherwise.

The primary questions posed by those decisions are: (a) whether the company’s needs outweighed the employee’s expectation of privacy, and (b) whether the employer received informed consent from its employees for such monitoring. But data and consent issues also create risks for employers where data retention might violate statutes or fail to satisfy requirements of informed consent. The obvious solution to avoiding those privacy and data retention concerns, while not a “catch-all solution,” would be for employers to anonymize the data.¹¹⁶ However, as commentators have pointed out:

While some of the applications (like reducing insurance premiums at the group level or improving overall safety) could be achieved through anonymized data, in other contexts, personalization is the very point. For example, how can a company achieve the benefit of

¹⁰⁸ Courtway & Colonna, *supra* note 50, at 8 (citing Smith, *supra* note 96).

¹⁰⁹ See Smith, *supra* note 96.

¹¹⁰ Otis Elevator Co. v. Loc. 1, Int’l Union of Elevator Constructors, No. 03 CIV. 8862 (DAB), 2005 WL 2385849, at *2 (S.D.N.Y. Sept. 23, 2005).

¹¹¹ *Id.*

¹¹² *Id.*

¹¹³ *Id.* at *7.

¹¹⁴ *Id.*

¹¹⁵ Carniol v. New York City Taxi & Limousine Comm’n, 42 Misc. 3d 199, 208, 975 N.Y.S.2d 842, 849 (N.Y. Sup. Ct. 2013), *aff’d*, 126 A.D.3d 409, 2 N.Y.S.3d 337 (N.Y. App. Div. 2015).

¹¹⁶ Courtway & Colonna, *supra* note 50, at 12.

being able to verify (or dispute) an individual employee's claims if the data has been anonymized?¹¹⁷

True indeed, and perhaps for this the reason, the New York court held that “[a]dults who choose to participate in a heavily regulated industry ... have a diminished expectation of privacy, particularly in information related to the goals of the industry regulation.”¹¹⁸

In short, companies should be wary of the risks presented and evaluate whether the need for technological advancement and data retention outweighs the need to ensure their employees' expectations of privacy. If so, then companies should obtain well-drafted agreements that provide the employer with informed consent from those employees.

III. CLIMATE CHANGE IS THE FORESEEABLE EXISTENTIAL THREAT TO HUMANITY BUT REMAINS LEGALLY UNFORESEEABLE TO CONTRACTING PARTIES.

Neither technological advancement nor product application exists in a vacuum; the external factors affecting projects broaden not only through the application of new technology, but also through the often-unforeseen effects of climate change. The allocation of responsibilities for project participants and the obligation to adapt to climate change both create nuanced and unpredictable risks for project participants—responsibilities and risks that intersect with technological advancements, emerging legislation, uncertainty, and developing trends in case law.

Consider this simple question from two American practitioners: Are design professionals liable for failing to anticipate the effects of climate change?¹¹⁹ With increasing likelihood, the simple answer is: Not typically. If only a small number of architects account for climate change, then it would not create an applicable standard of care. The standard of care would remain bound to the client's desires and the applicable legal codes. Architects and engineers obviously cannot compel their clients to build above and beyond code requirements, but should architects and engineers raise these issues around climate change with their clients? If so, how? Should designers consider an ethical obligation to raise the issue? This time, the simple answer is: Possibly.

¹¹⁷ *Id.*

¹¹⁸ *Carniol*, 42 Misc. 3d at 207, 975 N.Y.S.2d at 848. The New York District Courts have also evaluated whether the monitored property is sufficiently public or private, in addition to its considerations surrounding consent. *See, e.g.,* *El-Nahal v. Yassky*, 993 F. Supp. 2d 460, 467 (S.D.N.Y. 2014), *aff'd*, 835 F.3d 248 (2d Cir. 2016) (distinguishing *Carniol* from *United States v. Jones*, 565 U.S. 400 (2012)).

¹¹⁹ Larry Dany & Nicholas Boyd, *Are Design Professionals Liable for Failing to Anticipate the Effects of Climate Change*, ARCHITECT'S NEWSPAPER (May 9, 2019), <https://www.archpaper.com/2019/05/architect-liability-climate-change> [<https://perma.cc/8VVS8-PXQD>].

Developers should not shrug off the potential for imminent legislation, either. Washington State considerably increased and augmented its environmental legislation¹²⁰ in the last two years under its current Governor, but the broadest and most specific attempt to impose restrictions on owners and developers probably arrived this year, in New Jersey.¹²¹

New York is not far behind with its legislative agenda, proposing new bills that are “aimed at accelerating the siting and development of renewable energy projects in order to meet the Empire State’s ambitious climate change and decarbonization goals.”¹²² Proponents of the legislation call it a “full-scale revamp of the state’s large-scale renewable energy permitting system, both structurally and legally.”¹²³ The bill includes a “carrot of incentives” for local communities that host renewable projects, along with “a stick that bars any other state or local agency or government subdivision from requiring additional permits or approvals for a project that goes through the new siting process.”¹²⁴

Given its potentially controversial elements, such as local preemption, experts say the bill will likely go through plenty of political and regulatory wrangling on its path to implementation. But they say the legislation represents a recognition that the existing siting law, enacted in a time when most of the state’s electricity facilities being

¹²⁰ Some of the many recent laws proposed or enacted by Washington in the last two years include S.B. 5308, 66th Leg., Reg. Sess., (Wash. 2019) (proposing to amend performance-based energy services contracting program); Act effective July 28, 2019, ch. 285, 2019 Wash. Sess. Laws 2 (requiring energy performance standards for covered commercial buildings); Act effective July 28, 2019, ch. 284, 2019 Wash. Sess. Laws 2-3 (restricting ozone-depleting substances); Act effective July 28, 2019, ch. 344, 2019 Wash. Sess. Laws 3 (requiring paint stewardship); Act effective July 28, 2019, ch. 286, 2019 Wash. Sess. Laws 1 (restructuring state appliance-efficiency standards); Act effective July 28, 2019, ch. 255, 2018 Wash. Sess. Laws 1 (regarding dredged materials); Act effective July 1, 2019, ch. 166, 2019 Wash. Sess. Laws 6-12 (requiring certain recycling contamination reduction plans); Act effective May 7, 2019, ch. 288, 2019 Wash. Sess. Laws 10 (requiring electric utilities to eliminate coal resources and implement renewable energy standards within specific timelines); Act effective July 28, 2019, ch. 292, 2019 Wash. Sess. Laws 3-14 (requiring identification and regulation on toxic pollutants every five years); and Act effective July 28, 2019, ch. 287, 2019 Wash. Sess. Laws 2-31 (incentivizing alternative fuel vehicles). Note, these cited bills and laws comprise just a smattering of the new energy laws in Washington state.

¹²¹ Tracey Tully, *With 130-Mile Coast, New Jersey Marks a First in Climate Change Fight*, N.Y. TIMES (Jan. 27, 2020), <https://www.nytimes.com/2020/01/27/nyregion/climate-change-nj-environmental-rules.html> [<https://perma.cc/AXW3-STT2>] (“A study released in November by Rutgers University found that the sea level in New Jersey was rising more than two times faster than the global average. Since 1911, the sea level rose 1.5 feet, compared with the global mean of 0.6 feet. It is expected to rise by as much as another foot by 2030, the study found. At the same time, some coastal areas are undergoing subsidence, meaning they are sinking.”) Accordingly, the rising sea level in New Jersey, separate and apart from Superstorm/Hurricane Sandy in 2012, *infra*, will present a particular set of legislative hurdles for the Tri-State Area in the northeastern United States.

¹²² Keith Goldberg, *NY Gov. ’s Bill Aims To Jumpstart Green Energy Project Siting*, LAW360 (Feb. 21, 2020), https://www.law360.com/construction/articles/1246201/ny-gov-s-bill-aims-to-jumpstart-green-energy-project-siting?nl_pk=027a54af-a795-4edc-a0f7-f8257668c6d2&utm_source=newsletter&utm_medium=email&utm_campaign=construction [<https://perma.cc/6CY8-2DMR>].

¹²³ *Id.*

¹²⁴ *Id.*

built were large fossil-fuel plants, isn't capable of satisfying [its] aggressive green energy goals.¹²⁵

On the federal level, current legislation includes a CLEAN Future Act, after the Green New Deal in 2019. The proposed legislation serves as a comprehensive climate bill that “aims to achieve net-zero greenhouse gas pollution throughout the United States by 2050 by directing federal agencies and states to oversee transformative changes to the country’s energy, transportation[,] and manufacturing sectors.”¹²⁶ The bill signals a “new era in climate-relater regulation” and will promote the evolution of future climate change legislation in the coming decades.¹²⁷

The United States currently does not have comprehensive federal legislation equipped to address the multifaceted, transboundary issues posed by climate change. Instead, the U.S. Environmental Protection Agency (EPA) has employed a piecemeal approach limited by the confines of existing federal law—including, primarily, the Clean Air Act—and a patchwork of court decisions. States, meanwhile, have implemented a variety of approaches to mitigate climate risk amidst the fragmented federal regime. Against this backdrop, the private sector is devoting increasing attention to combatting climate change through the adoption of internal carbon pricing, voluntary offset programs and sustainability principles, most frequently through implementation of environment, social and governance commitments, often referred to as ‘ESG’ policies.¹²⁸

In short, the United States faces a lack of federal legislation and limited federal guidance. The state legislation on these issues is evolving but has created mixed and often unworkable standards for companies, even within the same geographic region. And while initiatives exist for private companies, a lack of uniformity will exist for those standards adopted among various national and international companies on the same project.

How do these impending and ever-changing standards, alongside the continued effects of climate change, affect parties contracting for construction projects? The applicable standard of care for design professionals—or the degree of care a typical design professional in a specific geographic region might exercise—could shift dramatically. The regulations on developers and contractors are changing and will continue to change.

¹²⁵ *Id.*

¹²⁶ James Romney Tucker et al., *Regulatory Alert: An Inside Look at the House Bill to Revolutionize U.S. Climate Strategy*, AKIN GUMP STRAUSS HAUER & FELD LLP (Feb. 7, 2020) <https://www.akingump.com/a/web/114624/aokKK/an-inside-look-at-the-house-bill-to-revolutionize.pdf> [https://perma.cc/W577-844D].

¹²⁷ *Id.*

¹²⁸ *Id.*

Materials procurement for specific projects will probably face rapid shifts and increasingly rigid standards. This industry-wide reaction to climate change writ large creates multifaceted and overlapping risks for any company within the industry—challenges that most companies will want to face head-on. But finding one’s company (or client) scrambling on the back end of these industry-wide changes would be a distressing and untenable situation, especially where the body of case law is undeveloped and potentially unpredictable.

For design professionals, the essential elements of “professional negligence” are duty, breach, legal causation, and damages.¹²⁹ A design professional must exercise the same level of ability, skill, and care customarily used by those in the profession under similar circumstances.¹³⁰ The central question posed when designing around climate change is whether possible risks imposed by climate change would be foreseeable.¹³¹ The second question is obvious, but much harder to answer: Whether designers have a legal duty—and the ability and occasion—to adapt their designs based on those potential climate issues. That question is also predicated on whether the designer’s client wants such a design and contractually agrees to pay for it.

In practice, at bare minimum, designers must provide a design that (a) works, (b) meets the applicable codes, and (c) is safe. That’s essentially it. What about the client’s informed consent regarding potential climate change impacts – is that enough to satisfy the designer’s ethical obligations? Probably yes, without much argument. If the designer provides that information about potential climate change hazards, and the client does not want to incorporate design changes, addenda, or heightened requirements, the designer will not have some independent duty to provide those designs. But if there is a heightened obligation on designers based on the client’s desires, then contractors and owners should bear at least *some* heightened obligations to adapt to the risks imposed by climate change.

Public owners like the state, cities, municipalities, and utilities, must also seek or accept appropriate (and realistic) changes to the building codes in order to achieve greater sustainability. Contractors should be held to a contractually higher standard for addenda or riders that address sustainability, climate change, or specific building codes in the same way design professionals agree to a higher contractual standard. Contractors

¹²⁹ See generally *Wells v. City of Vancouver*, 77 Wash.2d 800, 467 P.2d 292 (1970); *Seiler v. Levitz Furniture Co.*, 367 A.2d 999 (Del. 1976); *Chapel v. Clark*, 117 Mich. 638, 640, 76 N.W. 62, 62 (1898).

¹³⁰ *The Pointe at Westport Harbor Homeowners’ Ass’n v. Eng’rs Nw., Inc.*, P.S., 193 Wash. App. 695, 703, 376 P.3d 1158 (2016) (quoting *Affiliated FM Ins. Co. v. LTK Consulting Servs., Inc.*, 170 Wash.2d 442, 455, 243 P.3d 521 (2010)).

¹³¹ Elena Mihaly et al., *Legal Liability of Design Professionals for Failure to Adapt to Climate Change*, 12 J. AM. COLL. CONSTR. LAW, 89, 90-91 (2018).

should also be on the hook, like architects and engineers, for any of their delegated design or design-build obligations that fail to meet the client's sustainability and climate resiliency desires. The measure of those contractor obligations could also be the climate resiliency riders or contract addenda agreed to among the owner and design team, so long as those addenda and riders are incorporated by reference.

As a legal question, though, where does the proverbial rubber meet the road for climate resiliency? For starters, whether an issue like rising sea levels will be foreseeable¹³² has become a common question, but other live questions exist around issues like unpredictable natural disasters such as wind events, flooding above certain levels, or even the wildfires that have plagued California¹³³ and the Inland Northwest.¹³⁴ In July 2020, the Council on Environmental Quality issued its final rule revising how agencies should implement the National Environmental Protection Act (NEPA) in their project reviews and governmental permitting.¹³⁵ The decisions have been criticized by some:

The final regulations significantly narrow the definition of what 'effects' must be considered in conjunction with a project application by excluding the terms 'direct,' 'indirect' and cumulative,' which the agency said has been confusing fodder for litigation. The rule defines 'effect' as only affecting the 'human environment,' being 'reasonably foreseeable' and having 'a reasonably close causal relationship to the proposed action.'¹³⁶

Environmentalists argue the change allows the federal government to shirk its obligation to consider climate change impacts when evaluating the potential environmental impact of a project.¹³⁷ On the other hand, the Federal Courts of Appeal for the Fourth Circuit and Ninth Circuit

¹³² James Wilkins, *Is Sea Level Rise 'Foreseeable?' Does it Matter?*, 26 J. LAND USE & ENVTL. L. 437, 484 (2011).

¹³³ At least one California court examined the applicable Environmental Impact Statement (EIS) to analyze a potential risk of fire foreseeability. *Protect Our Communities v. U.S. Dep't of Agric.*, 845 F. Supp. 2d 1102, 1109 (S.D. Cal. 2012), *aff'd*, 473 F. App'x 790 (9th Cir. 2012) (EIS indicated that transmission lines could create five areas in which wildfire containment activities would be restricted "to a very high degree" and analyzed cumulative fire impacts from numerous construction activities, including new energy generation facilities where reasonably foreseeable).

¹³⁴ *See generally* Idaho Rivers United v. Probert, No. 16-CV-00102, 2016 WL 2757690, at *2 (D. Idaho May 12, 2016) (analyzing sufficiency of environmental impact statement in light of recent wildfires in 2014 and 2015).

¹³⁵ Michael Phillips, *Green Groups Say Trump's Enviro Law Overhaul Was Flawed*, LAW360, (July 29, 2020, 5:47 PM), <https://www.law360.com/construction/articles/1296399/green-groups-say-trump-s-enviro-law-overhaul-was-flawed> [<https://perma.cc/2FDZ-WU76>].

¹³⁶ *Id.*

¹³⁷ Keith Goldberg, *Trump Finalizes Overhaul of Infrastructure Enviro Reviews*, LAW360, (July 15, 2020, 6:34 PM), <https://www.law360.com/construction/articles/1292100/trump-finalizes-overhaul-of-infrastructure-enviro-reviews> [<https://perma.cc/LK3Y-MQVH>].

both held in 2020 that local governments can seek to hold fossil fuel companies, at least, liable for climate-change-related infrastructure damages in state courts:¹³⁸

With the First, Second[,] and Tenth Circuits yet to weigh in on whether state-law climate torts can be sustained, a circuit split that piques the Supreme Court’s interest is still possible. Energy companies have already petitioned the high court to review the Fourth Circuit’s decision.

But experts say the growing body of case law will only embolden municipalities to pursue state-law climate claims, whether in existing or new lawsuits.¹³⁹

How might such federal rollbacks—or state expansions—on the definitions that are considered under the various permitting agencies affect project designers moving forward? To what extent, if any, might design professionals be responsible to anticipate or design for events that are not “reasonably foreseeable” under the federal regulations (e.g. NEPA)?¹⁴⁰ The short answer is that design professionals probably would not be held legally accountable for failing to foresee such events if not deemed foreseeable by the permitting authorities. And that seems logical enough, under the basic tenants of tort law. However, architects and engineers should be keenly aware of the legal doctrines that can be used as swords and shields when such claims might arise.

In practice, the economic loss rule serves as an often-robust barrier to professional negligence. Most jurisdictions adopt the economic loss doctrine¹⁴¹ and agree that plaintiffs typically cannot recover purely economic losses, under common tort principles, against a party with whom they possess privity of contract.¹⁴² The majority rule was clarified in *East*

¹³⁸ Keith Goldberg, *The Biggest Energy Rulings of 2020: Midyear Report*, LAW360, (July 2, 2020), <https://www.law360.com/construction/articles/1278821/the-biggest-energy-rulings-of-2020-mid-year-report> [https://perma.cc/BV4N-AKAM].

¹³⁹ *Id.*

¹⁴⁰ Andrews & Selman, *supra* note 5, at 3 (citing Wilkins, *supra* note 132, at 484; Mihaly et al., *supra* note 131, at 90-91).

¹⁴¹ The Economic Loss Doctrine generally illustrates (and demarcates) the juxtaposition between the law of contracts that secures the expectations of the parties, and the law of torts that governs the duty, if any, owed to the injured party. The Doctrine is predicated on the concern for potentially unlimited exposure to liability, particularly in the context of products liability. See *Hininger v. Case Corp.*, 23 F.3d 124 (5th Cir. 1994) (quoting *Nobility Homes of Tex., Inc. v. Shivers*, 557 S.W.2d 77 (Tex. 1977)) (recognizing that courts “fear that holding manufacturers liable for economic loss imposes unlimited and unforeseeable liability upon manufacturers”).

¹⁴² Without providing citations to all fifty states, a sampling of the favorable application of the Economic Loss Doctrine includes the following jurisdictions: Indianapolis–Marion Cnty. Pub. Lib. v. Charlier Clark & Linard, P.C., 929 N.E.2d 722, 729 (Ind. 2010) (Indiana); *Utah Int’l, Inc. v. Caterpillar Tractor Co.*, 775 P.2d 741 (N.M. App. 1989) (New Mexico); *Filak v. George*, 267 Va. 612, 618, 594 S.E.2d 610, 613 (Va. 2004) (Virginia); *Sunnyslope Grading, Inc. v. Miller, Bradford &*

River Steamship,¹⁴³ which held the economic loss doctrine would bar tort claims where defective products injure only the products themselves.¹⁴⁴ Courts have expanded this doctrine to provide safeguards to contracting parties from tort duties that would otherwise exist independent of the parties' contract under the "Independent Duty Doctrine." In Washington¹⁴⁵ and Colorado,¹⁴⁶ for example, plaintiffs typically cannot maintain negligence or negligent misrepresentation claims against contracted design professionals, unless an independent tort duty arises outside the terms of the contract. The analysis could also depend on the exculpatory clauses contained in the design professionals' contracts.

Despite the difficulty in seeking a remedy under the current jurisprudence, claimants can still assert claims for professional negligence. But the more complex question is whether an external factor like climate change might impose heightened duties upon design professionals or other contracting parties in a claim for professional negligence or breach of contract. The question should turn on the language of the contract's indemnity provision or climate resiliency provision, if any.

Design professionals are most commonly exposed to liability not through failure "to account for the effects of climate change,"¹⁴⁷ but rather

Risberg, Inc., 437 N.W.2d 213 (Wis. 1989) (Wisconsin); Berschauer/Phillips Constr. Co. v. Seattle Sch. Dist. No. 1, 124 Wash. 2d 816, 826-27, 881 P.2d 986 (1994) (Washington); S K Peightal Engineers, Ltd. v. Mid Valley Real Estate Sols. V, LLC, 2015 CO 7, ¶ 8, 342 P.3d 868, 872 (Colo. 2015) (Colorado); Lloyd Word Coal Co. v. Clark Equip. Co., 543 So.2d 671 (Ala. 1989) (Alabama); Duffin v. Idaho Crop Improvement Ass'n, 895 P.2d 1195 (Idaho 1995) (Idaho); Oceanside at Pine Point Condos. v. Peachtree Doors, Inc., 659 A.2d 267 (Me. 1995) (Maine). Maryland, adopting decisions from Indiana and Florida, has blurred the line by noting that whether a party has a duty in tort to a party with whom it lacks a contract "should depend upon the risk generated by the negligent conduct, rather than upon the fortuitous circumstance of the nature of the resultant damage." Council of Co-Owners Atlantis Condos., Inc. v. Whiting-Turner Contracting Co., 308 Md. 18, 35, 517 A.2d 336, 345 (Md. 1986).

¹⁴³ E. River S.S. Corp. v. Transamerica Delaval, Inc., 476 U.S. 858, 868-76 (1986).

¹⁴⁴ *Id.* at 875-76 (holding economic loss doctrine barred tort claim where defective product malfunctioned, injuring the product itself).

¹⁴⁵ Donatelli v. D.R. Strong Consulting Engineers, Inc., 179 Wash. 2d 84, 92, 312 P.3d 620, 624 (2013) ("Under the independent duty doctrine, '[a]n injury is remediable in tort if it traces back to the breach of a tort duty arising independently of the terms of the contract.'") (citation omitted); see also Pac. Boring, Inc. v. Staheli Trenchless Consultants, Inc., 138 F. Supp. 3d 1156, 1167 (W.D. Wash. 2015), *aff'd* 708 F. App'x 324 (9th Cir. 2017) ("[T]ort law is a superfluous and inapt tool for resolving purely commercial disputes... [and] if aggrieved parties to a contract could bring tort claims whenever a contract dispute arose, certainty and predictability in allocating risk would decrease and impede future business activity.") (internal citations and quotation marks omitted). The latter court also held that, under the independent duty doctrine: "Washington law does not support Plaintiff's claim that Defendants owed it a professional duty. The absence of a duty is fatal to Plaintiff's claim of professional negligence." *Id.*

¹⁴⁶ S K Peightal Engineers, Ltd. v. Mid Valley Real Estate Sols. V, LLC, 2015 CO 7, ¶ 8, 342 P.3d 868, 872 (Colo. 2015) (finding tort duty will not arise outside of parties' contract absent a duty of care to plaintiff independent from duty contained in any interrelated contracts).

¹⁴⁷ See Andrews & Selman, *supra* note 5, at 3 (citing Mihaly et al., *supra* note 131, at 90-91).

through contractual liability for breaches in the face of climate change.¹⁴⁸ Design contracts typically contain a “standard of care” provision that requires a design professional to exercise the same skill, care, and attention as another member of the profession would exercise in a similar locality and under similar circumstances—the heightened standard of care for professional negligence.¹⁴⁹ Where design professionals might otherwise adapt their designs to deal with the effects of climate change—like architects in California facing wildfires, or engineers in the Southeast facing rising sea levels and hurricanes, or geotechnical engineers in the Northwest facing landslides—they are typically *not* required to adjust their design work to account for climate change.¹⁵⁰

No rigid formula currently exists for the courts. But design professionals who do not account for climate change, when their clients have asked and contracted for such work, might run the risk of potential claims for breach of contract. Those same design professionals might not face any professional negligence claims, in the same scenario, for failure to uphold their professional standard of care.

Superstorm Sandy was an unpredictable event that caused many injured parties to seek judicial recourse. A major and very live issue, especially after COVID-19, is whether Superstorm Sandy was a force majeure (“Act of God”) beyond the contracting parties’ ability to reasonably foresee. It should also be noted that force majeure contract language can—and should—shield one or more parties from such unforeseeable disasters. The force majeure language negotiated by the contracting project participants can even reach issues like global pandemics,¹⁵¹ epidemics, and

¹⁴⁸ Mihaly et al., *supra* note 131, at 99.

¹⁴⁹ *Id.* at 99-100; *see also* Aetna Ins. Co. v. Hellmuth, Obata & Kassabaum, Inc., 392 F.2d 472, 476 (8th Cir. 1968); *see also* Peck v. Horrocks Engineers, Inc., 106 F.3d 949, 955 (10th Cir. 1997). For the state of Washington specifically, *see* Michaels v. CH2M Hill, Inc., 171 Wash. 2d 587, 606, 257 P.3d 532 (2011) (“Professionals, including engineers, owe a duty to ‘exercise the degree of skill, care, and learning possessed by members of their profession in the community.’”) (citations omitted).

¹⁵⁰ Mihaly et al., *supra* note 131, at 99-100.

¹⁵¹ The novel coronavirus (COVID-19) that struck the globe in 2020 provides an easy example of how global pandemics can affect companies across the world:

Coronavirus has the potential to affect different contracts in different ways. If, for instance, a country imposes a legal quarantine ban on movement out of an area, so that a materials supplier cannot fulfil its supply obligation to a subcontractor, that might be a frustrating or force majeure event under the supply contract, but whether that is also the case under the subcontract with a main contractor may be a different story.

...

Whether frustration or force majeure applies will depend on the individual circumstances of each case. How seriously did coronavirus affect performance? Did it become illegal or impossible or radically different and how, if at all, does the contract in question deal with this situation? Is an epidemic, for instance, defined by the contract as an event of force majeure?

quarantines. Whether frustration of contract or force majeure might apply in such instances would vary among contracts and depend upon the specific language employed by the contracting parties.

The disastrous impact of Superstorm Sandy illustrates how courts may view these issues in the future.¹⁵² After a plaintiff's vehicle suffered damage from a flood at defendant's automotive repair shop during the storm, the court considered some of the legal issues related to the implications of climate change—and storms like Sandy.¹⁵³ The looming question for property owners and practitioners should also be whether climate change is a force majeure beyond the reasonable foreseeability of the parties. After Hurricane/Superstorm Sandy there were ample reports that the natural phenomena that came together to create a storm of that magnitude, was not in fact a completely 'natural' event. Many sources speculated that what made Sandy into a 'superstorm' was a result of 'global warming' or 'climate change,' which is the current popular term for changes in weather patterns. Supporters of this theory postulate that human activities have made changes in the Earth's atmosphere leading to altered patterns of more extreme weather. If this is true, then the possibility exists that Sandy is not a pure 'act of nature' but is the result of human activity. If that were established, then would the 'act of nature' defense still be available? Assuming that there is some truth to the theory that man's activities have altered weather patterns, locating a source of the altered weather pattern might be impossible. The act of nature defense would still be available as a defense because the proper party or parties could not be identified with any certainty so as to bring them into the court's jurisdiction. Some court will face this decision sometime in the future. For the moment it is merely intellectual speculation.¹⁵⁴

Ultimately, the court did not address the potential liability of any construction industry participants, but noted that a potential insurance payout requirement would be different depending on whether Sandy had been

Coronavirus COVID-19: Construction, Frustration, Force Majeure – What Does Contract Law Say?, MAYER BROWN (Mar. 11, 2020), <https://www.mayerbrown.com/en/perspectives-events/publications/2020/03/coronavirus-covid19-construction-frustration-force-majeure-what-does-contract-law-say> [<https://perma.cc/5EBV-J5WF>]; see also *Coronavirus Disease 2019 (COVID-19)*, CENTERS FOR DISEASE CONTROL AND PREVENTION, <https://www.cdc.gov/coronavirus/2019-ncov/index.html> [<https://perma.cc/LSG9-YFNK>] (last visited March 13, 2020).

¹⁵² *Accord*, e.g., Andrews & Selman, *supra* note 5, at 5 (analyzing several cases, including *Pietroangelo*, related to potential liability for design professionals).

¹⁵³ *Pietrangelo v. S & E Customize it Auto Corp.*, 39 Misc. 3d 1239(A) at *4, 972 N.Y.S.2d 146 (N.Y. Civ. Ct. May 22, 2013).

¹⁵⁴ *Id.* at *4.

actually classified as a “hurricane.”¹⁵⁵ The court found little import beyond intellectual exercise when examining the potential legal consequences, however:

[I]f you are one of the thousands of people who were adversely affected by the storm, it really does not matter to you what category storm Sandy was when it landed on Staten Island. All you know is that the storm caused the loss of life, resulted in billions of dollars in property damage, and caused the disruption of countless people’s lives.¹⁵⁶

. . . As Sancho Panza notes in the song ‘A Little Gossip’ in ‘Man of La Mancha[:.]’ ‘whether the pitcher hits the stone or the stone hits the pitcher, it’s bad for the pitcher,’ so whatever Sandy is labeled does not really matter if you suffered a loss. However, this issue will become one the courts will have to deal with along with whether damage was ‘flood damage’ or ‘wind blown water damage’ or some other source and other niceties of the world of insurance coverage.¹⁵⁷

Other commentators have agreed the court’s observations certainly “highlight how climate change is complicating issues and terms that may previously have been more straightforward.”¹⁵⁸

A more practical issue, beyond the mere hypothetical, is whether participants in the construction industry have a legal duty to incorporate climate resiliency into their projects (particularly designers and developers), or adapt to the effects of climate change during construction (particularly builders). Some cases have shed light on these issues, especially for design professionals and developers. Project participants and third parties can now assert “failure to adapt” claims against design professionals or developers under specific federal statutes.¹⁵⁹

In *Norwalk Harbor Keeper v. U.S. Department of Transportation*, a conservation group challenged a designer’s resiliency analysis because that developer (the government) chose to replace a “fixed bridge” with a “movable bridge.”¹⁶⁰ The conservationists unsuccessfully argued the project was supposed to be using federal funds to promote resiliency and combat the effects of climate change.¹⁶¹ The government successfully argued

¹⁵⁵ For clarification, and as aptly noted by the court: “Although Sandy started a Category 3 storm, when it made landfall in New Jersey its winds were down to Category 1 level.” *Id.*

¹⁵⁶ *Id.*

¹⁵⁷ *Id.* (citing *Man of La Mancha*, a musical play by Dale Wasserman, music by Mitch Leigh and lyrics by Joe Darion).

¹⁵⁸ Andrews & Selman, *supra* note 5, at 5.

¹⁵⁹ *Id.* (“A tactic some concerned with the effects of climate change are taking is making ‘failure to adapt’ claims under statutes such as the Clean Water Act (CWA), the Resource Conservation & Recovery Act (RCRA), state air and water codes, and the National Environmental Policy Act.”).

¹⁶⁰ *Norwalk Harbor Keeper v. U.S. Dep’t of Trans.*, No. 18-CV-0091, 2019 WL 2931641, at *4 (D. Conn. July 8, 2019).

¹⁶¹ *See id.* at *5.

it had “assessed the potential resiliency benefits, potential railroad safety[,] and reliability benefits, balanced the needs of rail and waterborne transport, assessed the navigational impact of each Fixed Bridge Alternative, and considered actual and future marine commerce” when making its decision.¹⁶² The court ruled that the plaintiffs lacked standing to bring the suit and, in granting summary judgment in favor of the government, also dismissed the case on the merits.¹⁶³

But a design professional’s failure to consider or utilize the most resilient design is the obvious corollary from that case. Whether a design professional would possess a heightened professional duty for design resiliency, and whether a third party could potentially sue for a failure to address specific design resiliencies, remain live questions.

While the alleged requirement to consider resiliency in the design in this case came from stipulations associated with the provision of the funds used to complete the project, a design professional could nevertheless face a claim based on a similar theory—failure to consider or use a resilient design—when the duty to consider resiliency comes from a contract, tort, or statute.¹⁶⁴

For example, in Massachusetts, the Conservation Law Foundation (CLF) sued ExxonMobil under the Clean Water Act (CWA), where CLF alleged that Exxon failed to consider imminent increases in rainfall, severity of storms, and sea levels in its management of an oil terminal facility. CLF also alleged Exxon did not meet the regulatory standard of building, maintaining, and inspecting the facility in accordance with “good engineering practice.”¹⁶⁵

Exxon argue[d] that, under the doctrine of primary jurisdiction, the court should let the EPA have the first chance to address the permit since it has the authority and expertise to do so and because a new permit could render the lawsuit moot. ‘This is a very uncommon, very aggressive, first-of-its-kind citizen suit by CLF’s own admission,’ said . . . a lawyer for Exxon, accusing CLF of trying to use the court as an end-around to a regulatory process the EPA said will be completed within the next two fiscal years.¹⁶⁶

The court found that CLF lacked standing to sue “for injuries that allegedly will result from rises in sea level, or increases in the severity and

¹⁶² *Id.*

¹⁶³ *Id.*

¹⁶⁴ Andrews & Selman, *supra* note 5, at 5.

¹⁶⁵ Complaint for Declaratory and Injunctive Relief and Civil Penalties, Conservation Law Found., Inc. v. ExxonMobil Corp., No. 16-CV-11950, 2016 WL 5426194 (D. Mass. Sept. 29, 2016).

¹⁶⁶ Chris Villani, *EPA Lawyer Threatened with Contempt in Exxon Climate Case*, LAW360, (May 14, 2019, 4:16 PM), <https://www.law360.com/articles/1159531> [<https://perma.cc/2BTX-DAPL>].

frequency of storms and flooding, that will occur in the far future, such as in 2050 or 2100.”¹⁶⁷ The Massachusetts District Court reasoned the alleged harms were not imminent because the EPA might prevent those harms from occurring through other methods, like permitting alterations.¹⁶⁸ However, the court “recognized CLF’s standing to sue for present and imminent storm-related risks and found facts sufficient to support a claim that Exxon was currently discharging pollutants in excess of its permit and to recognize the ‘substantial risk’ that severe weather events could cause the terminal to violate its permit in the near future.”¹⁶⁹ No construction project participants were named in the CLF suit against ExxonMobil. However, as other commentators have noted: “While design professionals [and contractors] were not named directly in this suit, their work is certainly implicated in the way this lawsuit is framed.”¹⁷⁰

Under the framework of these recent lawsuits, scholars have recently coined “attribution science” as the term for parties’ responsibilities with regard to—and arguably their obligations to account for—the effects of climate change.¹⁷¹

Attribution science also plays a more limited role in lawsuits involving climate change impacts, adaptation, and disclosures about climate change-related risks. These include: (i) failure-to-adapt lawsuits, which involve allegations that an actor has failed to account for the effects of climate change and this resulted in an adverse outcome that would not have occurred if the actor had accounted for those effects, or else failed to develop adequate plans to prevent foreseeable adverse outcomes in the future; (ii) lawsuits involving legal defense of adaptation measures; (iii) lawsuits in which defendants seek to shield themselves from liability for climate-related harms by alleging that climate change, and not their own conduct, was responsible for those harms; and (iv) lawsuits involving climate change-related risk disclosures in contexts, such as environmental reviews and financial statements.¹⁷²

¹⁶⁷ Order Granting in Part and Denying in Part Defendants’ Motion to Dismiss at 1(b), Conservation Law Found. v. ExxonMobil Corp., No. 16-CV-11950 (D. Mass. Sept. 13, 2017) [hereinafter “CLF Order”].

¹⁶⁸ *Id.* at 3.

¹⁶⁹ Dena P. Adler, *Turning the Tide in Coastal and Riverine Energy Infrastructure Adaptation: Can an Emerging Wave of Litigation Advance Preparation for Climate Change?*, 4 OIL & GAS, NAT. RES. & ENERGY J. 1, 6 (Nov. 2018); see also Andrews & Selman, *supra* note 5, at 4.

¹⁷⁰ *Id.*

¹⁷¹ Michael Burger, Jessica Wentz, and Radley Horton, *The Law and Science of Climate Change Attribution*, 45 COLUM. J. ENVTL. L. 56 (2020).

¹⁷² *Id.* at 216-17 (citing Conservation Law Found. v. ExxonMobil Corp., No. 16-CV-11950 (D. Mass. Sep. 9, 2016); Complaint and Jury Demand, Conservation Law Found., Inc. v. Shell Oil Products U.S., No. 17-CV-00396 (Aug. 28, 2017); accord Jennifer Klein, *Potential Liability of Governments for Failure to Prepare for Climate Change*, SABIN CTR. FOR CLIMATE CHANGE LAW (2015);

Claims akin to those discussed above will, of course, depend on the risks imposed by climate change within specific regions and upon specific construction trades. For example, some areas will face greater risk of damage from windstorms, hurricanes, or rising sea levels, whereas other areas must account for rising temperatures or other types of severe storms. Companies must also evaluate whether pollution regulations or some other potential harm might be governed by recent legislation or case law. The case law seems to suggest that project participants will not face liability for vague or distant harms. For example, CLF did not have standing to sue Exxon for injuries related to climate change, like sea level rise, that might (or may even definitively) occur thirty, forty, or fifty years in the future.¹⁷³

The ultimate question for construction project participations, however, remains whether a claimant alleging breach can “point to a concrete harm, even if the risk of that harm might not be immediate.”¹⁷⁴

Design professionals can—and should—contract around such potential exposures to liability. Owners and developers can also likely limit their exposure to liability by passing down attribution and adaptation requirements to their designers and builders. Certain contract provisions might require designers to obtain permits or work with governmental agencies for those permits, to review or obtain environmental impact assessments, to visit the site or confirm site observations, or to seek or obtain additional testing.¹⁷⁵ “Another way contractual liability for designing to address climate change effects can arise is if the scope of the work is sufficiently broad to include responsibilities that implicate aspects of the project that may be susceptible to the effects of climate change.”¹⁷⁶ But diligent attorneys can carve out indemnity provisions that protect the designers from such liability or shift the risks associated with potentially unforeseeable changes away from designers and owners. On the other hand,

Jacqueline Peel & Hari M. Osofsky, *Sue to Adapt?*, 99 MINN. L. REV. 2177, 2193-95 (2015); *AquaAl-
liance v. Bureau of Reclamation*, F. Supp. 3d 969 (E.D. Cal. 2018) (agency violated NEPA by fail-
ing to adequately assess climate change impacts on water supply); *Sierra Club v. FERC*, 867 F.3d
1357 (D.C. Cir. 2017) (agency violated NEPA by failing to adequately disclose GHG emissions
from pipeline project); *People of the State of New York v. Exxon Mobil Corp.*, N.Y. No. 452044
(Dec. 10, 2019) (Exxon did not violate Martin Act through public disclosures concerning how it ac-
counted for past, present, and future climate change risks); Michael Burger & Jessica Wentz, *Down-
stream and Upstream Emissions: The Proper Scope of NEPA Review*, 41 HARV. L. REV. 109 (2017);
Jessica Wentz, *Planning for the Effects of Climate Change on Natural Resources*, 47 ENVTL L. REP.
10220 (March 2017); Jessica Wentz, *Assessing the Impacts of Climate Change on the Built Environ-
ment: A Framework for Environmental Reviews*, 45 ENVTL L. REP. 11015 (Nov. 2015) (internal cita-
tions and footnotes omitted). That timely law review article by Michael Burger, Jessica Wentz, and
Radley Horton is undeniably a “comprehensive, of-the-moment survey of the roles attribution sci-
ence plays in climate change law and litigation” that would benefit many practitioners. *Id.* at 62.

¹⁷³ *CLF Order*, *supra* at note 167, at 74; *see also* Adler, *supra* note 169, at 6.

¹⁷⁴ *See* Andrews & Selman, *supra* note 5, at 5.

¹⁷⁵ *Id.* at 101.

¹⁷⁶ *Id.* (citing Mihaly et al., *supra* note 131, at 100-02).

the owner could also craft indemnity provisions that would expose the architect or engineer to damages sustained by third parties, arguably caused by the designers' failure to foresee climate change implications within the climate resiliency provisions of their contracts. Whether such an argument might alter the designers' applicable standard of care to account for the effects of climate change remains a live issue for another day—perhaps even a question that could invite litigation.¹⁷⁷ But it seems unlikely that courts would impose a heightened duty upon design professionals under independent tort theories.

Design professionals certainly face the greatest risk for these potential impending legal nuances surrounding climate change.¹⁷⁸ They also lack the ability to effectuate change or provide climate resiliency without cooperation from the client and permitting authorities. The safest route is for design professionals to carve out potential contractual liability for climate change attribution and resiliency, along with exceptions for any unpredictable climate events. Strong addenda related to climate change, resiliency, or specific indemnification language can broaden the protections available to design professionals and shield architects and engineers from potential liability. Owners and developers must remain aware of the current or pending legislation related to climate change. They must also draft construction contracts synergistically, in order to evenly allocate the potential liability for any possible failure to account for the admittedly unpredictable risks of climate change.

IV. THE “ADAPT OR DIE” MANTRA IS A FAMILIAR BUT PERHAPS UNWISE STRATEGY FOR LARGE COMMERCIAL CONSTRUCTION PARTICIPANTS.

Finally, in the decade of emerging tech and shifting risk, companies should be reviewing and revising their contractual indemnification and defense provisions. Parties should consider exclusions such as GPS, blockchain, use of drones, artificial intelligence, and augmented or virtual reality, just to name a few. Legislative erosions have expanded in specific jurisdictions, and anti-indemnity statutes vary greatly from state to state. When their attorneys are revising indemnity and defense provisions, companies should also consider the locations of future projects and the governing law provisions, including the duties to defend and attendant defense obligations (if any), certificate of review processes, the robustness of the Economic Loss Doctrine, and any applicable homeowner protection acts or regulations on healthcare facilities.

¹⁷⁷ *Id.* at 102.

¹⁷⁸ See generally Adler, *supra* note 169; see also Andrews & Selman, *supra* note 5; see also Burger et al., *supra* note 171.

One commentator noted the following risks presented by new technologies in construction projects, but took the contrary, more optimistic view regarding the need to implement these technologies:

So, what are the concerns? Mainly three: (1) lawyers and their clients like certainty and new technologies have the potential to create new risks; (2) technologies like BIM have the potential to blur lines of responsibility and shift risk; and (3) the use of some technologies may create risks for which there is no insurance coverage.

. . . .

The bottom line is that there is significant value to be captured by everyone involved in the design and construction process by employing the full value of new technologies, especially those that increase collaboration and improve communication. The stubborn structural problems in the industry contribute to the slow adoption of new technologies . . . The relationship between technology, the business of construction, and the law is dynamic, with developments in one continually driving changes in the others. It's time for construction lawyers to step up and assist in facilitating the next phase of the industry.¹⁷⁹

While the concept of “adapt or die” might seem inviting—whether posed in the Matrix¹⁸⁰ or Terminator: Rise of the Machines¹⁸¹—that argument ignores companies’ valid concerns about exposure to millions of dollars in potential liability in the face of new technologies. The problems are not predicated on the technologies themselves, to be sure. The issues will remain: delays, cost overruns, differing site conditions, errors and omissions, etc. But the terms of the parties’ contracts must both *clearly* and *carefully* delineate these potential risks, which could underpin or exacerbate those potential claims. One missing contractual term could be the difference between a favorable settlement and a disastrous adverse award or jury verdict.

Exposure to liability can be dramatically limited through contract. For example, in Washington, design professionals can limit their exposure to tort claims through their exculpatory provisions.¹⁸² Present-day risks grow out of greater uncertainty in terms of project responsibility and potential downstream allocation of fault. Delegated design and delayed submittals are two areas where the potential exposure to liability has grown

¹⁷⁹ Greenwald, *supra* note 20, at 29, 34.

¹⁸⁰ THE MATRIX (Warner Bros. Pictures 1999).

¹⁸¹ TERMINATOR 3: RISE OF THE MACHINES (Warner Bros. Pictures 2003).

¹⁸² See, e.g., *Eastwood v. Horse Harbor Found., Inc.*, 170 Wash. 2d 380, 389-93 (2010) (noting both that exculpatory clauses are strictly construed and that the court will not disturb the general rule that parties are free to limit their liability through their freedom of contract).

for both contractors and owners (depending on who is delegating those designs). Especially within the context of design-build agreements, including design-build subcontracts, where the delegated design flows downstream from the design team, through a subconsultant, through the general contractor, to a specific design-build subcontractor. Who should be potentially liable – all of those possible companies? The answer must be “no,” depending on the scope of work and terms of the parties’ contracts.

If the delegated design provision clearly shifts the allocation of risk for that design down to the general contractor, and then the general contractor shifts that risk down to the subcontractor, then perhaps it would be only the subcontractor who should be held responsible for that particular delegated design. Any contrary result would obviate the terms of the parties’ contracts and the strong policy that favors freedom of contract. Plus, an upstream engineer, for example, or their subconsultant, should obviously not be held liable for the means and methods of a design-build scope of work where that design professional had no control over the means and methods employed by the subcontractor.

Delineating these contractual scopes and allocating for potential risks associated with those scopes will only become more nuanced as technology and integrated project delivery expand. The companies adopting those new technologies or integrated systems should carefully examine the terms of their contracts, vet potential systems and developers, incorporate rigid network permissions and strong quality assurance/quality control practices—and most importantly, clearly define the project participants’ contractual roles and responsibilities.

V. CONCLUSION

The legal landscape surrounding emerging technologies and climate resiliency is constantly changing. Assuming some projects can take years before permits are issued, years of work in the pre-design and design phases, a year or more for construction, and given that most claims arising on the project will not actually be litigated until a few years after project closeout: parties may not have judicial decisions on some of these technological issues until the next decade. In the interim, the safest course for companies is to evaluate the technologies and weigh the potential cost-benefit for the use of each such technology system. Contracts should be reviewed alongside attorneys and insurers to protect project participants before the project gets underway.

Too frequently, and much like the delay to seek or involve insurers, parties wait until projects are moving sideways before involving their attorneys. Contract drafting and foresight from skilled construction attorneys will be key to the success of project participants in this decade of new technology. The best part about dealing with those issues at the beginning

of a project is that parties will not have to spend as much time with their attorneys throughout the project (and can hopefully avoid several years of arbitration or litigation, thereafter).

With the rapid changes to global climates, both in the United States and elsewhere, parties should be seeking sustainable and climate-resilient options for their designs and construction. Parties can seek out new technologies, optimize their project delivery systems, and maximize productivity, all while simultaneously advancing the ball for sustainable project delivery. On the other hand, parties need to be aware of the risks and legal ramifications of their sustainability and climate resiliency systems. For companies in the construction industry, the general rule remains the same, regardless of the new technologies and emerging climate considerations: *have a strong contract*. The best way to mitigate risk is to consciously allocate risk, and the best way to allocate risk is through well-drafted contract provisions.