

Searching for
a Predictable
Liability Regime

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Three liability regimes offer helpful guidance to those involved in 3D printing until the law becomes clearer: the construction regime, the medical care provider regime, and the instructional materials regime.

Direct-to-Consumer 3D Printing Protection

The potential for 3D printing, formally known as additive manufacturing, to forever change traditional manufacturing processes has been well documented. Once merely a hobbyist's niche, 3D printing has opened the door for

individuals and businesses to “manufacture” products, ranging from replacement cabinet hardware to component car parts, from the comfort of their own homes or on-site in an office, simply by downloading computer-aided design (CAD) files and clicking “print.” This democratization of the manufacturing process also promises to disrupt the traditional designer–manufacturer–retailer–consumer supply chain significantly, which has been a constant in the development of product liability law. As such, businesses or individuals participating in, or entering into, the 3D printing marketplace—for example, through design of products or sale of 3D printing services—should consider their best legal defenses and protections to protect their interests maximally.

In her seminal 2013 article, Nora Freeman Engstrom, an associate dean and professor at Stanford Law School, highlighted

some of the problems with the traditional product liability regime when applied to the world of 3D printing. See Nora Freeman Engstrom, *3-D Printing and Product Liability: Identifying the Obstacles*, 162 U. Pa. L. Rev. Online 34 (2013). See also Allison Harris, *The Effects of In-home Printing on Product Liability Law*, 6 J. of Sci. Policy & Governance 1 (2015) (discussing 3D printing's effect on traditional supply chains). Our goal is not to rehash Professor Engstrom's observations. As attorneys guiding our clients utilizing 3D printing, however, we must think creatively about new defenses and draw analogies to other industries or liability regimes in an effort to predict how the courts may handle future 3D printing-related claims.

In this article, we will explore three potential analogs to direct-to-consumer 3D printing liability and the potential defenses that each regime offers to a group



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of potential defendants: (1) the construction regime, (2) the medical care provider regime, and (3) the instructional materials regime. There are, of course, important distinctions between potential 3D printing claims and claims under each of these regimes, but much can be learned from a comparison. To that end, in this article, we focus on the similarities. Although there is

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no perfect analog for predicting how courts will handle 3D printing claims, we believe that these three regimes provide helpful guidance to businesses and individuals until the law clarifies.

CAD File Designers or 3D Print Vendors: Construction Industry Regime

First, we turn to the construction industry, which provides guidance for CAD file designers, open-source platforms (offering CAD files for free download and alteration), and 3D printing vendors (offering 3D printing services for outside designed products). There are a myriad of similarities between potential 3D printing claims and claims in the construction context, which derive primarily from the parallels between the individuals producing the end product. Both contexts involve: (1) architects or designers producing product designs in the form of CAD files; (2) contractors or printers actually executing those designs to produce an end product; (3) suppliers providing the tools and materials needed for the build; and (4) an end user that suffers economic or personal injury.

For example, in construction cases, damages could result from a defect in the architect's original plans, or the transfer between the architect and builder could corrupt the CAD file and alter the plans.

Both of those would represent design defects. A defect could also result from improper implementation of the plans, rather than the design itself. Alternatively, the same defect could result from faulty products or materials incorporated correctly into the structure. These would represent a type of manufacturing defect. The chain of potential liability in 3D printing, particularly in instances in which the consumer downloads a CAD file and sends it to print through a 3D printing vendor, is a nearly perfect mirror of these potential liability scenarios.

The question, then, is how do companies protect themselves from liability when the law is unclear on liability allocation? The construction industry has historically relied on contracting to control the allocation of liabilities in its complex environment. Unsurprisingly, modern technology has also revolutionized the construction industry: blueprints have turned into CAD files and building-information management has further evolved a CAD file into a living, breathing document with multiple authors editing the same file in real time. As the technology has evolved, the contracts have as well, allowing continued predictability in the allocation of liabilities.

Many construction contracts use the American Institute of Architects' Contract Documents (referred to as the "AIA Docs"), a set of uniform contracts drafted to bring predictability to the construction market. See Mark W.S. Young *et al.*, Ass'n of Corp. Counsel & Womble Carlyle, Understanding Construction Contracts 5 (Aug. 2008), <http://www.acc.com>. Although savvy companies typically amend the AIA Docs to create balance in some of the architect-friendly provisions, many sign off on the AIA Docs without comment or revision. *Id.* The benefit of the AIA Docs, or any set of standardized contracts, is the predictability that those documents provide, which could be equally important for the 3D printing industry as it works through its infancy.

Notably, under the AIA Docs, contractors and property owners take on most of the burden. *Id.* Typically, architects are liable only in the event that there is a breach of the professional standard of care for architects. See, e.g., Dale L. Munhall, "Standard of Care: Confronting the Errors-

and-Omissions Taboo Up Front," AIA Best Practices (Feb. 2011), <http://www.aia.org>. Short of such a breach, the owner typically bears responsibility for any damages.

As for responsibility for CAD file management and file integrity, the AIA Docs cover this in the 2013 Digital Practice Documents, placing the burden on the architect to maintain a centralized document that may be referenced to identify any alterations in the document downstream. See Krista Hallberg Kapp, "The What, When, and How of the 2013 AIA Digital Practice Documents," Construction Law Corner (Fall 2013), <http://www.lauriebrennan.com> (last visited Sept. 20, 2016). See also AIA Document E203™, Building Information Modeling and Digital Data Exhibit (2013), <http://www.aia.org>. Finally, the AIA Docs also have arbitration provisions, providing for elective arbitration to reduce potential litigation costs. See Young, *supra*, at 39.

Architects are fortunate. The AIA had the foresight to undertake the project of putting together the AIA Docs. Individuals and businesses contemplating consumer-based 3D printing should consider doing the same. At present, however, CAD product designers lack the organization to develop uniform contracts and likely are without the market control that licensed architects possessed through organizations such as the AIA. Additionally, there is no discernable professional standard of care for CAD product designers as there is with architects. Architects undergo lengthy training and license examinations, which makes them reliable to the public and within the industry. The same is not true for CAD designers. Instead, many are untrained hobbyists posting files to open-source platforms, such as Thingiverse or Pinshape, which makes CAD files available for free or fee and invites the community to alter design files.

Two initial suggestions arise. First, CAD product designers should take steps to form reliable organizations. These organizations could begin to develop best practices and recommend formal standards for design and sale of CAD files into the 3D printing marketplace. Those same open-source platforms that make CAD files available to the public could be used to implement uniform contracts for 3D printing to limit liability for the designer and the platform. Similarly, the community could move toward

national certifications or licensure for designers to increase public trust in individual designers or businesses. The community should also consider creating a federal or private clearinghouse for certification of CAD files that pass certain objection quality-control criteria. That type of clearinghouse could also reduce the problem of later-altered designs and increase reliability for end users. See Harris, *supra*, at 9 (providing more complete discussion of policy reasons supporting and benefits of CAD file clearinghouse).

Interestingly, the construction industry may prove the catalyst for some of these changes; the integration of 3D printing into construction processes—exemplified in the work of Branch Technology in Chattanooga, Tennessee—raises an array of issues relating to professional building standards that could ultimately pave the way for the imposition of stricter standards on some CAD designers and 3D printers. See Michael Molitch-Hou, *Construction on Chattanooga's First 3D-Printed Home to Begin in July*, Engineering.com (May 4, 2016), <http://www.engineering.com> (last visited Sept. 20, 2016).

Whether we are considering CAD file designers or 3D printing vendors, discussed in more detail below, the common thread is that all 3D printing requires use of a computer by the end-product consumer. This is how individuals and businesses in the 3D printing supply chain (for example, designer–printer–consumer) can bring uniform contracts into play. It is well established that contracts can be entered into electronically, and frequently, companies using the internet as a core feature of their business employ click through contracts to govern potential litigation or allocate liabilities in the absence of face-to-face interaction with their customers. See, e.g., *Zaltz v. JDATE*, 952 F. Supp. 2d 439, 452–54 (E.D.N.Y. 2013). See also *Nguyen v. Barnes & Noble, Inc.*, 763 F.3d 1171 (9th Cir. 2014) (providing thorough discussion of click-through contracts). As those cases make clear, courts across the country have analyzed and upheld the validity of these click-through contracts.

By developing uniform contracts, such as the AIA Docs, CAD product designers and 3D printing vendors could introduce limitation of liability provisions, indemni-

fication provisions, arbitration provisions, and choice-of-law provisions to their benefit. Moreover, those individuals or entities can implement those provisions by requiring click-through agreement to a contract to obtain access to the CAD file or to upload the CAD file to the 3D printer. Similarly, a company with on-site 3D printers could provide written contracts or click-through screens to use the equipment, much as some banks use click-through contracts on ATM machines. See, e.g., *Mayotte v. Associated Bank, N.A.*, 2007 WL 2358646, at *5–8 (E.D. Wis. Aug. 17, 2007).

Indeed, we already see similar provisions on 3D printing vendor websites. For example, companies, such as Shapeways, offer online 3D printing of CAD design files uploaded by third parties. Shapeways' terms and conditions already include a cap on direct damages (limiting damages to “the fee received from you by Shapeways for the use of the services”), a disclaimer of liability (under “strict liability, negligence or any other legal or equitable theory”), and an indemnification provision (which includes claims for “personal injury or property damage”). Similarly, Project Shapeshifter is a 3D modeling program for beginners operated by Autodesk/AutoCAD. This CAD file design tool is available online, and its terms and conditions disclaim any warranty of merchantability or fitness for a particular purpose for the CAD files developed. Those terms also include a “Limitation of Liability” section.

This is a first step for individuals and businesses involved in 3D printing to make clear to consumers that the vendor does not intend to assume the legal position of a traditional manufacturer; however, these businesses may be better protected by click-through contracts as opposed to limitations listed solely in the “Terms & Conditions” available in another section of the website.

One important caveat: if designers or vendors employ click-through contracts, it will be important for the contracts to be drafted to avoid being deemed unconscionable or running afoul of specific state prohibitions on certain provisions unfavorable to consumers. Furthermore, courts may be reluctant to place all liability on end consumers, even if those consumers are now acting as their own manufacturers. Therefore, in developing uniform contracts, or-

ganizations need to balance avoiding strict or unreasonable liability with policy favoring liability for actual negligence or fault.

CAD File Designers: Instructional Materials Regime

Next, we turn to another potential defense for CAD file designers to product liability claims: whether CAD files constitute “products.” Section 19(a) of the *Restatement (Third) of Torts—Products Liability* defines “product” as “tangible personal property distributed commercially for use or consumption.” The definition includes a caveat for items that do not fit neatly within the definition: “Other items, such as real property and electricity, are products when the context of their distribution and use is sufficiently analogous to the distribution and use of tangible personal property that it is appropriate to apply the rules stated in this Restatement.” *Id.* The section also explicitly excludes services, “even when provided commercially.” *Id.* at §19(b). Under this *Restatement* definition, the question becomes whether the (1) distribution and (2) use of CAD files in 3D printing are “sufficiently analogous” to tangible products. If not, product liability law is simply inapplicable to CAD file designers and likely inapplicable to open-source platforms providing those designs for free and fee.

The question is whether CAD files are “products” or simply drawings or instructional materials. This debate is shaped by what courts have done with other emerging technologies, such as electricity. See Lucas S. Osborn, *Regulating Three-Dimensional Printing: The Converging Worlds of Bits and Atoms*, 51 San Diego L. Rev. 553, 568 (2014). The characterization of CAD files is important to determining where they fit into these shifting frameworks. Autodesk, a leader in computer-aided design, defines CAD as “the use of computer technology for design and design documentation. CAD software replaces manual drafting with an automated process.” See *What Is CAD Software?*, Autodesk, <http://www.autodesk.com/solutions/cad-software>. To the extent that CAD files are instructions, there is a rich history of judicial interpretation of other instructional materials that can help place these digital files in context. Four types of instructional materials give insight into how courts may treat product liability

claims against CAD file designers: (1) how-to books and articles; (2) aeronautical and navigational charts; (3) computer software; and (4) architectural plans.

How-To Books and Articles Are Not Products

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ject to strict product liability. *See, e.g., Torres v. City of Madera*, 2005 WL 1683736, at *13 (E.D. Cal. July 11, 2005), *aff’d sub nom., Torres v. Taser Int’l, Inc.*, 277 F. App’x 684 (9th Cir. 2008) (“Ideas and expressions in books are generally not considered products for purposes of strict products liability.”); *Fowler v. Thomas Nelson Pub.*, 2009 WL 612385, at *2 (E.D. Mich. Mar. 6, 2009) (“Courts in this and other jurisdictions have held that, aside from those cases in which the content of the publication encourages specific (and usually risky) activity, publishers do not owe any duty to its readers to warn them of the content of its publications.”); *Lewin v. McCreight*, 655 F. Supp. 282, 284 (E.D. Mich. 1987) (“[G]iven the tremendous burden such a duty would place upon defendant publishers, the weighty societal interest in free access to ideas, and potentially unlimited liability, it would be unwise to impose a duty to warn of ‘defective ideas’ upon publishers of information supplied by third party authors.”); *Way v. Boy Scouts of Am.*, 856 S.W.2d 230, 239 (Tex. App. 1993), *writ denied* (Oct. 6, 1993) (“Because we find the content of the magazine and supple-

ment are not products within the meaning of the Restatement (Second) of Torts, these [products liability claims] are also without merit.”); *Winter v G.P. Putnam’s Sons*, 938 F.2d 1033, 1035–36 (9th Cir. 1991) (“[W]e decline to expand products liability law to embrace the ideas and expression in a book.”). These printed books serve a similar purpose to CAD files, compiling instructions for using machinery, repairing appliances, or any number of other processes.

Aeronautical and Other Navigational Charts Are Products

The *Winter* court distinguished the advice in the how-to book at issue from an aeronautical or other navigational chart, stating that “[t]he chart itself is like a physical ‘product’ while the ‘How to Use’ book is pure thought and expression.” 938 F.2d at 1035–36. The court cited a line of cases that held that written works are products. In *Brocklesby v. United States*, an airplane crashed while following a government-developed instrument approach procedure (published by the defendant), and all six crewmembers died. 767 F.2d 1288, 1291 (9th Cir. 1985). The defendant argued that the procedure was not a product under the *Restatement*, but the court noted, in holding that the chart was a product, that “[t]he issue is whether (defendant’s) chart is a product, not whether the instrument approach procedure is a product.” *Id.* at 1294. Other courts have made similar holdings. *See, e.g., Saloomey v. Jeppesen & Co.*, 707 F.2d 671, 676–77 (2d Cir. 1983) (“By publishing and selling the charts, [defendant] undertook a special responsibility, as seller, to insure that consumers will not be injured by the use of the charts”).

Software May Be a Product

The debate over whether software is a product for purposes of product liability is ongoing and more hotly contested. Informed by the two previous analogies—instructional materials and aeronautical or other navigational charts—courts have come to different conclusions when considering whether software is a product. A Texas appellate court considered a product liability claim by an oil and gas company against a software developer after the company used the specialized software to select a site for an oil well. *Hou-Tex, Inc. v. Landmark Graphics*, 26 S.W.3d

103, 105 (Tex. App. 2000). The oil company was forced to abandon the dry well and later discovered that the software contained an error. *Id.* at 105. The court “accept[ed] that the SeisVision software is a product for purposes of this appeal because, as shown by the undisputed summary judgment evidence, it is a highly technical tool used to create a graphic representation from technical data.” *Id.* at 107 n.2. However, the court noted that it did “not imply that all software programs are products for purposes of products liability.” *Id.* The court emphasized the technical nature, analogizing to the *Winter* court’s dichotomy between instructional materials on one hand and aeronautical charts on the other. *Id.* at 107.

Conversely, other courts have held that software does not constitute a product. *See, e.g., Sanders v. Acclaim Entm’t, Inc.*, 188 F. Supp. 2d 1264, 1279 (D. Colo. 2002) (considering a strict liability claim against video game designers and holding that “intangible thoughts, ideas, and expressive content are not ‘products’ as contemplated by the strict liability doctrine”). Likewise, a Connecticut district court held that the *Mortal Kombat* video game was not a product under the Connecticut Product Liability Act, noting that courts generally decided the “product” question based on whether the “properties of the item that the plaintiff claimed to have caused the harm was ‘tangible’ or ‘intangible.’” *Wilson v. Midway Games, Inc.*, 198 F. Supp. 2d 167, 173 (D. Conn. 2002).

Architectural Plans Are Not Generally Products

In the strict liability context, courts have held that a defendant designer’s “drawings, designs and blueprints are not a product.” *Milford v. Commercial Carriers, Inc.*, 210 F. Supp. 2d 987, 991 (N.D. Ill. 2002) (noting further that “the product could not have been defective when it left [defendant designer’s] control because there was no product until CCI manufactured it and placed it into the stream of commerce”). *See also Snyder v. ISC Alloys, Ltd.*, 772 F. Supp. 244, 251 (W.D. Pa. 1991) (“[T]echnical drawings, services and information ... do not constitute a product.”). In this context, architectural designs are treated as services, and therefore, they are explicitly excluded from consideration as a product.

Picking an Analogy

Courts considering whether a new design or instructional item is a “product” have concentrated on the relationship between the entity providing the designs (either the CAD file designer or the online platform making it available for download) and the person receiving them. Because of this focus on the relationship, courts could consider “off-the-shelf” solutions more fully to resemble “products.” CAD file designers, on the other hand, should adopt the analogy in *Winter* that aeronautical charts are like compasses, and an instructional encyclopedia is “like a book on how to use a compass.” *Winter*, 938 F.2d at 1036. Better still, defendants should note that CAD files are not products until a design is printed and placed into the stream of commerce. Then, defendants can analogize easily to traditional architectural drawings, which fall under the service exception to the definition of a product.

By the same token, the closer that CAD files come to being an “off-the-shelf” solution, requiring no alteration but sold and printed “as is,” the more likely courts will be to treat them as products under the “other items” caveat within the *Restatement (Third)* definition of product. See *Lewin*, 655 F. Supp. at 284 (noting that the question of liability for book contents could have been decided differently were the risk of harm “plain and severe such as a book entitled, *How To Make Your Own Parachute*”); *Osborn*, *supra*, at 568 (noting, in the context of this software-product debate, that “[m]uch, though not all, of the commentary on applying strict products liability... focuses on whether the software has a greater service aspect—custom-made, customer-specific programs—or product aspect—mass-marketed software.”). This reasoning is reminiscent of the *Salomey* court’s emphasis on the lack of customization and the *Snyder* court’s comment that the drawings and instructions had not been mass marketed, a cornerstone requirement for product liability. *Salomey*, 707 F.2d at 676–77 (noting that the defendant sold charts “without any individual tailoring or substantial change in contents”); *Snyder*, 772 F. Supp. at 251.

The benefits of customized instead of “off-the-shelf” are in conflict with the need to boost efficiencies in this developing technology, specifically as they relate to file for-

mats. Microsoft has recently rolled out a new 3D file format called “3MF,” which boasts that it “is designed to be an additive manufacturing format, with the complete model information contained within a single archive: mesh, textures, materials, colors and print ticket.” See 3MF Consortium, *What Is 3mf?*, <http://www.3mf.io/what-is-3mf/> (last visited Sept. 20, 2016). This inclusion of all possible information necessary for a final product, which also increases an end user’s ability to identify the designer and prove that there were no subsequent alterations, may mean that CAD designers are more likely to be held liable under product liability doctrines because the file format is a self-contained commodity. Moreover, advances in file formats could pave the way for the type of clearinghouse discussed above because the 3MF format could incorporate markings into any product printed from the unaltered file.

3D Printing Vendors: Medical Device Regime

Finally, we turn to third-party 3D printing vendors. These 3D printing vendors can be seen both in stores and online. For example, beginning in 2015, Lowe’s Innovation Labs partnered with Authentise, a developer working to provide remote 3D print-streaming solutions, to provide in-store and online 3D printing and scanning. The first store offering this in-store 3D printing solution was Orchard Supply Hardware in Mountain View, California. In effect, consumers can bring items, such as an antique door handle or cabinet knob, scan an item to create a CAD file, and have that item printed, in a limited range of materials, while waiting in the store. Customers can also order those items printed in a wider range of materials, such as metal or ceramic, for pickup or delivery.

Alternatively, as previously discussed, online vendors, such as Shapeways, offer online 3D printing of CAD files uploaded by third parties. In effect, Shapeways and other online outlets provide services such as reviewing the print-readiness of the design (testing the model’s integrity), offering a variety of print materials (including various metals and plastics), monitoring the 3D print job, and delivering the product when completed.

These in-store and online 3D printing vendors present unique questions under

traditional strict product liability law. Significantly, the on-site and online 3D printing vendors also offer 3D-printed products designed in-house. These in-house-designed products, manufactured on the companies’ own 3D printers, fit within standard product liability regime; however, the same cannot be said for products printed from files uploaded to an OSH or

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Shapeways 3D printer. In that instance, the 3D printing vendor may reasonably contend that it is merely a service provider, printing a product that it did not design.

As noted above, Shapeways and other companies are already seeking to limit liability through terms and conditions of use. Looking at the current case law, these 3D printing vendors should also analogize their position to the established legal framework in product liability cases against hospitals and medical care providers. Section 20 of the *Restatement (Third) of Torts—Products Liability* provides definitions of “one who sells.” Of particular interest here, comment d discusses “sale-service hybrid transactions.” As comment d points out, when the parties do not separate the product and service components of the transaction, the status of the potential product seller becomes more difficult to classify. One area in which this classification has been made almost uniformly is in the hospital and health-care provider contexts: “in a strong majority of jurisdictions, hospitals are held not to be sellers of products they supply in connection with the provision of medical care, regardless of the circumstances.” *Restatement (Third) of Torts: Prod. Liab.* §20 cmt. d (1998). In recent cases, that exclusion has not been

linked to public policy in favor of medical care but to the distinction between service and sale. See, e.g., *Tucker v. Kaleida Health*, 2011 WL 1260117, at *3 (W.D.N.Y. Mar. 31, 2011) (stating “the nature of the relationship between hospital and patient is that of a service, rather than a sale” and “as a matter of law, hospitals... cannot be held liable for a purported ‘sale’ of supplies or devices

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associated with treatment under a breach of warranty or strict products liability theory”); *Cobb v. Dallas Fort Worth Med. Ctr.-Grand Prairie*, 48 S.W.3d 820, 826 (Tex. App. 2001) (“hospitals are not engaged in the business of selling the products or equipment used in the course of providing medical services.... Consequently, the products used are intimately and inseparably connected with the provision of medical services.”); *Cafazzo v. Cent. Med. Health Servs., Inc.*, 542 Pa. 526, 523–24 (Pa. 1995) (discussing Section 402A of the *Restatement (Second) of Torts* and holding “the relationship of hospital... to patients is not dictated by the distribution of [medical devices], even if there is some surcharge on the price of the product”); *Hector v. Cedars-Sinai Med. Ctr.*, 180 Cal. App. 3d 493, 505 (Cal. Ct. App. 1986) (“the patient does not enter the hospital merely to purchase a pacemaker but to obtain a course of treatment which includes implantation of a pacemaker.... As a provider of services rather than a seller of a product, the hospital is not subject to strict liability for a defective product provided to the patient.”).

Although there are obvious distinctions between medical service providers and 3D printing vendors, these cases provide a potential defense against strict liability.

Moreover, there may be policy arguments in favor of protecting 3D printing vendors making 3D printing available to wider audiences, including small businesses. For many individuals and businesses, additive manufacturing has been prohibitively costly. Yet, the United States government, and the Obama administration in particular, have singled out additive manufacturing as important technology for future job growth and manufacturing innovation. In 2012, the Obama administration authorized creation of the National Additive Manufacturing Innovation Institute, which became “America Makes,” a public-private partnership including five federal agencies, 50 companies, 28 research universities, and other organizations. The aim of America Makes is, among other things, “fostering a highly collaborative infrastructure for the open exchange of additive manufacturing information and research” and “assisting small- and medium-sized enterprises and [start-ups]” engaged in additive manufacturing. These vendors provide precisely the type of accessibility that the United States government is trying to support.

While those policy factors may be counterbalanced by other public policies (consumer protection, risk spreading, to name two), 3D printing vendors should contend that the *primary* relationship between the company and the purchaser is that of service provision. Although delivery of a product is the end result of that relationship, Shapeways, for example, does not warrant the model, prototype, or product for any particular use and does not ensure the quality or correctness of the design beyond minimum standards for the print job. Instead, Shapeways provides a platform for designers, small businesses, and individuals to access otherwise inaccessible technology. Unless a claimant can prove a manufacturing defect existed as a result of processes solely within the 3D printing vendor’s control, the sale versus service distinction and the medical care provider cases provide an analog that may provide a defense against strict product liability claims.

Conclusion

The foregoing discussions only skim the surface of the liability regimes discussed and do not address the nuances involved

in each. Additionally, our focus was solely on direct-to-consumer 3D printing, which provides a small glimpse into the 3D printing industry. As the industry continues both to grow and decentralize, companies using the technology and their attorneys need to consider the best means for quality assurance and liability limitation. Indeed, companies are already emerging to offer such services. Sigma Labs, a member of America Makes, now offers in-process quality assurance that is being utilized by companies such as GE, Honeywell, and Boeing. Attorneys would do well to keep pace with the rapid technological developments to make the best recommendations to any client seeking to use 3D printing. In many ways, quality control during the process and inspection after printing may be the best ways to limit liability.

Nevertheless, helpful lessons can be gleaned from the established liability regimes that we have discussed above. Although 3D printing promises to disrupt simultaneously manufacturing supply chains and traditional product liability, analysis of these analogs provide one of the best ways to predict how courts will treat future claims based on 3D printing defects. These regimes provide at least some stability and predictability until regulatory agencies and legislators begin to shape expectations for the industry. As a proactive step, we recommend clear drafting contracts limiting liability at the point of download, upload, or sale. Additionally, we recommend that industry participants and their counsel begin to develop industry-driven protections for both businesses and consumers. 