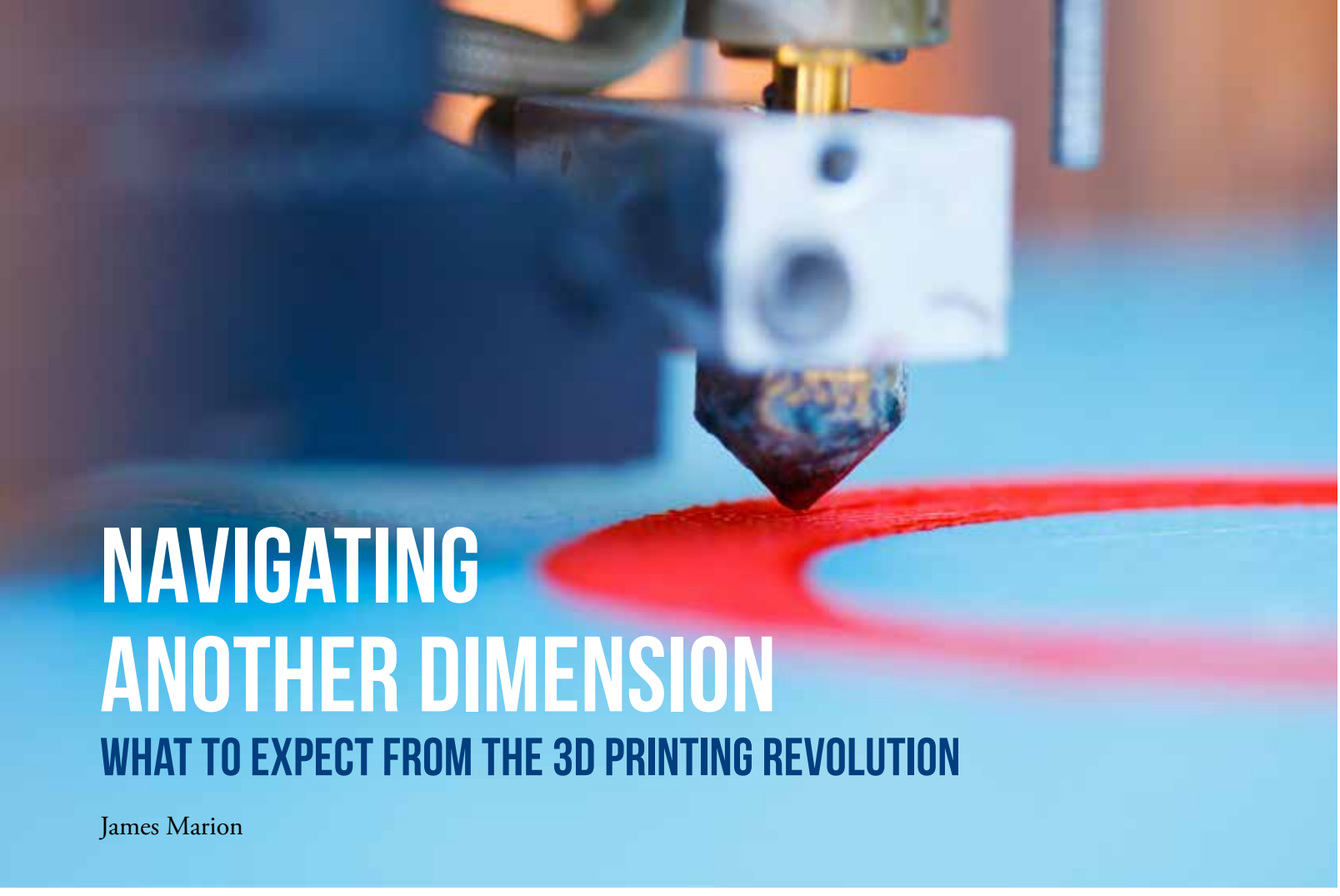


NAVIGATING ANOTHER DIMENSION

WHAT TO EXPECT FROM THE 3D PRINTING REVOLUTION

James Marion

Science and technology press ahead. The rest of us are left to catch up and adjust to the new reality created.

It's a pattern familiar to modern humans since the onset of the Industrial Revolution, and one that occurs with greater and greater frequency since the onset of digitization. The ease with which our society and laws conform to these changes depends largely on the essence of the change itself. Natural extensions of the prior standard—your word processors, laptops, or cellular phones, for instance—are met with enthusiasm by the public and integrate smoothly as regulatory regimes coalesce to meet the demands of new industries.

On the flip side of the coin you have your truly disruptive innovations—your Napsters, drones, and Ubers in tech, or your cloning, GMOs, and stem cells in the biomed space—that capture some of the public imagination, but also largely bristle the status quo. In these instances assimilation is often protracted and painful, with stakeholders in the old paradigm fighting tooth and nail to maintain relevance and control.

While it may seem that this brand of change is apt to materialize overnight, it's important to remember that in most cases these advancements are the product of years, often decades, of collective research, development, and trial and error. As such, the inability to integrate new technologies successfully can also be chalked up to a lack of foresight. If the effort to regulate properly begins as soon as a new invention drops, it's generally too late.

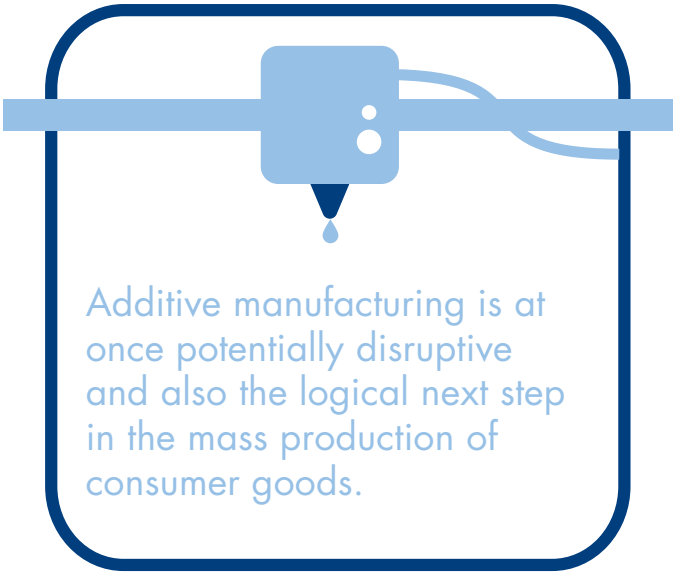
The recent proliferation of 3D printing technology, or additive manufacturing (AM), presents an opportunity to learn from the growing pains of the last two decades. AM is at once potentially disruptive and also the logical next step in the mass production of consumer goods. The technology has been in existence since the early 1980s—long enough to provide ample food for prescient thought—but has not been widely affordable or applicable until this decade. At the same time, industry and the public at large have only just begun to harness its potential. This leaves us with a shrinking window during which sensible policy and smart lawmaking can pave the way forward.

WHAT IS 3D PRINTING?

When we think of traditional manufacturing of anything, we tend to think of a handful of processes by which a larger piece, or mass, of material (metal, plastic, fiber) is cut, molded, or stamped down to create a smaller, more intricate product or component—processes of refinement and alteration, of subtraction. In a sense, AM is the inverse of these methods. It forgoes the need for the larger original piece of material and instead builds the refined end product from scratch, compiling successive layers of material upwards into a solid whole, hence *additive* manufacturing. The term used in the popular vernacular, *3D printing*, derives from a particular method that employs inkjet printer heads to spray plastics or binding materials in layered sequence, but this is only one of several existing AM techniques available on the market today.

What is common among all AM technologies is the basic concept of applying a two-dimensional image onto a three-dimensional medium. In most instances, the 2D image in question is a digital file, or computer-aided design (CAD). CADs can be downloaded from the web. They can also be created independently using special 3D modeling software, or with the help of a 3D scanner—simply place an existing object in the scanner and it produces a replicable digital version of that object.

From here, CADs are interpreted by the actual printer apparatus, which uses their digital blueprint to assemble the object, layer by layer, with any number of automated melting, heating, laminating, inkjet, laser, or photopolymer (hardened by UV light) technologies. In theory, these printers allow for the automated manufacture of objects too complex to feasibly create through classic means. To look at it on a more profound level, as put by *The Economist* in 2011, AM makes it "as cheap to create single items as it is to produce thousands and thus undermines economies of scale. It may have as profound an impact on the world as the coming of the factory did. . . . Just as nobody could have predicted the impact of the steam engine in 1750—or the printing press in 1450, or the transistor in 1950—it is impossible to foresee the long-term impact . . . But the technology is coming, and it is likely to disrupt every field it touches."



Since the initial invention of the technology in the early 1980s, AM has indeed expanded to influence many different sectors, and printing is in development or is already under way for everything from production of large-scale objects to nanoscale creations.

At the grander end of that spectrum, aerospace firms like Lockheed Martin and SpaceX are using AM to build the next generation of rockets and defense systems. Meanwhile, NASA has cooperated with these and other companies to operate a 3D printer in zero gravity on the

International Space Station, where its presence mitigates the need to ferry heavy (read costly) replacement parts into orbit. Similar designs are being plotted for future journeys to the moon and Mars, where printers could actually build human habitats using raw materials from lunar and Martian soil.

Meanwhile here on Earth, AM is currently responsible for the creation of myriad items including processed foods, toys, art, apparel, vehicle parts, medical supplies, living organ tissue, implants, prosthetics, firearms, and reconstructed archeological artifacts. The list continues. Nonetheless, AM has yet to hit its full stride when it comes to fundamental reinvention of wide-scale rapid manufacturing. That day may not be far off, but for now the technology is most effective at an industrial level due to its ability to produce a series of prototypes for use in research and development quickly and cheaply. Once final designs are established, mass production still occurs by traditional means.

This leaves the general consumer as perhaps the most prolific user of AM to date. Spurred by the precipitous drop in the cost of 3D printers since 2010, a nationwide army of DIY hobbyists, artists, and self-styled engineers has taken to their prefab or home-kit machines to manifest whatever strikes their fancy. Conveniently, we can also view this "maker" subculture as a testing ground of sorts for the numerous looming issues of regulation and the legal implications of AM's continuing rise.

AVOIDING AN INTELLECTUAL PROPERTY WAR

It should come as no surprise that where there are digital files, there is digital file sharing. And where there is digital file sharing, inevitably there will be sharing that is unauthorized.

When peer-to-peer file sharing hit the mainstream in 1999 with the arrival of Napster and its ilk, it turned both the recording and film industries on their heads, launched a decade of infringement lawsuits claiming both companies and individual consumers as collateral damage, and fundamentally altered the course of intellectual property jurisprudence, not to mention the way we consume media. Today we have a system, on the whole, where consumers are incentivized to compensate intellectual property owners for the use of digital media, but getting to that point was not easy.

So, what happens when John and Jane Q. 3D-Printer-Owner decide they just have to have a matching pair of the latest Ray-Ban sunglasses or, better yet, a brand new .9 mm handgun to keep them safe in their love nest? Will they be able to pull a pirated CAD off the Internet, hurdle a network of distribution and licensing regimes, and manufacture these products cheaply within the comfort of their living room? The answer, which is already raising the eyebrows of patent, trademark, and copyright owners everywhere, is "probably yes."

In her 2015 *University of San Francisco Law Review* article, Nicole Syzdek of Brand & Branch explains, "the patent system's stability was able to rely on physical limitations that made wide-scale infringement of physical goods infeasible. 3D printing challenges the profitability of companies that depend on patents to protect their

non-rivalrous goods, as the overhead required to reproduce such goods is minimized."

Despite a recent uptick in United States Patent and Trademark Office filings, along with some early skirmishes playing out over the patenting of certain 3D printer technology, we have yet to see the courts wrangle with the issues surrounding illegal dissemination of protected CAD files for printing purposes or the illegal dissemination of the printed products themselves. When juxtaposed to the mass swapping of MP3 files, the limits of AM technology still prohibit this free-for-all scenario in large part.

But the technology is advancing quickly. In the next few years, will we see a repeat of the last decade, with the industry establishment attacking consumers and intermediary providers, claiming multiple tiers of primary and secondary liability? Or will a balance be struck whereby for-profit licensing of designs and fair use create a patchwork of legal AM, allowing for further innovation in the space?

Only time will tell. In the meantime, it behooves all parties involved to train their sights more than a few steps down the road.

James Marion is the principal attorney at Law Offices of James P. Marion, Esq., and the president and head writer at Greenlitscripts, a media content and consulting service. He can be reached at james@marionesq.com.