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# The Technology-Intellectual Property Laws Dialectic: Forever Tumultuous?

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## ABSTRACT

*This paper attempts to look at the problems in the legal regulation of new technology of 3D printing. Copyright, patent and trade mark laws seek to protect creators, inventors and commercial endeavours from infringement. 3D printing offers a glimpse of hope towards solving many existential problems like food scarcity, housing shortage, climate change, drug development to name a few. There are calls from intellectual property rights holders to rein in this technology using intellectual property laws. The Paper tries to look at the possible impact of an expansive regulation of nascent technologies like 3D printing using intellectual property laws.*

**Keywords:** 3DPrinting, IPRlaws, Copyright, Patents, Trademarks, Innovation, Regulating.

## I. INTRODUCTION

Law has forever played catch-up with the rapid changes and developments in the society brought about by the march of technology. The efforts to strike a proper balance between the growth and spread of a technology and its regulation has been an ongoing struggle for legislators. IP, traditionally seen to protect 'creations of the mind' by way of copyrights, patents and trademarks in the publishing and pharmaceutical industries, today has to expand its reach to new and pioneering sectors of technological advancement. It is the endeavour here to examine the interplay between IP and the highly exciting and innovative field of 3D printing technology - the IP implications of consumer 3D printing.

### (A) 3D Printing and its hopefuls

3D printing is an exciting new technology that allows anyone with a computer to create his or her own parts and bypass traditional manufacturing<sup>2</sup>. 3D printing, also known as additive manufacturing, has existed for over thirty years. 3D printing allows for the rapid manufacture of physical parts by using a 3D Computer Aided Design (CAD) file, to create the represented part layer by layer. Beginning with a CAD file of a 3D object, a 3D printer slices the file image

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<sup>2</sup> Stephen Graves, 3D printing will do to the manufacturing industry what Napster did to the music industry, PC & Tech Authority (September 18, 2014)

into two-dimensional cross-sections

and deposits or “prints” the cross-sections layer-by-layer<sup>3</sup>. 3D printing refers to several types of additive manufacturing that produce a three-dimensional part from a digital model. The printing is achieved by using an additive process, where successive layers of material are laid down until a final three-dimensional (3D) object is created. Instead of using conventional inkjet cartridges, 3D printers utilize various materials, including plastic, steel, and ceramics. The marketing of personal 3D printers has been hailed as the coming of a 'third industrial revolution'<sup>4</sup>. 3D printers allow for tremendous efficiency gains in the areas of rapid prototyping and supply chain management.

## **II. OLD V NEW**

Traditional manufacturing methods utilize castings, forgings, or other raw materials as the base from which the final object is created by removing material using a variety of machining methods. It is also known as machining and is considered as a subtractive process, because the initial raw material block is larger than the finished product.

3D printing was initially used for “rapid prototyping” rather than for end products. Especially, the automobile and aerospace industry applied this technology to construct prototypes. This was beneficial as a prototype of the end product could swiftly and cheaply be produced and tested for its aptitude before putting resources into manufacturing the end product. Today however more than twenty percent of items printed from a 3D printer are end products and it has been said that this number may increase to fifty percent by the year 2020.

3D printing allows for the creation of organs using bio-printing. While still an emerging field, organ printing has the potential to allow human organs to be created as needed for individual patients. 3D printed implantable blood vessels, skin tissue and even complete organs are not impossible anymore - a new bio-glass material that mimics all the properties of cartilage, but is far easier to produce than lab-grown alternatives has been developed using 3D printing. NASA uses 3D printing to print food in space! There is even a first-ever 3D printed drug- anti-epilepsy drug Spritam. 3D printing helps make prosthetics for people and animals who have lost limbs. 3D printing is used in fashion industry to print dresses, shoes etc. Russia plans to use 3D technology to build a base on the moon. New, more versatile and cheap printing materials, like a PVC filament developed by the Australian company Chemson, are also being developed.

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<sup>3</sup>Deven R. Desai & Gerard N. Magliocca, Patents, Meet Napster: 3D Printing and the Digitization of Things, 102 *Geo. L.J.* 1691

<sup>4</sup>A Third Industrial Revolution, Special Report: Manufacturing And Innovation 4, *Economist*, Apr. 21, 2012

By creating parts from nothing, the 3D printing process offers several advantages over traditional machining. 3D printing also allows for mass customization and mass manufacturing, two things not traditionally associated with each other. 3D printing uses much less raw material, because it only uses the material needed to create a part. 3D printing can result in substantial time saving during the manufacturing process. 3D printing allows for on demand manufacturing, where the parts are not created until needed. 3D printing can create parts that cannot be produced by traditional methods or are prohibitively expensive using those methods. 3D printing requires no specialized skills. Using a 3D printer, the operator only needs the appropriate CAD file and a printer to start the printing process. Some newer printers even include a 3D scanner, which allows an operator to essentially 'photocopy' a 3D object. The advantages of 3D printing allow it to be used at home by amateurs. In fact, 'advances in 3D printing technology are launching an Industrial Counter-Revolution.'<sup>5</sup>This amateur use in turn increases the potential for infringement by increasing access to a technology that can easily be used to infringe. Thus 3D printing has the potential to disrupt traditional manufacturing for many reasons, from increasing production speed to allowing for mass customization. 3D printing has the potential to disrupt the way consumer products are manufactured. For example, 3D printing allows any individual to become a manufacturer simply by purchasing or building a printer.

3D printing use was initially limited to manufacturing companies. However, the availability of low-cost 3D printers and cheaper raw materials contributed for the development of domestic 3D printing. Although 3D printers are still far from becoming ubiquitous, available data shows an increase in the ownership of home printers. Concomitantly, the technology is becoming available to people who do not own a 3D printer. Copy shops are starting to bring 3D printing to the street and there are several entities that print objects on-demand and send them to customers. Shapeways allows designers to open an e-shop in its website, printing their products each time it receives an order. Online platforms provide users the opportunity to freely share 3D CAD files, encouraging the development of a 3D printing community. These include online repositories dedicated to 3D printing such as Thingiverse, but also popular illegal downloading sites such as The Pirate Bay. The combination of all these factors will result in 3D Printing becoming available to the general public and will contribute to alter the existing patterns of production, supply and consumption of goods.

This unprecedented level of access to small-scale manufacturing has the potential to

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<sup>5</sup>Deven R. Desai & Gerard N. Magliocca, Patents, Meet Napster: 3D Printing and the Digitization of Things, 102 Geo. L.J. 1691

revolutionize modern manufacturing by allowing anyone to create almost any product he or she needs on demand. 3D printing is feared by the manufacturing industry as it will enable anyone with access to either a modeling program or a printer to become a copyright or patent infringer. Current technology allows for the creation of 3D CAD files that are small enough in size to be easily shared using the Internet. The infringers may use any online service, which allows the transfer of small files, including email, file sharing sites, and bit torrent to share the file with others. Of the three major forms of IP, copyrights and trademarks have been the most affected thus far. Patents, in contrast, have suffered less so, because many of the patented technologies require manufacturing expertise that intellectual property infringers lack. 3D printing has the potential to change this, as it allows more complex products to be manufactured more quickly and cheaply than traditional manufacturing methods.

This situation, a consequence of rapidly changing technology, is very similar to the one faced by the recording industry in the late 1990's. The rise in ownership of personal computers, the ability to record sound files in MP3 format, and access to the internet allowed consumers to quickly copy and share music. This change helped to disrupt the traditional recording industry, which could previously rely on the limitations of copying technology to limit the ease and speed of copying music. Hence, the "nature itself protected that interest." The net effect was a dramatic increase in copyright piracy.

### **III. WHERE THE TWAIN SHALL MEET?**

Given the frequency with which someone suggests that IP is in trouble, and given the how successfully IP has adapted to two hundred years of technological change, it is important to be clear about the nature of the issues that motivate the current concern. Understanding the origins of the problem also helps ensure that proposed solutions are matched to the problem.

On February 2010, a DMCA takedown notice was sent to Thingiverse in relation to a Penrose Triangle file posted in the website. This was followed some months later by another takedown notice, this time in relation to two Warhammer 40,000 style miniatures. On January 2013, HBO, the owner of rights in *Game of Thrones*, sent a cease and desist letter to Fernando Sousa, who had created and was offering for sale an *Iron Throne Dock* replicating the Iron Throne featured on the Series. On

December 2013, makeCNC.com sent a DMCA (Copyright) Complaint to Google, claiming that a website was selling copyrighted design works and products used in 3D printing and CNC patterns.

These examples illustrate the fact that the technology can and will be used for infringing IP rights. The potential for infringement has caused the IP owners to raise serious concerns about the scope of existing intellectual property protection, and whether it will adequately protect intellectual property owners against 3D printing issues. However, the need for protection must be balanced against the benefits of widespread access to this valuable new technology.

The inherent paradox of the patent system: the balance of full disclosure of a patent with exclusive rights granted to the owner facilitate easier copying of things with the aid of 3D printing. A broad and encompassing cultural shift of 'creating instead of consuming' which empowers people to create customised goods in their homes and business, instead of buying products off supermarket shelves, has resulted in the 'maker movement'. And 3D printing is considered the 'lodestone' of this movement. The consumer with a 3D printer manufacture products from home! This premise has thrown the entire manufacturing industry, or the 'the economy of things' into a tizzy. Commentators envision a '3D printing will unleash the power of digitized things on manufacturers' situation. The analogizing of the effect of digitization on the copyright industry with what 3D printing might cause to the industries under the patent regime is not without problems. Two questions worthy of pondering arise – is the process of 3D printing a tangible object technically as simple as making a copy of an mp3 tune or a film by anybody with just a PC? Does it not entail additional initial costs for raw material, 3D printer etc while that of copying a film or mp3 is at actual zero costs to the copier? Even if a consumer were to avail of a print-to-order service he would still have to make a payment. The zero transaction costs in copying as seen in the copyright scenario is absent wrt to copying vide 3D printing. It has to be kept in mind that all these are sufficient deterrants to mass copying of tangible objects- patented and otherwise. The ease of copying of 'nonrivalrous goods' wrt the copyright industry is next to impossible in the case of tangible objects to be printed. Another threat propounded by the IP owners is of destruction of firms and jobs that live off rents from intellectual property. The quality of such home made products to that of the mass-manufactured ones might be a deterrant to their adoption by consumers. And the scales of such 3D manufacturing might never rival that of the mass-production manufacturers. The safety of such homemade 3D printed products is moot and might also cause a slow or no adoption by the consumers. The 3D printing as a viable commercial alternative capable of giving competition to the manufacturing industry is quite far off, if ever at all. The job scenario as stated would more likely be due to the huge manufacturing industry opting for 3D printing processes in their production system and not because of the possible patent infringers. So it is reasonable to assume that such threats are way-off. The considered outcomes of 3D printing with a return to local

manufacturing, lower costs, ability to make customized and just-in-time parts are positive developments to be embraced and promoted.

Many authors argue that 3D printing 'will do for physical objects what MP3 files did for music'<sup>6</sup>. The temptation to infringe a patent right is high when all of the information is available to do so, yet actual infringements are few. Threat of a lawsuit is the most obvious deterrent for infringers, it is mindful to also point out that some inventions are too difficult to copy given the traditional huge scales of production. It ought to be kept in mind that norms, markets, code, and physical architecture regulate as well, and law takes center stage only when the others are insufficient. When Gutenberg invented the printing press, it brought down the "physical shield" that prevented others from copying books. A similar barrier was in place for music until the creation of mp3 files that could be copied and shared easily digitally. Copyright policy changed and adapted to the new technology including employing digital rights management systems and lobbying for legislative changes with stronger enforcement mechanisms. The prime example being that of the DMCA law in USA. Yet, the litigation and legislative changes failed to protect the old business models for music and books<sup>7</sup>. A new "equilibrium" between the two can be brought about if the industry "embrace" the change. iTunes and Amazon ebooks as illustrations of businesses that embraced digitization of music and books by offering for sale single items online. Sales surged with the availability of safe files versus malware-infested pirated copies. A similar market could develop, driven by people using 3D printers at home who seek to produce patented objects. A pirated CAD file could have errors and could pose security problems to the home-computing system. Those printing patented objects at home may not have the raw materials to ensure product safety which could also open the market for 'original' products.

Other contentious points often raised by detractors of 3D printing is the copyrightability of CAD files. The inability of patent holders to gain protection over 3D scans vis-à-vis copyrights under originality and merger doctrines showcase the flimsy case of copyrights for CAD files. That must be a major sore point for the industry as a person can get a copyright to a CAD file when independently made. The 10<sup>th</sup> Circuit decision where the court held that a scan of a three-dimensional object that renders, or intends to render, the object as is should not be able to receive copyright protection<sup>8</sup>. The merger doctrine might gain traction in 3D printing as all scanned CAD files are mergers. It has been written that '[v]isual works are a classic example of a situation where ideas can be depicted visually in innumerable ways which should preclude

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<sup>6</sup>Bradshaw, S., Bowyer, A., Haufe, P. (2010). The Intellectual Property implications of low-cost 3D printing. ScriptEd, 7

<sup>7</sup>Michael A. Carrier, Copyright and Innovation: The Untold Story, 2012 Wis.L.Rev.891

<sup>8</sup>Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc. 528 F.3d 1258, 1260 (10th Cir. 2008)

application of the merger doctrine.<sup>9</sup> There also lacks a coherent yardstick in the way courts apply originality and merger doctrine to copyrightability issues. The fact remains that the maker community has staunchly adopted and is intent on an open-source model of operation. This is again a pointed threat to the industrial model of following an IP system.

Trade marks and distinguishing trade dresses are protectable under law<sup>10</sup>. Valuable marks and trade dresses are especially vulnerable to the onslaught of 3D printing. Source of goods can no longer be a certainty. Confusion can be absent and yet an infringement might have been recorded. Is home printing a 'use in commerce'? This certainly ought to be seen as a fair use. the tool of branding might help established companies protect their brand value by ensuring quality control, safety and engagement with the consumers. The companies can offer 3D files and accessories as a bonus for consumers of expensive patented products.

#### **IV. LEGISLATIVE REGULATION OF 3D PRINTING TECHNOLOGY**

A balance between patent rights and 3D printing technology is a must. Legislature should avoid making hardware manufacturers of 3D printers, raw materials, scanners and other associated accessories liable for contributory infringement. This is especially appreciated as they can all be used for many non-infringing purposes. The software in the form of CAD files on the other hand is a more contentious point. CAD files independently written and shared cannot be deemed infringing. A mere 3D scan resulting in a CAD file is also not technically infringing a patent as no one is 'making' a patented object at this stage. The websites hosting the infringing CAD files might face litigation from patent holders for inducement of infringement. Here the point of reckoning becomes section 79<sup>11</sup>, of The Information Technology Act, 2008 which again

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<sup>9</sup>Michael D. Murray, Copyright, Originality, and the End of the *Scènes à Faire* and Merger Doctrines for Visual Works, 58 *Baylor L. Rev.* 779 (2006).

<sup>10</sup>Trade Marks Act, 1999

<sup>11</sup>The Information Technology Act, 2008, section 79 provides: Exemption from liability of intermediary in certain cases

(1) Notwithstanding anything contained in any law for the time being in force but subject to the provisions of sub-sections (2) and (3), an intermediary shall not be liable for any third party information, data, or communication link hosted by him.

(2) The provisions of sub-section (1) shall apply if-

(a) the function of the intermediary is limited to providing access to a communication system over which information made available by third parties is transmitted or temporarily stored; or

(b) the intermediary does not-(i) initiate the transmission, (ii) select the receiver of the transmission, and (iii) select or modify the information contained in the transmission

(c) the intermediary observes due diligence while discharging his duties under this Act and also observes such other guidelines as the Central Government may prescribe in this behalf

(3) The provisions of sub-section (1) shall not apply if-

(a) the intermediary has conspired or abetted or aided or induced whether by threats or promise or otherwise in the commission of the unlawful act

(b) upon receiving actual knowledge, or on being notified by the appropriate Government or its agency that any information, data or communication link residing in or connected to a computer resource controlled by the



is hard to prove. A webhost merely provides a space to store files and generally have no right to access the content of the files uploaded by users. When the hardware manufacturers- the real facilitators of infringement are to be kept free from the shackles of liability, is it just to hold a service provider like a webhost liable for the same offence? Many non-infringing files are also hosted by them as a matter of course. Legislature should avoid limiting the 3D printer technology. Solutions ought to come from the market place rather than from the legislature. Any governmental controls could quickly become obsolete and cause great harm.

The threat of personal infringement liability can stunt the growth of 3D printing technology. This can be overcome by the legislatures opting to give personal 3D printing some immunity. This could be by setting a relatively high minimum amount-in-controversy for prosecution over any infringement claims involving this technology. Most home 3D printing would be below this lock-in amount and hence immune from action. Such a jurisdictional threshold would also have the advantage of being a rule, and as such would be clearer and easier for courts to apply. The burden should rest with the patentee to prove that the jurisdictional minimum is met, which in practice will be difficult to establish as the infringers primarily are home users.

The potential liability of 3D printing digital intermediaries ie mainly the websites that host the CAD files is moot and will vary from case to case. But case law dictates 'absent any specific information which identifies infringing activity, a computer system operator cannot be liable for contributory infringement merely because the structure of the system allows for the exchange of copyrighted material.'<sup>12</sup>

## V. CONCLUSION

'When legislative interventions fail to recognize new technological, economic, and business needs, social change happens and new forms of creation and dissemination flourish beyond, or in spite of the law'<sup>13</sup>.

A general, all purpose and useful technology like 3D printing ought to be 'lightly' regulated to make sure that the technology is safe to grow and thrive. Strong regulation could fall into 'path-dependent solutions' where creators are told to use a 3D printer only for certain purposes and this approach has to be avoided by the law makers. It is highly difficult for existing legal systems

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intermediary is being used to commit the unlawful act, the intermediary fails to expeditiously remove or disable access to that material on that resource without vitiating the evidence in any manner.

Explanation:- For the purpose of this section, the expression "third party information" means any information dealt with by an intermediary in his capacity as an intermediary.

<sup>12</sup>A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004 (9th Cir. 2001)

<sup>13</sup>Thomas Margoni, Not for Designers: on the Inadequacies of EU Design Law and How to Fix It' (2013) JIPITEC 3.

to grapple with issues that had not even been thought of at the time of their drafting. The double-edged sword that new technology poses for legal systems is an old problem. Technologies like biotechnology, nanotechnology and even computer software in its initial days, to name a few, come to mind. Without proper regulatory support all infant technologies would die a premature death.

As statutory law lags behind technological advances courts have come to play an outsize role in evolving intellectual property law. Yet judicial responsiveness to technological advance tends to be episodic, unsystematic, and path-dependent. The mixed character of intellectual property regimes – incorporating common law tort doctrines and statutory law (e.g., infringement standards, fair use) to flesh out and augment statutory provisions – afford jurists leeway to evolve patent, copyright, and trademark law in light of advances in technology.

A rising number of 3D Printing enthusiasts scan, design, share and print objects on a daily basis. Most of these activities occur without users even considering the possible Intellectual Property implications of 3D Printing technologies. So far, this has only resulted in a small number of clashes between the technology and the law. In a world of plenty, like the one imagined possible by 3D printing technology, intellectual property would have no place. So the threat is actually to both the existing business models and the legal system of IP regime which try to protect IP holders from the ravages of new technology. The patent industry needs to reexamine and restructure its business models rather than drive legislative and judicial actions to stifle new technologies like 3D printing. 3D printing has steadily evolved and recent activities are as diverse as they are useful- they range from *3D-printed* facial implants and a *3D-printed* heart model to *3D-printed* sports equipment, *3D -printed* shoes, and works of art by *3D- printing* sound waves. The public benefits afforded by this new technology must be kept in mind before attempts to shackle it are taken. The old models of enforcement and what constituted infringement will have to be rethought. 3D printing technology is yet to become mainstream and is still in the more exotic areas of innovation and creation.

It is hoped that the predictable growth in the use of the technology does not result in a counter-reaction from right holders trying to protect their businesses in face of changes in the patterns of production, supply and consumption of goods. Instead, the existing balance should be cherished and legal measures that hinder the development and widespread use of technology should be avoided. Intellectual Property cannot be an instrument for maintaining the status quo or protecting existing business models.

Recent history has seen intellectual property law being outpaced by the rapid progress in digital

technology. Rather than letting it become a reason in itself for regulating innovational technologies, we should take this rare opportunity to proactively resist the urge to enable innovation and advancements in new and useful technologies. Law needs to step in only in cases of mass-infringement of patent protected ideas which is still eons away.

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