3-D PRINTING: ADDING A NEW DIMENSION TO INTELLECTUAL PROPERTY?

ZAFAR KHURSHID

ST. EDMUND HALL

MPHIL IN LAW

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ABSTRACT

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Zafar Khurshid, St. Edmund Hall

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3D printing is a phrase often seen in the media in relation to wondrous or troubling developments in manufacturing, health, arms and myriad other areas. The growth of 3D printing has the potential to have a major economic impact, and while we may be at a tilting point with regard to the relationship between 3D printing and intellectual property law, whether the future will see it as a truly 'disruptive' element remains to be seen.

This dissertation identifies three key issues for intellectual property and highlights how 3D printing raises both old and new questions in the areas of copyright, trade mark and patent law. In looking at these focal areas it analyses the extent to which existing regimes are capable of answering some of the difficult questions 3D printing may raise. It does so with the aim of questioning whether the newness of these issues is primarily fuelled by media buzz and a fear regarding the status quo, or whether 3D printing is inherently disruptive.

While the idea of printing a car or a watch may be as novel to the layman as the Star Trek Replicator, the host of issues that come with this new technology are not so fantastic or beyond comprehension. In dealing with many of the questions raised by 3D printing we need to keep a mind to questions that IP law has addressed in the past in relation to disruptive technologies. Some areas may benefit from new legislation or amendments. For others, it is clear that what is required is a re-interpretation of existing legal principles. Either way, while the technology may be new, it does not require us to re-write our IP law. At least not yet.

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1. INTRODUCTION

3D printing is a phrase we often see in the media in relation to fantastic or troubling new developments in manufacturing, health, arms and myriad other areas. Compared to traditional manufacturing 3D printing has the potential to be more efficient, greener and require less manpower. It also has the potential to bring the manufacturer and consumer closer together, eliminate the need for intermediaries, and transform the relationship between rights-owners and end-users. For these and many other reasons authors have called it 'disruptive'[1]; some have even termed it a new industrial revolution[2]. The growth of 3D printing has the potential to have a major economic impact and the fear is that this impact will also entail significant clashes with regard to the relationship between 3D printing and the law. This dissertation seeks to question that conclusion, at least as far as intellectual property ('IP') rights are concerned, by analysing some of the key areas where 3D printing may be the cause of disputes between the existing system of exploitation and protection of IP and the changes introduced by this new technology. The aim of this analysis will be to see whether these issues raise truly novel challenges for IP, or whether the current law is equipped to adapt to these challenges and manage any disruptive influence.

[1] See M Weinberg, 'It Will be Awesome If They Don't Screw It Up: 3D Printing, Intellectual Property and the Fight Over the Next Great Disruptive Technology' (Public Knowledge, 2010) <www.publicknowledge.org/files/docs/3DPrintingPaperPublicKnowledge.pdf > accessed 21 September 2016; M Simon, 'When Copyright Can Kill: How 3D Printers Are Breaking the Barriers Between "Intellectual" Property and the Physical World' (2013) 3 Pace Intell Prop Sports & Ent LF 60 <http://digitalcommons.pace.edu/pipself/vol3/iss1/4> accessed 21 September 2016; T Schneider and others, '3D Printing: Perceptions, Risks, and Opportunities' (2014) <http://ssrn.com/abstract=2533681> accessed 21 September 2016.

[2] See D Mendis, '"The Clone Wars": Episode 1 - The Rise of 3D Printing and its Implications for Intellectual Property Law - Learning Lessons from the Past?' EIPR 2013 35(3) 155-169; B Depoorter, 'Intellectual Property Infringements & 3D Printing: Decentralized Piracy' (2014) 65 Hastings Law Journal 1483 <http://repository.uchastings.edu/faculty_scholarship/1011> accessed 21 September 2016; TY Ebrahim, '3D Printing: Digital Infringement & Digital Regulation' (2016) 14 Nw J Tech & Intell Prop 37, 4 <http://scholarlycommons.law.northwestern.edu/njtip/vol14/iss1/2> accessed 21 September 2016.

Section I of this dissertation will provide an introduction to 3D printing, a brief history of some of the technologies involved and a road map of the issues addressed in this dissertation. Section II will address three key issues or 'points of focus' in the areas of copyright, trade mark and patent law, to highlight the kinds of challenges that the growth of 3D printing may raise for IP. Finally this dissertation will conclude by offering an opinion on 3D printing's 'disruptive' influence on IP and the extent to which that influence can be mitigated.

1.1 What Is 3D Printing?

Three dimensional printing or '3D Printing' is a collective term used to describe a range of technologies that produce objects layer-by-layer, much like an inkjet printer does in two dimensions. It is a process by which a 3D printer 'makes things by following instructions from a computer and stacking raw materials into layers'.[3] Also known as 'Additive Manufacturing' or 'Additive Layer Manufacturing', the main way in which these technologies differ from traditional manufacturing is that they work by depositing materials according to the programmed dimensions, rather than starting with a bigger piece of material and carving out pieces to achieve the desired shape/dimensions, or by creating an object using an existing mould. While the terms '3D Printing' and 'Additive Manufacturing' are often used interchangeably, one of the UK IPO Reports[4] suggests that the two terms 'relate to different activities'.[5] 'Additive Manufacturing refers to the production of end-use layer manufactured parts

[3] H Lipson and M Kurma, *Fabricated: The New World of 3D Printing* (1ST edn, Wiley 2013), 11.

[4] D Mendis, D Secchi and P Reeves, *A Legal and Empirical Study into the Intellectual Property Implications of 3D Printing: Executive Summary* (UK IPO 2015).

[5] *Ibid*, 2.

produced within a business-to-consumer supply chain'[6], while '3D Printing is used to refer to the manufacture of layer-manufactured products within the home or community.'[7] On a plain reading, the distinction here seems to lie in scale. However, with the expansion of the technologies involved, there is fear that the old models of manufacture may soon become obsolete[8]. As the cost of printers and materials falls, users may begin to produce their desired products at home, relying on rights-owners only for authorised designs. 3D printing shops may emerge, mimicking the copy-shops today, where users simply pop around the corner with a file on a flash drive and come back an hour later to pick up their new watch or sneakers. In these models, there is no traditional business-to-consumer supply chain of any physical goods. Thus, in at least one potential future the distinction between the two terms may be reduced to a nullity. This is an important consideration, as some IP provisions are written and/or interpreted within an underlying distinction between personal and commercial use, as we will see in Section II.

For the purposes of this dissertation we shall deal with the various technologies/processes collectively, as '3D printing'. Also, when speaking of 3D printing this dissertation focuses on consumer 3D printing, as opposed to its usage in industries and/or for research & development. The general aim is to look at the effect of large volume, small-scale use of 3D printing and its impact on IP rights.

[6] *Ibid*, 10 (See fn 14).

[7] *Ibid*.

[8] See T Schneider and others (n 1), 4-5; See also A Sinnreich, *3D Printing: Hype, Hope or Threat?* (GIGAOM Research Report 2014).

1.2 The 3D Manufacturing Process

Many people have the impression that 3D printing is an automatic, one-click process. However, while it may greatly simplify the manufacturing process for the common user, it is still a bit more complicated than using your inkjet at home. And while most of the steps involved may not require human intervention, for most consumer printers there is still a need for human supervision and oversight through the overall process. Generally speaking, the process of 3D printing can be broken down into 6 stages or steps:

I. Creating the Computer Aided Design ('CAD') file

Much like a dress-maker making a top or dress for H&M's new summer line needs a design or schematic to work from, a user seeking to create a 3D printed object requires a specialised design file known as a 'computer aided design' or 'CAD' file. This file is the model for the 3D object; the blueprint for its construction. Users can either create original designs or edit existing CAD files using specialised software,[9] or even create designs that replicate existing objects by using 3D scanners.[10] There are also many websites that host CAD files, which users can access either for a license or one-time payment, and even some that make them available open-source to be shared, modified, adapted and further proliferated[11]. Thus, unlike the traditional process of manufacturing, the need for specialised knowledge, training or machinery to be able to access and use these design files is greatly reduced.

[9] Users have access to literally dozens of options, such as TurboCAD, DesignCAD, SketchUp, TurboCAD LTE, CADopia 15, which range from approximately £70.56 to £490.42 and offer a range of user experiences.

[10] Such as the SLS2 High Speed & Resolution 3D Scanner, the Cubify Sense 3D Scanner, or BQ Ciclop 3D Scanner, which can range anywhere from approximately £270 to £850, and vary in terms of accuracy, ease of use and portability.

[11] Such as Shapeways, Thingiverse, GrabCAD, 3DCADBrowser.

II. Conversion to STL Format

In order to be able to use CAD files made using different programs and scanners, these files need to be converted into a standard format, recognisable by the 3D printer. Most 3D printers use the Standard Tesselation Language ('STL') format, first developed by 3D Systems in 1987 for use by its apparatus stereolithography machines.[12] Speaking simplistically, an STL file is to a CAD file what software source code is to object code: 'CAD files and source code are readily intelligible and modifiable by humans, while the STL files and object code designed to be used by computers are not.'[13]

III. STL File Setup

In the third stage, 'a pre-processing program prepares the STL file to be built.'[14] This is akin to the stage where users designate the properties of a document they would like to print, i.e. they make choices regarding the position, orientation, size, etc. of the end product.

IV. Layer Slicing

Once the dimensions, positioning, etc. of the intended product have been decided, the '[t]he pre-processing software slices the STL model into a number of layers from 0.01 mm to 0.7 mm thick'.[15] At this stage, the printer software essentially

[12] S Crawford, 'How 3-D Printing Works' (*How Stuff Works*, 1 March 2011) <http://computer.howstuffworks.com/3-d-printing4.htm> accessed 21 September 2016.

[13] E Greenbaum, 'Three-Dimensional Printing and Open Source Hardware' (2013) JIPEL Vol 2 No 2, 274 <http://jipel.law.nyu.edu/vol-2-no-2-1-greenbaum> accessed 21 September 2016.

[14] P More, '3D Printing: Making the Digital Real' (2013) IJESRT 2(7) July, 2 <www.ijesrt.com/issues%20pdf%20file/Archives%202013/july-2013/25.pdf> accessed 21 September 2016.

[15] *Ibid*.

breaks down the 3D image into slices to be deposited on top of each other layer-by-layer.

V. Printing

Once the machine knows what it has to print, and how, it begins the process of constructing the desired product. The printer uses one of the many different techniques that are generally grouped together as '3D printing', and deposits the chosen material (metal, polymer, plastic, etc.) to build the product. Many envisage this process as being flashy and near-instantaneous. However, '[d]epending on the object's size, the machine and the materials used, this process could take hours or even days to complete.'[16]

VI. Finishing/Processing

In the final stage of the process one generally has a product that looks identical to the designed/scanned product, minus any surface decorations. While some printers are capable of printing using multiple polymers simultaneously, most (particularly those on the more affordable side) create the product using mono-filament tubes. The printed product might require painting and affixing of some bits and pieces before it truly resembles the desired product. Some products may require minor sanding or polishing to improve their use and appearance and finally photosensitive items might require additional time to cure.

1.3 The 3D Printer

An obvious implied requirement of the printing process, after the CAD file, is access to a 3D printer. While the cost can vary greatly, both commercial and consumer level

[16] Crawford (n 12).

printers are easily available. On the consumer end, a quick perusal of the online marketplace Amazon UK shows one model, the 'XYZprinting 3F1J0XEU00E Junior 3D Printer' (the 'da Vinci Jr.') available for only £257.60 (down from £285.50).[17] On the more expensive end is the 'Kloner3D 5607 240TWIN 3D Printer, Production Series' available for £9,000.23.[18]

One may argue that the cost and effort involved in the process may itself eliminate most users' participation. For such consumers, however, there are many sites such as Shapeways, which offer 'Personalized, 3D Printed Projects'.[19] Such sites let you shop for products uploaded by their community of designers, customise them to your taste, and print them in over 50 materials '[f]rom plastics to porcelain, silver to sandstone'.[20] To many, particularly lay consumers, this may all still seem like science fiction. Indeed to most the fact (and it is now fact) that we can print functional parts of the human body seems too fantastic to believe. The idea that we can print food just seems strange and ultra-futuristic. In truth, while we are still likely many years away from the 'Replicator' from Star Trek[21], the technology is no longer science fiction. It is science.

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[17] Product Description <www.amazon.co.uk/XYZprinting-3F1J0XEU00E-Junior-3D-Printer/dp/B00VRTCX7G/ref=sr_1_3?ie=UTF8&qid=1456848902&sr=8-3&keywords=3d+printer#biss-product-description-and-details> accessed 21 September 2016.

[18] Product Description <www.amazon.co.uk/Kloner3D-5607-240TWIN-Printer-Production/dp/B018EJ5GNE/ref=sr_1_1?s=industrial&ie=UTF8&qid=1456849702&sr=1-1&keywords=3d+printer> accessed 21 September 2016; Price based on earlier access to webpage, which was unavailable when last accessed because item was out of stock.

[19] Shapeways Home Page <www.shapeways.com> 21 September 2016.

[20] *Ibid*.

[21] A machine capable of synthesising objects, seemingly from thin air; See Wikipedia <https://en.wikipedia.org/wiki/Replicator_(Star_Trek)> accessed 27 September 2016

1.4 A Brief History

While the common perception is that 3D printing is a recent ground-breaking technology, the technologies involved are far from new. The first related Patent was filed as early as 1971 (and granted in 1977) to Wyn Kelly Swainson for a 'Method, medium and apparatus for producing three-dimensional figure product'.[22] The first commercial 3D printer was launched just a decade later in 1988 by Charles Hull who was granted a patent in 1986 for an 'Apparatus for Production of Three- Dimensional Objects by Stereolithography'.[23] One of the reasons that the issue has come to the forefront in the last decade or so is that many, if not most, of the early patents in the area of Additive Manufacturing have expired. The expiration of patents over key components has led to a surge in improved models that can now be produced, and thus marketed, at significantly lower costs. Parallel developments in other areas, such as materials – with regard to choice and costs – have further laid the ground for the rapid commercial expansion of 3D printing.

In the early 2000s, 3D printing saw a great push forward with open source initiatives – initiatives that decentralised the process of research and development by making material and knowledge open to the public and building upon existing technology through shared content and progress. Unlike traditional product development, which is done in-house at large establishments, expending significant manpower and funds in inventing and improving new products, these initiatives made their proprietary information available to anyone who was able to access them and build upon them. One key contribution came from the RepRap project, which

[22] Patent No. US 4041476 (A), granted 9 August 1977 <www.google.co.uk/patents/US4041476> accessed 21 September 2016.

[23] Patent No. US 4575330 (A), granted 11 March 1986 <www.google.co.uk/patents/US4575330> accessed 21 September 2016.

was started as an initiative 'to develop a 3D printer that could print most of its own components at low-cost'[24]. The RepRap project used the community interested and involved with 3D printing to develop the technology. Though small at its inception, it grew with the technology. The project's schematics were shared publicly and numerous individuals contributed towards making the project a success by experimenting with its various components. RepRap is a striking example of where peer-to-peer sharing led to many developments and improvements in the early models of 3D printer and '[t]he release of the non-commercial Darwin 3D printer by the RepRap project in 2007 is considered the advent of end-consumer 3D printing'.[25] Most of these developments are still the basis for modern 3D printers. One of RepRaps developers, Zach Smith, went on to found Makerbot, owner of the online platform Thingiverse. The latter was chosen by the UK IPO as one of the case studies for its report on 3D printing platforms and is one of the most popular 3D printing services available. Even to this day, RepRap continues to provide open source access to the various models of 3D printers born out of its original project.[26] RepRap and Makerbot thus are prime examples of the evolution of 3D printing in the 2000s from hobbyist-driven open source development to privatised commercial consumer initiatives. RepRap is thus also a key to understanding the future of 3D printing – As a technology that grew out of openness and sharing, many sections of the 3D printing community are resistant to its being penned in and restricted by traditional attitudes towards IP.

[24] Rep Rap Project Wikipedia page <https://en.wikipedia.org/wiki/RepRap_project> accessed 14 August 2016.

[25] S Friesike, H Send and RPG Tech, 'What Do Consumers Use 3D Printers For?' (2014), 2 <http://ssrn.com/abstract=2547528> accessed 21 September 2016.

[26] Rep Rap Project website <http://reprap.org/wiki/Build_A_RepRap> accessed 21 September 2016.

1.5 3D Printing Today

Currently, 3D printing is used in myriad sectors/industries, including medical, automotive, defence, and, most importantly for the purposes of this dissertation, commercial manufacturing. In each of these sectors, it has the potential to revamp traditional manufacturing processes. Since machines are used to manufacture parts, there is a potential to limit the need for labour force, which some see as eliminating future outsourcing needs for western manufacturers. While current models might still require personnel for the assembly of parts, particularly for more complex goods, this too is an aspect of the manufacturing process that may soon be eliminated, as the potential for machines to print entire items, with working parts, continues to expand. For example in 2014 Solid Concepts, which was later purchased by Stratasys, printed a .45 caliber pistol – the 'world's first functional metal handgun'.[27] For manufacturers, eliminating the need for labour is not the only boon. Since 3D printers create objects through layering, they also limit, if not entirely eliminate, waste/wasteful by-products, which can significantly limit costs[28].

3D printing could also have important implications for other economic actors by closing the gap between product originators (designers, creators, manufacturers) and end-consumers. Consumers may be able to access product designs directly from such sources, reducing the need for formal distribution networks. Eventually this may lead to an elimination of retailers, wholesalers and the like, and the growth of what

[27] S Heller, 'This 3-D Printed Gun Turned Skeptics Into Believers' (*The Motley Fool*, 20 July 2014) <www.fool.com/investing/general/2014/07/20/this-3-d-printed-gun-turned-skeptics-into-believer.aspx> accessed 21 September 2016.

[28] Though it may be kept in mind that this could also be harmful to certain industries, particularly ones that source their raw material(s) from the waste products of other manufacturers.

has been termed by Ratto & Ree as a 'prosumer' society.[29] These are amongst the prime reasons that many are referring to 3D printing as a 'game-changing technology'.[30] However while it is tempting to accept such assumptions about the potential of 3D printing it must be remembered that the predictions of growth on which this potential impact is based are far from guaranteed. Indeed how rights owners and legislators choose to react to/deal with the kind of challenges that this dissertation will address will itself be a major influence in the growth of 3D printing.

While there is no doubt about the disruptive or transformative potential of 3D printing for manufacturing, and related industries, it might be a leap to insist that it will also be just as disruptive for IP. Some existing laws may be too narrowly worded to take into consideration new means of exploitation. To this extent, 3D printing may present challenges, but can we assume on this basis that the technology is inherently disruptive? A majority of commentators seem to accept that 3D printing is a revolutionary technology, which poses challenges for how owners, consumers and lawmakers currently address and apply IP.[31] In 2013 the McKinsey Global Institute included 3D printing in its list of '12 technology areas with the potential for massive impact on how people live and work, and on industries and economies',[32] estimating that 'consumer use of 3D printing could have potential economic impact

[29] M Ratto and R Ree, 'Materializing Information: 3D Printing and Social Change' (*First Monday*, 2 July 2012) <http://firstmonday.org/ojs/index.php/fm/article/view/3968/3273> accessed 21 September 2016.

[30] T Schneider and others (n 1).

[31] See CW Finocchiaro, 'Personal Factory Or Catalyst For Piracy? The Hype, Hysteria, And Hard Realities Of Consumer 3-D Printing' (2013) Cardozo Arts & Ent LJ Vol 31 473; Depoorter (n 2); SM Santoso, BD Horne and SB Wicker, 'Destroying by Creating: Exploring the Creative Destruction of 3D Printing Through Intellectual Property' <www.truststc.org/education/reu/13/Papers/HorneB_Paper.pdf> accessed 21 September 2016.

[32] J Manyika and others, *Disruptive Technologies: Advances That Will Transform Life, Business, and the Global Economy* (McKinsey Global Institute 2013), Preface.

of $100 billion to $300 billion per year by 2025, based on reduced cost (compared with buying items through retailers) and the value of customization'.[33] As the cost of consumer printers and materials falls, the risk increases for users to privately manufacture goods that entail IP rights of others and thus, '[g]overnments will also be called upon to clarify how intellectual property rights will be protected'[34]. As the report states, '3D printing could have meaningful impact on certain consumer product categories, including toys, accessories, jewellery, footwear, ceramics, and simple apparel.'[35] It is clear that a 'meaningful impact' in the home printing of toys should be of some concern to Hasbro and Mattel, while footwear giant Adidas should watch for the impact of users copying their idea of customised 'Superstars'.[36]

1.6 Focus of this Dissertation

This dissertation argues that instead of the 'disruptive technology' that many fear 3D printing has the potential to be a 're-interpretive technology'. We may learn from our mistakes and adapt in order to benefit from its continued development. Alternatively, we may suffer in the face of an obstinate belief that 'if it ain't broke, don't fix it!'

In its plainest sense, there is no denying that 3D printing is a disruptive technology. It has the potential to raise issues that have not been faced before, to compel actors to change business models, and to push legislators and/or judiciaries to clarify and fill gaps in the law. However this does not mean that is necessarily

[33] *Ibid*, 110.

[34] *Ibid*, 113.

[35] *Ibid*, 110.

[36] R Jones, 'Adidas Is Making a 3-D Printed Version of the Superstar' (*Complex*, 4 November 2015) <http://uk.complex.com/sneakers/2015/11/adidas-superstar-futurecraft-3d> accessed 21 September 2016.

disruptive in the sense of Schumpter's 'creative destruction', i.e. innovation that completely destroys established enterprises. Instead this dissertation highlights the potential to accept the changes that 3D printing presents within the existing regimes, through the interpretation of legal principles. In this sense, it can usher in a period of 're-interpretation' rather than 'disruption' or 'destruction'. The aim of making this comparison is to encourage stakeholders – governments, industries, rights holders and consumers – to balance the so-called disruptive force against the potential advantages of this new technology. Whereas a 'disruptive' or 'destructive' technology may encounter the chilling effects of rushed reform or over-enforcement, it is hoped that approaching it as s 're-interpretive' technology will balance the need for clarity and enforceability in the law with technology's need for freedom and innovation.

In addressing the potential challenges that 3D printing may pose to IP law, this dissertation narrows down on and analyses three key issues, i.e. (1) whether, and the extent to which, CAD files are protectable under copyright; (2) whether the types of 'use' involved in 3D printing and its related services are actionable as trade mark infringement; and (3) whether the law of patent infringement adequately addresses the processes and services involved in 3D printing. While 3D printing has the potential to raise other issues for IP law, these three issues have been chosen to highlight the varying degrees to which 3D printing may be 'disruptive'. Analysis of these issues will allow us to identify whether gaps in the law can be addressed within existing regimes and the extent to which the response that should follow should be lead by judicial or legislative action. And it is hoped that comparing the varied impact that 3D printing may have in these three areas – with regard to the complexity

or straight-forwardness of the challenges entailed – will serve to highlight how 3D printing may have different levels of impact on different areas of IP law. That is to say, if it is going to be 'disruptive', it may not be so across the board. These particular issues have also been chosen as they provide good examples of how clarity is necessary for both end-users and rights-holders when it comes to possible gaps in the law. 3D printing provides new avenues of exploitation, but also for infringement (whether intentional or unintentional) – in addressing the challenges that it may raise it is important to consider both perspectives; particularly where changing consumer/owner behaviours may make great strides to offset disruptiveness.

Here it should be noted that when this dissertation speaks of 'disruptiveness', it speaks of the disruptive impact for the application and enforcement of the law, as it stands. It may be that with changing business models rights-holders and consumers may work together in changing how they use or think of intellectual property, i.e. they may move from a system of infringement and enforcement to one of mutual cooperation and gain. To whatever extent such changes in consumer and manufacture culture may 'offset' the disruptive influence of 3D printing, it is beyond the scope of this dissertation at this time.

1.7 Methodology

Few disputes regarding 3D printing have come before courts and fewer still have led to published decisions. In light of this, I will extend principles developed in other contexts and consider how courts and legislators have reacted to past disruptive technologies. Based on this case law I will examine some of the challenges presented

by 3D printing and look at whether existing regimes can adapt to these new challenges.

Each of the issues identified will be dealt with separately under a particular area of IP law, i.e. Copyright, Trade Mark and Patents, respectively. Here this dissertation makes a conscious effort to carve out each issue within a specific area of IP law, for two reasons: (i) to deal with the nuances of each issue for that particular area of IP law, and (ii) for the very practical reason that reform/change, when it occurs in the law – whether through legislative or judicial action – rarely targets IP generally, but rather focuses on one area; an amendment to the private copying exception in Copyright for example would not entail a similar change under Trade Mark law, per se. Thus it would be useful to look at these specific issues within the area specified.

This dissertation will focus on US and UK law. As large creators, exporters and importers of IP, the way in which this technology is received in these jurisdictions will have a significant impact on its development. It is also key that most of the top online providers offering 3D printing services, manufacturers of 3D printers, and sites that host 3D printing related content, are either based in the US or clearly state that any transactions in which they are involved fall within the jurisdiction of a particular state of the US.[37] The UK is chosen as a sub-set/manifestation of how courts and other stakeholders may react in the EU, given

[37] See for example Shapeways Terms and Conditions <www.shapeways.com/terms_and_conditions> accessed 21 September 2016; Thingiverse Terms and Conditions <www.thingiverse.com/legal/terms> accessed 21 September 2016.

that much of the law is harmonised in area of IP.[38] Moreover, both the US and UK are signatories of the major global IP conventions, which means that certain parallels can be drawn under other jurisdictions, based on this 'de-facto harmonisation' of global IP law.

[38] At the time of writing this dissertation the UK is yet to trigger Article 50 of the Lisbon Treaty.

2. '3D PRINTING' AND INTELLECTUAL PROPERTY RIGHTS

3D printing is going to have a major impact in various areas of law, such as gun control, medical law, consumer protection; and for various industries – aviation, manufacturing, medicine – just to name a few. IP law will be no exception. Though how this impact will manifest is less clear. Is the technology going to throw up novel and insurmountable challenges for current legal and economic models? Will the current models constrain the rapid expansion of this 'revolutionary' technology? Is there a need to modify systems from ones based primarily on enforcement and exclusivity, to ones based on cooperation and symbiosis? 3D printing throws up many questions. And while this dissertation cannot answer them all it will seek to answer one (to an extent), i.e. how far is the impact going to be legally disruptive.

This section will deal with three key 'points of focus' within the areas of copyright, trade mark, and patent law. Some elements of the issues addressed will be particular to certain forms of IP, while others pose larger challenges that affect IP in general. This dissertation makes the conscious decision to separate these issues within the separate areas of law. However, the aim throughout will be to focus on the relationship between 3D printing and existing IP regimes and the extent to which the former may challenge the latter.

2.1 SUBSISTENCE OF COPYRIGHT IN CAD FILES

Generally when commentators think about the relationship between 3D printing and copyright, the discussion focuses on infringement issues[39]. However, 3D printing has the potential to raise difficult questions of subsistence of copyright in objects created using 3D printers, specifically in relation to CAD files. It is key to address these questions as CAD files are the backbone of the 3D printing process and like any other digital file they can be easily reproduced, shared and modified. Thus these digital files are poised to become valuable commodities and rights-owners will have a vested interest in knowing how they fit into the copyright system.

Such subsistence issues fall mainly into two categories: issues relating to original CAD files (raising questions about the nature of such works) and issues relating to CAD files created through scanning (raising questions of the originality threshold).

2.1.1 Original CAD File as a Literary Work

Many authors have suggested that CAD files are protectable as computer programs[40], which are protected as literary works under the TRIPS agreement:[41] Article 10(1)

[39] See P Hanna, 'The Next Napster? Copyright Questions as 3D Printing Comes of age' (*Ars Technica*, 4 June 2011) <http://arstechnica.com/tech-policy/2011/04/the-next-napster-copyright-questions-as-3d-printing-comes-of-age/> accessed 21 September 2016; Mendis, '"The Clone Wars": Episode 1' (n 2), 11-13; T Amirtha, '3D Printing's Napster Moment' (*Fast Company*, 6 May 2015) <www.fastcompany.com/3046901/3d-printed-legal-problems#2> accessed 21 September 2016.

[40] PJ Viscounty, AM Gass and KA Virgien, '3D Printing: A New Technology Challenges The Existing Intellectual Property Framework'(2014) Orange County Lawyer Vol 56(10) 16, 17-18 <https://www.lw.com/thoughtLeadership/three-d-printing-new-technology> accessed 21 September 2016; D Mendis, D Secchi and P Reeves, *A Legal and Empirical Study of 3D Printing Online Platforms and an Analysis of User Behaviour* (UK IPO 2015), 12.

[41] Uruguay Round Agreement on Trade-Related Aspects of Intellectual Property Rights, Annex 1C of the Marrakesh Agreement Establishing the World Trade Organization (signed in Marrakesh, Morocco on 15 April 1994) (TRIPS).

states '[c]omputer programs, whether in source or object code, shall be protected as literary works under the Berne Convention (1971)'. Under the Copyright Designs and Patents Act 1988 in the UK, '"literary work" means any work, other than a dramatic or musical work, which is written, spoken or sung, and accordingly includes […] (b) a computer program, (c) preparatory design material for a computer program'.[42] The CDPA does not offer a definition of 'computer program'. However the CJEU has held that the object of protection is the 'expression in any form of a computer program which permits reproduction in different computer languages, such as the source code and the object code.'[43] Similarly, according to the US Copyright Act, '"[l]iterary works" are works, other than audiovisual works, expressed in words, numbers, or other verbal or numerical symbols or indicia, regardless of the nature of the material objects […] in which they are embodied.'[44] Computer Program is defined separately as 'a set of instructions to be used directly or indirectly in a computer in order to bring about a certain result'.[45] Unlike the UK Act, there is no specific enumeration of computer programs as a literary work; however later in the act it does make reference to 'nonmusical literary works, including computer programs or data bases'.[46] It also states in the Final Report of the National Commission on New Technology Uses of Copyrighted Works that computer

[42] Copyright Designs and Patents Act 1988 (CDPA 1988), sec 3(1).

[43] See Case C-393/09 *Bezpečnostní Softwarová Asociace (BSA) v Ministerstvo Kultury* [2011] ECDR 3, paras 34-35; See also Case C-406/10 *SAS Institute Inc v World Programming Ltd* [2012] 3 CMLR (4) 55, paras 35-37.

[44] 17 USC § 101.

[45] *Ibid*.

[46] 17 USC § 1001, defining a 'digital audio recording device'.

programs are 'a form of writing… [which] are prepared by the careful fixation of words, phrases, numbers, and other symbols in various media.'[47]

It is arguably unproblematic then that CAD files should be protected as literary works. CAD files are after all digital files, which would provide certain instructions for a 3D printer, which would be perceived by it as 0s and 1s. Support for this view may be found in the (obiter dictum) reference in *Autospin v Beehive Spinning*, where Laddie J. acknowledged as far back as 1995 that many designs for three dimensional objects are now made using computers and that '[a] literary work consisting of computer code therefore represents the three dimensional article.'[48]

Some authors, however, argue that CAD files should not be protected as computer programs. For example, Simon argues that while CAD files are digital like computer programs, they do not embody the necessary element of authorship to be considered the literary expressions of their creators, i.e. they do not possess the right kind of authorship to be literary works akin to software:

> When a programmer is creating software […] it is the programmer's range of choice in selecting how to accomplish their goal that amounts to creative expression equivalent to that of authorship, taken together with the fact that human-readable source code is in the form of a 'writing.' A 3D design file created by hand in CAD software, [footnote/citation omitted] or created by using a laser scanning device [footnote/citation omitted] is devoid of any of this type of authorship, and cannot be considered a 'writing'. […] There is no 'expression' like in a programmer's choice of code, because the 3D Design file never exists in a human-readable form.[49]

[47] National Commission on New Technological Uses of Copyrighted Works (CONTU) Final Report, 3 Computer LJ 53 (1981), 56.

[48] *Autospin (Oil Seals) Ltd v Beehive Spinning* [1995] RPC (Ch), 698.

[49] Simon (n 1), 79-80.

This argument has merit. When one looks past the description of the design file as being a 'digital' or 'computer-aided' file, one observes that what is being protected is not the expression, i.e. the actual computer program, with its underlying code, but rather the output of that code, i.e. the embedded design. Compare this to the example of a recipe. While a recipe in a recipe book may be protectable as a literary work (as a set of instructions), the dish that it describes (the end product which is created) would not be protected as a literary work. Here the embedded design is the end product, rather than the set of instructions, i.e. it is not the expression, but rather the idea. The distinction lies in the object of protection. In relation to CAD files, what we are attempting to make the object of an exclusive proprietary right is the 3D model. This model does not come about by a programmers use of specific coding language but rather by choices made using modelling software. The latter can be expressed as object code, similar to a computer program, however the objects of protection are distinct. We are not protecting the literary expression of the author. The CAD files themselves 'never exist in a "source code" (i.e. human-readable) form, therefore they cannot be considered the "writing of an author" and be protected as literary works.'[50] At most what we are protecting is the translation of the model into computer language, perhaps making it an adaptation/derivative work.

2.1.2 Original CAD File as an Artistic Work

If what we are looking to protect in the CAD file is the embedded design then surely it should be protected as an artistic work since the object of protection is more akin to an artistic expression rather than a literary one. However, unlike traditional artistic works, it is not fixed or perceptible without the use of specialised software i.e. design

[50] *Ibid*, 79 (See fn 91).

software like AutoCAD.[51] This could be problematic as most courts still consider 'aesthetic appeal'[52] or 'visual significance'[53] when it comes to such works. So the answer is not that intuitively clear.

United Kingdom

In the UK courts have traditionally focussed on questions of how a work looks or the 'visual effect'[54] with regard to artistic works. Under the CDPA:

> 'artistic work' means--
> (a) a graphic work, photograph, sculpture or collage, irrespective of artistic quality,
> (b) a work of architecture being a building or a model for a building,
> (c) or a work of artistic craftsmanship.
> […]
> 'graphic work' includes--
> (a) any painting, drawing, diagram, map, chart or plan, and
> (b) any engraving, etching, lithograph, woodcut or similar work[55]

As mentioned before, CAD files are like blueprints; designs that describe a three-dimensional object. They may be likened in this sense to sketches an artist may draw of a sculpture before creating it from a block of stone. In *Nova v Mazooma*, Kitchin J. stated that the definition of graphic work included in the CDPA 'is not restricted to the specific exemplars given.'[56] Thus, composite frames created by a video game (i.e. the computer program underlying the game) are protectable as artistic works. In a similar way, a CAD file creates a composite image on a screen

[51] Product Overview, AutoCAD <www.autodesk.co.uk/products/autocad/overview> accessed 21 September 2016.

[52] See *Zalewski v Cicero Builder Dev Inc* 754 F 3d 95 (USCA 2nd Circuit 2014), 102; *Savant Homes Inc v Collins* 809 F 3d 1133 (USCA 10th Circuit 2016), 1140.

[53] See *Taylor v Maguire* [2013] EWHC 3804 (IPEC), [2014] ECDR 4, [13] (citing *Designers Guild Ltd v Russell Williams (Textiles) Ltd* [2001] ECDR 10, [2001] FSR 11); See also L Bently and B Sherman, *Intellectual Property Law* (4th edn, OUP 2014), 201.

[54] See *Nova Productions Ltd v Mazooma Games Ltd* [2006] EWHC 24 (Ch), [2006] RPC 14, [101].

[55] CDPA 1988, s 4.

[56] *Nova v Mazooma* (n 54), [100].

when viewed on a digital device using some specialised software. In this sense it is comparable to video games. This argument is unhindered by the fact that the image(s) in question may be entirely computer generated, as according to the CDPA:

> In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.[57]

In *Abraham Moon v Thornber*, the Patents County Court found that '[a]rtistic copyright must relate to the content of the work of the artist and not the medium in which it is recorded'[58], i.e. if what is actually being protected is some form of 'artistic' or 'graphic' expression, it could be protected regardless of an unconventional medium of fixation. In this case H.H.J. Birss QC gave the example of an artist (David Hockney) who had created works of art on a digital device, these images being ephemeral in the sense of only existing as digital files on a tablet. Much like a 3D design file, in the case of Mr. Hockney '[t]he visual image is only visible, at least to a layman, as a result of using the fixed record to tell a machine (a loom or a computer) to produce something.'[59]

While CAD files are by their nature artistic rather than literary, there seem to be sound arguments for both sides. So, does it matter what kind of work a CAD file is?[60] In the UK, following the decision in *Infopaq*,[61] a work should be protectable

[57] CDPA 1988, s 9(3).

[58] *Abraham Moon & Sons Ltd v Thornber* [2012] EWPCC 37, [2013] FSR 17, [106].

[59] *Ibid*, [105].

[60] Rights owners may be more inclined to argue for literary works, so as to avoid the exception under Sec. 52 wherein '[a]fter the end of the period of 25 years from the end of the calendar year in which [articles which are made by exploiting artistic works, by an industrial process] are first marketed, the work may be copied by making articles of any description, or doing anything for the purpose of making articles of any description, and anything may be done in relation to articles so made, without infringing copyright in the work.'

[61] Case C-5/08 *Infopaq International A/S v Danske Dagblades Forening* [2009] ECDR 16.

under copyright in the UK if it is original in the sense of being the 'author's own intellectual creation'.[62] In *BSA v Ministerstvo Kultury* the court affirmed the decision in *Infopaq* that 'copyright within the meaning of [the InfoSoc Directive][63] is liable to apply only in relation to a subject-matter which is original in the sense that it is its author's own intellectual creation'.[64] The Court thus held that a Graphic-User-Interface ('GUI') could be protected as a copyright work provided the national court made the assessment that the 'the specific arrangement or configuration of all the components which form part of the graphic user interface'[65] met the criterion for originality. The Court added that in that regard this criterion could not be met by elements of the work where their expression was dictated by technical functions:

> [W]here the expression of those components is dictated by their technical function, the criterion of originality is not met, since the different methods of implementing an idea are so limited that the idea and the expression become indissociable.[66]

In *NLA v Meltwater* Proudman J., sitting in the High Court, relied on the Infopaq decision to conclude that newspaper headlines were 'capable of being literary works, whether independently or as part of the articles to which they relate'[67] based on the skill and judgment expended in devising them. However not every contribution is protectable, even if it is the author's own intellectual creation. In *SAS Institute v World Programming* the CJEU held that 'neither the functionality of a computer program nor the programming language and the format of data files used in a

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[62] *Ibid*, para 37.

[63] Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the Harmonisation of Certain Aspects of Copyright and Related Rights in the Information Society [2001] OJ L167/10 ('The InfoSoc Directive').

[64] *BSA v Ministerstvo Kultury* (n 43), para 45.

[65] *Ibid*, para 48.

[66] Ibid, para 49.

[67] *Newspaper Licensing Agency Ltd v Meltwater Holding BV* [2010] EWHC 3099 (Ch), [2011] ECDR 10, [71].

computer program in order to exploit certain of its functions constitute a form of expression of that program.'[68] Thus these elements are not protectable as copyright in computer programs for the purposes of the Software Directive.[69] However the court conceded that this did not mean they were not protectable under the InfoSoc Directive, if they satisfied the originality criterion.

If a national court finds that the CAD file adequately fulfils the condition of being the author's intellectual creation, then the work would be protected, which might prompt some to argue that it would not matter which category it falls under. Indeed *Infopaq* has led some to question the very continuance of the closed list system in member states like the UK.[70] Arnold J. commented in *SAS Institute* that it was 'arguable that it is not a fatal objection to a claim that copyright subsists in a particular work that the work is not one of the kinds of work listed in s.1(1)(a) of the Copyright, Designs and Patents 1988 and defined elsewhere in that Act.'[71] Though he added that the work at issue must still be a literary or artistic work within the meaning of Art. 2(1) of Berne.[72] To date no case has come up that has directly challenged the closed list system and some authors have suggested alternative readings of the CJEU judgments that would have far less drastic impact on national statutes with closed list systems. Jonathan Griffiths has suggested that one reads the '[c]ourt's words as a rather loose, non-exhaustive statement of the criteria to be

[68] *SAS Institute v World Programming* (n 43), para 39.

[69] Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs [2009] L 111/16 ('The Software Directive').

[70] See C Handig, 'Infopaq International A/S v Danske Dagblades Forening (C-5/08): Is the Term "Work" of the CDPA 1988 in Line With the European Directives?' EIPR 2010 32(2), 53-57.

[71] *SAS Institute Inc v World Programming Ltd* [2013] EWHC 69 (Ch), [2013] RPC 17, [27].

[72] Berne Convention for the Protection of Literary and Artistic Works 1988.

satisfied by a protected work'[73] rather than accepting that 'anything satisfying the "author's own intellectual creation" standard is a "work"'.[74] This view seems at first to be supported by the decision in *FAPL v QC Leisure* where the court refused FAPL's claim for 'copyright in the Premier League matches themselves, as they [could not] be classified as works.'[75] However, in the very next paragraphs the court once again conflates work and originality by stating that '[t]o be so classified, the subject-matter concerned would have to be original in the sense that it is its author's own intellectual creation'[76] and that football matches in particular could not be considered intellectual creations because they were constrained by the rules of the game.

So, while national courts are now compelled to consider whether elements of a work are the 'author's own intellectual creation' for the sake of subsistence, there is some debate as to whether *Infopaq* has set a new test for subsistence altogether. It is clear from a look at the decisions of the CJEU above that they often conflated the questions of whether something is protectable subject matter and whether it meets the criterion of originality. But this argument has not been without criticism, particularly from UK courts. Sir Andrew Morritt categorically stated in *NLA v Meltwater* that the *Infopaq* ruling applied to the question of origin, i.e. authorship rather than originality and thus he '[did] not understand the decision of the European Court of Justice in

[73] J Griffiths, 'ECJ Decision in Czech GUI Case Could Pose Questions for UK Copyright Law' (*Practical Law*, 24 February 2011) <http://uk.practicallaw.com/6-504-8145#null> accessed 21 September 2016.

[74] *Ibid*.

[75] Joined Cases C-403/08 and C-429/08 *Football Association Premier League Ltd v QC Leisure* and *Karen Murphy v Media Protection Services* [2012] 1 CMLR 29, para 96.

[76] *Ibid*, paras 97-98.

Infopaq to have qualified the long standing test established by the authorities'[77] such as *University of London Press Ltd* and *Ladbroke v William Hill.* Thus UK courts may continue to apply the established British tests of originality, i.e. 'that the expression must be in an original or novel form, but that the work must not be copied from another work—that it should originate from the author'[78] taking into account 'all the skill, judgment and labour expended in producing'[79] the work.

United States

The 'umbrella test' of *Infopaq* might lend an easy answer to the doubts raised concerning CAD files in the UK, however the question may be answered differently in the US. Rideout suggests that CAD files would not be considered literary works under the US Copyright Act. He argues that '[w]hat differentiates 3D CAD files from other computer programs is that the 3D CAD files are basically just a triangular representation of a 3D object. The CAD files themselves do not control how 3D printers operate, they merely serve as more of a blueprint for software to utilize.'[80] As shown in Section 1.2, the 3D printing process involves a number of distinct steps. And while not all require human intervention, it is clear that the process is far from the one-click process many of us imagine when we think about 3D printing. One key part of that process is the conversion of the CAD file into the standard STL format. After that the pre-processing software, which varies with each hardware provider, prepares the STL File to be printed. It is this software that executes the printing

[77] *The Newspaper Licensing Agency v Meltwater Holding BV* [2011] EWCA 890 Civ, [2012] RPC 1, [20].

[78] *University of London Press Ltd v University Tutorial Press Ltd* [1916] 2 Ch 601.

[79] *Ladbroke (Football) Ltd v William Hill (Football) Ltd* [1964] 1 WLR 273 (HL).

[80] B Rideout, 'Printing the Impossible Triangle: The Copyright Implications of Three-Dimensional Printing' (2011) 5 J Bus Entrepreneurship & L Iss 1 <http://digitalcommons.pepperdine.edu/jbel/vol5/iss1/6> accessed 21 September 2016.

command. It tells the printer to print the object according to the design embodied in the CAD, and thus STL, file.

Rideout suggests that CAD files are more likely to fall within the realm of 'pictorial, graphic, and sculptural works',[81] which include

> two-dimensional and three-dimensional works of fine, graphic, and applied art, photographs, prints and art reproductions, maps, globes, charts, diagrams, models, and technical drawings, including architectural plans. Such works shall include works of artistic craftsmanship insofar as their form but not their mechanical or utilitarian aspects are concerned; the design of a useful article, as defined in this section, shall be considered a pictorial, graphic, or sculptural work only if, and only to the extent that, such design incorporates pictorial, graphic, or sculptural features that can be identified separately from, and are capable of existing independently of, the utilitarian aspects of the article.[82]

This view is also supported by Simon who argues that this category of works is the 'obvious best categorization so long as the work contains enough creative expression separable from its utilitarian or functional aspects'[83] Classifying CAD files as artistic works under this definition would align better with the nature of what one is aiming to protect. Since it is the underlying design that is the heart of the work, it should be the graphic representation of the work that is protected. This also follows from the separate categories of copyright work themselves – literary, artistic, dramatic and musical. While theoretically the originality requirement/test for each is the same, the discussion focuses on the kind of contribution made by the author. Distinct categories of works suggest that to claim copyright the author should have expended that kind

[81] 17 USC § 102.

[82] 17 USC § 101.

[83] Simon (n 1), 80-81. See also L Osborn, 'Doctrinal Quandaries with 3D Printing and IP' (*ABA Intellectual Property Litigation Newsletter*, 1 July 2016) <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2814806> accessed 21 September 2016.

of skill, labour, judgment, etc. And as it was discussed above, the kind of skill and judgment employed in creating CAD files is not literary, but rather artistic.

In *Meshwerks Inc v Toyota Motor Sales USA*, the court held that 3D design files that were created as accurate representations of existing cars were not sufficiently original to warrant copyright protection, because the 3D wireframe model was essentially a result of slavish copying, the entire purpose being to faithfully reproduce Toyota cars[84]. The Court did however add that '[d]igital modeling can be, surely is being, and no doubt increasingly will be used to create copyrightable expressions.'[85] The implication of this judgment seems to be that while the court was hesitant to do so in this case, it left the door open for 3D models to be protected under artistic copyright. Here, the model frames are akin to our hypothetical of CAD files that are created from scratch, i.e. using modelling software, rather than by using a digital 3D scanner. Thus, it is also important to keep this decision in mind in our next section (discussing CAD files created by scanning). However, for the purposes of original CAD files, the model or design would warrant protection if it makes creative choices, i.e. it is in itself or represents an original work.

3D designs could be protected as pictorial works that are 'technical, mechanical, engineering, or architectural drawings.'[86] In *Forest River Inc v Heartland Recreational Vehicles LLC*, the court held that a manufacturer's floor plan

[84] *Meshwerks Inc v Toyota Motor Sales USA* 528 F 3d 1258 (USCA 10th Circuit 2008).

[85] *Ibid,* 1269-70.

[86] Simon (n 1), 82.

was 'protected under § 102(a)(5) as a technical drawing'[87] and that 'copyright in a technical drawing of a non-architectural useful article, precluded a competitor from using copies of that drawing to construct the useful article'.[88] This offers limited protection however since others would not be precluded from creating such objects based on their own designs, but rather only be precluded from unauthorised use of the original designs.[89] Thus, while copying the drawings would be an act of copyright infringement, 'manufacture of a machine from a copyrighted technical drawing is clearly not copyright infringement'[90] under the useful article exception[91]. In *Forest River* the court also made it clear that 'use of copies, or derivatives of copies, of copyrighted technical drawings to manufacture a machine did not constitute an act of copyright infringement.'[92]

In *Victor Stanley v Creative Pipe* the court acknowledged that the plaintiff's technical drawings, in the form of CAD files, were 'original pictorial or graphic works protected by 17 U.S.C. § 102(a)(5).'[93] Thus CAD files can be protected as 'pictorial, graphic, and sculptural works'. However the scope of this protection may vary. Where the CAD file incorporates the design for a useful article, copyright in the design would not preclude another from producing that article, nor would it prohibit

[87] *Forest River Inc v Heartland Recreational Vehicles LLC* 753 F Supp 2d 753 (ND Ind 2010), 758.

[88] *Ibid*, 754.

[89] See *Donald Frederick Evans and Associates Inc v Continental Homes Inc* 785 F 2d 897 (USCA Eleventh Circuit, 1986); See also A Silverman, 'Copyright Protection for Engineering Drawings' (1995) JOM 47 (9) 65 <www.tms.org/pubs/journals/JOM/matters/matters-9509.html> accessed 21 September 2016.

[90] *Forest River* (n 87), 758.

[91] See 17 USC § 113(b).

[92] *Forest River* (n 87), 759 (citing *Richard K. Niemi v American Axle Manufacturing & Holding Inc* (ED Mich Southern Division, 2006)).

[93] *Victor Stanley Inc v Creative Pipe Inc* (D Maryland 2011).

them from reverse engineering the design,[94] as US copyright law 'does not afford, to the owner of copyright in a work that portrays a useful article as such, any greater or lesser rights with respect to the making, distribution, or display of the useful article so portrayed than those afforded to such works under the law'.[95] Finding copyright infringement, based on drawings, where the defendant had manufactured such an article 'would be to elevate the copyright to a patent.'[96]

Key to potential infringers in relation to 3D printing, 'toys are not generally considered "useful articles" for purposes of this exception, and they are therefore copyrightable.'[97] Admittedly, this statement is dicta (though many courts have held similarly). Yet, it could still be helpful for rights-owners, with licensed toys and collectables being amongst the most desired 3D printed products[98]. Still, the determination whether an object is a useful article is a 'fact-intensive one that must be decided on a case-by-case basis'.[99]

It would be useful then to briefly see what is meant by 'useful article'. The US Act defines the term as meaning 'an article having an intrinsic utilitarian function that is not merely to portray the appearance of the article or to convey

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[94] *Ibid.*

[95] 17 USC § 113(b).

[96] *Forest River* (n 87), 759; *Victor Stanley* (n 93).

[97] See *Gay Toys Inc v Buddy L Corp* 703 F 2d 970 (USCA 6th Circuit 1983); *Hasbro Bradley Inc v Sparkle Toys Inc* (USCA 2nd Circuit 1985); *Kid Stuff Marketing Inc v Creative Consumer Concepts Inc* (D Kansas 2015).

[98] 'Lego', 'Batman' and 'Star Wars' were amongst the 'top 27 products/brands, or other recognisable trade marks' recorded as descriptive words in relation to CAD files uploaded to major hosting websites (See Mendis, Secchi and Reeves, *A Legal and Empirical Study of 3D Printing Online Platforms* (n 39), 33).

[99] *Lanard Toys Ltd v Novelty Inc* 375 Fed Appx 705 (USCA 9th Circuit 2010), 710.

information.'[100] This definition of useful article embodies the 'conceptual separability test', first accorded to the decision in *Mazer v Stein*. Though the term is not mentioned in the decision, it is generally accepted that it is embedded in the court's finding that utilitarian objects (in this case statuettes) were copyrightable if they were 'original, that is, the author's tangible expression of his ideas.'[101] Since *Mazer v Stein* this test has been encoded in the definition of 'pictorial, graphic, and sculptural works'. Thus, while useful articles are generally not copyrightable, 'if a useful article incorporates a design element that is physically or conceptually separable from the underlying product, the element is eligible for copyright protection.'[102] The Court in *Chosun Interntaional v Chrisha Creations* also noted that

> while design elements that reflect a merger of aesthetic and functional considerations … cannot be said to be conceptually separable from the utilitarian elements [internal citation omitted] where design elements can be identified as reflecting the designer's artistic judgment exercised *independently* of functional influences, conceptual separability exists.[103]

Following this decision, in 2012 the Second Circuit held that the design elements of a prom dress were not copyrightable because they were not physically separable. According to the court, '[p]hysical separability can be shown where one or more decorative elements can actually be removed from the original item and separately sold, without adversely impacting the article's functionality [internal quotations omitted].'[104] The court noted that in the case of garments, such as a prom dress, there were was no way to remove the design elements such that they may be

[100] 17 USC § 101.

[101] *Mazer v Stein* 74 S Ct 460 (1953), 468.

[102] *Chosun International Inc v Chrisha Creations Ltd* 413 F 3d 324 (USCA 2nd Circuit 2005), 328; (Affirmed in *Aqua Creations USA Inc v Hilton Worldwide Inc* 487 Fed Appx 627 (USCA 2nd circuit, 2012), 628).

[103] *Chosun International v Chrisha Creations* (n 101), 329 (citing *Brandir International Inc v Cascade Pacific Lumber Co* 834 F 2d 1142 (USCA 2nd Circuit 1987).

[104] *Jovani Fashion Ltd v Fiesta Fashions* 500 Fed Appx 42 (USCA 2nd Circuit 2012), 45.

sold separately, and in fact doing so would adversely affect the garment's function to be attractive. In the more recent case of *Varsity Brands v Star Athletica* however, the Sixth Circuit held that copyright law 'protects the ''pictorial, graphic, or sculptural features'' of a design of a useful article even if those features cannot be removed physically from the useful article, as long as they are conceptually separable from the utilitarian aspects of the article.'[105] This decision is particularly important as earlier this year certiorari was granted in this matter by the Supreme Court[106]. While the case does not directly deal with 3D printing or CAD files, the importance of a Supreme Court decision on the point is obvious to many, including Formlabs, Matter and Form, and Shapeways who have collectively filed an amici curiae brief before the court. If the Supreme Court affirms the decision of the appellate court then it will a great impact on 3D printing. Utilitarian objects that otherwise may not have been protectable will now be copyrightable as long as the object is 'clearly recognisable as a pictorial, graphic, or sculptural work, notwithstanding the fact that it cannot be physically separated from the article by ordinary means.'[107]

There is clearly a stronger argument in the US in favour of CAD files being artistic, rather than literary, works; here the more expansive definition of 'pictorial and graphical works' seems to be an advantage to that side of the debate, as opposed to the more restrictive treatment of 'artistic works' in the UK. However until the final decision of the Supreme Court in Varsity Brands v Star Athletica it is hard to speak definitively. That decision, while it may not directly address the issue, will surely have an impact on future discussions of this nature.

[105] *Varsity Brands Inc v Star Athletica LLC* 799 F.3d 468 (USCA 6th Cir 2015), 483.

[106] *Star Athletica LLC v Varsity Brands Inc* 136 S Ct 1823 (2016).

[107] *Varsity Brands v Star Athletica* (n 105), 483.

2.1.3 CAD Files Created by Scanning

Clearly the nature of CAD files as copyright works can be complicated, and further questions are raised as to the status of CAD files that reproduce existing objects or designs. Here, as there is yet no case law on CAD files or scans, case law on photographs may be somewhat instructive since, while photographs are not identical to 3D scans, they are somewhat analogous.

As mentioned before, CAD files can be created either by using specialised software or by using a digital 3D scanner. Where the design is created using specialised software a court would be called upon to see whether the new work was original in the sense of being the expression of the intellectual contribution of the author[108]; or that the 'work was independently created by the author (as opposed to copied from other works), and that it possesses at least some minimal degree of creativity'.[109] Where the design is made by using a 3D scanner, it would arguably be harder to show that the work was original, at least if it was reproduced authentically, as it could be considered a copy or an unauthorised derivative work.

In some cases, a person using a digital scanner may make an unauthorised design file by scanning an object that the general public does not have permission to photograph or make a likeness of, for example in a Museum or Art Gallery. Many such institutions rely on the income from exclusive access to out-of-copyright works to support their activities through admission, publicity materials, souvenirs, etc.

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[108] See *Infopaq* (n 61).

[109] See *Feist Publications Inc v Rural Telephone Service Co Inc* 499 US 340, 111 S Ct 1282 (1991).

While the author of the design file may run afoul of their rules and regulations, he will have infringed no copyright in scanning such works and reproducing them for profit. If he made modifications to this design that expressed his independent contribution, he could even claim full copyright in the design file created using his digital scanner, as long as it was not an identical copy.

Some authors support the view that individuals should have the freedom to reproduce antecedent works, especially where they are inaccessible and of cultural significance.[110] But does reproducing such works also entail fresh rights in the reproduction? An answer in the affirmative could certainly be supported by cases such as *Painer* in the CJEU, as well as *Antiquesportfolio* and *Temple Island Collections* and in the UK courts.

In *Antiquesportfolio v Rodney Fitch*[111] the Court held that copyright did exist in the two dimensional reproductions (i.e. photographs) of three-dimensional objects. Neuberger J. found that in the case of 3D objects, 'the positioning of the object (unless it is a sphere), the angle at which it is taken, the lighting and the focus, and matters such as that, could all be matters of aesthetic or even commercial judgment, albeit in most cases at a very basic level.'[112] It was also considered relevant that 'the photographer chose the particular item in order to find a typical example of a certain type of artefact, or a particularly fine example of a certain type of artefact'.[113] Further, the Judge acknowledged that some of the photographs specifically focused

[110] B Ong, 'Originality From Copying: Fitting Recreative Works Into The Copyright Universe' (2010) (2) Intellectual Property Quarterly 165-199, 174.

[111] *Antiquesportfolio.com Plc v Rodney Fitch & Co Ltd* [2001] FSR 23 (Ch).

[112] *Ibid*, [36].

[113] *Ibid*, [38].

on exhibiting particular qualities and details of the objects at issue and that 'in those circumstances, some degree of skill was involved in the lighting, angling and judging the positioning.'[114] Thus, there was copyright in photographs that very diligently reproduced the elements of an object, much as a 3D model would. In *Temple Island Collections v New English Teas* the Patents County Court held that

> [a] photograph of an object found in nature or for that matter a building […] can have the character of an artistic work in terms of copyright law if the task of taking the photograph leaves ample room for an individual arrangement. What is decisive are the arrangements (motif, visual angle, illumination, etc.) selected by the photographer.[115]

In some ways a CAD file created using a 3D scanner is like a photograph – it captures the likeness of an object(s) or scene. Unlike a photograph however, it does so in more than 2 dimensions.

In *Painer v Standard*[116] the CJEU clarified that photographs (particularly portraits) could bear the 'personal touch' of the author through a photographer's creative choices and would be protected if a national court found that the 'photograph is an intellectual creation of the author reflecting his personality and expressing his free and creative choices in the production of that photograph.'[117] Speaking to the extent to which such works would enjoy protection in relation to other works, the court clarified that nothing in any European Directive hinted that 'the extent of such protection should depend on possible differences in the degree of creative freedom in the production of various categories of works.'[118] Theoretically then, a CAD would

[114] *Ibid*, [37].

[115] *Temple Island Collections Ltd v New English Teas Ltd* [2012] EWPCC 1, [2012] ECDR 11, [20].

[116] Case C-145/10 *Painer v Standard Verlags GmbH* [2012] ECDR 6.

[117] *Ibid*, para 94.

[118] *Ibid*, para 97.

enjoy protection like any other copyright work if a national court found that it was the author's own intellectual creation under the reasoning of the *Infopaq* line of cases, i.e. they reflected the author's expression in the choices of arrangement or composition and were not dictated by technical functions.

In the United States the question of whether photographs are copyrightable first came to a head in *Burrow Giles Lithographic v Sarony*. Here the Supreme Court agreed with the lower court's finding that the photograph in question was made from the plaintiff's 'own original mental conception'[119] which was exemplified in the photograph by the selection and arrangement of costumes, the posing of the subject, the arrangement of props, the arrangement and disposition of light and shadow, etc. The decision of the court essentially turned on the plaintiff's choices creating 'an original work of art, the product of [the] plaintiff's intellectual invention'.[120] In *Bridgeman Art Library*, the court emphasised that while photographs required a 'minimal expression of personality'[121] to be protectable, 'where a photograph of a photograph or other printed matter is made that amounts to nothing more than slavish copying.'[122] The court essentially reasoned that while reproductions could per se be copyrightable, '[o]nly ''a distinguishable variation''— something beyond technical skill—will render the reproduction original'[123] and that 'production of a work of art in a different medium cannot by itself constitute the originality required for copyright protection.'[124] This latter ratio is key, as CAD files are essentially the reproduction of

[119] *Burrow Giles Lithographic v Sarony* 111 US 53 (1884), SC 17 Fed Rep 591.

[120] *Ibid*.

[121] *Bridgeman Art Library Ltd v Corel Corp* 36 F Supp 2d 191 (SDNY 1999), 196.

[122] *Ibid*.

[123] *Ibid*.

[124] *Ibid* (Citing *Past Pluto Productions v Dana* 627 F Supp 1435 (SDNY 1986), 1441).

a work, whether originally 2D or 3D, in a different medium. This is further buttressed by the decision in *Meshwerks* (mentioned above) that a 3D model is not copyrightable where it is a 'slavish copy'[125]. Much like the CJEU and UK cases, Bridgeman pointed out that for photographs originality lay in the author's decisions regarding 'posing the subjects, lighting, angle, selection of film and camera, evoking the desired expression, and almost any other variant involved.'[126] Today courts still judge the originality requirement of photographs in similar terms: 'lighting […] the angles […] the shadows and highlighting […] the reflections and back- ground';[127] or 'decisions regarding lighting, appropriate camera equipment and lens, camera settings and use of the white background'.[128]

A survey of the relevant case law on photographs shows that theoretically scans may be copyrightable, if they embody the minimal level of originality required. But even then the scope of such protection may be very thin. Unlike photographs, which may involve creative choices such as angles, lighting, etc., CAD files are (at least theoretically) a perfect reproduction of an object in three dimensions. This means that they must authentically and completely reproduce the object in order to be of value. This would certainly be the task when an individual creates a design file by scanning the object with a digital 3D scanner. In such a situation, he may make some choices with regard to how to approach the object and how to obtain a complete scan, but his choices would be dictated by the end result, i.e. to scan the entire object. In

[125] See *Meshwerks v Toyota Motor Sales* (n 84).

[126] *Bridgeman* (n 121) (Citing *Rogers v Koons,* 960 F 2d 301, 307 (USCA 2nd Circuit)).

[127] *Ets–Hokin v Skyy Spirits Inc* 323 F 3d 763 (USCA 9th Circuit 2003), 766.

[128] *Latimer v Roaring Toyz Inc* 601 F 3d 1224 (USCA 11th Circuit 2010), 1230.

theory thus, he has no real creative choices; there are a limited number of ways his task may be executed in order to be successful. In other words:

> Where the content of the photograph [or in our case scan] has an independent reality, and the photographer seeks only to achieve and does in fact achieve an accurate representation of that independent reality, there is a good chance that the photograph has no copyright protection at all.[129]

Such photographs are analogous to what Weinberg terms 'representational scans', i.e. 'those designed primarily to transfer a physical thing into a digital medium. They can serve as a foundation for a creative work, but are not themselves creative and therefore are not eligible for copyright protection.'[130]

Under the previous tests of 'skill, labour and judgment'[131] the work may have been protected, however under the existing tests something more would be necessary. The CAD file would have to embody the expression of the author's intellectual contribution, or some modicum of creativity which distinguished it from the original; '"slavish copying", although doubtless requiring technical skill and effort, does not qualify'.[132] The authors of the UK IPO report are thus incorrect when they suggest that

> it could be argued that by making creative choices such as selecting particular views of the physical object when a 3D digital model is created through scanning an object is sufficient to make the 3D digital model an 'intellectual creation of the author reflecting his personality and expressing his free and creative choice' in its production.[133]

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[129] J Hughes, 'The Photographer's Copyright – Photograph as Art, Photograph as Database' (2012) Harvard Journal of Law and Technology Vol 25 No 2, 36.

[130] M Weinberg, '3D Scanning: A World Without Copyright' (*Shapeways*, 2016), 7 <www.shapeways.com/wordpress/wp-content/uploads/2016/05/white-paper-3d-scanning-world-without-copyright.pdf> accessed 21 September 2016.

[131] Terms such as skill, labour, judgment, expense, knowledge are used interchangeably; See for example *Walter v Lane* [1900] AC 451 (HL); *University of London Press* (n 77); *Sawkins v Hyperion Records Ltd* [2005] EWCA Civ 565, [2005] 1 WLR 3281.

[132] *Bridgeman* (n 121).

[133] Mendis, Secchi and Reeves, *A Legal and Empirical Study of 3D Printing Online Platforms* (n 40), 14.

Where the aim of creating a design is to make a replica or an accurate scale reproduction, the decisions of light, angle, etc. will be dictated by the form and the end result. The creator of the CAD file will either create the file on his computer to be identical to the existing object, or use a scanner in a way as to fully reproduce the object, as is. He would have no freedom to impart his personal touch or creative expression. Furthermore, even if the process of making the 3D scan ready for actual printing may require significant skill and labour, and perhaps even some creative choices,[134] '[w]hat is visually significant in an artistic work is not the skill and labour (or intellectual creative effort) which led up to the work, it is the product of that activity.'[135]

There would only be scope for a new right to arise where the creator of the CAD file changed aspects of the image to create a new, transformative work. Here, a fresh copyright may subsist, as long as the new work is visually dissimilar or does not take a substantial part of the original work. These would be what Weinberg terms 'expressive scans', i.e. 'those designed explicitly to interpret the scanned object differently, and to imbue the resulting file with expressive purpose that varies in some way from the original.'[136] Weinberg offers the example of the artist Sophie Khan[137] who builds sculptures based on scans that are 'intentionally incomplete and

[134] This is often the case since 3D scanners generally do not provide a finished scan but rather a cloud of points which must be integrated into a mesh pattern to be usable for printing. See Finocchiaro, 'Personal Factory Or Catalyst For Piracy?' (n 31), 492-493. See also Weinberg, '3D Scanning: A World Without Copyright' (n 130), 6-7.

[135] *Temple Island Collections* (n 115), [34].

[136] Weinberg, '3D Scanning: A World Without Copyright' (n 130), 8.

[137] See Sophie Khan Sculptures <www.sophiekahn.net/#!portraits/c199t> accessed 21 September 2016.

distortive, not perfect replicas of the source material.'[138] However, unlike representational scans the entire point is that such scans are essentially useless as accurate 3D models of the scanned object.

CAD files made using 3D scans may warrant some very thin copyright protection where the author genuinely has to make some creative choices in reproducing the object in question. Take the case of the playable editions of Lalande's Baroque compositions authored by Dr. Sawkins in *Sawkins v Hyperion Records*. Here the court found that reproductions of public domain compositions were copyrightable because Sawkins did more than just authentically reproduce the musical works, he added to them by making creative choices in order to make them playable by a modern orchestra. The court thus found that his works had a thin copyright protection, i.e. while a second party may be prevented from copying the actual work this would not prevent that party from creating their own version of the work using the original source material.[139] But the creator of the CAD file would have to show that in reproducing the former copyrighted work his process included making some creative choices and not just 'strict faithfulness'[140] to the original. Such scans would fall somewhere between Weinberg's representational and expressive scans – they would involve a modicum of creativity, even though their aim would be to reproduce the original, rather than simply use it as a basis for creation.

[138] Weinberg, '3D Scanning: A World Without Copyright' (n 130), 10.

[139] See *Sawkins v Hyperion Records* (n 131) [30-31].

[140] *Sawkins v Harmonia Mundi* (January 19, 2005) (Tribunal de Grande Instance (Nanterre)).

Concluding Remarks

It is clear that there is some ambiguity relating to the nature of CAD files. While CAD files are arguably copyrightable *per se*, there is obviously disagreement amongst authors as to whether they are literary or artistic works. This has a lesser impact on the question of subsistence but it could have a significant bearing on questions of infringement. And while this dissertation makes the argument that they are more akin to artistic works than literary works, it also shows that there are credible grounds to hold either way in both major jurisdictions.

CAD files created through scanning are on far less sure footing however. In both the US and the UK, the analogous case law on the copyrightability of photographs shows that in most situations utilitarian scans, i.e. ones made in order to authentically replicate an object, will fail to meet the originality standard. Though this is not necessarily a bad thing – there are many creations in the world that copyright does not protect. And just like copyright may often not protect CCTV footage or satellite imagery, 'in many cases copyright does not – and should not – protect 3D scans.'[141]

In both cases however the questions are not brand new. In one form or another copyright law has dealt with questions of subsistence and originality time and again. When a dispute arises the courts will simply have to re-apply the law. There is ample case law to guide future courts on these questions. Thus, arguably legislative action may not even be necessary; certainly not anytime soon. So while 3D printing may yet have disruptive potential it seems, on these questions at least,

[141] Weinberg, '3D Scanning: A World Without Copyright' (n 130), 1.

copyright law is more than capable of answering the questions before it with some able judicial reasoning.

2.2 'USE' IN TRADEMARK

While the challenges posed by 3D printing for copyright, design and patents has seen some coverage in legal discussions, comparatively less attention has been paid to trade marks. Perhaps this is because in the opinion of some a design can avoid any infringement issues by simply omitting a protected mark from the design. In simple terms, if the allegedly infringing file does not 'use' a protected mark, there is no conflict with trade mark law. This seems to be the view of the UK IPO Report – 'where a 3D product file is uploaded or scanned and sold without the trade mark embedded on to the product, there will be no infringement of trade mark law.'[142] However, on a closer examination, one can see that the interaction between 3D printing and trade mark law is going to be more complex.

Let me begin by clarifying that when this dissertation speaks of 'use', it means the requirement that the allegedly infringing use be the kind as contemplated by trade mark law, i.e. 'use in the course of trade' or 'use in commerce'. Deciphering the meaning of these phrases has not been simple in the US or the UK. And the proliferation of 3D printing has the potential to increase controversy in this area with changing the nature of manufacturing and the frequency of unauthorised use that is not commercial or large-scale but instead 'home counterfeiting'.

[142] D Mendis, D Secchi and P Reeves, *The Current Status and Impact of 3D Printing Within the Industrial Sector: An Analysis of Six Case Studies* (UK IPO 2015), 34.

2.2.1 The UK: 'in the course of trade'

Under the UK Trade Mark Act, '[a] person infringes a registered trade mark if he uses in the course of trade a sign which is identical with the trade mark in relation to goods or services which are identical with those for which it is registered.'[143] But not every use of a mark can be prohibited by the owner of the mark. As the court emphasised in *Arsenal v Reed*,[144] the exercise of the exclusive right 'must be reserved to cases in which a third party's use of the sign affects or is liable to affect the functions of the trade mark, in particular its essential function of guaranteeing to consumers the origin of the goods.'[145] Thus it does not span over any and every 'use'.

The UK Act provides particular examples of 'use' for the purposes of the section relating to infringement of a registered trade mark. Each of these examples hints at some form of commercial activity or exercises of some commercial enterprise, such as when a person:

> (a) affixes it to goods or the packaging thereof;
> (b) offers or exposes goods for sale, puts them on the market or stocks them for those purposes under the sign, or offers or supplies services under the sign;
> (c) imports or exports goods under the sign; or
> (d) uses the sign on business papers or in advertising.[146]

While these examples in the legislation may give us some limited idea of the kind of uses that are envisioned by trade mark law as 'use in the course of trade', one generally looks to case law to flesh out a vague concept. However, in most cases, it is either uncontested or the court presumes use in the course of trade based on the

[143] Trade Marks Act 1994 (TMA 1994), s 10(1).

[144] Case C-206/01 *Arsenal Football Club v Matthew Reed* [2003] 3 WLR 450.

[145] *Ibid*, para 51.

[146] TMA 1994, s 10(4).

commercial nature of the impugned activities. Still, the language of key judgments can help us infer what factors courts consider important when judging whether there is 'use in the course of trade'. Looking at these cases it is clear that there are two key considerations when UK/CJEU courts addresses 'use in the course of trade', i.e. (1) the use refers to commercial or trade-related use, and (2) that use must have some adverse effect on the functions of the mark. It is however sometimes hard to separate the two and courts often conflate the discussion of commerciality and adverse effects when looking at questions of infringement.

'In Trade'/The Commercial Requirement

In *Arsenal*, one of the key CJEU decisions to consider the issue, the court noted that 'the use of the sign identical to the mark [was] indeed use in the course of trade, since it [took] place in the context of commercial activity with a view to economic advantage and not as a private matter.'[147]

This interpretation that the infringing use should have some commercial nature is buttressed by the CJEU's opinion that 'the exclusive rights conferred by trade marks may, as a rule, be relied on only as against economic operators.'[148] Thus, the phrase 'use in the course of trade' seems to draw a link between trade marks and their origin as a differentiator between one proprietor and another. This is damning for any claim that mark owners would have against individual using their 3D printers for their own use, as far as trade mark law is concerned. It may be that even one-time or sporadic sales by individuals could not necessarily be prevented. In other words,

[147] *Arsenal* (n 144), para 40.

[148] Case C-324/09 *L'Oreal SA and others v eBay International AG* [2011] ETMR 52, para 54.

> when an individual sells a product bearing a trade mark through an online marketplace and the transaction does not take place in the context of a commercial activity, the proprietor of the trade mark cannot rely on his exclusive right.[149]

It may be however that where sales by individuals go beyond private activity 'owing to their volume, their frequency or other characteristics […] the seller will be acting in the "course of trade" within the meaning of those provisions.'[150] It is clear though that EU courts consider commercial activity to be an important factor in trade mark litigation. Individuals who make use of a mark will not be considered to be 'using' that mark in a prohibitive manner where they do not offer any of their printed goods for sale. Even then, perhaps not unless they make such an offer on a minimum scale of volume. In *Martin Blomqvist v Rolex* the CJEU held that the sale of a Rolex watch, 'sold to a person residing in the territory of a Member State through an online sales website in a non-member country'[151] would be considered 'use in the course of trade within the meaning of the trade mark directive and the Community trade mark regulation'[152] in the territory of a Member State. While the court here was primarily concerned with whether the goods at issue could be destroyed as counterfeit goods under customs regulation, it noted that the exclusive rights in a mark 'may be infringed where, even before their arrival in the territory covered by that protection, goods coming from non-Member States are the subject of a commercial act directed at consumers in that territory, such as a sale, offer for sale or advertising.'[153] Thus while commerciality is a requirement, this case shows that courts may be willing to

[149] *Ibid,* para 55.

[150] *Ibid*.

[151] Case C-98/13 *Martin Blomqvist v Rolex SA* [2014] ETMR 25, para 26.

[152] *Ibid*, para 29.

[153] *Ibid*, para 32.

consider a de minimis use as 'use in the course of trade'. Even a single commercial act directed at consumers of a member state may sufficiently satisfy this requirement.

In some cases the primary purpose of 'using' the trade mark is not to market the product, but rather to faithfully reproduce a product bearing the mark in scale. In *Adam Opel*[154] the referring court emphasised that consumers in Germany would understand that the use of the Opel logo on scale models of cars was for their faithful reproduction, rather than to draw an economic link. The CJEU stated that it was for the referring court to determine whether the use at issue affected the functions of the mark, but it did not seem to think that this in any way detracted from the commercial nature of the use.

In the recent case of *Top Logistics v Bacardi*[155] the CJEU clarified that 'the terms "using" and "in the course of trade" […] cannot be interpreted as meaning that they refer only to immediate relationships between a trader and a consumer'.[156] While this case was concerned with the importing and storing of allegedly infringing goods, it shows the Court's willingness to interpret the 'use in the course of trade' requirement liberally. However, it is still unclear whether this would extend to cases where some commercial activity or intent is not readily visible. I would argue that despite the implications of this recent case, courts would be slow to find liability for infringement where the impugned use was not in connection with an identifiable minimum level of commercial activity. In short, courts would (and should) be hesitant to apply trade mark law in purely private, non-commercial transactions.

[154] Case C-48/05 *Adam Opel AG v Autec AG* [2007] ETMR 33.

[155] Case C-379/14 *TOP Logistics BV v Bacardi & Co Ltd* [2015] Bus LR 1014.

[156] *Ibid*, para 40.

Thus it is clear that under the current case law courts will look for some commercial intention/activity. Commercialism need not be the primary focus of the use; it is enough that the possibility of a commercial link is present, even if not paramount. However, the absence of any commercial link altogether would greatly prejudice any action by a mark owner.

Functions of Trade Mark

In *Arsenal* the court held that the defendant's use was such as to 'create the impression that there is a material link in the course of trade between the goods concerned and the trade mark proprietor'[157] and thus 'liable to jeopardise the guarantee of origin which constitutes the essential function of the mark'.[158] It thus constituted 'a use which the trade mark proprietor may prevent.'[159] This ruling has been approved by many judgments of the CJEU since[160] and courts thus look for whether the use in question has an adverse affect on the functions of a mark. For example, in *Adam Opel*, a claimant sought to prohibit the maker of remote-controlled scale models from affixing its Opel logo on scale models of vehicles. The court held that the proprietor of scale models of cars could affix the logos, provided this use did not affect the functions of the registered mark. The Court added that while it could not preclude the possibility of such use having the benefit of a defence under Art. 6(1)(a),

> the affixing of a sign which is identical to a trade mark registered […] in respect of motor vehicles to scale models of that make of vehicle in order to

[157] *Arsenal* (n 144), para 56.

[158] *Ibid*, para 60.

[159] *Ibid*.

[160] Joined Cases C-236/08, C-237/08 and C-238/08 *Google France v Louis Vuitton Malletier* [2010] ETMR 30, para 50; *TOP Logistics v Bacardi & Co Ltd* (n 155), para 43.

> reproduce those vehicles faithfully is not intended to provide an indication as to a characteristic of those scale models, but is merely an element in the faithful reproduction of the original vehicles.[161]

The last decade alone has seen expansion of the exclusive rights afforded by a registered mark in part by enlargement of the protected functions that cannot be adversely affected. In *L'Oreal v Bellure* the court stated that the functions that a trade mark proprietor has an interest in

> include not only the essential function of the trade mark, which is to guarantee to consumers the origin of the goods or services, but also its other functions, in particular that of guaranteeing the quality of the goods or services in question and those of communication, investment or advertising.[162]

While courts still mainly refer to the origin function when dealing with the adverse effect requirement, they have given some guidance on some of these other functions.

Advertising Function

In *Google France* the CJEU clarified that in cases where the defendant's 'use adversely affects the proprietor's use of its mark as a factor in sales promotion or as an instrument of commercial strategy'[163] the proprietor was entitled to prohibit the use. The court noted however that in cases of keyword advertising it may be the case that a proprietor of a registered mark 'cannot be certain that its ad will appear before those of those third parties'[164] in the 'sponsored links' section, given that these 'sponsored links' are based on several factors, including maximum pay-per-click price, number of times the link has been clicked in the past and quality of ad. However, 'those repercussions of use by third parties of a sign identical with the

[161] *Adam Opel* (n 154), para 44.

[162] Case C-487/07 *L'Oreal v Bellure* [2010] Bus LR 303, para 58.

[163] *Google France* (n 160), para 92.

[164] *Ibid*, para 94.

trade mark do not of themselves constitute an adverse effect on the advertising function of the trade mark.'[165] Here the court seemed to be swayed by the findings of the referring Cour de Cassation which suggested that if a user entered the name of a registered mark in the search engine, links to the proprietor's home page/advertising would appear high (usually highest) in the list of natural results, which guaranteed visibility of the authentic proprietor to users. In essence, the proprietor's advertising was not replaced or hidden by competitors' use of the mark as an AdWord.

In a later case Arnold J. stated that the key factor in relation to the advertising function was the particular image that the proprietor of the mark wished to convey[166]. Arnold J. reasoned that, based on the decisions of the CJEU the advertising function is most likely to be affected adversely 'where the trade mark has been used by the trade mark proprietor in relation to prestigious goods that have a luxurious image and the third party's use of the signs […] adversely affects that image by associating it with down-market goods, marketing methods or advertising'.[167] He acknowledged however that this conclusion does not sit squarely with the reasoning in *Google France*. Thus, while there does seem to be a perception that the advertising function is linked with the concept of the image of a mark, like the investment and quality functions, this is not clearly the case and further guidance may be necessary here. In *Cosmetic Warriors v Amazon* the court found the use at issue to damage the advertising function where the mark was used 'to attract the attention of consumers to and attempt to sell to them the goods of third parties whilst at the same time making no effort at all to inform the consumer that the goods being offered are not in

[165] Ibid, para 95.

[166] See *Datacard Corp v Eagle Technologies* [2011] EWHC 244 (Pat), [2012] Bus LR 160, [272].

[167] *Ibid*.

fact the goods of [the original proprietor].'[168] This reasoning draws a strong link between the origin function and the advertising function and it is hard to see how one would distinguish a test for the latter.

Quality Function

The quality function seems to go hand in hand with the origin and advertising functions, to the extent that it may be hard to distinguish from them other functions, particularly the essential origin function. In *Copad v Christian Dior*[169] the court stated that '[s]ince luxury goods are high-class goods, the aura of luxury emanating from them is essential in that it enables consumers to distinguish them from similar goods… Therefore, an impairment to that aura of luxury is likely to affect the actual quality of those goods.' This broad interpretation of the quality function seems to conflate it with the advertising function in that quality seems to incorporate not just the physical characteristics of the product, but rather also the brand and image that surround it.

We seem to have clearer guidance in cases of second-hand sales/resellers. In this scenario the quality function may be adversely affected where the sale of second-hand goods 'risks, in the light of their volume, their presentation or their poor quality, seriously damaging the image which the proprietor has succeeded in creating for its mark.'[170] Even here the quality function links to the image of the mark, but the test is based on the goods themselves. In cases where labeling or clear markings sever the link between the product and the proprietor of the original mark, then the mark does

[168] *Cosmetic Warriors Ltd v Amazon.Co.Uk Ltd* [2014] EWHC 181 (Ch) [2014] ECC 28

[169] Case C-59/08 *Copad SA v Christian Dior Couture SA* [2009] ETMR 40, paras 25-26.

[170] Case C-558/08 *Portakabin Ltd v Primakabin BV* [2010] ETMR 52, para 91.

not necessarily act as guarantee of quality and that function is not adversely affected.[171]

Investment Function

While the advertising and quality function seem to be linked to the average consumer's image of the mark, the investment function is linked to the goodwill, i.e. the reputation of the mark based on that image. The purpose of the investment function is to 'acquire or preserve a reputation capable of attracting consumers and retaining their loyalty'[172] and it is adversely affected when a third party's use of a similar or identical mark 'substantially interferes with the proprietor's use of its trade mark to acquire or preserve a reputation capable of attracting consumers and retaining their loyalty'.[173] While the CJEU insisted that the investment function is distinct from the advertising function, they seem to overlap significantly and again, it is hard to see how a test for one would not conflate with the test for the other.

So far we can see that the application of these two factors against individual proprietors or private users may be problematic for trade mark owners. Where an individual 'uses' the trade mark in a entirely private act the lack of commerciality will defeat any finding of 'use in the course of trade'. And even where a proprietor argues adverse effect, this lack of commerciality might weigh against a finding of infringement as courts often conflate the two requirements. To compound the issue, the tests for functions other than origin are unclear and it might be hard to make a showing of adverse affect based on private manufacturing. Perhaps then trade mark

[171] Case C-46/10 *Viking Gas A/S v Kosan Gas A/S* [2011] ETMR 58, paras AG 45-49.

[172] Case C-323/09 *Interflora Inc v Marks & Spencer Plc* [2012] ETMR 1, para 60.

[173] *Ibid*, para 62.

owners may have better luck against those that hosting or provide the allegedly infringing designs for use by private counterfeiters.[174]

2.2.1.1 CAD File Owners/Hosts as Infringers

Unlike the physical goods upon which a mark may be easily identifiable, the use of the mark may not be so easily perceptible in/on the design. Consider the nature of the CAD file. The file itself consists of underlying design, stored in some digital format, encoded using computer language. While the underlying design when viewed on some device might show the affixed mark, the CAD file itself does not. A person with a CAD file on a host server or a physical product such as a CD would not be said to be using a mark that is a part of a design in that file. While the CAD file's sole purpose might be to enable that item to be printed, this does not mean we can equate the design with the actual physical object. In this regard, a CAD file is not like an mp3 version of a song. At the same time, the CJEU has found that in cases of 'invisible use' proprietors could still be liable if the use leads to consumer confusion.[175] The distinction between the CJEU's 'invisible use' and our example of a CD/CAD file however is that in the latter, absent the user's use of the registered mark as a meta tag or AdWord or in the file name, it is hard to see how there could be consumer confusion. In essence, if the host does nothing to draw attention to the fact that the mark is embedded in the design, then how could he be using it?

[174] Here we should note that this dissertation makes the choice to focus on the primary liability of those who may otherwise be seen as intermediaries, i.e. those providing the CAD files, since common law accessory liability may be much harder to show in cases of trade mark infringement and thus targeting such users as primary infringers under statutory provisions may be a mark owner's best recourse.

[175] See *Google France* (n 160).

It might be that the owner of the CAD file makes use of the protected mark when providing a description of the underlying design in a CAD file. A user who uploads a design may let possible end users know that it is for a watch by a reputable Swiss company, or may provide an image of the design where an identical or similar mark is visible. Unlike our hypothetical above, here the user has actually included the registered mark, albeit only in the product description. But is this 'use'. In *Adam Opel* the court acknowledged the possibility that Article 6(1) of the Trade Mark Directive[176]

> might authorise a third party to use a trade mark if such use consists in giving an indication concerning the kind, quality or other characteristics of products marketed by that third party, provided that use is made in accordance with honest practices in industrial or commercial matters.[177]

So if a user faithfully reproduces the design of a toy or shoe, including a protected mark, would he be authorised to use an identical mark in the description? Technically he might simply be giving an indication of the kind of product or describing some of its characteristics (for example: these toy building bricks are compatible with Lego). Where the design is a faithful reproduction/copy the user may fall foul of the second leg of that test – honest practices in commercial matters.

The condition of 'honest practices' implies a duty to act in a fair manner. Thus it is 'essentially the same condition as that laid down by Art.17 of the TRIPS Agreement'[178], i.e. the third party must act in a way that does not unfairly prejudice the legitimate interests of the trade mark owner. In cases of faithful reproduction, the

[176] Directive 2008/95/EC of the European Parliament and of the Council of 22 October 2008 to Approximate the Laws of the Member States Relating to Trade Marks (the 'Trade Marks Directive'); Incorporated in the TMA 1994, s 11).

[177] *Adam Opel* (n 154), para 43.

[178] Case C–245/02 *Anheuser-Busch v Budejovický Budvar* [2005] ETMR 27, para 82.

legitimate interests of the owner may be affected if consumers purchasing those reproductions would draw a link between the trade mark owner and the defendant, i.e. 'it is done in such a manner that it may give the impression that there is a commercial connection between the re-seller and the trade mark proprietor'.[179] In *Adam Opel* for instance, the referring court emphasised that in Germany 'the average consumer of the products of the toy industry, normally informed and reasonably attentive and circumspect, is used to scale models being based on real examples and even accords great importance to absolute fidelity to the original'[180] such that they would see the use of a mark as indicating that it was a scale replica. In making this assessment national courts need to take account of the overall impression created by the use of the mark,

> particularly the circumstances in which the mark of which the third party is not the owner is displayed in that presentation, the circumstances in which a distinction is made between that mark and the mark or sign of the third party, and the effort made by that third party to ensure that consumers distinguish its products from those of which it is not the trade mark owner.[181]

Additionally, the use of the mark may 'affect the value of the trade mark by taking unfair advantage of its distinctive character or repute'.[182]

It is clear that in some cases users may have legitimate cause to use a registered mark in the descriptions of CAD files. However this will depend on the embedded design itself. For example, it may be a reasonable for individuals to offer up CAD files for 'blocks that are compatible with Lego products'. It would be an entirely different scenario for them to call them 'Lego bricks'.

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[179] Case C-63/97 *Bayerische Motorenwerke AG (BMW) v Deenik* [1999] ETMR 339, para 51.

[180] *Adam Opel* (n 154), para 23.

[181] Case C–228/03 *Gillette Co v LA-Laboratories Ltd OY* [2005] ETMR 67, para 46.

[182] *Ibid*, para 43.

The user, or perhaps the online service hosting the design, may also include terms that are identical or similar to the mark in the meta data, i.e. search tags. In *Google France* the Court held that the selection by advertisers of keywords that were

> identical with a trade mark [had] the object and effect of displaying an advertising link to the site on which he offers his goods or services for sale. Since the sign selected as a keyword is the means used to trigger that ad display, it cannot be disputed that the advertiser indeed [used] it in the context of commercial activity and not as a private matter.[183]

As mentioned above, in such cases, even though there is no readily perceptible or visible use of the mark by the defendant, courts have found 'AdWords' or other such meta tags to constitute use in relation to goods and services within the meaning of the trade mark directive. The question is, would the presence of the mark in the embedded design alone be enough to impose liability, without the use of such 'AdWords'? In this second scenario, there is no triggering of ads or luring of customers based on the use of the mark, so I would argue that an individual could escape liability, at least on this point. Here, the presence of the mark alone does not draw any link between the proprietor of the mark and the allegedly infringing goods. Even though the embedded design may incorporate the mark, without meta tags or AdWords the owner of the CAD file is not attempting to advertise using the reputation of the mark, nor is he attempting to draw a link between his goods and the authentic proprietor. In other words, he is not adversely affecting the functions of the mark.

Even where users make designs available online without a fee they might be receiving ad revenue based on the traffic that they draw to the page. This could be enough to qualify as commercial activity, fulfilling one of the requirements for 'use

[183] *Google France* (n 160), para 52.

in the course of trade', i.e. a commercial link. However, the claimant would still have to show that such use affected one of the functions of the mark. In *Google France* the court added that

> [t]he function of indicating the origin of the mark is adversely affected if the ad does not enable normally informed and reasonably attentive internet users, or enables them only with difficulty, to ascertain whether the goods or services referred to by the ad originate from the proprietor of the trade mark or an undertaking economically connected to it or, on the contrary, originate from a third party.[184]

Thus the courts would be called upon to judge whether normally informed users would see a mark in a CAD file description or image and be able to ascertain without difficulty whether the goods originate from the mark owner or from a third party. It would be 'for the national court to assess, on a case-by-case basis, whether the facts of the dispute before it indicate adverse effects, or a risk thereof, on the function of indicating origin'.[185] Where an average user would not be able to make out that the CAD file is not being offered by the original proprietor/under an authorised license, the use of the mark would adversely affect the prime function of the mark.

2.2.2 The US: 'use in commerce'

Under Sec 32(1)(a) of the US Trade Mark Act ('the Lanham Act'):

> Any person who shall, without the consent of the registrant […] use in commerce any reproduction, counterfeit, copy, or colorable imitation of a registered mark […] shall be liable in a civil action[186]

This section should be read with the definition of 'Use in Commerce' provided in Sec. 45[187] and Sec. 32 (1)(b).[188]

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[184] *Ibid*, para 84.

[185] *Ibid*, para 88.

[186] 15 USC § 1114.

Unlike the 'course of trade' discussions by the CJEU, many US courts have been far more decisive and direct in holding that trade mark '[i]nfringement claims are subject to a commercial use requirement.'[189] An allegedly infringing would satisfy this requirement if it was 'in connection with a sale of goods or services. If it was not, then [the] use was '"noncommercial'' and did not violate the Lanham Act.'[190] In essence, courts have held that the Lanham Act is meant to be applied only in commercial contexts and cannot not be used to prohibit any and every use of a protected mark. Any use that does not mislead consumers, or harm the original mark, or capitalise upon it, cannot be prohibited. Thus in cases where the consumer is not confused, it may not be enough that an alleged infringer is profiting from the goodwill and reputation of the mark owner, absent actual improper 'use'.

In *Rescuecom* the Second Circuit found held that the practice of marketing and selling protected marks as 'AdWords' was use in commerce within the meaning of the Lanham Act. The Court drew a distinction between benign 'Product Placement' and unauthorised use that violated the Lanham Act:

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[187] Use in Commerce: The term 'use in commerce' means the bona fide use of a mark in the ordinary course of trade, and not made merely to reserve a right in a mark. For purposes of this chapter, a mark shall be deemed to be in use in commerce –
(1) on goods when –
(A) it is placed in any manner on the goods or their containers or the displays associated therewith or on the tags or labels affixed thereto, or if the nature of the goods makes such placement impracticable, then on documents associated with the goods or their sale, and
(B) the goods are sold or transported in commerce.

[188] Which refers to the application of marks to '[…] labels, signs, prints, packages, wrappers, receptacles or advertisements intended to be used in commerce upon or in connection with the sale, offering for sale, distribution, or advertising of goods or services'.

[189] *Bosley Mecial Institute Inc v Michael Steven Kremer* 403 F 3d 672 (USCA 9th Circuit 2007), 676. See also *Utah Lighthouse Ministry v Foundation For Apologetic Information And Research (FAIR)* 527 F.3d 1045 (USCA 10th Circuit 2008), 1051-52; *Aviva USA Corp v Vazirani* 902 F Supp 2d 1246 (D Ariz 2012), 1255-56.

[190] *Bosley v Kremer* (n 189), 677.

> It is not by reason of absence of a use of a mark in commerce that benign product placement escapes liability; it escapes liability because it is a benign practice which does not cause a likelihood of consumer confusion […] a defendant must do more than use another's mark in commerce to violate the Lanham Act. The gist of a Lanham Act violation is an unauthorized use, which 'is likely to cause confusion, or to cause mistake, or to deceive as to the affiliation, … or as to the origin, sponsorship, or approval of … goods [or] services.'[191]

This decision shows that US courts are also open to holding invisible use as infringing where it causes consumer confusion. Similar rulings, treating search engine keywords as 'use in commerce' for the purposes of the Lanham Act, have been made by the ninth Circuit as well.[192]

In *North American Medical Corporation v Axiom* Worldwide the court stated that to prevail on a claim of trademark infringement parties must establish (among other factors) that:

> […]
> (2) that the defendants used the mark,
> (3) that the defendants' use of the mark occurred ''in commerce,''
> (4) that the defendants used the mark ''in connection with the sale or advertising of any goods[193]

While it listed these requirements separately, it conflated the discussion and concluded that in this case 'Axiom's use of NAM's trademarks as meta tags constitute[d] a ''use in commerce … in connection with the sale … or advertising of any goods'' under the facts of this case.'[194] Thus the court seemed to draw no distinction between 'use', 'use in relation to goods and services' and 'use in commerce' – it treated all the requirements as met by the commercial use of the

[191] *Rescuecom Corp v Google Inc* 562 F 3d 123 (USCA 2nd Circuit 2009), 130.

[192] See *Network Automation v Advanced Systems Concepts* 638 F 3d 1137 (USCA 9th Circuit 2011), 1145; *Multi Time Machine Inc v Amazon.com Inc* 792 F 3d 1070 (USCA 9th Circuit 2015).

[193] *North American Medical Corporation v Axiom Worldwide* 522 F 3d 1211 (USCA 11th Circuit 2008), 1218.

[194] *Ibid*, 1220.

marks. Such a ruling would be helpful for trade mark owners looking to stop infringing designs from being offered on the internet. Where users or hosting services used marks either as meta tags or in the product descriptions (either as words or in preview images), such use would fulfil the requirements for infringement under the Lanham Act. Even where users or sites were making designs available for free, an argument could be made on ad revenues collected from visitors – this would be a concrete financial benefit and could bring the use into the realm of commerciality.

Thus, like in the UK, the courts in US look for a link between the alleged use and some commercial activity. However, in the US there seem to be conflicting decisions on two additional questions – (1) whether there needs to be 'use as a mark', separate from the 'in commerce' requirement, and (2) whether the 'use in commerce' is a jurisdictional requirement or a prerequisite for a finding of infringement.

'Use as a Mark'

The core of the first question is whether an 'an unauthorized user of a mark is only liable, and should only be liable, when it uses the plaintiff's mark "as a mark."'[195] Proponents of this 'Trademark Use' theory argue that the kind of use made of a mark should serve as a 'threshold filter'[196] in a dispute regarding infringement. This argument seeks to limit the scope and power of the trade mark owner to prohibit the use of his mark where an unauthorised user does not seek to refer to the mark in its protected sense. By doing so it seeks to provide a test that would precede the test of consumer confusion.

[195] MD Janis and GB Dinwoodie, 'Confusion Over Use: Contextualism in Trademark Law' (2007) Iowa Law Review Vol 92 No 1597, 1599 <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=927996> accessed 21 September 2016.

[196] *Ibid*.

Janis and Dinwoodie have criticised the Trademark Use theory and argue that it has no foundation in the language of the Lanham Act. They point out that '[t]he statute does address "use otherwise than as a mark" or non-trademark use in the fair use provision, suggesting that Congress knew how to enunciate the concept when it wished to do so.'[197] Further, they point out that the trademark theory's proposition that there will be no consumer confusion where the mark is not used as a mark conflicts with the US Supreme Court decision in *KP Permanent Make-Up v Lasting Impression*,[198] which held that a party asserting fair use had no burden to show that there was no likelihood of confusion amongst consumers about the origin of the goods or services affected. In essence, this confirms that non-trademark uses can also cause consumer confusion and thus a threshold test of 'use as a mark' does not provide a simple and efficient test. Unfortunately, as the Court did not provide explicit guidance on this issue, conflicting decisions continue to be handed down. For example, in *1–800 Contacts, Inc v WhenU.Com, Inc* the Second Circuit specifically stated that,

> [n]ot only are 'use,' 'in commerce,' and 'likelihood of confusion' three distinct elements of a trademark infringement claim, but 'use' must be decided as a threshold matter because, while any number of activities may be 'in commerce' or create a likelihood of confusion, no such activity is actionable under the Lanham Act absent the 'use' of a trademark.[199]

The same court however stated in *Kelly–Brown v Winfrey* that showing use 'as a mark'' was not a requirement in an action for infringement. In the words of the court, '[w]hile we held in 1– 800 Contacts that demonstrating use in commerce is a

[197] *Ibid*, 1609.

[198] *KP Permanent Make-Up Inc v Lasting Impression I Inc* 543 US 111, 125 S Ct 542 (2004).

[199] *1–800 Contacts Inc v WhenU.Com Inc* 414 F 3d 400 (USCA 2nd Circuit 2005), 412.

threshold burden on plaintiff, we have never so held with regard to use ‘‘as a mark.’’’[200] The Court also declined to follow the ruling by the Sixth Circuit in *Hensley Manufacturing*[201] and *Interactive Products*,[202] which had held that use as a mark was a threshold requirement.

I would agree with Dinwoodie and Janis that ‘the different purposes that the “use in commerce” requirement serves in the context of establishing rights and proving infringement cut against an identical meaning’[203] but would add that the construction and definitions provided in the Lanham Act serve as credible guidelines for both purposes. Sec. 45 includes the words, ‘[i]n the construction of this chapter, unless the contrary is plainly apparent from the context’[204], meaning that the separate definitions of ‘use’ in Sec. 32 would supersede the same, as far as necessary. Admittedly, on this point the Second Circuit Court of Appeals would disagree – it opined in the appendix in *Rescuecom* that the full definition included in Sec. 45 could not apply to the infringement sections. Offering some explanation of the prima facie conflict between the two possible definitions of ‘use in commerce’ the court stated that this occurred ‘in part from a rearrangement of this complex statute, which resulted in joining together words which, as originally written, were separated from one another.’[205] While *Rescuecom* provides some valuable insight into this conflict, it unfortunately does not provide definitive resolution. In my opinion, it makes sense for courts to include a threshold requirement that the mark in question is actually

[200] *Kelly–Brown v Winfrey* 717 F 3d 295 (USCA 2nd Circuit 2013), 306.

[201] *Hensley Manufacturing Inc v ProPride Inc* 579 F 3d 603 (USCA 6th Circuit 2009).

[202] *Interactive Products Corp v a2z Mobile Office Solutions Inc* 326 F 3d 687 (USCA 6th Circuit 2002).

[203] Janis and Dinwoodie (n 191), 1612.

[204] 15 USC § 1127.

[205] For a history of the phrase see *Rescuecom* (n 188), 131-141.

being used 'as a mark'. As the court stated in *Hensley Manufacturing v Propride*, '[t]he touchstone of liability for trademark infringement is whether the defendant's use of the disputed mark is likely to cause confusion among consumers regarding the origin of the goods offered by the parties (internal quotations and formatting omitted).'[206] Where the secondary use of the mark is not one that would cause consumer confusion because it is used in a 'non-trademark way (internal quotations omitted)'[207] the dispute should not be considered one that comes within trade mark law. In essence the argument here is that if the purpose of trade marks is to identify the goods and/or services of one proprietor from another's then trade mark law should not apply where the mark is not being used as such an identifier. This seems like a reasonable limit on over-protection in trade mark law. Admittedly the weakness in this argument is that 'none of the doctrine's advocates is able to articulate clear rules by which courts can distinguish trademark uses from non-trademark uses.'[208]

'Use in Commerce as a Jurisdictional Requirement'

One of issues in applying the 'use in commerce' requirement under the Lanham Act is that courts have handed down contrasting decisions in dealing with whether this is a procedural/jurisdictional requirement, or whether it is an substantive element of a claim for relief. This obviously creates additional hurdles for proprietors as differing case law imposes different standards of the use required for infringement.

[206] *Hensley v ProPride* (n 200), 610 (citing *Daddy's Junky Music Stores Inc v Big Daddy's Family Music Ctr* 109 F 3d 275, 280 (USCA 6th Circuit 1997)).

[207] *Hensley v Propride* (n 201) (citing *Interactive Products* (n 202)).

[208] MP McKenna, 'Trademark Use and the Problem of Source' (2008) University of Illinois Law Review Vol 2009 No 3 p 773, 775.

The Ninth Circuit stated in *Bosley Medical* that '"Use in commerce'' is simply a jurisdictional predicate to any law passed by Congress under the Commerce Clause.'[209] However, in a more recent decision, the Ninth Circuit took a different approach, based on the Supreme Court decision in *Arbaugh v Y&H*.[210] In *Arbaugh* the Court emphasised that,

> [i]f the Legislature clearly state[d] that a threshold limitation on a statute's scope shall count as jurisdictional, then courts and litigants will be duly instructed and will not be left to wrestle with the issue. But when Congress does not rank a statutory limitation on coverage as jurisdictional, courts should treat the restriction as nonjurisdictional in character.[211]

Upon this basis the court in *La Quinta Worldwide* held that 'the ''use in commerce'' element of Lanham Act sections 32 and 43(a) claims is not a jurisdictional requirement'.[212] The Court clarified that Federal jurisdiction over trademark claims is granted by 15 U.S.C. § 1121(a) and that

> the 'use in commerce' element of Lanham Act claims under sections 32 and 43(a) is not connected to the Lanham Act's jurisdictional grant in 15 U.S.C. § 1121(a), which grants federal subject-matter jurisdiction without any reference to a 'use in commerce' requirement. [213]

La Quinta was cited and approved earlier this year in *Gibson Brands Inc v Viacom International Inc.*[214]

In the face of such differing and contrasting opinions, it is hard to apply the case law of the US to clearly predict how mark owners may be able to safeguard their protected marks in the face of infringement as a result of 3D printing. In some

[209] *Bosley v Kremer* (n 189), 677.

[210] *Jenifer Arbaugh v Y & H Corp* 126 S Ct 1235 (2006).

[211] *Ibid*, 1237.

[212] *La Quinta Worldwide LLC v QRTM* 762 F 3d 867 (USCA 9th Circuit 2014), 872.

[213] *Ibid*, 873.

[214] *Gibson Brands Inc v Viacom Internationl Inc* (CD Cal 2013).

circuits, affixation of the marks to an object or design may suffice; in others some commercial activity may be required. Some may hold that the use of a protected mark as meta tags or as keyword may be sufficient to prohibit the use by those uploading or hosting designs, for others it may only fulfil the requirement if the use is more than descriptive.

Another challenge in the US comes from the Supreme Court's ruling that in cases of trade mark the court is concerned with the goods at issue, rather than 'any idea, concept, or communication embodied in those goods'.[215] In light of this ruling it could be argued that when a user uploads or makes available an allegedly infringing design what he makes available is the actual CAD file, which originates from him. Unless the title or description of the file contains an indication that the user attempts to pass off the file as originating from the owner of an embedded mark, he may not be in violation of the Lanham Act. The Seventh Circuit addressed this issue again recently in *Slep-Tone Entertainment*. The court upheld the ruling in *Dastar* that it is consumer confusion in relation to tangible goods that is key for trade mark infringement. In *Slep-Tone* consumers never saw any tangible good, but rather the proprietor's marks were displayed alongside content using allegedly unauthorised content. The court noted that in such cases we must

> ask ourselves what the tangible good at issue is, and whether the unauthorized use of the plaintiffs' marks (including trade dress) might cause consumers to be confused about who produced that good. Or is the real confusion, if any, about the source of the creative conduct contained within that good? If the latter, the confusion is not actionable under the Lanham Act.[216]

[215] *Dastar Corp v Twentieth Century Fox Film Corp* 123 S Ct 2041 (2003), 2050.

[216] *Phoenix Entertainment Partners v Dannette Rumsey* (USCA 7th Circuit, 2016).

Though a consumer might look at the marks alongside the content and assume that the proprietor of the mark was the source of the content, this was not confusion as to the origin of the tangible good – because the consumer never saw the tangible good/physical medium on which the content was stored. This ruling obviously has a great impact on the delivery of CAD files. In cases of online delivery or download, there is no tangible good per se. The user does not receive a CD – at most he receives a digital file. Even if we consider that digital file to be the tangible good, as mentioned above unless the CAD file owner specifically labels it or markets it using the a registered mark, under the reasoning of *Dastar* and *Slep-Tone* the dispute, if any, would fall under copyright and not trade mark.

Concluding Remarks

It is apparent from the discussion in this section that trade mark owners in both the US and the UK would still be able to prevent most unauthorised use of their protected marks in outright commercial activity. Under the *L'Oreal v Ebay* test, even someone producing unauthorised figurines at home could be prohibited from making them if he attempted to sell them frequently or in bulk. Under *Blomqvist*, simply the offer to sell may suffice. The *Axiom* case shows how even the use of meta tags could fulfil the 'use in commerce' requirement.

Where owners may find some small relief is in actions against the providers or hosts of the allegedly infringing designs, possibly stemming the tide of decentralised infringement at the source. Here plaintiffs will stand a better chance of arguing that CAD file owners or hosting sites are reaping some commercial benefit; even in cases where the file is being offered for free arguments could be made that ad

revenue from visits to the page is a sufficient commercial link. In the UK rights owners would even be able to make out adverse effect of functions under the expansive treatment of the functions of a mark.

In targeting individual owners/uploaders of CAD files trade mark owners should learn from the experience of the entertainment industry's saga with decentralised piracy[217]. Actions against individual users can be time consuming, expensive and often, counterproductive. Actions against intermediaries may present better options for limiting the source of infringing material. At the same time, owners should be wary of aggressive litigation and possibly explore the benefits of changing the way they interact with their end consumers. Some rights owners – like Nike[218] and Hasbro[219] – may already have found ways of doing this that would help mitigate the disruptive influence of home counterfeiting on their marks/brands.

Where rights owners may find themselves at a real disadvantage is against private hobbyists and the like, who may undertake frequent unauthorised use of marks, well known or otherwise, but only for their own private purposes. Here the current language of trade mark statutes creates a per se private copying exemption. This is understandable as trade marks traditionally served to distinguish the goods

[217] For an account of the RIAA saga see JC Storch, '3-D Printing Your Way Down The Garden Path: 3-D Printers, The Copyrightization Of Patents, And A Method For Manufacturers To Avoid The Entertainment Industry's Fate' (2014) JIPEL Vol 3 No 2 <http://jipel.law.nyu.edu/vol-3-no-2-2-storch/> accessed 21 September 2016; See also R Beckerman, 'Ha ha ha ha ha. RIAA paid its lawyers more than $16,000,000 in 2008 to recover only $391,000!!!' (*Recording Industry vs The People*, July 13 2010) <http://recordingindustryvspeople.blogspot.co.uk/2010/07/ha-ha-ha-ha-ha-riaa-paid-its-lawyers.html> accessed 21 September 2016.

[218] See NIKEiD Product Page <www.nike.com/gb/en_gb/c/nikeid/what-is-nikeid?ref=https%253A%252F%252Fwww.google.co.uk%252F> accessed 21 September 2016.

[219] See M Garcia, 'Why Princess Twilight Sparkle May Be The Key To Keeping 3D Printing Revolutionary' (*Tech Dirt*, 24 march 2015) <www.techdirt.com/blog/innovation/articles/20150323/15571030407/why-no-ones-laughing-princess-twilight-sparkle-how-to-keep-3d-printing-revolutionary.shtml> accessed 21 September 2016.

and services of different manufacturers, however it could be a costly proposition for marks owners with the expansion of home manufacturing. It is hard to see how the judiciary alone may be able to offer some relief for proprietors on this front. At the same time, legislative amendments would have to take care to strike a careful balance between the rights of proprietors and the freedom of users. This may not be a new exercise in trade mark law, but the shifting nature of manufacturing may make it a harder exercise to conclude.

2.3 INFRINGEMENT UNDER PATENT LAW

While many are focusing on the impact of 3D printing on highly valued licensed merchandise and brands (i.e. trade marks and copyright), there is another area of IP law where 3D printing is poised to have a marked impact. When dealing with this 'revolutionary' way of making things, we cannot forget to look at the field of law designed to protect those that invent 'things' – Patents. Unlike copyright and trade mark, patent law has yet to substantially deal with decentralised digital infringement. Thus without a progressive view of how 3D printing may test patent systems, it is poised to bear the brunt of this technology's 'disruptive' force. This is because many aspects of 3D printing may not neatly fit into traditional notions of patent infringement.

One of the greatest challenges that 3D printing will bring about for patent law is the gradual merging in many minds of the design and the end product. Holbrook & Osborn have suggested that CAD files will stress patent systems, and that the line between digital and tangible has already eroded to the point that CAD files could be viewed as infringement in and of themselves.[220] While I do not fully support this proposition, I will point out in this section how CAD files do by their nature have the potential to challenge the current conception of infringement under patent law, in particular direct infringement.

This section discusses infringement of product patents, i.e. cases in which users print or create objects that infringe existing product patents. This is the aspect

[220] TR Holbrook and L Osborn, 'Digital Patent Infringement in an Era of 3D Printing' (2014) UC Davis Law Review Vol 48 pp 1319-1385, 1319 <http://ssrn.com/abstract=2483550> accessed 21 September 2016.

of infringement that I believe is likely to be most greatly affected by consumer behaviour in connection with 3D printing.

2.3.1 Direct Infringement

Under both US and UK law a user would be liable for direct infringement if he creates a patented product using a 3D printer. Under Sec. 60 of the UK Patents Act 1977:

> (1) […] a person infringes a patent for an invention if […] while the patent is in force, he does any of the following things […] in relation to the invention without the consent of the proprietor of the patent, that is to say –
>
> > (a) where the invention is a product, he makes, disposes of, offers to dispose of, uses or imports the product or keeps it whether for disposal or otherwise[221]

This section should be read along with Sec 125 ('Extent of Invention'), which reads in part:

> (1) For the purposes of this Act an invention for a patent for which an application has been made or for which the patent has been granted shall, unless the context otherwise requires, be taken to be that specified in a claim of specification of the application of the patent, as the case may be, as interpreted by the description and any drawings contained in that specification, and the extent of the protection conferred by a patent or an application for a patent shall be determined accordingly.[222]

Similarly, under Section 271 of the US Patents Act:[223]

> (a) Except as otherwise provided in this title, whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States, or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.

[221] Patents Act 1977 (PA 1977), s 60.

[222] PA 1977, s 125(1).

[223] 35 USC § 271.

By printing a patented product, an individual falls foul of the first of these prohibited activities in both jurisdictions – he 'makes' the patented invention. The user would be liable for direct infringement, if the patent owner can provide evidence that the printing of the product was unauthorised. If the user then sells the printed object, a case for infringement would be easily made out. Therefore, in cases of commercial use patent owners would still be able to effectively combat infringement. However, patent owners may face great challenges in the face of increasing cases of unauthorised non-commercial use.

Patent owners pursuing infringement actions against individuals would face many of the same challenges that copyright owners did in the face of widespread decentralised piracy in the realm of mp3s. Private or small scale infringement is the hardest to detect, and even where an owner may be able to show such unauthorised use, pursuing actions against individual users may yield little return. And as the Recording Industry Association of America (RIAA) litigation saga has shown, the deterrent effect of such litigation is often minimal in comparison to the larger 'evil'.

In the UK the patent owner would also encounter the problem of showing commercial or non-private use, as for the purposes of UK Patents Act, '[a]n act which […] would constitute an infringement of a patent for an invention shall not do so if (a) it is done privately and for purposes which are not commercial'.[224] Under the US Act, however, such a private use defence does not exist and patent owners would have recourse against individual infringers. Still, in the end it is unlikely any owner would see enough return to justify such costly and/or time consuming actions.

[224] PA 1977, s 60(5).

Websites such as Shapeways offer services where users can customise and create objects based on designs hosted on their sites. Once the user is happy with his design choices, Shapeways prints the object using one of its industrial 3D printers and ships the product to the user who ordered it. In this scenario, it could be argued that Shapeways has made and sold the patented product. Even though such services are acting as intermediaries, i.e. they are printing the specified product on behalf of an end-user, it could be argued that they are liable for direct infringement, since they are making the infringing product and selling it to the end-user. Even before the end-user puts the process of making into motion by selecting and purchasing the product, the sites would be liable since they are actively offering the product for sale. Such sites would also make better targets for patent owners than individual end-users.

The further alternative would be to pursue users and creators/owners of the CAD files. Such files would be easier to track than actual physical products and stemming the tide of unauthorised CAD files on the Internet would help stop the spread of infringing users. However, here the patent owner would have to show that the use or sale of such CAD files amounts to the use or sale of the patented product. Since a CAD file is like a blueprint for an object, it is hard to argue that a person is making or using a patent simply by creating a CAD file. Thus a user who uploads an allegedly infringing design and makes it available online has not necessarily 'made', 'used' or 'disposed of' the protected patent. When an individual offers to sell a CAD file or makes it available freely, he is not offering up any tangible product. In the face of this tension between the traditional notion of dealing with product patents and the nature of CAD files, some commentators have suggested new ways of dealing with

the distinction between tangible and intangible means. For example, one commentator suggests that,

> [i]n comparing the differences between the intangible electronic representations and the tangible physical embodiment, the time to transition from intangible to tangible, the complexity in transitioning from intangible to tangible, and the degree in transformation from intangible to tangible should be paramount. These comparisons should become a new test for differentiating what is tangible and what is intangible.[225]

Such an argument essentially reduces the distinction between the digital representation (the CAD file) and the physical manifestation (the patented product) to a nullity, based on the ease with which the latter can be attained using the former. One can sympathise with patent owners who might have to resort to such novel arguments in order to protect their proprietary rights against the mass decentralization and proliferation of infringing design files; but it would be a stretch to equate the two, even noting that the patent owner might point out the 'increasing commonality between electronic media and its equivalent physical embodiment; for example, e-books, thumbnail images, and mp3 files each can be treated identically to books, photographs, and songs respectively.'[226] While CAD files are analogous to other electronic media, they are not identical. When an individual downloads an mp3 that person has a copy of the song; they can listen to it, enjoy it, share it. However, when an individual downloads a CAD file, they only have the file – not the tangible object. The digital file is the precursor to the physical object. The fallacy that one can equate the digital file with the tangible object often relies on the ease and speed with which one becomes the other – the image in our minds of 3D printing being like the Star Trek Replicator. However, as we saw in Section 1.2, it is hardly a one-click process. Many steps intercede between digital file and real object – conversion

[225] Ebrahim (n 2), 17.

[226] *Ibid*, 18.

(which changes the format of the digital file), printing (which can take hours or days, depending on the complexity of the design) and even finishing (which may require external assistance if the end-user does not have the requisite skills).

In considering the question of 'making' in relation to CAD files, courts in the UK may find some guidance from *United Wire Ltd v Screen Repair*. The House of Lords laid out there that 'when deciding whether there has been manufacture of the product of the invention, it will be necessary to take into account the nature of the invention as claimed and what was done by the defendant.'[227] The court in that case was primarily concerned with cases of repair, as the plaintiff claimed that the screens made by Screen Repair came within the claim in the patent specification. The court laid down this rule in an effort to define the concept of manufacture of a product, stating that 'acts as prohibited by section 60 are infringing acts whether or not they can be categorised as repairs.'[228] Specifications for product patents would rarely extend to the instructions for their manufacture, if nothing else because this would make them a method/process patent[229]. Patent owners may struggle to hold individuals liable for just the disposal or sale of design files since CAD files are merely designs, i.e. specifications that instruct how to build a product, arguably much like those submitted along with a patent application as part of the disclosure requirement[230]. The Supreme Court visited this concept again in *Schütz v Werit*

[227] *United Wire Ltd v Screen Repair Services (Scotland) Ltd* [2001] RPC 24 (HL), [25].

[228] *Ibid.*

[229] Some authors have already discussed the futility of directing patent claims towards CAD files under 'Beauregard claims'; See DH Brean, 'Asserting Patents to Combat Infringement via 3D Printing: It's No 'Use'' (2013) Fordham Intellectual Property, Media & Entertainment Law Journal Vol XXIII No 3, 805-807; Holbrook and Osborn (n 219), 1378-1380

[230] Bradshaw, Bowyer and Haufe also suggest this as a possible interpretation of the CAD file, which they term a '3DPDF'; See S Bradshaw, A Bowyer and P Haufe, 'The intellectual property implications of low-cost 3D printing' (2010) ScriptEd 7 (1) pp 5-31, 27.

where it stated that 'it will inevitably be a matter of fact and degree in many cases whether an activity involves "making" an article'.[231] It added that 'the word "makes" must be interpreted in a practical way, by reference to the facts of the particular case.'[232] In my opinion it seems rather unpractical to construe downloading a file as 'making' any tangible 'thing'.

Another factor for UK courts to consider would be involvement, i.e. 'how much involvement in the construction of an apparatus is sufficient for the person involved to become a maker of that apparatus within the terms of s60(1)(a)?'[233] According to *Musion Systems*, the courts would have to find 'some real contribution to the finished apparatus' for a person to be said to have made the thing in question.[234] In making this assessment the court should look at the quality and quantity of the contribution. The question for the court would be, is making a CAD file available a minor contribution to the creation of a 3D file? While it is not an insubstantial contribution, it is not major enough to cross the line into actual 'making' as envisioned by this decision. The CAD file itself may be invaluable to the process but the user who uploads the design does not himself get involved in the printing process.

In the US, in the case of apparatus claim, the allegedly infringing product (the CAD file) would have to fit within the claim for the apparatus, as represented in the specifications of the patent. The claim would not ordinarily cover how to

[231] *Schütz (UK) Ltd v Werit UK Ltd* (Nos 1 to 3) [2013] UKSC 16, 573 [2013] Bus LR 575, [26].
[232] *Ibid*.
[233] *Musion Systems Limited v Activ8–3D Limited* [2011] EWPCC 012, [50-52].
[234] *Ibid*, [51].

manufacture the product, nor methods for putting the product into use ('[A]pparatus claims cover what a device is, not what a device does.')[235] A plaintiff would fail if he could not show that the defendant actually made the apparatus in the claim, rather than just provided instructions on how to construct it. Thus, '[t]o prove direct infringement, the plaintiff must establish by a preponderance of the evidence that one or more claims of the patent read on the accused device literally or under the doctrine of equivalents.'[236] Furthermore, '[i]n order to prove direct infringement, a patentee must either point to specific instances of direct infringement or show that the accused device necessarily infringes the patent in suit.'[237] At the time when just the CAD file is in existence, there is no infringing device per se. And the CAD file itself would not fall within most claim specifications.

Particularly relevant to CAD files, the Supreme Court in *Microsoft v AT&T* likened abstract software code, i.e. software separated from some physical tangible medium, to blueprints or 'anything containing design information, e.g., a schematic, template, or prototype'.[238] It held that such a 'blueprint may contain precise instructions for the construction and combination of the components of a patented device, but it is not itself a combinable component of that device.' While here the Court was commenting on Windows software in regard to Sec. 271(f), the description greatly accords to that of a CAD file and is directly relevant to our discussion. If such a file is not a component of a patented product, it can hardly be

[235] *Cross Medical Products v Medtronic Sofamor Danek* 424 F 3d 1293 (USCA Federal Circuit 2005), 1312 (citing *Re Michlin* 45 CCPA 1028, 256 F 2d 317).

[236] *Ibid*, 1310.

[237] *ACCO Brands Inc v ABA Locks Manufacturer Co Ltd* 501 F.3d 1307 (USCA Federal Circuit 2007), 1313 (citing *Dynacore Holdings Corp v US Philips Corp* 363 F 3d 1263 (USCA Federal Circuit 2004), 1275–76).

[238] *Microsoft Corp v AT&T Corp* 127 S Ct 1746 (2007), 1755.

said to be the product itself. The argument that CAD files would not fall within this meaning is further buttressed by Justice Alito's concurring opinion:

> [A] component of a machine […] must be some thing physical… This is because the word 'component,' when concerning a physical device, is most naturally read to mean a physical part of the device… a set of instructions on how to build an infringing device, or even a template of the device, does not qualify as a component.[239]

Since the decision in Microsoft is dictated heavily by the fact that the court was considering Sec. 271(f)[240] rather than 271(a) we should not read heavily into this decision; while the court was dealing with a conceptually similar term, i.e. 'components', it remains to be seen whether a similar treatment would be afforded to 'means'. Still, the reasoning behind it does hint at the Court's hesitance to equate software in the abstract with 'material components'.

Another indication that Federal Courts require the use of 'material articles' comes from the recent challenge of the United States International Trade Commission (ITC) to regulate electronic digital files used in 3D printing, on the basis that the term 'articles that infringe'[241] should be construed to mean '"material things" […and] not cover electronically transmitted digital data.'[242] Here the court was considering the ITC's authority under the Tariff Act of 1930, however, the ruling is still a good indication that some courts, or at least the majority opinion,[243] are not yet

[239] *Ibid*, 1761.

[240] Sec. 271(f) provides a statutory exception wherein there is no infringement if components of a patented invention are supplied from the United States for combination abroad.

[241] 19 USC § 1337(a).

[242] *Clearcorrect Operating v International Trade Commission* 810 F 3d 1283 (USCA Federal Circuit 2015), 1293-94.

[243] See the dissenting opinion holding that 'articles' include digital goods: *Ibid,* 1304-1312.

willing to disregard the distinction between digital files and real tangible articles.[244] But even this must be taken with a pinch of salt considering the strong dissent in both the Federal Court's decision and the recent refusal to rehear the matter en banc.[245] Until a court indicates otherwise in a patent dispute it is hard to speak definitively on this point and this distinction between the tangible and the intangible might be 'the Achilles heel of modern patent law since many patent law provisions have been drafted with physical objects in mind.'[246]

While in the cases of copyright or trade mark infringement most users know that they are making or offering up for sale a protected product (in fact this status is what often gives the unauthorised version of the product its value), in the case of patents end-users may not know that they are making or using a protected patent. Even if this is the case however, it is of little import as patent statutes impose a strict liability for acts of infringement. For the purposes of Sec. 60(1), 'liability is absolute: the knowledge of the defendant is not relevant when deciding whether they have carried out one of the activities within the owner's control.'[247] Similarly, in the US too '[d]irect infringement is a strict-liability offense'.[248] Intention might be important however in cases of indirect or contributory infringement.

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[244] See RM Ballardini and M Norrgård, 'Digitising Patent Law: Challenges From 3D Printing Technologies' EIPR 2016 38(8) 519, 520 (suggesting that 'It might, however, be deduced from the decision that the [Federal Court] suggests that CAD files are to be considered as purely "intangible" items, not "physical" ones.').

[245] *Clearcorrect Operating LLC v International Trade Commission* 819 F 3d 1334 (USCA Federal Circuit 2016).

[246] Ballardini and Norrgård (n 244), 521.

[247] Bently and Sherman, *Intellectual Property Law* (n 53), 610.

[248] *BMC Resources Inc v Paymentech LP* 498 F 3d 1373 (USCA Federal Circuit 2007), 1381; *Global–Tech Appliances, Inc v SEB SA* 131 S Ct 2060 (2011), 2061; *Commil USA LLC v Cisco Systems Inc* 135 S Ct 1920 (2015), 1926.

2.3.2 Indirect Infringement

While some infringers (particularly sites that offer 3D printing services) may offer more attractive targets for direct infringement actions than end-users, as we saw above such disputes are not without difficulty and ambiguity.

As with cases of digital music piracy, going after direct infringers could be problematic, costly and counter-productive. Patent owners may therefore adopt the other strategy employed by the music industry in their war against piracy – targeting secondary infringers.[249] This strategy offers some distinct advantages: (1) intermediaries/secondary infringers are more easily identifiable, as often they must be highly visible in order to be attractive to users (the direct infringers); (2) obtaining orders against intermediaries can take action against countless other infringers; and (3) owners can be more assured of returns on their actions against intermediaries that provide their services for profit.

However, actions against intermediaries also suffer from some key disadvantages: (1) owners may have to show first that there is a direct infringer, before an intermediary can be held liable under a theory of inducement or active encouragement; (2) intermediaries are often afforded statutory protection, under certain circumstances; and (3) the burden to monitor for new acts of infringement would remain on owners, and not intermediaries.

[249] It should be noted that, as with trade marks, it is always open to proprietors to go after intermediaries and secondary infringers under common law principles of accessory liability. However, due a paucity of space and the general difficulty in applying such principles in patent cases the focus here is on the statutory provisions for indirect infringement.

2.3.2.1 Indirect Infringement under the UK Patents Act

Under Sec. 60(2) of the Patents Act 1977:

> [A] person (other than the proprietor of the patent) also infringes a patent for an invention if, while the patent is in force and without the consent of the proprietor, he supplies or offers to supply in the United Kingdom a person other than a licensee or other person entitled to work the invention with any of the means, relating to an essential element of the invention, for putting the invention into effect when he knows, or it is obvious to a reasonable person in the circumstances, that those means are suitable for putting, and are intended to put, the invention into effect in the United Kingdom.[250]

In *Cranway v Playtech* the High Court held that '[w]hether means are suitable for putting an invention into effect must be a purely objective test. But whether they are intended to put an invention into effect cannot be wholly objective. […] Thus this limb of the test must depend on the subjective intention of someone.'[251] This someone, according to the court was the supplier of essential means to a direct infringer. The court was hesitant to acknowledge that suitable intention could be present where the supplier was separated from a potential direct infringer by many levels in a supply chain, since 'at the time of the supplier's supply of the essential means the person who ultimately forms the intention to use the means to put the invention into effect may not be ascertainable and he may not have formed that intention.'[252]

However, other courts have taken a different stance on this latter point. In *Menashe Business Mercantile v William* the court clarified that for the purposes of Sec. 60(2), the court 'was concerned with means intended to put the invention into an infringing state. To construe Sec. 60(2) so as to extend it to cases where an effect

[250] PA 1977, s 60(2).

[251] *Cranway Ltd v Playtech Ltd* [2009] EWHC 1588 (Pat), [2010] FSR 3, [156].

[252] *Ibid*.

occurs would be inconsistent with that belief '.[253] Admittedly, in this case the focus of the court's discussion was whether 'the means […] must be suitable for putting and be intended to put the claimed apparatus in a state of effectiveness, essentially to put into an infringing state in the United Kingdom'[254] i.e. they were concerned with the territoriality aspect of this provision. However, one can infer from the reasoning in this judgment that in cases of indirect infringement, the court need not be concerned with whether direct infringement had actually occurred when imputing whether the supplier had the requisite knowledge and intention to put Sec 60(2) into effect.

Further guidance can be found on this point in *Qualcomm v Nokia*. The court clarified that under Sec. 60(2), 'infringement takes place at the moment of the supply, or offer to supply, of the essential means. It follows that the time at which the knowledge requirement of the section is to be fulfilled is the instant of supply or offer as well.'[255] As regards the means referred to in this section, the court stated that they must both be suitable to put the invention into effect and they must be intended to put the invention into effect. In the words of the court,

> [m]erely supplying something which the supplier knows can be used for infringement is not enough. What the second requirement adds is that the supplier must know (actually or constructively) that the means supplied are intended to be so used.[256]

The court noted that 'there can (and in fact almost always will) be a gap in time between the supply of the essential means and the putting of the invention into

[253] *Menashe Business Mercantile Ltd v William Hill Organisation Ltd* [2002] EWCA Civ 1702, [2003] 1 WLR 1462, [27].

[254] *Ibid*, [24].

[255] *Qualcomm Inc v Nokia Corp* [2008] EWHC 329 (Pat), [241].

[256] *Ibid*, [242]

effect.'[257] It may be that there is no actual infringement because the party to whom means are supplied may change his mind. However, if the supplier at the time of supplying the means knows that they are capable of infringing, and knows that his buyer intends to use them to infringe, then it does not matter if the buyer later changes his mind. '[I]nfringement has already occurred'[258] under Sec. 60(2) at the time of supply.

The court emphasised this point again in *Grimme v Scott* stating that 'there can even be infringement by "offering" to sell an essential means – at the time of the offer there is unlikely to be any particular end user in mind.'[259] The court noted that the knowledge requirement is satisfied if 'at the time of supply or offer of supply, the supplier knows, or it is obvious in the circumstances, that ultimate users will intend to put the invention into effect. That is to be proved on the usual standard of balance of probabilities.'[260] Here some of the factors that courts may consider are whether 'the supplier proposes or recommends or even indicates the possibility of such use in his promotional material.'[261]

These cases have very important implications for 3D printing as acts of private non-authorised use may be very hard to prove. In countries like the UK, they may not even be considered infringement. This reading of Sec. 60(2) would empower

[257] *Ibid*, [243].

[258] *Ibid*.

[259] *Grimme Landmaschinenfabrik GmbH v Scott* [2010] EWCA Civ 1110 [2011] FSR 7, [90]; Cited and affirmed by *KCI Licensing Inc v Smith & Nephew Plc* [2010] EWCA Civ 1260 [2011] FSR 8, [53-54]; *Warner-Lambert Co LLC v Actavis Group PTC EHF* [2015] EWCA Civ 556, [2015] RPC 24, [47].

[260] *Grimme v Scott* (n 259), [131].

[261] *Ibid*.

patent owners to stop the dissemination of designs that reproduce their products, that is, if they could show that CAD files fell within the definition of 'means suitable'. Bradshaw, Bowyer and Haufe suggest that one possible interpretation is that 'a 3D printer, raw materials and a 3DPDF for a patented item together count as a kit for making that item, on which basis the 3DPDF is the essential "means" that the 3D printer user would require to infringe the patent'.[262]

Finally, it may be worth noting that even though the terms 'contributory infringement' and 'indirect infringement' are often used interchangeably to refer to the cause of action under Sec. 60(2), this may be a misnomer, as Sec. 60(2) arguably does not require any actual direct infringement. Thus, unlike common law tort claims, statutory torts arising under Sec. 60(2) are actionable

> (1) even though what is supplied is capable of perfectly lawful, non-infringing use, (2) even though what is supplied never has been and may never in fact be used in a way directly infringing the patent in suit, (3) without any damage being suffered by the patentee, and (4) at the moment of supply, irrespective of anything that may or may not occur afterwards. [263]

2.3.2.2 Active Inducement/Contributory Infringement in the US

While the 'means' requirement may trip up patent owners in the UK, owners may find some advantage under the active inducement theory in the US. Under the US Patents Act:

> (b) Whoever actively induces infringement of a patent shall be liable as an infringer
> (c) Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination, or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such

[262] Bradshaw, Boyer and Haufe (n 230), 27.

[263] *Grimme v Scott* (n 259), [88].

> patent, and not a staple article or commodity of commerce suitable for substantial non-infringing use, shall be liable as a contributory infringer.[264]

Sec. 35(c) lays out liability for a contributory infringer, similar to that in the UK Patents Act while Sec. 35(b) lays out separate liability for one that actively, i.e. wilfully induces a direct infringer, even if he does not contribute to the infringement by supplying any essential means. As under the UK Patents Act, intention/knowledge is a material aspect of liability under these provisions.

Need for a Direct Infringer

Unlike in the UK, the US courts have categorically stated that '[i]ndirect infringement, whether inducement to infringe or contributory infringement, can only arise in the presence of direct infringement'.[265] This requirement would present the main challenge for patent owners in the face of decentralised infringement like in the case of music files – showing specific instances/acts of direct infringement can be difficult, and no matter how plausible '[h]ypothetical instances of direct infringement are insufficient to establish vicarious liability or indirect infringement.'[266] However 'direct evidence is not required; rather, circumstantial evidence may suffice.'[267] Where the allegedly infringer article is designed to infringe, and the defendant

[264] 35 USC § 271.

[265] *Dynacore v US Philips* (n 237), 1272; See also *DSU Medical Corp v JMS Co Ltd* 471 F 3d 1293 (USCA Federal Circuit 2006), 1303; *Limelight Networks v Akamai Technologies* 134 S Ct 2111 (2014), 2117; and *Largan Precision Co Ltd v Genius Electronic Optical Co Ltd* (USCA Federal Circuit, 2016).

[266] *ACCO Brands v ABA Locks* (n 237), 1313.

[267] *MEMC Electronic Materials v Mitsubishi Materials Silicon Corp* 420 F.3d 1369 (USCA Federal Circuit 2005), 1378 (citing *Water Techs Corp v Calco Ltd* 850 F.2d 660 (USCA Federal Circuit 1988), 668); See also *Symantec Corp v Computer Associates International* 522 F 3d 1279 (USCA Federal Circuit 2008), 1293.

instructs others to use it in an infringing manner, that may be sufficient evidence for direct infringement.[268]

Contributory Infringement

In order to prove indirect infringement, a plaintiff must also show that the defendant had the requisite intent/knowledge, i.e. he knew that the means supplied would be used to infringe the patent, and he intended for them to be used so, i.e. it 'require[s] a showing that the alleged contributory infringer knew that the combination for which his component was especially designed was both patented and infringing. (internal quotations omitted)'[269] The requisite knowledge/intention must also relate to specific instances of direct infringement.[270]

The mere sale of products that are capable of infringing the patent is also not sufficient for a showing of secondary infringement liability. Here, the standard applied by the Courts in patent law is the same as incorporated into copyright law by the Supreme Court in the *Betamax case*,[271] i.e. '[t]he mere sale of a product capable of substantial non-infringing uses does not constitute indirect infringement of a patent.'[272] The corollary of this is that if the article being supplied has no other substantial non-infringing use, i.e. it can ordinarily only be used in a way that would infringe patent, then it can be presumed that the supplier of that article understood how the article would be used and intended the natural consequences of supplying

[268] *Toshiba Corp v Imation Corp* 681 F 3d 1358 (USCA Federal Circuit 2012), 1365.

[269] *Koninklijke Philips NV v Zoll Medical Corp* (USCA Federal Circuit, 2016) (citing *Aro Mfg Co v Convertible Top Replacement Co* 377 US 476 (1964)).

[270] See *Dynacore v US Philips* (n 237), 1273.

[271] *Sony Corp of America v Universal City Studios Inc* 104 S Ct 774 (1984).

[272] See *Dynacore v US Philips* (n 237), 1275; See also *Metro–Goldwyn–Mayer Studios Inc v Grokster* 125 S Ct 2764 (2005), 2777-8; *Koninklijke Philips v Zoll Medical* (n 268).

them. Thus, 'where an article is ''good for nothing else'' but infringement there is no legitimate public interest in its unlicensed availability, and there is no injustice in presuming or imputing an intent to infringe'.[273]

Whether a non-infringing use is 'substantial' requires a court may take into consideration several factors, such as 'the use's frequency, […] the use's practicality, the invention's intended purpose, and the intended market.'[274] To be considered substantial a potential use must be more than just 'unusual, far-fetched, illusory, impractical, occasional, aberrant, or experimental'.[275] Other uses would not fall within the category of unusual, far-fetched, etc. simply because the most logical or useful purpose of the defendant's products would be to infringe a patent. That alone does not eliminate them as 'substantial'.[276] Clearly the ordinary use for an infringing CAD file would be to print the object, infringing the prohibition against 'making' a patented product. However, this is not the only use. Indeed one of the main draw of 3D printing is that people can customise the CAD files to their needs. Many users may be accessing CAD files in order to create new designs based on them or to reverse engineer them to create a different product. Here the lack of empirical data makes it hard to speak definitively. However, a look at the Table 2: 'Types of Licenses' in the UK IPO Report[277] does show that where users assigned a type of license, the most commonly assigned licenses were 'Commons Attribution' and

[273] *MGM v Grokster* (n 272), 2777.

[274] *I4I Ltd Partnership v Microsoft Corp* 598 F 3d 831 (USCA Federal Circuit 2010), 851.

[275] *Ibid*, 851 (citing *Vita–Mix Corp v Basic Holding Inc* 581 F 3d 1317 (USCA Federal Circuit 2009)).

[276] See *Re Bill of Lading Transmission* 681 F 3d 1323 (USCA Federal Circuit 2012), 1338.

[277] See Mendis, Secchi and Reeves, *A Legal and Empirical Study of 3D Printing Online Platforms* (n 40), 29-30.

'Creative Commons' implying that those that do upload designs often 'give people the right to share, use, and build upon a work that they have created.'[278]

If an article does have substantial non-infringing use(s), the plaintiff may overcome the presumption that the sale of such articles alone does not infringe by showing that the defendant intended for the articles to be used in an infringing manner. Generally the simplest way to show that the defendant intended such a use would be through this words and actions regarding the article:

> Evidence of active steps … taken to encourage direct infringement [internal citation omitted] such as advertising an infringing use or instructing how to engage in an infringing use, show an affirmative intent that the product be used to infringe, and a showing that infringement was encouraged overcomes the law's reluctance to find liability when a defendant merely sells a commercial product suitable for some lawful use.[279]

While *MGM v Grokster* may be a copyright case, its reasoning has been adopted by many courts in disputes relating to patent infringement[280]. And like sites that host copyright infringing material, many sites that host CAD files also instruct users how to download and use them.[281] If these instructions promote an infringing use, that would be enough for the hosts and/or the uploading user(s) to be liable for contributory infringement.

Active Inducement

Although the text of Sec. 271(b) makes no reference to intent, courts have held that to prove liability under the theory of active inducement the plaintiff must show that the 'alleged infringer's actions induced infringing acts and that he knew or should

[278] Creative Commons License, Wikipedia <https://en.wikipedia.org/wiki/Creative_Commons_license> accessed 21 September 2016.

[279] *MGM v Grokster* (n 272), 2779.

[280] See *DSU Medical v JMS* (n 265), 1303-1306; *Global–Tech v SEB* (n 248), 2067; *Ricoh Co Ltd v Quanta Computer Inc* 550 F 3d 1325 (USCA Federal Circuit 2008), 1341; *Eplus Inc v Lawson Software Inc* 789 F 3d 1349 (USCA Federal Circuit 2015).

[281] See for example Trace Parts download tutorial videos <www.traceparts.com/use-and-manage-3d-cad-models/download-free-cad-models/tutorials/> accessed 21 September 2016.

have known his actions would induce actual infringements.'[282] Here, liability is based on an individual's actions and words, rather than the supply of some tangible means or component(s); the use of the word 'actively' implies 'that the inducement must involve the taking of affirmative steps to bring about the desired result'.[283] It is not enough that the defendant knew of infringing activities; 'inducement requires evidence of culpable conduct, directed to encouraging another's infringement'.[284]

While liability for direct infringement is strict, i.e. it does not matter whether the direct infringer knew of a patent/that he was infringing a patent, '[t]he requirement that the alleged infringer knew or should have known his actions would induce actual infringement necessarily includes the requirement that he or she knew of the patent.'[285] And it is no defence that the infringer believed that the patent was invalid; 'because infringement and validity are separate is- sues under the Act, belief regarding validity cannot negate the scienter required under § 271(b).'[286] However, the plaintiff must show more than just knowledge of the allegedly infringing acts; 'a patent holder must prove that once the defendants knew of the patent, they actively and knowingly aided and abetted another's direct infringement';[287] 'Merely describing an infringing mode is not the same as recommending, encouraging, or

[282] *DSU Medical v JMS* (n 265), 1304; See also *Global–Tech v SEB* (n 248), 2065.

[283] *Global–Tech v SEB* (n 248), 2065; See also *Largan Precision v Genius Electronic* (n 265).

[284] *DSU Medical v JMS* (n 265), 1306.

[285] *Ibid*, 1304.

[286] *Commil v Cisco* (n 248), 1928.

[287] *DSU Medical v JMS* (n 265), 1305 (internal formatting omitted); See also *Warsaw Orthopedic v NuVasive Inc* 824 F 3d 1344 (USCA Federal Court 2016).

promoting an infringing use, or suggesting that an infringing use should be performed'.[288]

As mentioned above, direct evidence of infringement is not required. Thus the burden of proof is not very strong. Where the defendant has supplied articles, as under Sec. 35(c), a presumption in favour of contributory liability would also serve the purposes of Sec. 35(b). The most common forms of active inducement would be instructions or advertising; by advertising an infringing use of an article or helping direct infringers by providing instructions on how to use an article in an infringing manner, a defendant would cross the line from passive actor to active infringer.

While emphasis under Sec. 35(b) is on 'active' steps, this does not mean that the defendant will necessarily escape liability if he is wilfully passive. Court may find that a defendant has the requisite knowledge by applying the theory of willful blindness, which 'requires the alleged inducer to (1) subjectively believe there is a high probability that a fact exists and (2) take deliberate actions to avoid learning of that fact.'[289] Thus, where it is clear that the defendant is advertising an article, which will ordinarily infringe, or where infringement would be clear to any ordinary observer, 'defendants cannot escape the reach of these statutes by deliberately shielding themselves from clear evidence of critical facts that are strongly suggested by the circumstances.'[290]

[288] *Takeda Pharmaceuticals v West–Ward Pharmaceutical* 785 F 3d 625 (USCA Federal Circuit 2015), 631 (internal formatting and citations omitted).

[289] *Largan Precision v Genius Electronic* (n 265).

[290] *Global–Tech v SEB* (n 248), 2067-69.

Concluding Remarks

3D printing will undoubtedly stress the patent system, if only to the extent that some concepts will be tested anew. However, an examination of the case law shows that the line between digital and tangible is far less 'eroded' than Holbrook and Osborn have suggested. In many different contexts court have favoured an interpretation that still requires some physical 'thing' when dealing with concepts like 'material components', 'means', etc. Though it is uncertain if future courts will be as unwilling to blur the lines.

The other aspect where patent systems will feel pressure is intermediary liability. An analysis of both US and UK case law shows that actions by patent owners against intermediaries and indirect infringers are not without their obstacles. While the aforementioned distinction between tangible and digital in relation to CAD files is one of these obstacles, patent owners may also be stymied by the need for a direct infringer in the US as courts consider a showing of some direct infringement a sine qua non for such causes of action; in the UK direct a majority of unauthorised activities may be wholly outside the realm of relief due to the private copying exception in Sec. 60(5). On the flipside, intermediaries such as hosting sites or other 3D printing services may find themselves innocently infringing without any copyright-style exceptions or safe harbour provisions.

Thus one of the areas where new legislation has been called for, and may indeed benefit both industry and consumer, is intermediary liability. Many authors have advocated Digital Millennium Copyright Act (DMCA)-like statutes for intermediaries in patent infringement, to provide safe harbours for those who may

otherwise come under indirect infringement statutes, which in turn may stifle commerce[291]. Such legislation would have the advantage of bringing intermediary liability in cases of patent infringement more in line with copyright law. An alternative response may be to develop 'general principles of accessory liability […] in the intellectual property sphere'[292] by applying common law principles for liability. This would have the advantage of providing a flexible, case-by-case solution for judges to address possible conflicts without the risk of rushed legislative action.

Unlike copyrights and trade marks thus, patents is an area where law and policy may face some fresh questions. This does not mean however that the concepts with which it must deal are so novel that judicial interpretation and legislative forethought cannot dull its disruptive force.

[291] See D Doherty 'Downloading Infirngement: Patent Law As A Roadblock To The 3D Printing Revolution' (2012) Harvard Journal of Law & Technology Vol 26 No 1, 365-368; DR Desai and GN Magliocca, 'Patents, Meet Napster: 3D Printing and the Digitization of Things' (2014) 102 Geo L J 1691, 1718-19; Ebrahim (n 2), 34-36.

[292] PS Davies, 'Accessory Liability: Protecting Intellectual Property Rights' (2011) IPQ 4 390-409, 391.

3. CONCLUSION

Despite the hype 3D printing and other related technologies are still far from their ultimate potential. Legal and economic systems that refuse to adapt or incorporate the potential of this new industrial revolution are sure to feel its disruptive force. Those that simply make adjustments will likely reap many of its benefits, without the turmoil that has followed past disruptive technologies. Thus, it is important that legislators recognise the potentially chilling effect of hasty legislation and/or protectionist measures. At the same time, while it is sage advice for governments to adopt the general 'wait and see' approach[293] recommended by the UK IPO,[294] rights owners should look to take a more proactive stand. 3D printing has many parallels with past disruptive technologies, particularly digital media, and industry actors have the opportunity to respond to 'the next Napster'[295] early, instead of waiting till the unauthorised use gets to an extent where enforcement and control are beyond their capabilities. In other words:

> 3D printing industry is still in its infancy, and, though its long-term potential for disruption is considerable, it poses no immediate threat to traditional manufacturing and related markets. Yet no company operating in the production, distribution or sales of material goods can afford to turn a blind eye to this technology for long.[296]

Commentators have already begun to identify possible areas of conflict between 3D printing and existing IP regimes. Some of these have been explored quite thoroughly in this dissertation. And while the three issues explored in this

[293] Which is how it was phrased in a well frequented IP blog (See Jeremy, '3D printing and the law: three recent studies and some recommendations' (*The IPKat*, 26 May 2015) <http://ipkitten.blogspot.co.uk/2015/05/3d-printing-and-law-three-recent.html> accessed 21 September 2016).

[294] See Mendis, Secchi and Reeves, *A Legal and Empirical Study of 3D Printing Online Platforms* (n 40), 43-45.

[295] Hanna (n 39).

[296] Sinnreich (n 8), page 10.

dissertation give us an interesting outlook on the so-called 'disruptiveness' of 3D printing, it is important to keep in mind that there are still other issues (not covered here because of a paucity of time and space) that may provide insight as well. For example, 3D printing may have particular importance for designs and shape marks. In the case of the former, further research may show that it raises harder questions to answer, particularly for the hybrid design-patents in the US; in the latter, 3D Printing may add a new dimension to the discussion regarding 3D marks, while issues relating to infringement may arguably be subsumed within our earlier discussions of Trade Marks. An examination of other issues such as these is key to the further understanding of the long-term impact of 3D printing on IP.

The hype and potential of 3D printing at times encourages some to exaggerate the novelty of these issues. This dissertation has sought to show that though the technology may be novel, many of the issues it raises are not brand new. In dealing with many of the questions raised by 3D printing we need to keep a mind to the questions that IP law has addressed in the past in relation to disruptive technologies, and adopt similar techniques to adjust legal principles to fit the needs of the present.[297] As the examination of the infringement issues for Patents shows, some areas may benefit from new legislation/legislative amendments; particularly as the relationship between 3D printing and IP may not adhere to the traditional notions of exclusivity or the balance between private property rights and public access. A look at the issues in the Copyright and Trade Marks sections highlights that in many cases what may be required is a re-interpretation of existing legal principles to fill potential

[297] For an interesting discussion on how legal commentators often focus on the wrong aspect of legal questions in relation to new technologies see LB Moses and NL Gollan, 'The Illusion of Newness: The Importance of History in Understanding the Law-Technology Interface' <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2697311> accessed 21 September 2016.

gaps in the law. In any case, while the technology may be new, it does not require us to re-write our IP law. It is for this reason that this dissertation emphasizes the 're-interpretive' impact of 3D printing over its 'disruptive' influence.

The aim of this dissertation has been to highlight the extent to which the hype and hysteria around 3D Printing may cloud the true nature of the legal issues involved. The impact on IP law will be varied. And indeed a closer look at other issues, such as Designs or Shape Marks or the changing nature of personal copying exemptions, may show the impact to be more varied still. What this dissertation has hopefully shown however, is that this 'new' technology does not require necessarily require new laws. What it does require however is new approaches – by the legislature, judiciary, rights-holders or the newly emerging consumer-manufacturer. In the words of Michael Weinburg:

> 3D printers do not take away intellectual property rights any more than computers grant them. But they do provide an opportunity for people to re-examine old assumptions about how the system works.[298]

[298] Weinberg, 'It Will be Awesome If They Don't Screw It Up' (n 1), 1.

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