THE STRUGGLE BETWEEN THREE DIMENSIONAL PRINTERS AND INTELLECTUAL PROTECTIONS OF DESIGN

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Buy it, use it, break it, fix it, Trash it, change it, mail - upgrade it,
Charge it, point it, zoom it, press it, Snap it, work it, quick - erase
it, Write it, cut it, paste it, save it, Load it, check it, quick - rewrite
it, Plug it, play it, burn it, rip it, Drag and drop it, zip - unzip it,
Lock it, fill it, call it, find it, View it, code it, jam - unlock it, Surf it,
scroll it, pause it, click it, Cross it, crack it, switch - update it,
Name it, rate it, tune it, print it, Scan it, send it, fax - rename it,
Touch it, bring it, pay it, watch it, Turn it, leave it, start - format it

(Daft Punk, “Technologic”, album *Human after all*, 2005)

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INTRODUCTION

Although three dimensional printers (3D printers) could still be considered a futurist idea, they are actually already used by several companies in their activities. The industry of "additive manufacturing"[1] has been increasing for the last 25 years with a spectacular average growth of 16,4% per year. Experts expect that this trend will be maintained in the upcoming years; with the market reaching 3.7 billion dollars in 2015 and 6.5 billion in 2019[2].

Several new start ups, whose core business is 3D printing for consumers, have recently popped up. They already show a high sales volume that continues to increase yearly. For instance, the company *Shapeways* offers its clients the opportunity to select an object within their online catalogue and get a 3D printing in different materials for a reasonable price. The client can also make the choice to send them a Computer Aided Design (CAD) file[3] and obtain a printed version of a personal creation. To give a rough idea of *Shapeways*' economic health; the company was created in 2008 and yet sold 750.000 pieces in 2011. Other websites, such as *Thingiverse*[4], are content platforms where members create and share based on open source licenses.

3D printers are also about to come into our houses and become part of our daily life. Thanks to opensource communities, numerous affordable brands are already on the market[5]. For instance, the easy-to-build *Buccanneer* printer from *Pirate 3D Inc* should be available by December 2013 and will not cost more than $350[6]. Moreover, both the quality and the range of possible materials are improving. This means concretely that, as with any previous

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[1] The technical terms will be defined in the first chapter.

[2] F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, document of *Sirris*, 2012, p. 3. Note: F. WINDELS is manager of the Department of Information, Technology Watch and Intellectual Property at *Sirris*. *Sirris* is the collective center of the Belgian technological industry that assists companies in the implementation of technological innovations. They carry out more than 4,000 industrial interventions per year in more than 1,800 different companies(80% are SMEs) and are involved in more than 100 European projects (www.sirris.be). Moreover this organization is the owner of a wide range of 3D printers, from printers designed for consumers to a wide range of machines designed for professionals. This places *Sirris* at the forefront of research and development projects in Europe(Le vif L'express n°51, 21 December 2012, p. 42).

[3] In this thesis, the terms "CAD files" and "3D files" are indifferently used.

[4] *Thingiverse* was launched in 2008 by *MakerBot Industries.*

[5] For a detailed comparison between the available and upcoming 3D printers, see http://www.3ders.org/pricecompare/3dprinters/ (6 June 2013).

[6] See http://www.kickstarter.com/projects/pirate3d/the-buccaneer-the-3d-printer-that-everyone-can-use (6 June 2013).

emerging technology[7], it is obvious that more and more families are going to be equipped with this new technology. The speed at which the market will assimilate these low-cost machines will merely differ from one country to another[8].

In his book "Makers, the new industrial revolution", C. ANDERSON presents this new technology as a great opportunity to totally re-shape and democratize the current manufacturing system[9]. Thanks to these new tools, any inventor might be able to bypass the traditional chain and become a genuine entrepreneur in his garage. As the author of the book puts it, the separation between bits and atoms is getting erased, leaving room for a genuine new industrial revolution[10].

It is difficult not to be overcome by this enthusiasm: the combination of these handy and democratic tools with the huge web that connects us to each other might indeed permit any layman with good ideas to create, build, advertise, sell products and share CAD files over the internet. As confirmed by Miss. M.VAN TUIJL, responsible clients at *Shapeways*: "You can make everything you want 3D printed, that we can make things in metal or ceramics that cannot even be made handcrafted"[11]. With the increasing range of available materials progressing, we can already state with confidence that the scope of possibilities will increase at a very fast pace[12]. The possibility to easily print 3D objects (thanks to specialized companies as well as domestic printers) and share 3D files will offer the opportunity of a more open market for new initiatives[13]. Furthermore, other positive outcomes can be advanced: environmental protection, possibility for the manufacturers to avoid huge stocks, the opportunity for them to innovate and have a wider range of products without consideration for a minimal amount of sales. These ideas will be further developed in the first chapter.

On the other hand, Intellectual property rights (IPRs) have never been as protected as today. Somehow, the protection of the authors has been replaced by the protection of huge economic

[7] For example: smart phones, flat screens, touchpads, etc. All these technologies managed to become part of our daily life at an incredibly fast pace.
[8] For instance, the Netherlands seem very enthusiastic about this new technology. In February 2013, the third edition of *Rapidpro* conference on additive manufacturing took place in Veldhoven. This event, originally intended for professionals, has already been focusing on the growing consumer market. In 2013, there were 80 exhibitors.
[9] C. ANDERSON, *Makers: The new industrial revolution*, Crown Business, 2012.
[10] See *Ibidem.*
[11] Exchange of emails, 14 March 2013.
[12] Further discussion is provided in the chapter 1.
[13] See C. ANDERSON, *op cit*, pp. 143-223.

interests. IPRs are now considered and maintained as a very consequent part of a firm's assets. As F. GURRY, the Director General of WIPO writes it: "While the global economy continued to underperform, IP filing growth persisted in 2011" [14]. This evolution towards what one could call the "immaterial era" took another dimension with the Trade-Related Aspects of Intellectual Property Rights (TRIPs) agreement signed in Marrakesh in 1994[15]. The TRIPs agreement is characterized by an obligation for all the members of the World Trade Organization to guarantee a minimum level of protection for IPRs, regardless whether they belong to nationals or foreigners.

Even if this economic view might seem more pertinent concerning trade marks and utility patents than designs protections, the world seems more and more concerned with the protection of designs. The figures released by the World intellectual Property Organization (WIPO) illustrate this assertion. In 2011, a record 4.2 million trade mark applications were filed worldwide[16] leading to around 23 million trade marks in force over 70 IP offices[17]. During the same period, industrial design filings increased by 16%, which means 75.700 design applications worldwide[18].

A simple observation of the facts lets me believe that a clash is likely to happen between the overprotection of IPRs on the one hand and the flourishing of 3D printers on the other hand. After the traditional printing, and the active sharing of files on the so-called Web 2.0[19], this great innovation could also become a new Pandora's Box for IPRs. Indeed, a lot of products that are currently protected by IPRs could soon become the target of domestic or professional infringements. This combination of 3D scanners, 3D printers and CAD files shared

[14] WIPO Economics & Statistics Series, World Intellectual Property Indicators, 2012 edition, p. 3, available at http://www.wipo.int/ipstats/en/statistics/designs/ (6 June 2013).
[15] Agreements 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, available at http://www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm (6 June 2013).
[16] WIPO Press release, Global IP filings continue to grow, China tops global patents filings, 11 December 2012, Geneva, available at http://www.wipo.int/pressroom/en/articles/2012/article_0025.html (6 June 2013).
[17] WIPO Economics & Statistics Series, World Intellectual Property Indicators, 2012 edition, *op cit*, p. 9.
[18] This followed the 16,9 growth in 2010, these growths being mostly related to strong growth in China. State Intellectual Property Office of the People's Republic of China (SIPO) was responsible for 90% of the world growth from 2009 to 2011 (WIPO Economics & Statistics Series, World Intellectual Property Indicators, 2012 edition, *op cit*, p. 9).
[19] Web 2.0 designates the evolution of the internet where users are not merely passive but interact and collaborate with each other, resulting in user-generated content.

throughout the internet – the world's biggest copy machine[20] – might turn into a real nightmare for many manufacturers.

RESEARCH QUESTION

There has always been an endless struggle between legislation and technology developments. The purpose of this thesis is to give a clear and keen analysis of the several issues that are likely to occur with the new technology of 3D printing and the intellectual protection of items' appearances. Beside this main question, several sub questions will be analyzed: What actually is this technology? What is its current state of development and why is it considered by some as an upcoming industrial revolution? Which IPRs might protect the design of an object and what are their limits regarding utilitarian features? What are the gaps in the current system and the potential issues with 3D printing? What are the options that might be followed or avoided in the evolution of IP law?

In the first chapter, I will provide a brief framework of these new revolutionary tools. What does "Printing a CAD file" actually mean? A definition of terms such as "CAD programs", "3D printers", "3D scanners", "laser cuttings" or "CNC machines" will be made in order to properly guide the reader. The second chapter will be dedicated to the description of IPRs that might apply to the protection of a design (ie. copyright, *sui generis* design protection, and trade mark) and the limitations of their scope. The third chapter will focus on the different gaps in intellectual property laws in relation to the use of these technologies. I will advance the argument that several gaps are highlighted by the use of 3D printers and CAD files. In the last chapter, I will try to focus on different options that could be advanced or, on the contrary, should be avoided in the evolution of IP regulation.

Even if the utility patent might, in very limited conditions, protect the shape of a functional product, it has been decided not to include it in this work. This choice is related to the technology as it exists today[21]. I agree that utility patent rights are also impacted by the rise of

[20] L. N. GATEWAY, "Copyright basics: from earliest times to the digital age", *Wake Forest Intell. Prop. L. J.*, vol. 10, 2009-2010, p. 257.

[21] For a detailed paper on this issue in the United States, see D. H. BREAN, "Asserting Patents to Combat Infringement via 3D Printing: It's No 'Use'", *Fordham Intellectual Property, Media & Entertainment Law Journal*, vol. XXIII, No. 3, 2013, available at SSRN: http://ssrn.com/abstract=2088294 (6 June 2013). In this

3D printing, especially with the fast evolution of the available range of materials[22]. Nonetheless, the current state of the technology makes me think that, from a practical point of view, the other IPRs related to the appearance of products should be first examined. One could for instance think about small plastic figurines such as *legos*, *playmobiles* or *warhammers*[23]. These figurines are already easily copied by basic low-cost 3D printers.

Considering trade mark protection, I will only assess it to the extent that it might serve as legal protection of a design (ie. trade dress). As a consequence, I will not mention and assess the recent case law involving intermediaries (namely the auction website *eBay*) and the companies that require the monitoring of the counterfeited products that infringed their trade mark.

Finally, given the limited length of this thesis, the territorial scope will be limited to the United States and the European Union. This choice comes from the strong, although different, historical and cultural backgrounds of intellectual protection laws in these two regions. I will try to develop a clear comparison along the different sections of the present work.

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paper, the author demonstrates that patents are mostly ineffective to prevent infringements in an efficient manner: "Patent law in its current form is unprepared for the fundamental shift in physical product sales and distribution that will likely occur as 3D printing by consumers becomes more widespread" (p. 38).

[22] See chapter 1 for further details.

[23] The example of *warhammers* is not innocent given that a conflict has already occurred and will be discussed in this thesis (see pp. 16, 55).

CHAPTER I: THE TECHNOLOGY

Section 1: Definition of terms

§1. 3D printing

The so-called Computer Numerical Control (CNC) technology comes in two forms: subtractive manufacturing and additive manufacturing. The latter constitutes the 3D printing and is a genuine key revolution. While subtractive manufacturing (such as laser cutters) cuts and extracts the final product from a block, additive technology builds this product "layer by layer"[24]. Roughly speaking, one could consider that the technology itself constitutes an evolution of its 2D ancestor; with an extra motor to control height[25]. Within additive technology, different systems of manufacture exist. The purpose of this thesis is not to give a complete overview of the different 3D printers' models that currently exist and I simply underline two common processes[26]. The first consists of using a laser that solidifies a powder or liquid resin lying inert, shaping the object to be extracted from this bath of raw material. This process is known as Selective Laser Sintering (SLS). The second consists in a spout that squirts down molten plastic in fine line in order to create the object. This is the so-called Fused Deposit Modelling (FDM) process[27]. The printers using the SLS process tend to have a better resolution and a wider range of available materials than the plastic extruding 3D printers. However, this technology is also more expensive and therefore less popular for the consumers than the FDM[28].

The use of 3D printers is not new; it has been increasingly used since the beginning of the year 2000 by some specialized sectors such as medical surgery[29], dentistry[30] and aeronautic[31].

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[24] C. ANDERSON, *op cit*, p. 83.
[25] C. ANDERSON, *op cit*, p.58.
[26] For the different technologies and the available brands using them, see http://www.3ders.org/pricecompare/3dprinters/ (6 June 2013).
[27] For trade marks reasons, this technology is also called Fused Filament Fabrication (FFF).
[28] (C. ANDERSON, *op cit*, p. 90). Among the low-cost machines using the FDM process, one can quote the *Makibox A6*, whose price is particularly attractive ($300). There are numerous other machines such as the *Replicator 2* from *MakerBot* or the *Cube* from the company *3D designs*.
[29] 40.000 leg prostheses have already been produced (F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 7). At the military hospital Walter Reed in Washington DC, more than 70 titanium craniums were designed by electron Beam Melting from a CT-scan of the patients and then implanted (F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 10).

The reason comes from the fact that 3D printers strongly facilitate the production of tailor made items, which is more valuable in the medical sector than in the great products lines. Nevertheless, the scope of concerned sectors has strongly expanded: military, automobiles[32], electronics, construction, and accessories for individuals (e.g. decoration accessories, jewellery and toys), *etc.* For the last seven years, the two predominant sectors have been the consumer and electronic products (20%) and the motor vehicles (20%). This is followed by the medical and dental (15%), the aerospace (12%) and the industrial machines (11%) sectors[33].

The sizes of the outputs produced by these professional machines already vary from the micro scale[34] to the very big[35]. This thesis draws attention to recent important evolutions. First, and as stated above, the range of available materials is always increasing[36]. The use of metal by the additive manufacturers is now developing in a very fast pace[37]. This creates the possibility for professionals to use 3D printers in order to create objects with features that are close to the

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[30] More than 10.000 metal dental caps are produced a day (F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 7). Recently, *Sirris* has participated in the implementation of a titanium jaw on an 83 year old patient. The customized nature of the jaw considerably reduced the length of the intervention (F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 11).

[31] *AEDS* (*Airbus*) is currently involved in several projects with the final goal of printing a genuine aircraft. Airbus is already comprised of pieces created by additive manufacturing and expects entire wings to be created this way by 2020 (F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, document of *Sirris* (collective center of the Belgian technological industry), January 2012. p. 39).

[32] *Mydea Technology Corp.* uses FDM elements to produce the audio and video equipment of Automotive Systems, supplier of *BMW* (F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 15).

[33] F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 4 (reference to the report of *Wohters Associates Inc*.).

[34] For instance, the *TNO* machine can lay down 1200 slides/hour with a resolution of 25µm (10^{-6} m). Companies such *as FineLine Prtotyping* or *Nanoscribe* are specialized in producing additive technology that creates 3D nanostructures. Vienna University, specialized in the recent 2 photons polymerization (2PP) technique, has demonstrated its ability to produce a nano race car whose dimensions are 330x130x100µm. This was produced in 4 minutes with a resolution of 1µm (F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 22).

[35] For instance, *Stratasys* built a complete working motorbike. *Kor Ecologic* built the whole body work of an electrical car via FDM (Fused Deposition Modeling). *Voxeljet* has launched a XXL machine able to print products of 4x2x1m dimensions with a resolution of 0,1mm (F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, pp. 23-24 & 37).

[36] Concerning consumer options, the online company *Shapeways* offers on its website to copy 3D models in the following materials: alumide, strong and flexible plastic, fine detail plastic, frosted detail plastic, stainless steel, sterling silver, full color sandstone and ceramics.

[37] Today, the range of metal materials available for the additive manufacturing is wide: steel, stainless steel, titanium and alloys, alloys of aluminum smelter, nickel and alloys, cobalt-chrome, gold, silver, etc. (F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 23).

ones created in a traditional way[38]. This is an important evolution since the use of polymers[39]. Another development under way concerns the possibility to combine several materials within the same final product[40]. One should also mention the printing of genuine electrical circuits[41]. There is no doubt that the combination of these electrical circuits and the use of metal would render patent laws way weaker that they are today. Indeed, that would mean the possible copy of far more sophisticated products, more likely protected by utility patents. Finally, some techniques are already available for the creation *in vitro* of living tissues and the reparation of tissues *in situ* is currently studied[42]. For 3 years, departments of *Fraunhofer Institute* are associated in the project *Biorap* to create artificial blood vessels by 3D printing[43].

The second paramount evolution, more in line with the present thesis and already stated in the introduction, concerns the boom of the low-cost 3D printers designed to target consumers[44]. T. DORMAL[45] was amazed to discover the existence of more than 120 different models whose prices do not reach 10.000€. This contrasts with the situation only a few years ago, where only a couple of these cheap options were available on the market[46]. In 2011, the sales of low-cost 3D printers increased by 290%, reaching a total of 32,000 systems sold[47]. Prices are decreasing monthly. This trend will be further encouraged by the term of the first patents filed in the nineties[48], and the ability of these machines to literally copy parts of themselves[49].

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[38] F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 12.
[39] F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 12.
[40] F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 34.
[41] The firm *Eoplex* has already developed a 3D printing process called High-Volume Print Forming, which is able to print with up to 6 different raw materials at the same time. Interest groups include, among others, the manufacturers of portable electronics (F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 51).
[42] F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 11. An artificial larynx created by a CT-Scan process has been successfully implemented in a patient by a European team (*Ibidem*).
[43] F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 12.
[44] For a detailed comparison between available and upcoming 3D printers, see http://www.3ders.org/pricecompare/3dprinters/ (6 June 2013).
[45] T. DORMAL is technological manager for additive manufacturing at *Sirris* (the Belgian collective center *Sirris* is presented in the second footnote).
[46] Interview of F. WINDELS and T. DORMAL at *Sirris* center (Liège Sciences Park), 8 March 2013.
[47] F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 4.
[48] The development of the open-sources machines has been made possible by the expiration of the patent protection of *Stratasys*'s on FDM (Fused Deposition Modeling). The last patent on SLS (Selective Laser Sintering), owned by Austin University, expires in 2014 (F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p.9).

As already stated above, a lot of different raw materials are already used by the professional machines. Concerning the low-cost machines designed for the public, it seems obvious that the current range of available materials is also going to evolve at a very fast pace. To give an example of a recent evolution, the German Firm Rapid Product Manufacturing has managed to produce a shoes sole by Selective Laser Sintering (SLS)[50]. Printing your whole wardrobe is already under way with certain low-cost printers[51], and the company 3D systems already offer some clothes on its website *cubify*[52].

§2. CAD files and 3 dimensional scanners

Like 3D printers that print 3 dimensional objects, 3D scanners scan 3 dimensional objects. The individual will turn the real object into 3D files, the so-called Computer Aided Design (CAD) files, which might be shared worldwide trough the web. Of course, CAD programs will not only allow the creation of a 3D file from a 3D object. Anyone can also create and edit these files following his own ideas. When the object is being printed, the 3D software will analyse the CAD file in order to figure out how to create a steady printing with as less material as possible[53]. Then it will literally slice the object in as small thin horizontal layers as the 3D printer can handle[54]. While CAD software might be expensive for the consumer, some brands are available without charge (eg. *Google sketch up* and *Autodesk 123D*).

Concerning the 3D scanners, different options can already offer the consumers a good result for a cheap price, if not for free. For instance, it is possible to merely take a few good-quality pictures of the objects from different angles. Once the pictures are on the computer, the free software *Autodesk 123D Catch* offers to upload them in the cloud and send you back a file containing the 3D object. *Microsoft* has developed software that works in the same way. With applications such as *Trimensional* ($0.99) or *iScan 3D* ($9,99), an iPhone can be turned into a 3D scanner. As with 3D printers, the resolution of these applications will evolve with the

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[49] F. MONFORT-WINDELS, "F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, pp. 7&17.
[50] F. MONFORT-WINDELS, *Veille technologique 2011-2012 - Techniques de fabrication additive - Mise à jour*, *op cit*, p. 26.
[51] For instance, the brand *Cube* released by *3D system* offers to print functional shoes and can use the "mobius textile" (interlaced rings of plastic woven) to print clothing (D. H. BREAN, *op cit*, p. 8).
[52] The visitor can find for instance a "Michael glove" at 250$ or a "Drape dress" at 2000$. Using the same technique, the website *Shapeways* proposes different fashion accessories such as glasses, wallets and purses.
[53] C. ANDERSON, *op cit*, p. 90.
[54] C. ANDERSON, *op cit*, p. 91.

time. Therefore, it is not difficult to imagine the following future scenario: "This sort of "guided scanning" can mean that someday if you want to duplicate an object, you need only point your phone at it, following the phone's directions to move around the object and zoom in on sections, and press "print". A duplicate, perhaps even in colour, will appear in your desktop 3D printer"[55]. Currently, scanning objects that include a lot of details still requires real hardware, but prices should nevertheless inevitably decrease over the years[56].

Section 2: the opportunities created by this technology

The purpose of this thesis is not to analyse the numerous opportunities created by 3D printers. Nonetheless, it is important to grasp that the increasing use of this additive manufacturing - by both the professionals and the consumers - should significantly alter the current manufacturing system[57].

C. ANDERSON praises these machines and presents them as an amazing change for those that he calls "the makers". According to him, society is shifting from atoms to bits[58]. As a result, any creator should be allowed to avoid licensing his work[59]. Indeed, as soon as he is equipped with correctly working gear, any tinkerer should be able to produce his own ideas and use the internet as an online shop. Moreover, beside any commercial project, anyone can create, edit, and share 3D files as an open-source. The author believes in the establishment of a worldwide open-source community. That would usher us towards a new era of creators, where the "makers'" would be inspired by the creations of each other and make improvements that would be in turn shared. As C. ANDERSON puts it: "Rather than drop-down innovation by some of the biggest companies in the world, we're seeing bottom-up innovation by countless individuals, including amateurs, entrepreneurs, and professionals"[60]. This vision of the "Do-it-yourself" culture seems nonetheless a bit to idealistic to me. Like Mr T. DORMAL[61], I consider that only a small part of the population is made of real "garage tinkerers" who see in this evolution a possibility to create and share or sell personal creations.

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[55] C. ANDERSON, *op cit*, p. 98.
[56] The 3D scanner of *David-Laserscanner* costs only 399€ and already offers a precision of 0.2 mm.
[57] In that sense: C. ANDERSON, *op cit*; D. H. BREAN, *op cit*, p. 4.
[58] This expression is used several times in the book (see for instance C. ANDERSON, *op cit* , p.54)
[59] See C. ANDERSON, *op cit*.
[60] C. ANDERSON, *op cit*, p. 32 & chapter 4: "We are all designers now" (pp. 53-60).
[61] Interview of F. WINDELS & T. DORMAL at *Sirris* center (Liège Sciences Park), 8 March 2013.

One thing everyone should agree on is that the combination of the well-established internet and the spread of additive manufacturing should lead to consequent modifications in the system of production as we know it today. Concretely, one could hypothetically advance at least two practical consequences: democratization of the production methods resulting in a wider range of available products, and environmentally friendlier production.

The first point has already been mentioned above. The main idea is that the current production line "distributors-wholesaler-retailers" should be reshaped[62]. As C. ANDERSON puts it: "The global supply chains have become "scale-free", able to serve the small as well as the large, the garage inventor and Samsung (…) Nothing is stopping you from making anything. The people now control the means of production"[63]. Concerning the last point, 3D printers permit the elimination of manufacturing's traditional tools[64]. This allows the companies to produce more locally and to launch products designed for a smaller group of people[65]. Moreover, the "economy of scale" does either not occur, or occur to a lesser extent[66], with 3D printers. Indeed, printing one or several objects won't change the price per unit. The economy of scale within traditional mass production encourages repetition and standardization while 3D printing favors individualization and customization[67]. This means that any startup can launch products for niche markets[68]. Several online shops, such as *Shapeways*[69] or *Digital Forming*, merely offer to print a wide range of 3D models[70], as available on their website or designed by consumers themselves. These new kinds of companies do not even have to own the printers. They often have agreements with partners owning high quality additive machines[71].

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[62] C. ANDERSON, *op cit*; F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 16.
[63] C. ANDERSON, *op cit*, p. 66.
[64] F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 9.
[65] Opinion shared by T. DORMAL (Interview of F. WINDELS & T. DORMAL at *Sirris* center (Liège Sciences Park), 8th March 2013).
[66] Research with the University of Loughborough have indicated that "economy of scales" might also take place, with less consequent results, within additive manufacturing (F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 9).
[67] C. ANDERSON, *op cit*, p. 87.
[68] C. ANDERSON, *op cit*, pp. 63-78.
[69] *Shapeways* is a spin-off of *Philips* created in 2008. The company sells about 100,000 objects per month. The most popular ones are jewelry, iPhone covers and model trains (A. VANCE, "3D printer, Make Whatever You Want", 26th April 2012, available at http://www.businessweek.com/articles/2012-04-26/3d-printers-make-whatever-you-want#p3 (6 June 2013)).
[70] This goes from a "little sad Keanny Reeves", to a pad-foot stand for Ipad , a miniature plane or any kind of jewelry.
[71] F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 29.

One should notice that in a first step, the lack of local 3D printers means the importation and exportation of 3D objects ordered. Such transportation needs undermine the alleged environmental protection developed below.

The idea of carbon footprint reduction stems from the fact that the additive machines cause less waste than traditional means of productions (subtractive manufacturing). Moreover, the spread of these local production methods within companies should incite them to avoid the imports from abroad[72]. Finally, it might be argued that the tailored-made products should be more valued and therefore kept longer by their owners[73]. Nevertheless, these remain simple hypothesis that are disputable. For instance, F. WINDELS[74] is not completely convinced with these statements. First, the consumption of energy is way higher than with the traditional means[75]. The machines require inputs that will have to be produced by companies and eventually imported[76]. In any case, it turns out that the impact of the distribution is weak compared to the impact of the manufacturing with the raw materials and should therefore not be considered as an essential factor on the ecologic footprint[77]. Still, a recent project in England has highlighted that the metal components of an aircraft created by additive manufacturing had up to 50% less carbon footprint than the traditional means[78]. One could also consider that manufacturers will faster react to new trends by using 3D printers instead of traditional tools. This might lead to the launching of numerous ephemeral products which are likely to be soon thrown away.

[72] Opinion shared by T. DORMAL (Interview of F. WINDELS & T. Dormal at *Sirris* center (Liège Sciences Park), 8 March 2013).
[73] C. ANDERSON, *op cit*, p. 86
[74] F. WINDELS is manager of the department information, technology watch and intellectual property at *Sirris* (the Belgian collective center *Sirris* is presented in the second footnote).
[75] The Selection Laser Merger (SLM) requires up to 100 times more energy to obtain one kilo Titanium than the traditional precision means. Nonetheless, the manufacturing of the machines and the post-treatments, such as the finition, should be taken into account for a complete comparison (F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive* – "Evolution of a revolution, *op cit*, p. 35).
[76] Opinion collected during the inteview of 8th March 2013 in the center located in the Science Park of Liège.
[77] F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 35).
[78] See the software http://www.enlighten-toolkit.com/ (cited by F. MONFORT-WINDELS, *Veille technologique - Techniques de fabrication additive – "Evolution of a revolution"*, *op cit*, p. 36).

Section 3: The more concerned objects with the rise of 3D printing

Concerning the range of products that might be copied thanks to this technology, a clear line must be drawn between the professional printers and the low-cost printers. Nevertheless, this distinction does not take a paramount place in this thesis since the consumer can decide between ordering a 3D printing via an online shop or using his personal machine. Moreover, it is assumed that like any technology, the quality of the low-cost 3D printers should increase while the prices decrease. This is one of the fundamental principles in a competitive market.

Given the current state of the technology and the market, it appears that the first targeted products for 3D printers should be: toys, jewelry, relatively small objects of decoration, utensils, etc.[79] Actually, the possibilities offered by the low-cost machines are already astonishing. In the end of 2011, a conflict occurred between Thomas Valenty and the UK firm *Games Workshop*[80]. Thanks to his printer from *MakerBot*, Thomas had created some figurines inspired by the figurines *warhammers*[81] and posted them on the website *Thingiverse*, a website for 3D file sharing. This case, analyzed in more details bellow, demonstrates that low-cost printers already reach a pretty good resolution. Indeed, the *warhammers* contain way more details than figurines such as *legos* and *playmobiles*. Even C. ANDERSON, though deeply enthusiastic about these technologies, wrote in his book: "If you're a toy company, this should give you chills"[82].

[79] With the same opinion, see D. H. BREAN, *op cit*, p. 38.
[80] C.THOMPSON, "Clive Thompson on 3-D printing's legal morass", 30 April 2012, available at http://www.wired.com/design/2012/05/3-d-printing-patent-law (6 June 2013).
[81] The *warhammers* is a collection of figurines (around 30mm) owned by *Games Workshop*.
[82] C. ANDERSON, *op cit*, p. 52.

CHAPTER II: BRIEF ANALYSIS OF THE INTELLECTUAL PROPERTY RIGHTS THAT APPLY TO DESIGNS

Section 1: In general

The common characteristic of IPRs is that they confer legal monopolies[83]. As stated previously, this thesis will briefly analyze the intellectual protections provided for an objects' design. Companies are now becoming aware of the opportunities presented by the expansion of design protection as a valuable source of economic growth. The main sectors on which the "top 10 industrial applicants" focus concern the electronics and ICT, automotive, clothing, and fashion, interior design and decorations industries[84].

The domain of design protection actually has two main objectives. On the one hand, it aims at rewarding creativity as a means to incentivize new creations[85]. On the other hand, IPRs in that field cannot protect functional features and prevent competitors to use these[86]. This second field of protection is covered by the utility patent and its specific requirements.

In the same way that I have given a short explanation about the technology, it seems important to properly frame the notion of "design". However, this might turn out to be more complicated given that there is still no shared definition of this word[87].

One can quote several definitions to illustrate this lack of consensus, both within the United States and in Europe:

- "The arrangement or layout of a product"[88];

[83] F. DE VISSCHER, "La protection des dessins et modèles", *Guide juridique de l'entreprise*,2nd ed., livre 98bis, update 1st September 2009, p. 9.
[84] See WIPO Economics & Statistics Series, World Intellectual Property Indicators, 2012 edition, *op cit*, p.34.
[85] A. MACHNICKA, "Fashion design – The European Union and the United States compared: The role of fashion creations and their legal recognition", in *Technology and competition contributions in honour of Hanns Ullrich*, Edtions Larcier, Bruxelles, 2009, p. 204.
[86] A. MACHNICKA, *op cit*, p. 204.
[87] WIPO Economics & Statistics Series, World Intellectual Property Indicators, 2012 edition, p. 19; G. TRITTON, *op cit*, pp. 551-552.
[88] Oxford English Dictionary (cited by G. TRITTON, *Intellectual property in Europe*, Sweet & Maxwell, London, 2008, p. 551).

- "The visual appearance of a product, whether that appearance is created by a choice of a particular shape or by surface ornamentation, or by a combination of shape and ornamentation"[89];
- "The appearance of the whole or a part of a product resulting from the features of, in particular, the lines, contours, colours, shape, texture and/or materials of the product itself and/or its ornamentation"[90].

"Industrial design" could be defined as "those elements incorporated into mass produced products that aim enhance their attractiveness by their appearance"[91]. These mass produced products are mainly functional objects, having therefore technical features. One cannot find an international agreement providing detailed rules on the level of design protection or the nature of regimes protecting designs[92]. As stated by A. KINGSBURY: "Design tends to occupy positions at the borders of the major intellectual property regimes, with potential for both overlaps and gaps in protection"[93].

Finally, before analyzing the different IPRs that might protect a design, it is important to mention the delicate question of the cumulated rights. In most European countries, a designed product is entitled to be granted more than one type of legal protection[94]. For example, France and Belgium do allow cumulation under the "unity of art" doctrine[95] and a product can therefore be protected under copyright protection and a registered right. Germany allows the so-called "partial cumulation" which permits copyright protection for some categories of works of applied art, in addition to the *sui generis* protection of design[96]. There are also notable exceptions: Italy, where copyright protection can only apply for a very limited range of design items[97], and the United Kingdom, where a product cannot be protected by both copyright and unregistered design[98]. Moreover, as provided by the English Copyright, Design and Patent Act (CDPA) 1988 s.51: "It is not an infringement of any copyright in a design

[89] TOOTAL, "The law of industrial Designs", *C.C.H.*, 1990 (cited by G. TRITTON, *op cit*, p. 551).
[90] Regulation (EC) No 6/2002 of 12 December 2001 on Community designs, art. 3(a); Directive 98/71/EC on the legal protection of design, art. 1(a).
[91] W. CORNISH, D. LLEWELYN, T. APLIN, *Intellectual Property: Patents, Copyright, Trademark and Allied Rights*, 7th ed., London, Sweet and Maxwell, 2010, p. 599.
[92] A. KINGSBURY, "International harmonization of designs law: the case for diversity", *E.I.P.R.*, vol. 32, issue 8, 2010, p. 391.
[93] A. KINGSBURY, *op cit*, p. 382.
[94] G. TRITTON, *op cit*, p. 590.
[95] A. KINGSBURY, *op cit*, p. 384.
[96] *Ibidem*.
[97] This is further discussed in this thesis p. 23.
[98] G. TRITTON, *op cit*, p. 590.

document or model recording or embodying a design for anything other than an artistic work or a typeface to make an article to the design or to copy an article made to the design".

The Directive 98/71 on the legal protection of designs provides in its article 17 the possibility for cumulation, but since Member States are left free to determine the requirements for a product to be granted the copyright protection, there is no real harmonization in practice. However, it has to be noted that in the case *Flos SpA v. Semeraro*[99], the ECJ ruled that article 17 of Directive 98/71 did not permit Member States to prevent copyright protection for a protected registered design because it had entered into the public domain before the implementation of the Design Directive 98/71. If an interim limitation applied for any production manufactured before the implementation of the directive, such limitation should not apply for a prolonged time (this period was reduced from 10 to 5 years in Italy).

There is actually a complicated interaction of several forms of IPRs that might serve to protect a design. In order to advance a clear development of the interrelationship of design's property rights and 3D printers, it is therefore necessary to analyze and assess each of these IPRs in a separate way. In my thesis, I will analyze design patent, copyright and trade dress.

As presented in the introduction, this thesis will describe and compare these property rights as existing in the United States and the European Union. It should be already underlined that the two systems are linked by several international agreements[100]. Nevertheless, these agreements actually provide the mere obligation for signatories to protect new and original industrial designs, leaving therefore considerable flexibility[101].

Since this thesis is mainly concerned with the different protections of designs, the sensitive question of functional objects' protection will be analyzed for each IPR. It is indeed clear that products embodying both artistic features and technical functions raise several issues for each IPR: copyright, design patent and trade dress.

[99] E.C.J., 27 January 2011, Flos SpA v. Semeraro Casa e Famiglia SpA, C-168/09; for an analysis of the case, see E. D. VENTOSE, "ECJ rules on legislative limitations on copyright protection for designs in Europe", *Journal on Intellectual Property Law & Practice*, 2011, available at http://jiplp.oxfordjournals.org (6 June 2013).
[100] The United States and the European Union are both members of the World Intellectual Property Organization (WIPO) and the World Trade Organization (WTO).
[101] A. KINGSBURY, *op cit*, p. 391.

Section 2: Copyright

§1. In general

Copyright might be considered to be the "golden protection" for a creator. This is mainly due to the fact that it has the longest term, is free of charge, and applies automatically as soon as there is an artistic creation. The basic principles are similar in the United States and the European Union since they are both signatories of the WIPO treaties[102] and WTO TRIPS Agreement[103]. The effort to introduce minimum international standards for copyright rules was made by the Berne Convention. As stated by E. L. CARTER, the following adoption of TRIPS "gave teeth to the harmonization effort by tying intellectual property protection to trade; nations that fail to comply with TRIPS may be subject to international trade sanctions"[104]. However, copyright protection remains a territorial right. Therefore, the core principles such as authorship, duration, rights, exceptions and remedies are treated at the national level, based upon the respect of international binding treaties and agreements[105].

Copyright protection can only apply to "expressed ideas" not ideas themselves. This is the so-called principle of "idea-expression dichotomy". The conditions of originality and fixation are the two paramount requirements for copyright protection. Moreover, the terms of protection are similar: 70 years after the death of the author[106]. The economic rights[107] provided to the author are also similar in the United States and the European Union: right to distribute, to make available to the public and right to reproduce[108].

Finally, both the United States and the European Union provide that the creative work has to be original but not unique. This means in theory that two artists are allowed to end up with the same creation, and therefore both be provided protection, if these creations were created

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[102] Berne Convention for the Protection of Literary and Artistic Works, 9 Sept. 1886, as revised at Paris on 24 July 1971, available at http://www.wipo.int/treaties/en/ip/berne/trtdocs_wo001.html (6 June 2013).
[103] Agreements 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, available at http://www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm (6 June 2013).
[104] E. L. CARTER, "Harmonization of copyright law in response to technological change: lessons from Europe about fair use and free expression", *U. La Verne L. Rev*., vol. 30, 2008-2009, p. 315.
[105] E. L. CARTER, *op cit*, p. 473.
[106] 17 U.S.C. §302(for works made for hire: 95 years from publication or 120 years from creation, whichever is the shortest); Council Directive 93/98/EEC of 29 October 1993 harmonizing the term of protection of copyright and certain related rights.
[107] Contrary to the European Union, the United States does not recognize any moral right to the author.
[108] 17 U.S.C. §106(1)-(6); art. 2-4 Copyright Directive.

independently. This possibility does not exist in design patent law, which forbids parallel creations. Moreover, this requirement of originality is in general considered as a lower standard than the condition of novelty for design patent[109].

§2. The United States and the principle of severability

The applicable regulation lies in the 13 chapters of the Title 17 U.S.C. The copyright protection encompasses a very wide range of products[110]. The category related to the scope of this thesis concerns the "pictorial, graphic, and sculptural works"[111]. As defined in §101, these works 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 (…)".

Concerning the protection of the CAD creations that were mentioned above, these seem to be very similar and therefore embodied by the term "technical drawings" in §101[112]. Moreover, they respect the requirement of being fixed on a tangible medium of expression given that "they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device"[113].

The United States' copyright regime has a fundamental principle: there is no copyright protection of useful articles. The last sentence of §101 strongly limits the scope of protection: "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". A useful article is defined

[109] D. AMOR, "World IP Report: Protecting Italian lamps and egg chairs: proposed repeal of section 52 CDPA (UK)", *Bloomberg BNA*, vol. 26, n° 10, October 2012, p. 2, available at http://www.hoganlovells.com/newsmedia/newspubs/pubDetail.aspx?publication=8409 (6 June 2013).
[110] 17 U.S.C. §102.
[111] 17 U.S.C. §102 (a)(5).
[112] D. H. BREAN, *op cit*, p. 33.
[113] *Ibidem*..

as "an article having an intrinsic utilitarian function that is not merely to portray the appearance of the article or to convey information"[114].

Therefore, the United States applies the so-called "principle of severability"; it must be possible to identify the artwork separately from the utilitarian aspects of the object. This method has led to several cases, issues, and debates on the doctrine. The idea is that the artistic expression of the author should always be separable from the utilitarian aspect of the article. Therefore, copyright does not protect the whole product but only the artistic features that stand alone[115]. There are currently two ways to separate ornamental features from functional ones: the traditional "physical severability" and the "conceptual severability" which was created later by case law[116]. Since a design always strives to be as incorporated as possible within the functionality of an object, it might be stated that "The better a product's design, the less likely it is to have copyright protection"[117].

As stated by M. WEINBERG[118] and numerous authors before him, the courts' arguments deeply differ from each other concerning this delicate question of severability. In *Kieselstein-Card v. Accessories*[119], the Court concluded that a pair of fancy belt buckles had conceptually separable sculptural elements since the artistic elements played a primary role. Concerning a sculpted mannequin[120], the Court held that this requirement had not been met because the features of the mannequin were "driven by the utilitarian need to display clothing"[121]. Concerning a bike rack[122], the Court decided that an industrial design, even if well-executed, could not be protected by copyright[123]. It was noted by the Court that conceptual separability exists where the "designer's artistic judgment"[124] is exercised independently of the item's function. Finally, concerning a cosmetology mannequin head[125], the Court remained in line with the previous case by stating that: "If the elements do reflect the independent artistic judgment of the designer, conceptual separability exists. Conversely, when the design of a

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[114] 17 U.S.C. §101.
[115] M. WEINBERG, "What's the deal with copyright and 3D printing?", January 2013, *Public knowledge*, p. 9, available at http://publicknowledge.org/Copyright-3DPrinting (6 June 2013).
[116] *Kieseltein-Cord v Accessories by Pearl*, Inc., 632 F.2d 989 U.S.P.Q. (BNA) 1 (2d Cir. 1980).
[117] P. J. SAIDMAN, "The crisis in the law of designs", *J. Pat. & Trademark Off. Soc'y*, vol. 89, 2007, p. 307.
[118] M. WEINBERG, "What's the deal with copyright and 3D printing?", *op cit*, pp. 10-13.
[119] *Kieseltein-Cord v. Accessories by Pearl, Inc*., 632 F.2d 989 (2d Cir. 1980).
[120] *Carol Barnhart Inc. v. Econ. Cover Corp., 773* F. 2d 411 (2d Cir. 1985).
[121] M. WEINBERG, "What's the deal with copyright and 3D printing?", *op cit*, p. 11.
[122] *Brandir Int'l, Inc. v. Cascada Pac. Lumber Co*., 834 F.2d 1142 (2d Cir. 1987).
[123] *Ibidem*, p. 1147.
[124] *Ibidem*, p. 1145.
[125] *Pivot Point v. Charlene Products*, 372 F.3d 913 (7th Cir. 2004).

useful article is as much the result of utilitarian pressures as aesthetics choices, the useful and aesthetic elements are not conceptually separable"[126]. The Court concluded by granting the copyright protection for the mannequin head. It was considered that the face could have been made in many other ways and that the artist did not have to follow strict industrial design requirements.

It seems obvious that despite the wish of the Courts to create a clear framework around these notions of "separability", the judgments still differ from one another. That leaves potential individual claimants with an unpredictable "case by case" analysis. However, it is shown by these cases that utilitarian objects are not likely to be protected by copyright[127]. It should also be noted that the last cases seem to come closer to the current principle of "multiple forms" that applies more or less strongly in the EU Member States as analyzed below.

§3. The European Union and the numerous regimes

Copyright is probably the least harmonized right across the European Member States. The so-called Copyright Directive[128] has actually only created a minimum harmonization standard for copyright and related rights in the information society. For instance, no definition is given as to what is subject to copyright protection, leaving the Member States to determine whether or not copyright protection should apply to industrial designs in their domestic law[129]. Therefore, it can be considered that the European Union owns 27 different regimes of copyright with conditions for protection that vary from a State to another. In Member States such as Italy, Germany, Portugal and Spain, a high degree of artistic merit is required in the work[130]. Italy is thus considered as more exigent regarding the conditions of originality than Member States such as France and Belgium[131]. As said above, copyright plays a small part for designs in Italy due to the strict requirement of "artistic value"[132].

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[126] *Pivot Point v. Charlene Products*, p. 931
[127] P. J. SAIDMAN, *op cit*, p. 309.
[128] 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.
[129] K. A. LEVIN, "A survey of industrial design protection in the European Union and the United States", *E.I.P.R.*, vol. 25, issue 3, 2003, p. 116.
[130] G. TRITTON, *op cit*, p. 589.
[131] E. DERCLAYE, "La Belgique: un pays de cocagne pour les créateurs de dessins et modèles ?", *I.R.D.I.*, 2009, p. 107.
[132] See Tribunal of Milan, 2 August 2012, Vitra Patente AG ed altri v. High Tech s.r.l., Case RG 1983/07; Tribunal of Milan, 12 September 2012, Flos SpA v. Semeraro Casa & Famiglia SpA, case R.G. 74660/06. In both cases, the Courts considered that a significant indicator of the artistic value of the design work was to be found in the concerned art critics and cultural institutions. The Court of Milan underlined that the ARCO lamp

Copyright protection can be subject to the "severability principle", as applied in the United States[133]. There is also room for the principle of "multiple forms" that can be applied at the step of the assessment of originality: the more the shape is dictated by a technical result, the less the creator was able to integrate his artistic expression, and the less the work is likely to be protected by copyright[134]. It can be considered that the "multiplicity of forms" might help to determine whether or not the author was forced to create in a certain way, the creation being therefore somewhat "imposed"[135].

An original decision was released in the UK. In the case *Lucasfilms*, it was decided that the copyright protections provided under CPDA 1988 s. 4 to "sculptures" and "works of artistic craftsmanship" should be limited to objects that were actually created for these artistic merits[136]. This case concerned helmets from the movie Star wars.

Section 3: The design patent

§1. The United States: a design patent stemming from the utility patent

The United States provide a protection for designs that lasts for fourteen years from the date of grant[137]. As stated in the chapter 16: "Whoever invents any new, original and ornamental design for an article of manufacture may obtain a patent therefore, subject to the conditions and requirements of this title"[138]. The design cannot be protected separately from the

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was included in the MoMA collection among other international expositions. This was a clear indication of the artistic value of the work. On the contrary, the name of the designer, whether well known or not, should be deemed irrelevant (see G. SPEDICATO, "Italy: copyright protection only for 'high level' industrial design", 11 October 2012, available at http://kluwercopyrightblog.com/2012/10/11/italy-copyright-protection-only-for-%E2%80%98high-level%E2%80%99-industrial-design (6 June 2013)).

[133] In Italy for instance (See FRANZOSI, "The legal protection of industrial design: unfair competition as a basis of protection", *E.I.P.R.*, issue 5, p. 154 (cited by G. TRITTON, *op cit*, p. 589).

[134] P. LAURENT, "Exclusion de la protection par le droit des dessins et modèles des "caractéristiques de l'apparence d'un produit qui sont exclusivement imposes par sa fonction technique": passé et présent", *I.R.D.I.*, 2003, p. 211.

[135] P. LAURENT, *op cit*, p. 212.

[136] Supreme Court, Lucasfilm Limited and others v. Ainsworth and another, [2011] UKSC 39. The parties tried to protect the creation as "sculpture" in order to avoid the special regime of s.52 CDPA (ie. a limited 25 years protection for the mass produced works).

[137] 35U.S.C. §173.

[138] 35 U.S.C. § 171.

product[139]. This is in line with the regime of the community design discussed below. As an illustration of this principle; the emblem of a car will be protected by a design patent if embodied in the car; there won't be an independent protection from the car[140].

As for the utility patent, an industrial design has to be original, novel and non-obvious to be granted protection. The novelty requirement is satisfied if "the overall appearance of the design in the eyes of an ordinary observer is different from the appearance of any other design in the prior art"[141]. It is interesting to note that the requirement seems closer to the European condition of "individual character" than the requirement of "novelty"[142].The notion of "ordinary observer" has led to more discussions than the "informed user" in the European Union[143]. Finally, the requirement of non-obviousness, stemming from the utility patent regime, goes a step further and is an additional, more stringent standard than the two European requirements (novelty and individual character) creating difficulties for many designs[144].

As in the European Union, the design cannot be dictated by technical functions[145] and has to be visible during the final use[146]. To avoid this exclusion, the designer has to prove that an alternative design can perform substantially the same function. One of the reasons for the exclusion of technical functions is to ensure that protection is not provided to what can be protected by utility patent. Overall, it is considered that United States is more stringent for protection of industrial design than the European Union. Besides the requirement of non-

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[139] *John H. Harland Co v. Clarke Checks* Inc., 711 F. 2d 966 (11th Cir. 1983); *Two Pesos, Inc. v. Taco Cabana, Inc.*, 505 US 763 (1992) (cited by K. A. LEVIN, *op cit*, p. 112).
[140] K. A. LEVIN, *op cit*, p. 123.
[141] K. A. LEVIN, *op cit*, p. 121.
[142] *Ibidem*.
[143] The Supreme Court, in the case Gorham, had clearly stated that the ordinary observer should not be an expert or someone versed in the trade, but rather someone with "ordinary acuteness, bringing to the examination of the article upon which the design has been placed that degree of observation which men of ordinary intelligence give" (*Gorham Manufacturing Co. v. White*, 81 U.S. at. 528 (1871)). However, in *Arminak & Associates v Saint-Gobain Calmar*, the Court of Appeals (Federal Circuit) upheld the decision of the District Court by stating that ordinary observer in the case should be the industrial purchaser. This decision was related to the circumstance that the product at issue, a sprayer shroud design, was a component part of a product bottle and could not be seen alone by the final consumer (*Arminak & Associates v. Saint-Gobain Calmar*, 501 F.3d 1314 (2007)).
[144] P. J. SAIDMAN, *op cit*, p. 332.
[145] *Best Lock v. Ilco Unican*, 94 F3d 1563, 40 (1996) (cited by P. J. SAIDMAN, *op cit*, p. 320). This principle is similar to the one we have in the European Union since the E.C.J. case *Philips v. Remington* (E.C.J., 18 June 2002, Koninklijke Philips Electronics NV v Remington Consumer Products Ltd, C-299/99).
[146]The fact that the design is hidden from the view is during the end use brings the presumption that it is primarily functional (K. A. LEVIN, *op cit*, p. 122).

obviousness, US patent law requires strict application formalities for reinsurances and re-examinations of the designs patents previously issued[147].

Concerning the issue of infringement, the designer was required, until a short time ago, to prove two distinct tests: the so-called Gorham test and "point of novelty" test[148]. The former weighs whether the two designs can be considered as being identical by asking if an ordinary observer might buy the accused copy supposing it to be the other one[149]. The "point of novelty test" questioned whether it was the novelty of the registered design, distinguishing it from prior art, that was appropriate by the accused design[150]. This second test for infringement, considered as a complicated separate requirement that weakened the whole design patent system[151], was considered inconsistent and stopped in September 2008 by the Court of Appeal (Federal Circuit) in *Egyptian Goddess v Swisa*[152].

§2. The European Union: different levels of harmonization

First of all, it is to be noted that patent design has faced different levels of harmonization in the European Union. A design could therefore be protected at national level, in a region (I quote here the Convention of Benelux), or at the European level. Concerning domestic law, the Directive 98/71/EC on the legal protection of designs[153] was designed to harmonize registered protection for industrial design within the European Member States. As a Directive, it leaves some freedom for the domestic regimes. The Member States remain empowered to decide how to implement it as long as the goals are reached.

The regulation[154] provides the existence of both a Registered Community Design (RCD) and an Unregistered Community Design (UCD) with a central registry[155].This specific protection of unregistered design does not exist in the United States. The RCD term is identical with the registered design provided by the directive, i.e. 25 years (5 years that can be 4 times

[147] K. A. LEVIN, *op cit*, P. 122.
[148] R. KATZ, "A global guide to design protection", *Managing Intell. Prop*., no. 189, May 2009, p. 55.
[149] *Ibidem*.
[150] *Ibidem*.
[151] *Ibidem*.
[152] *Egyptian Goddess v. Swisa*, 543 F.3d 665 (Fed. Cir. 2008).
[153] Directive 98/71/EC of the European Parliament and of the Council of 13 October 1998 on the legal protection of designs.
[154] Council Regulation (EC) No 6/2002 of 12 December 2001 on Community designs.
[155] Office for Harmonization in the Internal Market (OHIM).

renewed)[156]. The UCD protection is substantially shorter since it lasts for no more than 3 years[157]. In contrast with the RCD, the UCD occurs upon public disclosure and prevents commercial use of the design only if an actual copy is proven[158]. Contrary to the United States, a single application for registered design may contain several designs[159] and does not involve search for prior art. This makes the process relatively cheap and fast[160], and therefore really appealing for the applicants[161].

The scope of protection, as in the United States, is a product. The board of Appeal considered an RCD for a "toy car"[162] and demonstrated that the object of protection is not an appearance detached of the product, but constitutes a protection of a concrete product.

The general requirements remain the same. First, the design has to be new and have an individual character[163]. Both The Directive and the Regulation provide that the individual character exists if: "the overall impression it produces on the informed user differs from the overall impression produced on such a user by any design which has been made available to the public"[164]. Moreover, a design incorporated in a complex product has to remain visible during the use of the product[165]. The question of the freedom of the creator is also taken into consideration: a design cannot be solely dictated by the technical functions of the creation[166] and the degree of freedom of the designer has to be taken into consideration for the assessment of the individual character[167]. It seems obvious that more freedom will lead to more individual character and therefore a greater scope of protection[168]. This is followed by

[156] Art. 10 Directive 98/71/EC; art. 12 and 13 Regulation (EC) No 6/2002.
[157] Art. 11 Regulation (EC) No 6/2002.
[158] Art. 19(2) Regulation (EC) No 6/2002.
[159] Art. 37 Regulation (EC) No 6/2002.
[160] The registration is generally issued within 3-6 months, this contrast with the United-States (up to 2,5 years) (R. E. KEEBAUGH, "Intellectual property and the protection of industrial design : Are sui generis protection measures the answer to vocal opponents and a reluctant congress?", *J. Intell. Prop. L.*, vol. 13, 2005-2006, p. 262).
[161] Moreover, as in the United States, the designer has a 12 month grace period to fill a design application after the design has been made available to the public (Art. 7(2) Regulation (EC) No 6/2002).
[162] OHIM, The Board of Appeal, 25 January 2008, *Ferrari S.P.A. v Dansk Supermarked A/S*, Case R0084/2007-3.
[163] Art. 3(2) Directive 98/71/EC; art. 4(1) Regulation (EC) No 6/2002.
[164] Art. 5 Directive 98/71/EC; art. 6(1) Regulation (EC) No 6/2002.
[165] Art. 3(a) Directive 98/71/EC; art. 4(2)(a) Regulation (EC) No 6/2002.
[166] Art. 7(1) Directive 98/71/EC; art. 8(1) Regulation (EC) No 6/2002.
[167] Art. 5(2) Directive 98/71/EC; art. 6(2) Regulation (EC) No 6/2002.
[168] T. HEADDON, "Community design right infringement: an emerging consensus or a different overall impression?", *E.I.P.R.*, vol. 9, issue 8, 2007, p. 338.

the so-called must-fit exception[169] that prevents protection of tools that must be reproduced with the exact same shape in order to fit another product. This principle might apply, for instance, to refuse to grant protection for a phone case.

The question of the relation between design and technical requirements was considered by the ECJ in the trade mark case *Philips v. Remington*[170]. As demonstrated by the Advocate-General, the technical function exclusion contrasts with the trade mark protection. Indeed, contrary to trade mark; "the feature concerned must not only be necessary but essential in order to achieve a particular technical result: form follows function. This means that a functional design may, none the less, be eligible for protection if it can be shown that the same technical function could be achieved by another different form"[171]. This principle might seem very close of the principle of "multiple forms" mentioned concerning copyright: the characteristic is excluded if it is impossible to replace it by another shape reaching the same technical result[172].

The question of the "informed user", mentioned both concerning the notion of individual character[173] and scope of protection[174], is interesting enough to be briefly analyzed. It is considered that the informed user "is not the designer or a design expert but possibly someone with more specific knowledge of the relevant market perhaps a retailer or another person trading with the relevant product"[175]. In the case of the board of appeal mentioned above[176], it was held that the informed user was the child who used the toy, and that he could not perceive the intricate design details of the car. This vision, shared by the United States, seems to be accepted by the different national Courts[177].

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[169] Art. 7(2) Directive 98/71/EC; art.8(2) Regulation (EC) No 6/2002 : "A design right shall not subsist in features of appearance of a product which must necessarily be reproduced in their exact form and dimensions in order to permit the product in which the design is incorporated or to which it is applied to be mechanically connected to or placed in, around or against another product so that either product may perform its function".
[170] E.C.J., 18 June 2002, Koninklijke Philips Electronics NV v Remington Consumer Products Ltd, C-299/99.
[171] Opinion of Advocate-General COLOMER.
[172] P. LAURENT, *op cit*, p. 208.
[173] Art. 5 Directive 98/71/EC; art. 6(1) Regulation (EC) No 6/2002.
[174] Art. 9(1) Directive98/71/EC ; art. 10(1) Regulation (EC) No 6/2002.
[175] OHIM Newsletter 21 July 2005 (cited by G. TRITTON, *op cit*, p. 569).
[176] OHIM (The Board of Appeal), 25 January 2008, *Ferrari S.P.A. v Dansk Supermarked A/S*, Case R0084/2007-3.
[177] E. DERCLAYE, *op cit*, p. 107.

Unfortunately, the interpretations of what is an actual infringement still vary widely from a State to another. As an illustration: the *Procter and Gamble* cases[178]. This company sued *Reckit Benckiser* in 6 different countries for infringement of the registered design in there spray mechanism of an airspray freshener can. The first Instance Court of Brussels[179] and the Appeal Court of Paris[180] considered that the designs were identical. On the other hand, the UK Court of Appeal reversed the first instance finding of infringement[181], following the decision made by the Austrian Court of Appeal[182]. It should be noted that the United Kingdom makes a distinction between the "overall impression" when it comes to the claim of protection and the "overall impression" when it comes to a potential infringement. While a "clear difference" is necessary to obtain a design protection, a mere "difference" is enough to avoid the infringement of a protected product[183]. Such distinction, not provided by the Regulation neither the Directive, does not support the purpose of harmonization and is therefore strongly disputable.

In any case, it is interesting to note that the choice of the creator to claim protection for the whole or, on the contrary, a part of a product, will lead to different decisions concerning the "overall impression" and therefore the potential infringement[184]. Also, since the design protection applies to a product, only the products of the same nature or function are taken into account to assess a potential infringement[185].

The requirements seen above lead to a large exclusion of the protection for spare parts[186]. These spare parts will be either excluded because they are dictated by technical functions, because they are hidden during the normal use, or because of the must-fit exception[187]. Taking

[178] For a detailed analysis of the cases, see D. STONE "Some clarity, some confusion: 12 P&G v Reckitt Benckiser decisions help explain registered Community designs", *Journal of Intellectual Property Right and Practice*, 208, Vol. 3, n° 6. 2008, pp. 376-385.
[179] Tribunal of First Instance of Brussels, 10 November 2006, NV Reckitt Benckiser (Belgium) v. The Procter & Gamble Company, Case AR 06/7130/A (cited by D. STONE, *op cit*).
[180] Cour of Appeal of Paris, 17 January 2007, La Societe Reckitt Benckiser France v. La Societe Procter et Gamble Company, Case 06/07360 (cited by D. STONE, *op cit*).
[181] Court of Appeal Of England and Wales, 10 October 2007, Practer & Gamble v. Reckitt Benckiser [2007] EWCA Civ. 936 (cited by D. STONE, *op cit*).
[182] Oberlandesgericht Wien, 6 December 2006, The Procter & Gamble Company v. Reckitt Benckiser Austria GmbH, Case 5 R 195/06t (cited by D. STONE, *op cit*).
[183] See Court of Appeal Of England and Wales, *op cit* (cited by D. STONE, *op cit*).
[184] See G. TRITTON, *op cit*, pp. 580-581 (taking the example of a spoon which has a distinctive handle).
[185] F. DE VISSCHER, *op cit*, p. 25.
[186] D. MENDIS, ""The clone wars: episode 1 – the rise of 3D printing and its implications for intellectual property law – learning lessons from the past?", *E.I.P.R.*, vol. 35, issue 3, 2013, p. 163.
[187] D. MENDIS takes the example of exhaust pipes for a car, brake blocks for a bicycle or mobile phones covers (D. MENDIS, *op cit*, p. 163).

the imaginary example of the "Scorpio automobile"[188], it should be questioned if the tail door handles were designed as ornamental features or to achieve a technical result (such as a better grip) in order to decide whether or not it can be protected. It will also be asked whether another shape might perform the same result. Needless to say those assessments might be highly sensitive and unpredictable, especially since there has always been a relation between the design and the function. As stated by M. WEINBERG: "In general, industrial designers achieve elegance by wedding form to function – finding a single way to meet both imperatives"[189].

Neither the Regulation, nor the Directive is intended to affect the national IPRs that apply to designs, such as unregistered design right[190]. The United Kingdom is the only State that provides an unregistered Design, which is quite different from the one provided by the Regulation. Indeed, it protects internal features (visible or not) and lasts 10 years[191].

Concerning the Benelux, the Uniform Law of Benelux, in line with the Directive 98/71, was replaced in February 2005 by the Benelux Convention on Intellectual Property[192]. This Convention, applicable since February 2007, does not change the basic provisions of the previous regime.

To close the question of the European rules, it must be underlined that the conditions for a product to be deemed "disclosed" are less wide than for the utility patent. Indeed, a design will not be considered to have been made available to the public where "these events could not reasonably have become known in the normal course of business to the circles specialised in the sector concerned, operating within the Community"[193]. Nevertheless, the place of disclosure will not be taken into account: A model disclosed outside of Europe could be known by the concerned sector within the European Union[194].

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[188] K. A. LEVIN, *op cit*, pp. 122-123.
[189] 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*, November 2010, available at http://publicknowledge.org/it-will-be-awesome-if-they-dont-screw-it-up (6 June 2013).
[190] G. TRITTON, *op cit*, p. 562.
[191] *Ibidem*.
[192] Benelux Convention on Intellectual Property (Trademarks and Designs) of 25 February 2005, available at http://www.wipo.int/wipolex/en/other_treaties/details.jsp?treaty_id=229 (6 June 2013).
[193] art. 6(1) Direction 98/71/EC; art 7(1) Regulation (EC) No 6/2002.
[194] F. DE VISSCHER, *op cit*, p. 23.

Section 4: Trade dress

Like copyright, trade mark is a very attractive protection for companies given that it can last forever as long as the periodical fees are paid. The ultimate goal behind this right is however different than for the other intellectual property rights. Indeed, the purpose is the protection of the consumer, not the creator. Trade mark permits the consumer to be aware of the origin of a product and to distinguish the said product from other products within the same field. However, it has the spillover effect of protecting certain design elements[195].

The term "trade dress" might be considered as a subsection of trade mark, relating only to the shape of the item. Indeed, it should be kept in mind that trade mark is not only to protect words' representation. A classical example of a trade mark is the shape of coca cola's bottle.

This section might not seem really pertinent for the present thesis. It should be kept in mind that manufacturers will always strive to expand the scope of trade mark protection given that it is potentially infinite in time[196]. Nevertheless, since this IPR should not constitute a real difficulty with respect to the spread of 3D printers, the section will be succinct.

§1. The United States

Given its particular purpose, the protection is limited in the "use in commerce". Copying is not in itself a violation of the law. On the contrary, using a copied trade mark in commerce to deceive the consumer is a violation[197]. Therefore, it is permissible to copy a product protected by trade mark for a personal purpose. Indeed, it is considered that the individual will not deceive himself given that he is aware of the origin of the copy he just made.

Following the Court decisions in Wal-Mart[198] and TrafFix[199], it can be considered that a design might be protected under trade dress protection in very rare circumstances[200]. This

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[195] P. J. SAIDMAN, *op cit*, p. 304.
[196] 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", *op cit*, p. 14 (quoting Wal-Mart Stores and Traffix devices). For the EU, see the E.C.J. case (E.C.J., 18 June 2002, Koninklijke Philips Electronics NV v Remington Consumer Products Ltd, C-299/99).
[197] 15 U.S.C. §1114.
[198] *Wal-Mart Stores, Inc. v. Samara Bros., Inc*., 529 U.S. 205 (2000).
[199] *TrafFix Devices, Inc. v. Mktg. Displays*, Inc., 532 U.S. 23 (2001).
[200] P. J. SAIDMAN, *op cit*, p. 304.

comes from the requirement in the Wal-Mart decision of a "secondary meaning"[201]. As it is the case in the European Union, it takes time for a product to become somewhat famous and obtain such secondary meaning[202].

§2. The European Union

In The European Union, as long as a sign is capable of being represented graphically and capable of distinguishing the good or services from one other, it can be protected by trade mark[203]. Such as for design, there is a Community trade mark regime[204] a trade mark Directive[205] and the Benelux Convention[206]. Like in the United States, the trade mark owner can prevent any third party from using his trade mark in the use of trade[207]. Concerning the relation of trade mark and technical features, it was mentioned *supra* with the case *Philips v. Remington*[208] that the theory of "multiple forms" does not apply to trade mark: If the sign is necessary for a technical result, it is excluded.

[201] The secondary meaning, acquired over time with advertising, means that an association between the design and the source of the product must be made by the consumer (P. J. SAIDMAN, *op cit*, p. 304).
[202] P. J. SAIDMAN, *op cit*, p. 304.
[203] Art. 2 Directive 2008/95/EC; art. 4 Regulation (EC) No 207-2009.
[204] Council Regulation (EC) No 207-2009 of 26 February 2009 on the Community trade mark.
[205]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.
[206]Benelux Convention on Intellectual Property (Trademarks and Designs) of 25 February 2005.
[207] Art. 5 Directive 2008/95/EC ; art. 9(1) Regulation (EC) No 207-2009.
[208] E.C.J., 18 June 2002, Koninklijke Philips Electronics NV v Remington Consumer Products Ltd, C-299/99.

CHAPTER III: THE CURRENT WEAKNESSES OF THE RULES IN RELATION TO 3D PRINTERS

Section 1: Generality

§1. More products concerned and more rights to apply: An upcoming headache on the internet

In the previous chapter, the several rights that might protect designs were discussed. Differences have been underlined between the United States and the European Union as well as between the European Member States. Finally, the difficult relation between these rights and utility models has been underlined. This leads to an important observation: All these intellectual protections of physical objects' appearances, as well as their involved issues, are going to be widespread on the digital web thanks to 3D printers and CAD files.

The tangible objects, printable by 3D printing, are digitalized into 3D files and can be shared on internet, which knows no boundary. Every single gap within the regime of design protection that is revealed in the physical world will be mirrored and accentuated in the web 2.0. It could be considered that we have been facing IRPs issues related to the internet for several years already, especially regarding the entertainment industry. However, it is now clear that, while the current movie and music files are basically protected by copyright, a larger range of rights apply to 3D objects. Most countries accept the possibility for a product to be protected by several IP rights. As a consequence, printing an object might not infringe a specific IP right while breaching another one[209].

The case *Lucasfilms* was already discussed *supra*. Regarding the potential copyright protection of helmets, the Court in the United Kingdom refused to grant copyright protection for these items[210]. It is interesting to note that, in 2006, the United District Court (Central District of California) had ruled in favor of *Lucasfilm* and granted $20 million in respect of Mr Ainsworth's acts of copyright infringement[211]. After having refused to merely enforce this

[209] D. MENDIS, *op cit*, p. 167.
[210] Supreme Court, Lucasfilm Limited and others v. Ainsworth and another, [2011] UKSC 39.
[211] *Lucasfilm Ltd. v. Shepperton Design Studios Limited*, U.S. District Court for the Central District of California, No CV05-3434 RGK (2006).

judgment on its territory, the English Supreme Court confirmed the Court of Appeal by rejecting the copyright protection. This is again a good demonstration of the numerous "case-by-case" assessments and challenges that could arise in the future on the internet.

Besides this open door for more IPRs over the web, it seems that 3D files might raise another paramount issue compared to music and movie files. This difference lies in the fact that people are more likely to modify, improve, and reshape designed products in a 3D file than music files and, even more obviously, movie files[212]. As stated in the introduction, I am convinced that not everyone has the soul of a tinkerer eager to invent and create. However, as the programs get more and more user friendly, people will probably begin to change some aesthetical elements within the 3D file. These more or less substantial changes would be made in order to add or remove some features, and therefore result in a more personal object, in line with the tastes of the owner.

As a practical illustration of this statement, one could quote the case of Thomas Valenty mentioned above[213]. Actually, there was no certitude that Thomas would have been condemned if the case had been brought before a Court, as he was accused of having copied the style of the game, which cannot be protected[214]. The figurines had been tweaked before being scanned and posted on *Thingiverse*. The same question might be asked for the *penrose triangle* case since the 2D Penrose triangle was in the public domain[215]. On the one hand, it could be argued that the 3D form created by D. Schwanitz was enough creative to be separately copyrightable[216]. On the other hand, copyright allows for similar independent creation and the alleged infringing work might be considered as another interpretation of the same underlying public domain *penrose triangle*[217].

[212] The link could be made with the worldwide famous song "Technologic" by Daft Punk that was used for one of the most famous *iPod* (*Apple*) commercials. The first verse of this song goes with: "Buy it, use it, break it, fix it, Trash it, change it, mail - upgrade it, Charge it, point it, zoom it, press it, Snap it, work it, quick - erase it, Write it, cut it, paste it, save it, Load it, check it, quick - rewrite it, Plug it, play it, burn it, rip it, Drag and drop it, zip - unzip it, Lock it, fill it, call it, find it, View it, code it, jam - unlock it, Surf it, scroll it, pause it, click it, Cross it, crack it, switch - update it, Name it, rate it, tune it, print it, Scan it, send it, fax - rename it, Touch it, bring it, pay it, watch it, Turn it, leave it, start - format it" (Daft Punk, "Technologic", album *Human after all*, 2005).
[213] See p. 16.
[214] C. THOMPSON, *op cit*.
[215] B. RIDEOUT, "Printing the impossible triangle: The copyright implications of three-dimensional printing", *J. Bus. Entrepreneurship & L.*, vol. 5, 2011-2012, p. 170.
[216] *Ibidem*.
[217] *Ibidem*.

For each case, the main question will be to determine whether or not the alleged infringing design can actually be considered as a genuine infringement. Concerning the design patent, the several European trials opposing *Procter* and *Gamble* mentioned above form a good picture of the uncertainty in the domain. In the field of copyright, the Judgment in *Infopaq*[218] could be applied in the future to several technical situations related to design. The responses of the courts will be likely to stray from each others, leaving room for a lot of uncertainty.

As stated in the first chapter, the field of targeted products will increase as the technology improves and can produce objects in a wider range of materials. Again, one could for instance mention the field of clothes, for which jurisdictions might face in the near future alleged infringing CAD copies as well as 3D printed copies[219]. A case that concerned clothing accessories has already been mentioned *supra* concerning the United States: the Court had concluded that a pair of fancy belt buckles could be granted protection since the artwork was conceptually separable[220]. A. MACHNICKA wrote a paper which compares the intellectual protection of fashion design in the European Union and the United States[221]. The conclusion concerning the United States is in line with what was said in the second chapter; US Courts can apply with discretion the severability test for issues related to clothes, releasing decisions that are actually the reflection of a judge's personal opinion[222]. The European Union does not have a particular concern about the protection of fashion *per se*[223]. Nevertheless, it seems that domestic laws and national Courts are more concerned with this issue[224]. In France, where Paris is often perceived as the capital of fashion, a protection for fashion creations was introduced in by a law of 12 March 1952. The Code of Intellectual Property repealed that law,

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[218] E.C.J., 16 July 2009, Infopacq International A/S v. Dankse Dagblades Forening, C-5/08. In this case, it was decided that an eleven words quote might be a copyright infringement. "Regarding the elements of such works covered by the protection, it should be observed that they consist of words which, considered in isolation, are not as such an intellectual creation of the author who employs them. It is only through the choice, sequence and combination of those words that the author may express his creativity in an original manner and achieve a result which is an intellectual creation.". Following the reasoning of the Court, a tangible expression should be protected when it reflects the author's intellectual creativity.

[219] As mentioned in the first chapter, a 3D printed dress, wallet or sunglass can already be ordered online.

[220] *Kieseltein-Cord v. Accessories by Pearl*, Inc., 632 F.2d 989 U.S.P.Q. (BNA) 1 (2d Cir. 1980).

[221] A. MACHNICKA, "Fashion design – The European Union and the United States compared: The role of fashion creations and their legal recognition", in *Technology and competition contributions in honour of Hanns Ullrich*, Edtions Larcier, Bruxelles, 2009

[222] A. MACHNICKA, *op cit*, p. 214. The author analyzes different cases: *Whimsicality, Inc. v. Rubie's Costume Co., Inc*., 891 F. 2d 452 (2nd Cir. 1989), *National Theme Productions, Inc. v. Jerry B. Beck, Inc.*, 696 F.Supp. 1348 (S.D. Cal. 1988), *Animal Fair, Inc. v. Amfesco Indus., Inc*., 620 F. Supp. 175 (D. Minn. 1985) and *Chosen International Inc. v. Chrisha Creations Ltd*., 413 F. 3d 324 (2nd Cir. 2005).

[223] A. MACHNICKA, *op cit*, p. 217.

[224] A. MACHNICKA, *op cit*, pp. 217-218.

but expressively included the provision of copyright protection for fashion designs[225]. As a result, no clear framework for assessing issues relating to the future jackets and bags can be determined through past court decisions and current legislation.

Compared to these future situations, the assessment of the judge is currently easier concerning the claim for an unlawful distribution of a film copy. First, the judge is able to quickly assess whether or not the movie is protected by copyright. Second, it is clear that the movie distributed is a genuine copy of the original, and not an independent creation. It is possible to replace the movie in this example by, say, a 3D printable designed cup covered by little pins[226]. It is certain that that the assessment of the judge will be substantially more difficult. First, the judge will be no longer able to determine as swiftly whether any, or several, IPRs apply to this utilitarian object. Regarding this, it has to be noted that the little pins have a utility function since they prevent the user from getting burned when the cup is filled with a hot beverage. Second, it will have to be assessed whether a highly similar cup will be considered as an infringement. The situation will be even more complicated when the cup is also covered by specific colors and drawings. Needless to say that the jurisdictions of France, Italy, the United Kingdom or the United States are likely to have different analysis and therefore issue different decisions. This is precisely the direction where 3D printers and CAD files usher us.

§2. The remaining difficulty of the enforcement

It is thus clear that the assessment of claimed online infringements should become substantially more complicated than it is today. Furthermore, it should be kept in mind that any rule, clear or not, has to be enforced. This statement is particularly pertinent concerning cyberspace and could lead to the observation that copyright protection as never been stronger

[225] "Creations of seasonal industries of clothing and decoration" (Art. L. 112-1 and L. 112-2, 14, Code de la propriété intellectual) (cited by A. MACHNICKA, *op cit*, p. 218).

[226] This is actually an existing product: the *Hedgehog cup* was created by the design studio *Burojet* in 2010 (to see a picture of the item: http://www.burojet.com). Here is the description given of this designed product on the website: "The Hedgehog insulation cup, made out of 3D printed Polyamide. The inner cup is the container to hold the liquid, the outer cup is former trough pins, creating a skin of air between your hot drink and your hands. The pins get smaller at the top of the cup towards the rim so you can feel with your lips if the drink is not too hot! Hedgehog cup is suitable for hot and cold non alcoholic drinks, and available in white, grey and black" (http://www.burojet.com/ (6 June 2013).

while copyright enforcement has never been weaker than today[227]. The current struggle against pirated files constitutes a perfect example of the issues that could arise with 3D printers. Indeed, the well-known pirating organization, *The Pirate Bay*, declared in 2012 that the next major kind of circumvented consumer products would be these 3D objects: "One of the things that we really know is that we as a society will always share. Digital communication has made that a lot easier and will continue to do so. (…) Today most data is born digitally. It's not about the transition from analog to digital anymore. (…) We believe that the next step in copying will be made from digital form into physical form. It will be physical objects"[228].

Some online platforms, such as *Thingiverse* or *Quirky*, support consumers in sharing their ideas all around the world. Like D. MENDIS, one could ask oneself is this does not constitute the start of another "Napster revolution"[229]. In short, the case *Napster*[230] was about a Peer-to-Peer platform that contained an explicit list of contents (including music or movie files protected by copyright) available for sharing. It was decided that Napster should be held liable for contributory infringement because it knew that the platform was mainly used for infringement and could have purged the unlawful uses. The Court quoted the case *Sony*[231], in which it was considered that the possibility for tools to be used for an illegal purpose was not enough to condemn the manufacturer of that tool. This was followed in 2005 by another worldwide famous case - *Grokster*[232] - in which the Supreme Court also concluded that the website was liable for indirect copyright infringement. Contrary to the website Napster, there was no central server managing lists of files. Using another argument than its previous case, the Court stated that *Grokster* should be liable since it was obviously aware of and promoted these infringements. It was underlined that, in line with the case *Sony*, the mere support for distribution was not enough to be held liable, even with the knowledge of infringements. The question of enforcement will be further discussed in the last chapter of this thesis.

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[227] This idea was enhanced by Balázs BOLO, amember of the panel at the presentation "Balancing of fundamental rights in online copyright enforcement" (24 January 2013, Computer, Privacy & Data Protection Conferences, 6th edtion, Halles of Schaerbeek, Brussels).
[228] "Evolution : New category", The Pirate Bay Blog, 23 January 2012, http://thepiratebay.org/blog/203 (cited by D. H. BREAN, *op cit*, p. 12).
[229] D. MENDIS, *op cit*, p. 159.
[230] *A and M Records Inc v. Napster Inc* 239 F. 3d 1004 (9th Cir. 2001).
[231] *Sony Corp. of America v. Universal City Studios, Inc.*, 464 U.S. 417 (1984).
[232] *Metro-Goldwyn-Mayer Studios Inc v. Grokster Ltd* 545 U.S. (2005).

Section 2: Copyright

Particular issues arise when it comes to 3D printers and the sharing of 3D files on the internet. In this thesis, two specific questions are tackled: The relation between CAD files and copyright and the issue of private use.

§1. Copyright and CAD files: The Penrose triangle

There is no doubt that the combination of 3D printers and CAD files constitute a real threat to the copying and distribution monopolies of the copyright owner. This also leads to a delicate question in the application of the law: To which means of expression should copyright protection apply?

Before the "Valenty case" mentioned above[233], another dispute related to 3D printing occurred. The "Penrose case" [234], which concerned a CAD file with a 3D representation of the so-called *penrose triangle*, might be considered the first take-down notice related to 3D printing[235]. This triangle is a well-know 2D optical illusion. It was published by Penrose & Penrose in 1958 in the British journal of Technology[236]. It is an "impossible figure" since it cannot be turned into a real 3D object. However, a 3D object might look like the 2D drawing in a certain angle. Dr. Schanitz did create such an object and printed it via the website *Shapesway*. Then he posted a video of his creation on the internet. Seeing that video as a challenge, Artur Tchoukanov created a personal version of the triangle. His version was uploaded on the sharing platform *Thingiverse*, under the pseudonym artur 83, with the instructions explaining how to reach that result. This initiative resulted in a take-down notice being sent by Dr. Schanitz to *Thingiverse*. A copyright infringement was claimed against artur 83 and Chylld (who had made a derivate version of Arthur's public domain licensed work)[237].

As noted by B. RIDEOUT, it was not specified by the notice if the protected work was the 3D file or the actual *penrose triangle* as produced by a 3D printer"[238]. Copyright protection can

[233] See p. 16 & 34.
[234] B. RIDEOUT cites B. PETTIS, *Copyright Policy* (Blog Thingiverse which is no more accessible).
[235] B. RIDEOUT, *op cit*, p. 161.
[236] L. S . PENROSE & R. PENROSE, "Impossible Objects: A Special Type of Illusion", *Brit. J. Psychol*., vol. 49, 1958, p. 31 (cited by B. RIDEOUT, *op cit*, p. 165).
[237] Cited by B. RIDEOUT, *op cit*, p. 166.
[238] *Ibidem*.

only apply to the concrete expression of the author; it does not protect the ideas themselves. Concerning the case of *penrose triangle*, it could be argued that there was no violation of the original file since Artur used a new file to create a similar object[239].

In the field of 3D printers and CAD files, copyright might thus have to apply at different moments for the same content: When the CAD file is created but also when the product comes into being when printed. It was mentioned in the introduction that a digital 3D object might be either created via a 3D program or constitute a mere copy of a physical creation via a 3D scanner.

A few different situations have to be stressed and analyzed. First, an individual could make a 3D scan of an unprotected product and obtain a digital 3D copy. As a first statement, it could be considered that a mere scan should not be independently protected[240]. This point of view is defended on the basis of case law in the United States[241]. As stated by M. WEINBERG: "The fact that many 3D scanners explicitly try to reproduce the scanned object as faithfully as possible further undermines claims of originality"[242]. Concerning the scanned object, it was said *supra* that the conditions for granting copyright protection vary in practice within the European Member States and between the European Union and the United States. In the present case, one can merely consider that an unprotected object is integrated, via a scan, in a CAD file. Since neither the object, nor the CAD file itself, is protected, everyone should be allowed to basically do whatever he wants with the file without infringing any copyright. This means the possibility to reproduce, change, share and print.

An unprotected object could also be created directly on computer, digitally. Once again, since no copyright is granted to the object, the same conclusion can be advanced: the product can be printed and shared. Indeed, printing the object could not be considered as an infringement since there is no copyright protection applied to it. Concerning the CAD file, opinions could be divided on determining whether or not such a CAD file can be protected by copyright. In

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[239] B. RIDEOUT, *op cit*, p. 167.
[240] M. WEINBERG, "What's the deal with copyright and 3D printing?", *op cit*, p. 15.
[241] *Meshwerks, Inc. v. Toyota Motor Sales U.S.A. Inc*., 528 F. 3d 1258 (10th Cir. 2008) (about a 3D scan of a truck for use in commercials); *Bridgeman Art Library, Ltd., v. Corel Corporation*, 25 F. Supp. 2d 421 (S.D.N.Y. 1987), modified 36 F. Supp. 2d 191 (S.D.N.Y. 1999). The last cases concerned high quality photographs. It was concluded that these were not independently protected. The same conclusion for 3D printers would be in line with this previous opinion (cited by M. WEINBERG, "What's the deal with copyright and 3D printing?", *op cit*, p. 15).
[242] M. WEINBERG, "What's the deal with copyright and 3D printing?", *op cit*, p. 15.

my opinion, a CAD file is not likely to be protected by an independent protection since it lacks the creative element. As stated by M. WEINBERG: "If there is only one way to represent a given useful object [not protected by copyright] in a CAD program, it is unlikely that a court would grant the designer of the object copyright protection in the design file"[243].

As said *supra*, the United Kingdom already has a clear provision concerning this issue. CDPA s. 51 has already been discussed above. It provides the possibility to print the content of a design document without infringing the copyright of that design document, as long as it is not based on or embodying pre-existing artwork. It seems clear that this notion of "design document" encompasses the 3D files[244]. In that case, it means that using the 3D file to "print" an unprotected object would not infringe the copyright of the 3D file[245] while sharing such 3D files would constitute an infringement of this copyright[246]. In my opinion, one should go even further than the English law by stating that no specific copyright protection should apply to CAD files. In practice, a utilitarian object, not protected by copyright and embodied in a CAD file, could be either printed or shared without infringing any kind of copyright. However, it will still be assessed whether other IPRs protect the object and thus limit therefore the possible uses of it.

Following from the previous considerations, the same questions have to be asked in relation to copyrighted objects. It seems that in this case, the situation should be more straightforward. A scan of a protected object means a copy of that object. The core purpose of copyright is to grant a monopoly for any reproduction and distribution of the protected work to the rightholder. Therefore, it might be considered that any person scanning, sharing or printing a CAD file of a protected object would infringe the rights of the concerned rightholder(s). The same will apply if the object is digitally created. According to M. WEINBERG, there should be an independent copyright for the file, considering that the object is a derivate work of that file[247]. Once again, I think that no distinction should be made between the items and the CAD

[243] M. WEINBERG, "What's the deal with copyright and 3D printing?", *op cit*, p. 17.
[244] S. BRADSHAW, A. BOWYER & P. HAUFE, "Intellectual property implications of low-cost 3D printing", *Scripted*, vol. 7, issue 1, 2010, p. 24. The authors illustrate this certitude with the case High Court of Justice (Chancery Division), 22 February 1999, Mackie Designs Inc. v. Behringer Specialised Studio Equipment (UK) Ltd & Ors. [1999] RPC 717.
[245] I mentioned above the CDPA 1988 s. 51
[246] S. BRADSHAW, A. BOWYER & P. HAUFE, *op cit*, p. 25.
[247] M. WEINBERG, "What's the deal with copyright and 3D printing?", *op cit*, p. 19.

file. In any case, the attention will be drawn to the object itself. The copyrightability of a CAD file will basically depend on the copyrightability of that underlying object[248].

To close this section, one should ask whether CAD files could be protected by copyright in the same way as computer programs. Both the United States and the European Union allow the protection of computer programs[249], but the exact notion remains vague. I share the opinion of B. RIDEOUT by asserting that a CAD file should not be introduced in the category of computer programs: "What 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. As a result, Courts would likely not find CAD files to be considered copyrightable software"[250].

§2. Copyright and private copying

The possibility to copy for private use has always been a heated debate in the European Union and all over the world. It constitutes a well-known exception to the reproduction monopoly of the copyright owner. Therefore, the private copy lies in the middle of the struggle between the rightholders, who claim the loss of income, and the "anti-IRPs organizations" that advocate for increased freedom through sharing. In the European Union, the frame of this *exception* has not been harmonized even after the Directive 2001/29 on copyright in the informatics society[251]. Therefore, one could say that "the law of copying in Europe remains as diverse as its cultural traditions"[252].

The private copy was first advanced as a necessity for the respect of private life. Nevertheless, Digital Right Managements (DRMs) - also called Technical Protection Measures (TPMs) – allow the prevention of private copy without intrusion in the private sphere[253]. It should be

[248] B. RIDEOUT, *op cit*, p. 168.
[249] U.S. Copyright Office, "Circular 61: Copyright Registration for Computer Programs, June 1999 (cited by B. RIDEOUT, *op cit*, p. 167); Directive 2009/24/EC of the European Parliament and the Council of 23 April 2009 on the legal protection of computer programs.
[250] B. RIDEOUT, *op cit*, p. 168.
[251] 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. This directive implemented The WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT) for its application to Member States which were not parties of the World Trade Organization.
[252] N. Helberger & P. B. Hugenholtz, *op cit*, p. 1096.
[253] C. GEIGER, *op cit*, p. 122.

kept in mind that other fundamental rights can be advanced to support the existence of private copy, like the right of information[254]. It can also be argued that private copies might serve to allow the authors to reach a larger audience[255]. The spread of works might actually increase the probability of purchase *in fine*[256]. This argument is especially valuable in my opinion. Since copyright largely prevents sharing, private copy is one of the very few legal ways to avoid such interdiction.

The private use exception is quoted in article 5(2)(b) of the Directive 2001/29 which provides the *possibility* for a Member State to enact an exception to the owner's monopoly for the reproduction of his work. Suffice is to say that this discretion left to European Nations leaves the rules largely not harmonized within the EU[257]. Concerning the TPMs, the article 6(4)(2) also reads that Member States *may* take appropriate measures to ensure that rightholders make the private copy available throughout these technical protections. Moreover, a domestic provision implementing that rule will have to respect the so-called "three steps test" detailed in the article 5(5) of the Directive, which states that a measure limiting the rights of the copyright owner "shall only be applied in certain special cases which do not conflict with a normal exploitation of the work or other subject-matter and do not unreasonably prejudice the legitimate interests of the rightholder"[258]. This gives ground for several debates about any national implementation.

As illustrated by the case law in France and Belgium, the private copy has been strongly undermined by the Courts[259]. This allows some authors to consider that the private copy has "lost the game" against TPMs[260]. As recommended by several authors, an appropriate

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[254] C. GEIGER, *op cit*, p. 122.
[255] C. GEIGER, *op cit*, pp. 128-129.
[256] L.N. TAKEYAMAS, "The intertemporal consequences of unauthorized reproduction of intellectual property", *J. L. & Econ.*, vol. 40, 1997, p. 511 (cited by A. MACHNICKA, *op cit*, p. 205).
[257] N. HELBERGER & P. B. HUGENHOLTZ, "No place like home for making a copy : private copying in European copyright law and consumer law", *Berkleley Technology Law Journal*, 2007, p. 1064, available at SSRN: http://ssrn.com/abstract=1012305 (6 June 2013).
[258] This was already provided by international agreements (art. 9(2) Berne Convention; art. 10 WIPO Copyright Treaty; art. 13 TRIPS Agreement).
[259] Brussels Court of Appeal, 9 September 2005, Test Achats v. EMI Recorded Music Belgium, case 2004/AR/1649; Cass 1° civ., 19 June 2008, Universal Music Video France & others v. Stéphane F. & Association UFC Que Choisir, n° 07-14277; Cass 1° civ., 28 February 2006, Studio Canal, Universal Pictures Video France and SEV v. S. Perquin and UFC Que Choisir, *bull*. I n° 126; Court of Appeal of Paris, 4 April 2007, Stéphane F & Association U.F.C. - Que choisir v. Société Universal Pictures Vidéo France and others.
[260] S. DUSSOLIER, "Le « droit à la copie privée » : le débat est-il clos ?", *Revue du Droit des Technologies de l'Information*, issue 23, 2005, p. 78.

measure would have been the compulsory interdiction of TPMs that make the exception for private copy unenforceable[261].

It is interesting to note that the United Kingdom and Ireland do not have an exception for private copy as such. British law uses a different model called "fair dealing" provided for in ss. 29 and 30 of the CPDA 1988. This limits the exception to non-commercial research and private study, criticism and review, and the reporting of current events. The United Kingdom has recently decided to implement a narrow private copy exception[262]. The main reason for this relates to the decision not to apply the system of fair compensation provided for by the Directive. The goal is to keep the harm to the rightholder low enough so that compensation is not needed. Therefore, the UK would stray from the "remuneration principle" that prevails in the Member States of "authors rights tradition"[263] such as in Belgium and in France mentioned above.

Within the exception of the private copy lies the issue of the lawfulness of the source. This issue is paramount in the age of Peer-to-Peer sharing. Once again, the domestic laws are not harmonized. In France, the law implementing the Directive[264] took this question into account. Articles 331-9 and 122-5(2) of the Intellectual Property Code provides that the source has to be lawful. The question of the source is not itself answered by the Belgian law; instead there is simply the possibility to add the exception of private use as a limitation of TPMs. The United Kingdom seems to require the legal ownership of the original work[265]. This is probably a key element in the current digital age and the flood of peer-to-peer shares over the internet. This shows the delicate distinction between a *lawfully accessed* work and a *lawfully owned* work. Germany implemented the exception of private copy by stating that the source

[261] See for instance T. FAELLI, "La copie privée malmenée", *I.R.D.I.*, 2006, p. 50; C. GEIGER, "Copyright and free access to information, for a fair balance of interests in a globalized world", *E.I.P.R.*, vol. 28, issue 7, 2006, pp. 366-371.
[262] HM Government, "The Government Response to the Hargreaves Review of Intellectual Property and Growth", 2011, *pp.7–8*, available at http://www.ipo.gov.uk; Intellectual Property Office, Impact assessment BIS1055, "Copyright exception for private copying", 13 December 2012, available at www.ipo.gov.uk/consult-ia-bis1055.pdf (IPO, "2012 Impact Assessment") (cited by S. KARAPAPA, "A copyright exception for private copying in the United Kingdom", *E.I.P.R.*, vol. 35, issue 3, 2013, p. 129).
[263] N. Helberger & P. B. Hugenholtz, *op cit*, p. 1070.
[264] Law n° 2006-961 of 1st August 2006 on copyright and related rights in information society.
[265] It is made clear that the source copy should be either purchased or gifted (Intellectual Property Office, Impact assessment BIS1055, "Copyright exception for private copying", *op cit*; cited by K. KARAPAPA, *op cit*, p. 134).

should be lawfully accessed and not be obviously unlawful[266]. Spain also implemented the requirement of a legally accessed source, without further explanation[267]. Courts in Spain interpreted the legal requirement of a legally accessed work as meaning that the consumer should have used an internet connection that he paid for[268]. The Netherlands went even further: On 4 February 2013, the Government sent a letter to the Parliament stating that it would not prohibit the unauthorized downloading of copyright material[269]. Before this explicit decision by the Government, the District Appeal Court of The Hague had previously held that downloading from an illegal source was permitted under article 16(c) of the Dutch Copyright Act[270]. As a consequence, the Netherlands is one of the few countries in Europe where downloading protected content without any permission is still allowed under the private copying exception[271]. In my opinion, this ruling might go too far since it explicitly undermines any current copyright protection efforts in the digital world.. However, this legal regime might have to change soon; a preliminary ruling has been issued by the Dutch Supreme Court in the case *ACI ADAM* and is now pending before the European Court of Justice[272]. It is questioned whether article 5(2)(b) of the Copyright Directive allows the exception of private copy for illegal downloading[273]. The ruling of the European Court could put an end to the current lack of clarity.

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[266] Art. 53(1) of the law on copyright and related rights (cited by C. GEIGER, "The answer to the machine should not be the machine: safeguarding the private copy exception in the digital environment", *E.I.P.R.*, vol. 30, issue 4, 2008, p. 128).
[267] Art. 31(2) law of 7 July 2006 amending Revised Law on Intellectual Property.
[268] Commercial Court No.7 of Barcelona, Sociedad General de Autores y Editores (SGAE) v. D. Jesus Guerra Calderon, *C-67/10*, 9 March 2010 (cited by K. KARAPAPA, *op. cit.*, p. 135).
[269] Letter of government to parliament, 4 February 2013 (only in Dutch), available at https://www.bof.nl/live/wp-content/uploads/briefTeeven040213.pdf (6 June 2013).
[270] Court of Appeal of The Hague, 15 November 2010, ACI Adam BV cs v. Stichting De Thuiskopie cs, n° 200.018.226/01 (about the level of fair compensation); Gerechtshof 's-Gravenhage, 15 November 2010, FTD BV v. Eyeworks Film & TV Drama BV, LJN BO3980, n° 200.069.970/01.
[271] O. VAN DAALEN, "Dutch Government maintains private copying-exception for downloading", 13 February 2013, available at http://www.edri.org/edrigram/number11.3/dutch-government-copyright (6 June 2013).
[272] ACI ADAM and others, C-435/12.
[273] The questions of the Dutch Supreme Court are: "1. Should Article 5(2)(b) be interpreted as meaning that the limitation on copyright applies regardless of whether the works became available to the natural person concerned lawfully or does the limitation only apply when the work has become available without an infringement of copyright?
2. If the answer is that it applies only when work becomes available without infringement:-
a) Can the application of the three stage test form the basis of the expansion of the scope of Article 5(2) or can its application only lead to the reduction of the scope?
b) Is a national law that provides for payment of fair compensation for reproductions as above contrary to Article 5?
3. Is the Enforcement Directive (Directive 2004/48/EC) applicable to these proceedings – where a Member State has imposed an obligation to pay fair compensation under 5(2)(b)?" (http://www.ipo.gov.uk/pro-policy/policy-information/ecj/ecj-2012/ecj-2012-c43512.htm (6 June 2013).

Like the United Kingdom, the United States does not allow the right for a private copy and provides instead for the "fair use" of the work. This general principle includes several explicit exceptions to copyright's monopoly such as criticism, comment, news reporting, teaching, research and limited reproductions by libraries[274]. In the case *Sony Corporation*[275], the Supreme Court ruled that making copies for private time-shifting (ie. the recording of a program, such as a TV documentary or a radio show, for a later use) was to be considered as a fair use. This leaves room for a debate about the copy for personal use. On the one hand, many copyright scholars consider that private copies are a fair use, with some believing that the right is so basic that it exists outside of fair use[276]. On the other hand; rightholders stress that such a right results in dramatic loss sales and therefore deny the personal use right[277].

In any case, it is clear that the private copy is, and will remain, a rusty nail in the foot of copyright associations. What can be currently observed concerning downloading and sharing in private spheres of movies and MP3 files should be faced in the exact same way with CAD files.

Section 3: Design patent

§1. Design patent and the right to repair

The question of spare parts, for which the design patent is more likely to apply than the copyright protection, was analyzed *supra*. The right to repair is not explicitly provided in the European Union. Both the Regulation and the Directive invite the Commission to deal with this issue[278]. Nevertheless, the Regulation excludes design protection until modification of the regime and the Directive leaves the regimes that previously applied in the Member States. Regarding this, a designer might be well advised to apply for a design protection within his own country. The Benelux Convention took the clear position of providing the exception for

[274] 17 U.S.C. §§107-112.
[275] *Sony Corp. of America v. Universal City Studios, Inc.*, 464 U.S. 417 (1984).
[276] L. N. GATEWAY, *op cit*, p. 263.
[277] *Ibidem*.
[278] Art. 14 Directive 98/71/EC; art. 11 Regulation (EC) 6/2002.

repair[279]. In my opinion, the consumer will anyway easily use the exception of private copying in order to scan and/or print a CAD file and repair a spare part. It should also be kept in mind that spare parts are likely to be excluded from protection as soon as they fall under the "must-fit" exception or are not visible during the normal use of the product.

This is excellent news for the consumer in the current economic period. Indeed, companies such as automobile manufacturers do not hesitate to compensate the drop of sales on the price of spare parts. The prices of cars have not dramatically changed while the price of, say, a door handle, has boomed. The use of 3D printers combined with the adequate CAD file might allow the consumer to step away from that logic. The exact same logic can be advanced for the manufacturers of domestic appliances (eg. washing machine, dishwasher, vacuum cleaner), which build their machines with a determined limited lifetime. The consumer is then expected to buy a new product since it is sometimes even less expensive than replacing the spare part of the broken one. One again 3D printers might create a turning point in such practice. It should be however kept in mind that only relatively small spares in a printable raw material are concerned by the technology it exists today. Therefore, the sector of appliances might be considered as more relevant than the sector of automobiles.

§2. Design patent and private copying

Once again, the issue of the copy for private use comes to the forefront. The situation might be more straightforward than concerning copyright. Indeed, the Directive 98/71/EC and the Regulation 6/2002 provide that "the rights conferred by a design right upon registration shall not be exercised in respect of acts done privately and for non-commercial purposes"[280]. This means that anyone in the European Union is entitled to print a product protected by a design patent as long as it is for his personal use. Such ability will undoubtedly concern designers, whose creations could be printed thanks to a domestic 3D printer in a perfectly lawful way.

[279] Benelux Convention on Intellectual Property (Trademarks and Designs), art. 3.19(3): "The exclusive right in a design constituting a part of a complex product shall not imply the right to contest use of the design for the purposes of repair of that complex product in order to return it to its initial appearance".
[280] Article 13(1)(a) Directive 98/71/EC; art. 20(1)(a) Regulation (EC) 6/2002; art. 3.19(1) Benelux Convention.

Section 4: Trade dress

Such as M. Weinberg, I do not think that trade dress as it exists today might constitute a real issue in the field of 3D printers**.** The reason is actually twofold. First, and contrary to other IPRs, the main purpose of the trade mark is to protect the consumer. Second, trade dress takes time, effort and money to acquire a distinct meaning for the consumer and be associated with the good. Furthermore, it must be strictly distinct from any functional feature.

Concerning the first element, this means in practice that a trade mark will be considered as misused only when it is used in trade. Therefore, any consumer might distribute an object protected by trade mark as long as it is exempt from any commercial use. The second element simply means that a protection of a design by trade mark is a really long and uncertain process. Therefore, not many goods on the market have designs protected under trade dress.

The question is more interesting when it comes to a traditional trade mark (ie. a distinctive graphic sign such as a logo or a name) embedded into a product. The rise of 3D printers might lead to an increasing supply of counterfeit goods[281]. In the situation where an individual downloads and sells a spare part with a trade mark, it is uncertain what kind of liability may be encountered by the website where the product was downloaded[282]. Numerous Courts' decisions involving the auction website eBay have been issued – both in the United States [283] and the European Union[284] - with different assessments and outcomes. Unfortunately, as stated in the introduction, this is outside the scope of this thesis (ie. design protections). Therefore, this question will not be further assessed here.

[281] D. MENDIS, *op cit*, p. 162.
[282] *Ibidem*.
[283] See *Tiffany (NJ) Inc. v. eBay Inc.*, 600 F.3d 93 (2nd Cir. 2010).
[284] See E.C.J., 12 July 2011, L'Oréal SA and Others v eBay International AG and Others, C-324/09; for a comparative study of the different decisions in the European Nations (before the E.CJ. ruling) and the United States, see K. SAUDERS & G. BERGER-WALLISER, "The liability of online markets for counterfeit goods: a comparative analysis of secondary trademark infringement in the United States and Europe, *J. Int'l L. & Bus.*, vol. 32, issue 1, 2011, pp. 38-88.

CHAPTER IV: SOME ROUTES TO BE TAKEN OR AVOIDED FOR THE EVOLUTION OF THE SYSTEM

In the above chapter, I tried to provide a clear outline of the disparities and numerous issues within the different IPR regimes. These issues that we are faced currently will become even more complicate with the use of 3D printers. As it has always been the case between law and technology, the legal landscape will have to evolve in order to handle the threats to intellectual property. Since these IPRs are very valuable in developed economies, lobbying by copyright associations plays an obvious role in the law making. One of the purposes of IPRs is actually to encourage creation. The scope of these IPRs must be framed in a way that strikes a fair balance. It is impossible to set out with certitude the proper rules to create and maintain such a balance. Nevertheless, legalities could easily be unfairly used for the overprotection of IPRs. Therefore, it is paramount to keep the law far from numerous slippery slopes.

Section 1: A shorter and weaker copyright protection

§1. A shorter term of protection

The reason why the length of copyright protection should be shortened comes from the fact that IPRs might turn into real impediments of innovation. The reasoning behind such a statement is actually quite straightforward. As long as the protection runs, no new creation can freely come into being if it embodies a protected feature of a former work. As written by P. A. GEROSKI: "One important feature of the production of new knowledge is that knowledge builds on itself: new ideas are suggested by old ideas, and they often combine several old ideas in a new and quite different package. It follows that the process of innovation is likely to be more effective and more efficient if today's innovators are entitled free access to the results of yesterday's innovations. The difficulty is that the intellectual property rights granted to protect yesterday's innovation sometimes allow that innovator to control today's innovation. When that happens, intellectual property rights can impede the rate of innovation"[285].

[285] P. A. GEROSKI, "Intellectual Property Rights, Competition Policy and Innovation: Is There a Problem?", *Scripted*, vol. 2, issue 4, December 2005, p. 424, available at http://www.law.ed.ac.uk/ahrc/script-ed/vol2-4/geroski.pdf. (6 June 2013).

It has already been widely stated by numerous scholars that a copyright protection until 70 years after the death of the creator is a very long period, especially concerning products related to fashion and that are thus very ephemeral. I understand the need for a protection of the artist and his legacy. However, currently, copyright protection might last until after the death of anyone who knew the creator[286]. Should a grandchild of an artist still allowed to prevent any use of his grandfather's work?

Beside the question of natural persons' protection, it should be kept in mind that there has been a shift from artists' protection to companies' protection. IPRs are now a very valuable immaterial asset for these companies. Should a company be able to keep a copyright for 95 years from creation[287]? While the protection should insure the creators a fair return of their efforts, it should not permit them to obtain unreasonably high returns from consumers[288]. An excellent illustration of such downward slide is the world's most popular song: "Happy birthday to you". This song was taken as example by the justice BREYER when protesting, in his dissent in *Eldred v. Ashcroft*[289], the extra 20 years period protection provided by the US Copyright Term Extension Act of 1998[290]. This melody - first published in 1893 and copyrighted after litigation in 1935 - is still under copyright protection and owned by a subsidiary of the giant entertainment company *Time Warner*[291]. It has also to be noted that from before 1914 to 1934, unauthorized versions of the song had been available without any enforcement actions taken by the copyright owners[292]. Today, the amount of revenues obtained by *Time Warner* is probably around $2 million per year and the protection should last until the end of the year 2030[293].

A good route to follow might have come from the United Kingdom, where the current term of protection is shortened when it applies to an object that has been exploited industrially[294]. The

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[286] M. BRAUNEIS**,** "Copyright and the world's most popular song", *J. Copyright Soc'y U.S.A.*, vol. 56, 2008-2009, p. 340.
[287] 17 U.S.C. §302 (for works made for hire: 95 years from publication or 120 years from creation, whichever is the shortest),
[288] P. A. GEROSKI, *op cit*, p. 425.
[289] *Eldred v. Ashcroft*, 537 U.S. 186 (2003).
[290] With this Act, the copyright protection was extended from 50 years to 70 years after the death of the author.
[291] M. BRAUNEIS**,** *op cit*, p. 336.
[292] M. BRAUNEIS**,** *op cit*, p. 340.
[293] M. BRAUNEIS**,** *op cit*, p. 337.
[294] The United Kingdom is, with Romania and Estonia, one of the only Member States which restricts the term of copyright applied to design (D. AMOR, "World IP Report: Protecting Italian lamps and egg chairs: proposed

protection is limited to 25 years from the date the product was first marketed anywhere in the world[295]. The products made by "an industrial process" refer to the mass produced objects. It has been clarified that this encompassed any artistic work manufactured more than 50 times or works manufactured in lengths or pieces, not being hand-made goods (ie. most furniture)[296]. Furthermore, some specific items are excluded from the scope of the article, among other: works of sculpture, wall plaques, printed matter primarily of a literary or artistic character such as book jackets or calendars, etc[297]. In practice, the range of products concerned by s. 52 is very wide and encompasses almost any artistic work applied industrially[298]. The logic behind this shortened term of protection is that the items designated by s. 52 already enjoy a specific protection of designs. I could not agree more with the idea that an artist should not be able to take advantage of the extensive protection of copyright when he decides to exploit his work commercially[299]. Unfortunately, the current regime might soon change. A Bill is currently discussed to repeal s. 52[300]. This comes from the will of the Government to comply with the Copyright Term Directive after the ECJ case *Flos SpA v. Semeraro* mentioned above[301]. Besides this, there is the concern that countries with more relaxed laws are abused by importers of infringing products who use the United Kingdom to step into the European Union [302]. As acknowledged by the Government, there is a lack of data to determine the extent to which current products would infringe copyright once s. 52 repealed[303]. Like other authors[304], I am concerned about such evolution. Following Pr. BENTLY, I do not see how the decision in *Flos*, concerning the copyright protection of design as required by the article 17 of the Design Directive 98/71/EC, prevents the freedom of Member States to regulate the breadth of copyright protection applied to designs[305]. When it comes to 3D printers and CAD files, this provision could be applied to the copies of industrial

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repeal of section 52 CDPA (UK)", *Bloomberg BNA*, vol. 26, n° 10, October 2012, p. 2, available at http://www.hoganlovells.com/newsmedia/newspubs/pubDetail.aspx?publication=8409 (6 June 2013)).

[295] Section 52 CDPA.

[296] Art. 2 Copyright (Industrial Process and Excluded Articles) (No. 2) Order 1989.

[297] Art. 3 Copyright (Industrial Process and Excluded Articles) (No. 2) Order 1989.

[298] D. AMOR, *op cit*, p. 2.

[299] *Ibidem*.

[300] Enterprise & Regulatory Reform Bill, available at the UK Parliament website.

[301] See p.19.

[302] D. AMOR, *op cit*, p. 2.

[302] *Ibidem*.

[303] *Ibidem*.

[304] See the letter published in The Times the 31th of July 2012 and signed by eminent intellectual property scholars (cited by D. AMOR, *op cit*, p. 3).

[305] See A. MADDISON, "AIPPI UK Group meeting in London, chaired by Professor Sir Robin Jacob, debates proposed UK to extend term of copyright protection for industrially exploited designs", *AIPPI e-News*, n° 28, January 2013, available at https://www.aippi.org/enews/2013/mainedition/e-news_no28.html (6 June 2013).

designs and might be taken as an example by those who advocate the "sharing attitude".

§2. A weaker scope of protection

The situation is unambiguous: While the copyright associations fight for the expansion of copyright protection, the proponents of the freedom-to-share should fight for its decrease. Concerning the design of objects, it is desirable for the copyright holders to see the functional features of the objects integrated in the scope of protection. Such evolution might constitute a real threat for freedom of expression in the future. As stated by M. WEINBERG, this could lead to a "quasi-patent system", without any requirement for novelty or the more limited term of protection[306]. At some point, the over protection turns into a counterproductive measure for both creators and the whole of society[307]. Broader protection may diminish the public domain and hinder future innovation and competition[308]. Out of the fear of lawsuits, mechanical and functional innovation could be frozen[309]. The prices might be raised and the available products limited, at least in the short term[310]. Contrary to an expansion of protection, I think that the cumulation of IPRs should be strongly limited in the field of design's protection. Besides the overprotection that it might constitute, it might easily turn into a source of confusion for jurisdictions. As mentioned above, Italy might be taken as example in its choice to strongly limit the possibility of copyright protection on design creations.

More specifically to 3D printers, jurisdictions should not grant an independent protection for CAD files by considering them as an independent creation. A CAD file should be seen as no less than a mere representation of an object. This representation should be considered as lacking the originality requirement to obtain a copyright protection. Therefore, the issue should remain as simple as one faces it today with analogue objects. On the one hand, the copyright protection granted to an object should be applied to the 3D file version upon the

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[306] 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", *op cit*, p. 14.
[307] C. JASSERAND, "France : Part of law on private copying levy is unconditional", 28 January 2013, available at http://kluwercopyrightblog.com/2013/01/28/france-the-constitutional-council-censures-part-of-the-law-on-private-copying-levy (6 June 2013).
[308] B. RIDEOUT, *op cit*, p. 176.
[309] 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", *op cit*, p. 14.
[310] See P. K. YU, "The International Enclosure Movement", *Ind. L. J.*, vol. 82, 2007, p. 827 (cited by B. RIDEOUT, *op cit*, p. 176).

same principles. On the other hand, an object that is unprotected could be shared and printed without infringing any kind of *sui generis* protection of the CAD file.

Section 2: The TPMs should not be overprotected and the service providers should remain out of the game

The difficulty of IPR enforcement through the web was mentioned above. The "economic rule of enforcement" is actually quite simple; the victims of infringement will always try to get the greater return in investment when it sues the infringer[311]. Therefore, it is more efficient to "go after the big fish"[312] that spreads millions of pirated copies, rather than to pursue every single individual infringement[313]. This means that a right owner should always strive to kill the largest source of the infringement. Besides that logic, two main means seem to be particularly attractive for the rightholders to ensure the respect of IPRs by individuals: the technical measures and an involvement of the service providers.

§1. The danger of the technical measures

Rightholders could force the 3D printers manufacturers to implement DRMs in their printers. This would prevent them from printing CAD files that embody "do not copy" watermarks[314]. Actually, a U.S. patent called "Manufacturing control system" was granted in October 2012[315]. Its purpose is to control copy in 3D files, checking if a license has been agreed before allowing the file to be printed[316].

Similar to DRMs, this raises the issue of fair balance between rightholders' privileges and users' rights. The reign of DRMs has already been strongly criticized by the doctrine. It is deemed to expand the rights of copyright associations beyond the legal protections. As demonstrated in this thesis, most physical objects are not protected by any intellectual

[311] D. H. BREAN, *op cit*, p. 14.
[312] *Ibidem*.
[313] The particular system in France will be briefly analyzed.
[314] 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", *op cit*, p. 14.
[315] D. MENDIS, *op cit*, p. 161.
[316] *Ibidem*.

property rights[317]. As has been stated, spare parts should largely not be protected since it is likely to be solely dictated by a technical function or fall under the "must fit" exception. A wide use of DRMs could be a means to protect these objects that could normally be freely copied and distributed. This is dangerous, especially given that the rightholder is not likely to care about the legal framework when he can impose his will with through technology[318]. It could be even stated that when the technology is foolproof, regulation against infringement would be no more useful.

The exception of copy for private use, quoted above[319], can be made impossible by the use of this technology. DRMs, presented as a *second layer of protection*[320] offered to rightholders, is blind and cannot discern the legitimate copies from the unlawful ones[321]. This reality is accepted in France and in Belgium where Courts decided that the application of DRMs could prevent the possibility to make a copy for private use. In France, the protection of the private copy against DRMs is provided since the implementation of the Directive in 2006. An authority for the regulation of these TPMs (*Authorité de regulation des mesures techniques*[322]) was settled on 6 April 2007[323] and replaced in 2009 by the "High Authority for the dissemination of works and the protection of rights on the internet" (*Haute Authorité pour la diffusion des oeuvres et la protection des droits sur internet*: HADOPI)[324]. Issues about private copies can be brought before the authority which is entitled to give sanctions. The authority also has to make sure that the exception respects the three-steps test, which will lead to a case-by-case analysis. Such a system seems to be very burdensome for the consumer and is therefore likely to deter him.

The legislation in the United States is quite similar to the European rules since it also implemented the WTO digital treaties[325]. The relevant provision is the article 17 USC §1201. The exception for private use cannot be found within that list since the United States applies the more flexible principle of fair use. Nevertheless, this principle is extremely limited

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[317] M. WEINBERG, "What's the deal with copyright and 3D printing?", *op cit*, p. 1.
[318] C. GEIGER, *op cit*, p. 124.
[319] See p. 41.
[320] S. DUSSOLIER, "DRM at the intersection of copyright law and technology: a case study for regulation", in *Governance, Regulation and Powers on the Internet*, 2012, p. 4, available at http://works.bepress.com/cgi/viewcontent.cgi?article=1003&context=severine_dusollier (6 June 2013).
[321] C. GEIGER, *op cit*, p. 124.
[322] See L331-8 French Intellectual Property Code.
[323] Law n° 2006-961 of 1st August 2006 on copyright and related rights in the information society.
[324] Law n° 2009-669 of 12 June 2009 promoting the distribution and protection of creative works on the internet.
[325] Contrary to the EU, a distinction is made between the "access control" and the "copy control".

concerning the "copy control" since it can be circumvented in only two limited cases[326]. Moreover, it is interesting to mention that the exceptions do not mean any obligation for the rightholder to provide any means to ensure the enjoyment of the content. Therefore, the end consumer has to be a skilled user since he has nothing but the right to circumvent the protection measure[327]. Therefore, the TPMs in the United States seem even better protected by the law than in the European Union.

Besides this strict limitation of the exceptions, the scandal of the Sony BMG rootkit in the United States gives a good illustration where the DRMs can "go too far"[328]. This scandal, lasting from 2005 until 2007, related to copy protection measures that Sony BMG had implemented on about 22 million CDs. Once inserted into a computer, the CD installed two pieces of software that acted as a DRM by modifying the whole operating system and prevent CD copying. Basically, a secret rootkit was implemented by Sony BMG onto its music customers' Windows PCs in the name of anti-piracy. The software was undetectable by anti-virus and anti-spyware programs and it opened the door for other invisible malware to infiltrate computers. This allowed Sony BMG — and other hackers — to monitor and even seize control of users' computers. Following public reaction, some government investigations and class-action lawsuits in 2005 and 2006, Sony BMG reacted with consumer settlements, a recall of about 10 percent of the affected CDs, and the suspension of CD copy protection efforts in early 2007.

Over the years it has become apparent that DRMs are not a proper solution to protect rightholders from the downloading of music and films. This illustrates the endless race between law and technology, where each one tries to overcome the other. It the case of IPRs, it is interesting enough to note that technology serves to protect rightholders (DRMs) as well as circumventing both the legal and technological protections. It did not take a long time before DRMs were overtaken by Peer-to-Peer sharing. The legal protection of DRMs did not prevent illegal downloading and sharing from flooding the internet. As stated *supra*, the

[326] The exceptions in §1201(e) (federal, state and local law enforcement officers) and (f) (reverse engineering for computer programs) are the only ones that also apply to the prohibition of the circumvention of "copy control" (§1201(b)).
[327] N. BRAUN, "The interface between the protection of technological measures and the exercise of exceptions to copyright and related rights: comparing the situation in the United States and the European Community", *E.I.P.R.*, vol. 25, issue 11, 2003, p. 497.
[328] M. RUSSINOVICH , "Sony, Rootkits and Digital Rights Management Gone Too Far", 31 October 2005, available at http://blogs.technet.com/b/markrussinovich/archive/2005/10/31/sony-rootkits-and-digital-rights-management-gone-too-far.aspx (6 June 2013).

enforcement of IPRs on the web remains the key issue for rightholders. This issue will be confirmed in the future regarding 3D files. In view of all these elements, I am extremely wary of the increasing use of TPMs. It seems clear that, as stated by C. GEIGER, the answer to the machine cannot be found only in the machine[329].

§2. The service providers should not be involved in the game

A. the American "take down notice": A Penrose Triangle and a warhammer

These two highly similar stories have been already mentioned in this thesis. They are, to my knowledge, the only two disputes that have occurred so far in relation to CAD files. They are related to each other on several points. First, they both concerned a claim for copyright infringement addressed to the sharing online platform *Thingiverse*. Second, they were both applications of the so-called take-down notice. Third, the alleged infringers seemed to be of good faith and were acting with the sole purpose of sharing creations.

The United States has a specific regime for copyright and provides a detailed procedure in which the intermediary merely acts as a mere messenger between the rightholder and the publisher[330]. This system, called the "notice and take down" procedure, makes sure that the intermediary will never be held responsible as long as the requests from both parties are properly transmitted and the content taken down as required according to the procedure. In order to take advantage of the safe harbor provision[331], the service provider will always take down the content and leave it out if the publisher does not react. In both cases, *Thingiverse* removed the illegibly infringing contents to protect itself. However, as it was stated above, it is far from certain that the files of Artur and Thomas were actually infringements. The absence of reaction from the content provider might be merely due to the fear of being sued before a Court. As the well-known adage says: "the best defense is a good offense".

These two cases were not brought to Court since *Thingiverse* took down the warhammers models and Dr. Schwanitz finally dropped his complain. But while the rise of 3D printing is

[329] See C. GEIGER, "The answer to the machine should not be the machine: safeguarding the private copy exception in the digital environment", *op cit*.
[330] 17 U.S.C. §502.
[331] 17 U.S.C. §502(c).

still in its infancy, this is obviously only the beginning of other future disputes and claims from copyright owners.

B. The European Ecommerce Directive, the European Court of Justice and the specific legal system in France

The regime applied to intermediaries (Internet Service Provider or hosting website) is different between the European Union and the United States. Regarding the Ecommerce directive[332], the European Union does not have a specific procedure for the copyright infringements and the Member States thus retain a discretionary right to implement a specific regime[333]. The passive service providers should not be held liable as long as they are not informed by a claim. This was confirmed later by the ECJ in recent cases.

So far, internet service providers (ISPs) have been asked to deal with three kinds of claims related to copyright: The identification of users alleged to have infringed a copyright, the installation of automatic filtering of communications, and the shutting down of websites that facilitate file sharing[334]. Three paramount cases are to be mentioned concerning the first kind of request. In *Promusicae*[335], and later in *LSG*[336], the ECJ concluded that a State remains free to decide whether or not to implement a law requiring ISPs to disclose personal data in order to protect copyright. The Court nevertheless pointed out that the Member State should always strive to strike the balance between the fundamental rights involved. One thing at least was clear in the reasoning of the Court: there should not be a hierarchy between the fundamental rights. In the recent case *Bonnier*[337], The ECJ concluded that Swedish law's conditions for disclosure respected the fundamental principles of the European Union. The logic behind this decision remained the same as with the previous cases.

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332 Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in. particular electronic commerce, in the Internal Market ('Directive on electronic commerce').

333 See art. 12-15 Directive 2000/31/EC.

334 F. COUDERT, "ACTA's referral to the ECJ: The European Commission's response to the concerns of EU citizens on digital enforcement of copyright", available at http://www.timelex.eu/fr/blog/detail/actas-referral-to-the-ecj-the-european-commissions-response-to-the-concerns-of-eu-citizens-on-digital-enforcement-of-copyright (6 June 2013).

335 E.C.J., 29 January 2008, Productores de Música de España (Promusicae) v. Telefónica de España SAU, C-275/06.

336 E.C.J., 19 February 2009, LSG-Gesellschaft zur Wahrnehmung von Leistungsschutzrechten GmbH v. Tele2 Telecommunication GmbH, C-557/07.

337 E.C.J., 19 April 2012, Bonnier Audio AB and Others v Perfect Communication Sweden AB, C-461/10.

The ECJ has also dealt with the potential installation of filtering by ISPs. In the recent cases *SABAM v. Scarlett*[338] and *SABAM v. Netlog*[339], the preliminary rulings questioned the possibility of a Court injunction requiring an ISP (*Scarlett*) or a website (*Netlog*) to install filtering of all electronic communication. The ECJ did not use its margin of appreciation and provided a clear opinion by stating that such a requirement would be contrary to European fundamental rights, notably the right to privacy and the freedom of expression. Among the elements having led to this decision was the fact that the claimed system would have constituted ongoing preventive monitoring out of any time limitation.

To fully consider the question of enforcement, it must be noted that the French Government has a specific regime regarding copyright enforcement on the internet. The aforementioned law, HADOPI of 2009, settled an *ad hoc* independent administrative authority, also called HADOPI, to ensure the enforcement of copyright protection on the internet[340]. This authority prevents the Peer-to-Peer sharing by of pirated contents via the three-strikes procedure[341]. Simply put, the copyright management societies notify the authority of an alleged copyright infringement. The actual detection of potential infringements over Peer-to-Peer networks is performed by the detection company *Trident Media Guard*, which collects IP addresses for these management societies. Once the information verified by the authority, the alleged wrongdoer can be contacted thanks to the collaboration with ISPs and the three-strikes procedure is triggered. It has to be noted that ISPs are reluctant to be obliged to deliver personal information since it is costly and prejudicial for their business. In this European State, it could be considered that the "take down notice" procedure is actually raised to an upper level. HADOPI is a new actor which has been granted expansive powers to receive claims, directly contact infringers with the help of ISPs, and give sanctions (such as the internet cut down). Numerous concerns have been raised and are still being presented against

[338] E.C.J, 24 November 2011, Scarlet Extended SA v. Société belge des auteurs, compositeurs et éditeurs SCRL (SABAM)), C-70/10.
[339] E.C.J., 16 February 2012, Belgische Vereining van Auteurs, Componisten en Uitgevers CVBA (SABAM) v. Netlog NV, C-360/10.
[340] Law n° 2009-669 of 12 June 2009 promoting the distribution and protection of creative works on the Internet (Loi HADOPI 1). This law was completed by the Law n° 2009-1311 of 28 October 2009 relating to the protection of literary and artistic property on the internet through criminal law (Loi HADOPI 2) which was basically enacted in order to reintroduce the repressive section of HADOPI 1 censured by the Constitutional Council.
[341] These are: a warning email trough the identified IP adress, a certified letter and, if the offender still not complies, a suspension of internet access from two months to one year (See articles L. 331-25 and 336-2 of the French Intellectual Property Code). A court appeal is possible only during the third phase. As mentioned above, this *sui generis* authority also replaced the former Authority for the regulation of technical measures.

this legal regime: the absence of right for a due process[342], conviction on the sole basis of an IP address collected by private actors, access to private data without judiciary control, cut down of the internet connection by an administrative authority, high costs of the organization borne by the taxpayer, etc[343]. This specific regime, which actually focuses on the individuals rather than the "big fish", will not be analyzed in further detail here. I just want to underline that the introduction of complex design protections on the internet will make such system even more dangerous and dictatorial than it is today with entertainment contents. For the anecdote, it has to be mentioned that HADOPI, whose main purpose in to stop the unlawful use of copyrighted works, had an issue with the protected typeface used in its logo which is owned by *France Telecom*[344]. This incident is a great illustration of the fact that no one is sheltered from a mistake regarding the protection of designs.

C. The right balance to be protected

The absence of strict procedure in the European Union creates a more convenient situation for the publisher than the United States.. In the latter, the intermediary is not supposed to evaluate the quality of the argumentation within the take-down notice he receives from a claimant. The above section demonstrated the risk of an unfair outcome. The claim of infringement should be barely assessed given that the intermediary will not be held liable when respecting the procedure and taking down the content. There is a clear risk of a multiplication of requests for copyright protections that are actually not legitimate. This will lead to unfair takedown procedures where the intermediaries act in an automatic way as a tool of the rightholders. As it was said *supra*, the risk of mistakes is likely to be even higher with CAD files than it is now. This stems from the fact that more rights and exclusions of protection might apply to a 3D object than a movie.

In both legal regimes, one sees that intermediaries enjoy a very weak responsibility since they do not have to monitor the web on their initiative. The IPRs associations have strived to see

[342]No details about the alleged downloaded contents and no contradictory debate or public hearing.
[343] See the section only dedicated to HADOPI on the website *La Quadrature du Net*, and more especially: "Yet another adoption of liberty killer "three strikes" law in France", 21 September 2009, available at http://www.laquadrature.net/en/final-adoption-of-liberty-killer-three-strikes-in-france (6 June 2010); "HADOPI, 'riposte graduée': réponse inefficace, inapplicable et dangereuse à un faux problème", 9 February 2009, available at http://www.laquadrature.net/files/LaQuadratureduNet-Riposte-Graduee_reponse-inefficace-inapplicable-dangereuse-a-un-faux-probleme.pdf (6 June 2013).
[344] "Anti-piracy agency's logo broke copyright", *The Daily Telegraph* (London). 12 January 2010, available at http://www.telegraph.co.uk/news/worldnews/europe/france/6974249/Anti-piracy-agencys-logo-broke-copyright.html (6 June 2013).

the intermediaries becoming responsible for the monitoring of the internet and ensure protection of the rightholders. This was illustrated by several cases in the world and by the attempt to conclude international agreements such as the Anti-Counterfeiting Trade Agreement (ACTA)[345]. The United States also attempted to enact in its domestic law the Stop Online Piracy Act (SOPA)[346] and the Protect IP ACT (PIPA)[347]. Following strong reaction from the public all over the world, criticizing the restriction of freedom on the internet, these attempts did not manage to be implemented.

In my opinion, it is important to draw a distinction between the sharing communities, such as *Thingiverse*, and websites which promote the mere infringement of protected contents and/or get an economic advantage from these infringements. The second category concerns the genuine "pirate websites".

The US Courts have dealt with pirate websites in the cases *Napster* and *Grokster* mentioned *supra*. The difficulty comes as soon as the intermediary contributes in the sharing of both legal contents and infringing files[348]. Nevertheless, these websites had clearly built their economic plan as a platform for the sharing of illegal copies. Following these decisions, the future might be uncertain for websites that can be used as a tool to infringe IPRs[349]. However, following the case *Grokster*, it has to be proven that the service provider knew about the infringement and took an economic benefit from it. A key element observed for the Court to assess the liability will be the kind of marketing set up by the website[350].

In Europe, a very recent case has been released by the European Court of Human Rights against the two co-founders of one of the world's largest file sharing services: *The Pirate Bay*[351]. Fredrik Nejiand and Peter Sunde Kolmisoppi had challenged the decision of the

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[345] Anti-Counterfeiting Trade Agreement between the European Union and its Member States, Australia, Canada, Japan, the Republic of Korea, the United Mexican States, the Kingdom of Morocco, New Zealand, the Republic of Singapore, the Swiss Confederation and the United States of America, Council of the European Union, 12196/11, 23 August 2011.
[346] SOPA, H.R. 3261, 112th. Cong. (2011).
[347] PIPA, S. 968, 112th Cong. (2011).
[348] M. DALY, "Life after Grokster: analysis of US and European approaches to file-sharing", *E.I.P.R.*, vol. 29, issue 8, 2007, p. 319.
[349] M. DALY, *op cit*, p. 324.
[350] *Ibidem*.
[351] ECtHR, 19 February 2013, Fredrik Nejiand and Peter Sunde Kolmisoppi(The Pirate Bay) v. Sweden, Appl., n° 40397/12; for an analysis of the case, see D. VOORHOOF & I. HØEDT-RASMUSSEN, "ECHR: Copyright vs. Freedom of Expression II (The Pirate Bay)", 20 March 2013, available at http://kluwercopyrightblog.com/2013/03/20/echr-copyright-vs-freedom-of-expression-ii-the-pirate-bay (6

Swedish Court that convicted them for complicity to commit crimes in violation of the Copyright Act. They tried to claim protection under article 10 of the European Convention by stating that the national decision breached their freedom of expression and information. They considered that only the users who uploaded and downloaded illegal contents were guilty of an offense. As any previous case when it comes to the balance of fundamental rights (ie. protection of copyright and right to receive and impart information), the Courts checked whether the interference with article 10 was in adequacy with the three conditions of article 10§2: a legal basis which has a legitimate aim and is necessary in a democratic society. In a similar way as the decision Ashby Donald & others v. France of 10 January 2013[352], the Court left a wide margin of appreciation to Sweden concerning the last requirement ("proportionality") and upheld the national judgment.

In my opinion, it is fair to take down a website that promotes itself in a way that is suggestive of infringing use. Moreover, even if an online sharing platform might be of good faith, it is reasonable to have it shot down when it is proven that this sharing platform is mainly used for the spread of protected contents. Still, monitoring of IPRs infringements by intermediaries would lead us down a very dangerous slippery slope. The intermediaries would bear a burdensome responsibility and become the guardians of private interests. This would wipe out the delicate balance between fundamental rights that the ECJ has tried to achieve. The solution of the current issue cannot be found there. I think that the absence of strict rules in the European Union constitutes a fair balance between different interests and should be preferred over the take-down notice in the United States.

Section 3: The question of the harmonization

There is a simple and logical principle: the more the rules are harmonized, the easier the international issues are sorted out. I showed in the above section that IPR protections still differ greatly from a region to another. This means that a single claim for infringement might lead to several different outcomes depending on the jurisdictions. It seems clear that IPRs, or at least their interpretations by the Courts, have to evolve and become more international.

[352] ECtHR, 10 January 2013, Ashby Donald and others v. France, n° 36769/08.

The internationalization of rules is not without risk. The TRIPs agreements are an excellent illustration of what is today considered as the will of developed countries (driven by the United States) to impose stronger IRPs all over the world. The harmonization of IPRs is very valuable for countries that export more protected products than they import. It gives them the tools to prevent free riders in any country bound by the agreement. After acknowledging this point and several arguments *pro* harmonization[353], A. KINGSBURY is very skeptical about the opportunity of harmonizing design's protection rules and concludes that diversity should be preferred to harmonization[354]. Her point is that the absence of highly prescriptive international agreements allows room for States to build legal regimes that suit their own cultural and economic situation[355]. Among other arguments, she stresses that a harmonized level of protection could not fit all the economies and would be highly damaging for the developing countries[356]. In addition, one could also fear that rightholders take advantage of any internationalization of the rules to undermine the limits of the scopes and the exceptions to their monopolies[357]. The current situation in the United Kingdom and the possible repealing of s. 52, discussed *supra*[358], is a great illustration of where harmonization comes with a stronger IP protection.

The arguments are pertinent and are likely to be shared. It seems however that, like current digital contents like music and movies, CAD files are widespread through a digital world exempt of boundary. In my opinion, the internationalization of rules is therefore the best way to make the user aware of his rights and obligations. Moreover, harmonization is highly beneficial for the international trade. This has been illustrated within the European Union with the adoption of a European Community Design Protection as well as trade mark protection. The remaining question is about the way this globalization should occur. The best process would be to see each country allowed to assess the costs and benefits of levels and types of protection[359]. It is unfortunately likely that the first world countries often hold the floor and eventually impose their own views.

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[353] A. KINGSBURY, *op cit*, p. 391.
[354] See A. KINGSBURY, *op cit*, p. 395.
[355] A. KINGSBURY, *op cit*, p. 382.
[356] A. KINGSBURY, *op cit*, p. 392.
[357] See E. L. CARTER, *op cit*, p. 316.
[358] See p. 50.
[359] E. L. CARTER, *op cit*, p. 394.

Among other rules that should be harmonized, at least within the European Union, one can stress the need for a European leading decision stating clearly what can be considered as an infringement of a design patent. This should fill the current gap of uncertainty as illustrated by the pan-European cases *Procter and Gamble* mentioned above.

It is clear that copyright protection of designs is far from reaching harmonization and one should not expect that to change in the near future. Nevertheless, the question of the private copy is of practical importance for the user. Since almost all the Member States admit the existence of the private copy, a European debate on the exact scope of this term would be welcome. For instance, the question of the source which is copied is of paramount importance. Today, a Dutch or Spanish citizen who downloads a pirated CAD file on the internet is not infringing the law while a French, German or English person does.

In any case, harmonization or not, the user should be better informed of his rights and obligations regarding IPRs. One could think about this well-known clip implemented by the entertainment industry on the DVD and displayed before the film: "Piracy it's a crime". It turns out that such a message is not confirmed everywhere, for instance in the Netherlands where downloading protected works is still permitted. Some proper information for the consumer could be achieved by a public website controlled by public institutions or consumer associations. The second chapter of this thesis demonstrated that the current rules could constitute a maze for any lay individual. Such confusion should not profit the rightholders to expand their powers in case of modification. As says M. WEINBERG about copyright: "Being able to identify when copyright does and does not protect an object is the first step in knowing if copying or building upon it will lead to trouble"[360].

[360] M. WEINBERG, "What's the deal with copyright and 3D printing?", *op cit*, p. 3.

Section 4: The necessary reflection for a new business model

I have always been convinced that music and film industries missed the transition from the analogue to the digital world. First, they took too long to decrease the prices of the media, while consumers were already buying MP3 players and using Peer-to-Peer thanks to users friendly platforms. Moreover, they waited too long to shift from the optical disc to online legal platforms (such as the giant iTunes today). As a consequence, it could be stated that they "missed the boat" and are now attempting to remedy the situation. Basically, two questions are always to be answered before reacting to a new issue: "why" (clear purpose of the regulation) and "how" (kind of regulation: legal, economic or social). Nevertheless, another question is of paramount importance, especially when it comes to the fast evolving technology: "When". The sooner the issue is properly understood, the better the reaction should be. In the case of 3D printers, I think that the market should try to learn the lessons of previous mistakes and adapt itself early enough to enjoy this new coming actor as an opportunity rather than a danger.

In her recent paper, D. MENDIS stated that she would not defend stringent IP laws for this new technology, but rather find a sustainable solution in new business models[361]. First, manufacturers might work together to create online parts stores. This is what we face now with designers and the platforms such as the giant *Shapesway*, *Imaterialise*, or *Cubify*. These platforms invite the designers to join their community and open an "online shop" on their server. This is made with the hope that people will agree to pay something for a legal use of the creation instead of illegally downloading and printing. However, there might be a real risk of monopoly, such as the one we currently experience with iTunes[362]. This monopoly would arise at the expense of the artist or the manufacturer, who will be the weak counterpart against the giant hosting platform. Another possibility would be a stronger and wider system of licensing[363]. This would have the advantage of not locking the rightholder into a specific agreement.

[361] See D. MENDIS, *op cit*, p. 155.
[362] D. MENDIS, *op cit*, p. 168.
[363] D. MENDIS, *op cit*, p. 169.

In any case, it seems clear that sellers will have to adapt and open online shops beside the "physical" ones[364]. These online shops could permit the shops to sell products for a competitive price since the consumers will only buy the 3D file and print the product themselves.

On the other hand, B. RIDEOUT invites the 3D printing communities, such as *Thingiverse*, to properly police themselves. I agree that, in practice, this is the best way to keep the website as clean as possible, avoid legal problems, and make sure that freedom of individuals does not infringe on the rights of others. Online communities should continue avoiding the use of IPRs and rather rely on a framed open-source system[365]. Open-source has proved to be a suitable alternative in several situations[366]. Unfortunately, this will not prevent some users from uploading protected creations[367]. The 3D printing communities are unlikely to avoid new take-down notices in the future.

In a video displayed on the well known website "TED talks" in 2007, L. LESSIG called for more freedom for the culture of "remix"[368]. Stressing the paramount difference between "piracy" and "re-creativity", he insisted on the democratization of prices for the tools of creativity[369]. L. LESSIG insisted that artists and creators should make their works more freely available for non commercial use[370]. Six years later, A. ANDERSON (mentioned in my introduction) stated states the exact same observation concerning the personal 3D printers and CAD programs[371]. Thus, the digital technologies might change, but the arguments for a world permitting more sharing of creativity remain the same. For the moment, the only actor that might decide to take one direction or another is no one else than the creator himself[372].

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[364] D. MENDIS, *op cit*, p. 169.
[365] B. RIDEOUT, *op cit*, p. 176.
[366] To quote a few practical examples: the open-source Linux operating system does not prevent Red Hat from making money by customizing the software and offering specialized support, the band Phish makes money from live performances and concessions encourages fans to freely share his music, and the last album of Radiohead was downloadable free of charge with the possibility for a voluntary contribution. These examples are taken from K. A. KARSON, "How "Intellectual Property" impedes competition", 23 September 2009, available at http://www.fee.org/the_freeman/detail/how-intellectual-property-impedes-competition#axzz2V4ymNUY4 (6 June 2013).
[367] B. RIDEOUT, *op cit*, p. 176.
[368] See L. LESSIG, "Laws that chock creativity", video available at http://www.ted.com/talks/larry_lessig_says_the_law_is_strangling_creativity.html.
[369] *Ibidem*.
[370] *Ibidem*.
[371] See C. ANDERSON, *op cit*.
[372] For a good illustration of the choice that has to be made by creators, see the blog on the *thingiverse* website "Occupy Thingiverse Be the owner of your designs!!!" and the numerous reactions from its members. The discussion concerning the terms and conditions of the website and the release of the *replicator 2* as a closed

CONCLUSION

In the first chapter, it has been demonstrated that a new technology of production is used in a wide range of sectors, is developing at a very fast pace, and is inevitably going to be part of consumers daily life. A distinction still has to be drawn between the professional printers and the low-cost ones. However, as has been the case with personal computers, these low-cost machines are improving and the distinction should become more and more blurred. Given the new possibilities brought by 3D printers, several social and economic principles might change. This is why some authors speak of a new industrial revolution. Moreover, some promises come along this revolution (ie. a manufacturing system leaving more room for creativity and more environmentally friendly). However, these are only expectations and only time will bring the confirmation.

In the second chapter, the intellectual protections of designs have been discussed in both the European Union and the United States. It was underlined that the several possible protections enjoy different levels of harmonization and are more or less strongly limited by the functional aspects of the objects. This question of utilitarian objects' protection remain largely uncertain regarding the case law. Following this, chapter 3 was dedicated to stress specific issues in relation with 3D printers. It has been demonstrated that the IPR limitations leave a lot of objects out of any design's protection. It is therefore obvious that the current legal limitations of IPRs still permit the wide sharing and printing of 3D files. The sharing of spare parts, for example, is likely to fall in the must fit exception and therefore exempt of design protection. Moreover, the private copy will apply not only to digital contents and 2D printed matters, but also to 3D objects whose scope will evolve as the technology improves. The notion of private copy it not itself harmonized, notably concerning the source of the copy. It is expected that the future decision of the European Court of Justice will help to better frame this exception.

One could argue that 3D printers fail to raise any new real issue. Indeed, problems such as the protection of functional designs, the difficulty of copyright enforcement in the information

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source (instead of open source). With regards to the former, some users interpreted the royalty-free worldwide license on the user contents as giving up any ownership on the creation, launching the debate within the community about what is (and should be) open-source ("Occupy Thingiverse Be the owner of your designs!!!" , published by the user "prusajr" on the 19th September 2012, http://www.thingiverse.com/thing:30808 (6 June 2013)). Following this reaction, *MakerBot* published an explanation on its terms and conditions (R. MCKARTY, "Our lawyer explains explain the thingiverse terms of service", 26 September 2012, http://www.makerbot.com/blog/2012/09/26/our-lawyer-explains-the-thingiverse-terms-of-service/).

society and the right of private copies have already been largely analyzed. Nevertheless, the current struggle between rightholders and defenders of the freedom of sharing will be raised to a higher level of complexity. Design rights will be embedded in CAD files shared on the internet, forcing judges to conduct a more in-depth assessment of the applicable IPR protections than with entertainment content's piracy or traditional trade mark infringement. Second, the difficulty of enforcement against individuals and the exception of private copy will apply to any possible object that can be embedded in a CAD file, shared, and printed. The fine line between bites and atoms will be erased: a lot of new items will be found on the web thanks to CAD files and brought into being with personal low-cost or professional 3D printers. This means that the concerned rightholders will not be limited to the entertainment majors and the books houses but could also entail new members, such as toys manufacturers or appliances manufacturers. Finally, as the programs become easier to manipulate, users might transform existing creations before sharing them. The notion of infringement will be challenged more often with 3D files than, say, copies of movies.

As a result, rightholders - probably joined by new members worried for their business - will continue to ask for better protection against individual infringers and attempt to expand the cover of IPRs[373]. As stated by E. CARTER : "In fact, probably the single most significant development in copyright law in the 20th century-incorporation of copyright within international trade agreements-was largely the result of copyright holders' fears about how technology could affect their ability to exploit their intellectual property"[374]. That is, the 3D printers might be perceived as merely new infringing tools that should be put out of harm's way.

In the fourth Chapter, I gave my opinions on the future directions of IPRs that should be avoided or taken into consideration. I have argued against a *sui generis* copyright protection for the CAD file. Nothing leads me to believe that a CAD file might be considered an artwork. Moreover, such a protection would be nothing more than a source of confusion. I also think that the cumulation of rights should be more limited. As with the current ruling in Italian case law[375], an object should not be covered by both design and copyright protection. In line with this, I support the arguments in favour of a shorter copyright term of protection.

[373] 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", *op cit*, p. 15.
[374] E. L. CARTER, *op cit*, p. 314.
[375] See p. 23.

The current period of protection is anomaly long: 70 years of following the death of the artist. This term of protection is highly disputable in a society where information has never been so easily shared and the progress never been so fast. It was considered for the utility patent that a balance should be found between rewarding the inventor and the incitement of the research (ie. the invention must be disclosed in a clear and complete way). As the utility patent should be considered an incentive for research, copyright should be considered an incentive for creativity. The current protection term ushers us away from that fundamental objective of copyright and constitutes rather a protection for the successors of the creator. A good example of best practice to follow could be the United Kingdom and its copyright protection limited for 25 years for the mass produced items. This particular regime might unfortunately be repealed with the United Kingdom following the legal framework of the rest of the European Union.

I have also warned against the abusive use of TPMs that could go beyond the scope of the law by preventing fair copies of protected works or even protecting works that do not currently enjoy coverage by IPRs. Moreover, it was stressed that service providers might play a paramount role in the enforcement of IPRs in the digital world. Once again, the law-makers should be cautious that these intermediaries do not become agents of rightholders. In that sense, I have expressed my concern about the automatic “take-down notice” procedure in the United States and the powerful executive agency in France. This concern is related to the risk of wrongfully struck down content. Such situation is even more likely to happen with designs protections where alleged infringements might require very delicate assessments.

In the search for a balanced system, I also questioned the need for harmonization of IPRs. Even though I am aware of the danger that lobbying by copyright holders of developed nations could easily take control of the negotiations and impose their wills, I still believe that better harmonization would be highly beneficial for the awareness of the individuals and the confidence of the companies in the trade. Regarding this, the Community design and Community trade mark regimes have proved to be well received by the market. The same expectations support the future utility patent of the European Union. Therefore, in my opinion, the question should not be “why the harmonization?” but rather “how to properly harmonize?”. Finally, I mentioned the possibility for a new business model and underlined the possibility to see more “copyleft” communities arising on the internet.

I believe that the use of 3D printers as a means of expression should evolve with time as the programs become more consumer friendly. After all, a 3D printer is "a powerful new tool for experimenting with the design of the physical world, for thinking, for generating new culture, for stretching our imaginations"[376]. As is the case today, a fair balance has to be found in the regulation of the internet. On the one hand, "pirates" who upload or incite the uploading of infringing copies for the mere purpose of making profit should be found and convicted. On the other hand, I believe that creating and sharing is very valuable for the improvement of cultures[377]. Therefore, the best way for an "honest" sharing platform to avoid legal issues is to make sure it does not turn into a large illegal copy machine. Once again, I believe that excess is always easier to strike than the right compromise. Tinkerers should not be excluded by the fear of mass copying. In that sense, IPRs should not be a barrier for the culture of remix, the creation of new things that actually take root on former existing works: "It is critical that those who fear not stop those who are inspired"[378].

I focused in this thesis on the legal protections of design, but many other issues might, and will, be underlined in the field of 3D printing. I just want to mention two of them in my conclusion: 3D printed weapons[379] and the increasing sale of counterfeited products. The second element, concerning the infringement of traditional trade mark (as opposed to trade dress), might for instance be illustrated by the garage owners. Since the price of the official spare parts is getting more expensive along the years, this might be the beginning of a new online black market supported by CAD files and 3D printers. In that field, the claim for a better monitoring of the internet might be less disputable than for design's protections assessed in this thesis. Indeed, the copier is totally aware of the mislabeling and consequent infringing of an IPR. There might be more pressure for heavier liability for websites such as *eBay* or *Shapeways*.

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[376] C. THOMPSON, *op cit*.
[377] With the same opinion, see for instance P. AIGRAIN, *Sharing is legitimate*, 27 Sept. 2010, available at http://www.laquadrature.net/en/sharing-is-legitimate (6 June 2013).
[378] 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", *op cit*, p. 4.
[379] About this issue, see the K. O'NEIL, "Is technology outmoding traditional firearms regulation? 3-D printing, State security, and the need for regulatory foresight in gun policy, May 2012, Available at http://ssrn.com/abstract=2186936 (6 June 2013); recent press: D. CORY, "3D printed guns are going to create big legal precedents", 13 May 2013, available at http://www.guardian.co.uk/technology/2013/may/13/3d-printed-guns (6 June 2013); M. JAMES, "3D printing expert hoses down fears of homemade gun surge", 25 May 2013, available at http://www.abc.net.au/news/2013-05-25/expert-hoses-down-fears-of-3d-gun-surge/4712886 (6 June 2013).

One thing is certain, 3D printers will highlight several existing issues and will bring new ones, regardless of the law field. The endless race between technology and law has never been so real.

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