In Pursuit of Clarity: The Conundrum of CAD Software and Copyright – Seeking Direction Through Case Law

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Abstract

Through the application of selected statutes and case law drawn from the United Kingdom (UK), this paper will explore the copyright status of three-dimensional design files and will particularly question whether they can be protected as literary and / or artistic works. In responding to this question, the paper highlighting gaps and challenges inherent in the law and adopts a 'coherentist' and 'regulatory instrumentalist' analysis in responding to the challenges and providing recommendations for the future.

Key words: copyright, computer programs, CAD design files, 3D models, 3D printing, software

Introduction

Recent literature has considered the legal status of three-dimensional (3D) models and 3D design files, more commonly known as computer-aided design (CAD) files and their protection through intellectual property (IP) law. As such, over the past few years, much thought and attention has been expended on the topic, signalling that it is a significant component of the 3D printing process, which has fascinated many legal scholars and commentators alike.[1]

Yet, whilst the topic of CAD design files has been addressed in the literature, the specific question of whether they can be protected as literary and / or artistic works remains shrouded in uncertainty and remains unanswered. For example, many papers and policy reports have debated the topic in detail with the general conclusion being that "there needs to be clearer

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[1] B Rideout, Printing the Impossible Triangle: The Copyright Implications of Three-Dimensional Printing [2011] 5(1), *Journal of Business Entrepreneurship & Law* pp. 161-180; D Mendis, 'Clone Wars': Episode II The Next Generation – The Copyright Implications relating to 3D Printing and Computer-Aided Design (CAD) Files [2014] 6(2) *Law, Innovation and Technology*, pp. 265-281; A. Daly, Socio-Legal Aspects of the 3D Printing Revolution (London: Palgrave Macmillan; 2016), chapter 4; T Y Ebrahim, 3D Printing, Digital Infringement and Digital Regulation [2016] 14(1) *Northwestern Journal of Technology and Intellectual Property*, 37-74; M Rimmer, The Maker Movement: Copyright Law, Remix Culture and 3D Printing [2017] 41(2) The *University of Western Australia Law Review*, pp. 51-84; M Antikainen and D. Jongsma, The Art of CAD: Copyrightability of Digital Design Files in R. Ballardini et al, 3D Printing, Intellectual Property and Innovation: Insights from Law and Technology (The Netherlands: Kluwer Law International BV; 2017), chapter 1.

guidance on defining whether a CAD file is capable of copyright protection. The territorial nature of copyright law, coupled with the pervasive nature of online platforms and CAD files shared therein could lead to uncertainty and complex issues in the future".[2] This leads us to question why the legal status of 3D CAD design files, in particular, have gained such attention and importance in recent times. The main reason, it is suggested, is because the CAD design file is the starting point of any digitally manufactured physical product.[3]

As Lipson and Kurman, so eloquently state, "a 3D printer without an attached computer and a good design file is as useless as an iPod without music".[4] The design file is similar to the architectural blueprints for a building or the sewing pattern for a dress,[5] which is the starting point for the construction of a building or the design for a dress respectively – both of which are protected under copyright.[6] In the same manner, a design file represents a digital 3D model which the printer uses to build the object using the specifications defined in the design[7]. It is clear then, that whilst the hardware, amongst other elements such as materials, simulation, tooling is important in the 3D printing process, the design file (and the computer which facilitates it) is also important. As such, it can be argued that the 3D design file is a significant element of the 3D printing process.

Apart from the above mentioned reason, it is also suggested that the future potential of 3D printing will rest on the *customisation* of design files[8] which consequently raises questions about the implications for IP law, particularly those relating to authorship and ownership of copyright. This issue which has also been recognised by the European Parliament, highlights

[2] D Mendis, D Secchi and P Reeves, *A Legal and Empirical Study into the Intellectual Implications of 3D Printing* (London: UK Intellectual Property Office; 20150, pp. 6-7. Available at: https://www.gov.uk/government/publications/3d-printing-research-reports (last accessed 3 April 2018).
[3] H Lipson and M Kurman, *Fabricated: The New World of 3D Printing* (Indiana: John Wiley & Sons, Inc.; 2013), p. 12.
[4] ibid.
[5] S M Santoso, B D Horne & S B Wicker, Destroying by Creating: Exploring the Creative Destruction of 3D Printing Through Intellectual Property (2013). Available at www.truststc.org/education/reu/13/Papers/HorneB_Paper.pdf (last accessed 3 April 2018).
[6] Section 4(1)(b) CDPA 1988. To clarify, works of architecture are either buildings or models for buildings and do not include architects' plans which are dealt with as *drawings* for copyright purposes.
[7] SM Santoso, BD Horne & SB Wicker, Destroying by Creating: Exploring the Creative Destruction of 3D Printing Through Intellectual Property (2013). Available at www.truststc.org/education/reu/13/Papers/HorneB_Paper.pdf (last accessed 3 April 2018).
[8] *See*, D Mendis, "Clone Wars": Episode I – The Rise of 3D Printing and its Implications for Intellectual Property Law: Learning Lessons from the Past? [2013] 35(3) *European Intellectual Property Review* pp. 155-169 at p. 168 - p. 168. *"It is suggested that "adapting" to 3D printing technology by "adopting" new business models is the way forward".*

the importance attached to a design document, which raises "the possibility of customising an object" and with it, "raises concerns for intellectual property (and civil liability)".[9]

For these reasons, the copyright status of CAD files calls for further clarification. Whilst modification of 3D models through the use of online tools or scanning does indeed give rise to IP implications[10], it is submitted that the conundrum surrounding the copyright status of a CAD design file and its customisation, continues to be covered in ambiguity thereby calling for further examination.

Therefore, this paper attempts to provide clarity to this unanswered question. It does so, in three parts. In Part One, the paper will consider the IP issues surrounding CAD design files and will explore the copyright status and protection of these files with reference to the existing literature whilst raising questions which remain unanswered. Thereafter, in Part Two, the paper will delve deeper in to the issue of the copyright status of CAD files through the lens of three UK cases. In particular, this part of the paper will centre on two main questions:

> **(a)** Is a CAD file the kind of work (whether artistic or literary) that can attract copyright protection? and
> **(b)** If a CAD file can attract copyright protection, what kind of acts of use or reproduction/copying of a file would constitute infringement?

In shedding light and in responding to the above questions, Part Three of this paper will highlight the gaps and challenges which continue to exist whilst considering the way forward. In doing so and in considering the copyright framework in the context of CAD software, the paper will adopt and apply a 'coherentist' and 'regulatory instrumentalist' assessment of the law in providing recommendations and in looking ahead to the future.

[9] European Parliament, Working Document on Three- Dimensional Printing, a Challenge in the Fields of Intellectual Property Rights and Civil Liability (23 November 2017).
[10] *See supra* n. 1. The current literature has focused on the copyright status of object design files, where it has been (a) initiated by an individual; (b) where there has been modification to the file through the use of online tools or (c) modification caused by scanning. However, (a) above, requires further exploration. See in particular, D Mendis, 'Clone Wars': Episode II The Next Generation – The Copyright Implications relating to 3D Printing and Computer-Aided Design (CAD) Files [2014] 6(2) *Law, Innovation and Technology*, pp. 265-281; D Mendis and D Secchi, *A Legal and Empirical Study of 3D Printing Online Platforms and an Analysis of User Behaviour* (London: Intellectual Property Office; 2015), pp. 5-15.

Part One: The Copyright Status of Digital Design Files – The Conundrum of CAD

In two papers titled, *Clone Wars Episode I* and *Clone Wars Episode II*,[11] Mendis opined, that in applying the current law to the 3D printing context, it can be established that a computer program encompasses a CAD-based object design file, within its definition and is therefore, capable of copyright protection in the UK as a literary work. This statement requires further clarification.

First, it is interesting to note that the complex questions which the 3D design file gives rise to, do not necessarily apply to other file formats. For example, when writing this paper, utilising *Microsoft Word for Mac*, the present author did not stop to question the legal status of the *Word* document. Equally the author did not stop to question the work represented through the use of the *Word* package, i.e., whether what is being written is 'data' or a piece of creative work, attracting copyright. The *software package* and the *resulting work* represented by using the software are two separate features, although both are protected as literary works, under copyright law.[12]

With reference to the former (software), it is important to highlight at the outset, that software is an 'umbrella' term which encompasses a wide variety of programs and information sources which control hardware. Lacking in statutory definition, 'software' is open to many interpretations; however, the Institute of Electrical and Electronics Engineers (IEEE) defines software as "computer programs, procedures and possibly associated documentation and data pertaining to the operation of computer systems".[13] As such, software is seen as being heterogeneous and composed of several different elements which vary depending on the software and its functionality. In most cases, these elements consist of source code, object code, data flows, algorithms, programing language and general user-interface.[14] Of particular relevance to this paper are the 'source code' (the restatement of the functions to be performed as a set of algorithms through a computer language) and the 'object code' (translation of the source code generally by a computer running under a compiler program into a machine-readable language).[15] In other words, the source code allows a computer program or script to

[11] D Mendis, "Clone Wars": Episode I – The Rise of 3D Printing and its Implications for Intellectual Property Law: Learning Lessons from the Past? [2013] 35(3) *European Intellectual Property Review* pp. 155-169; and D Mendis, 'Clone Wars': Episode II The Next Generation – The Copyright Implications relating to 3D Printing and Computer-Aided Design (CAD) Files [2014] 6(2) *Law, Innovation and Technology*, pp. 265-281.
[12] Section 1(a) and 3(1)(b) *Copyright, Designs and Patents Act 1988 (as amended)* (hereinafter CDPA 1988).
[13] IEEE Std 610.12-1990 Standard Glossary of Software Engineering Terminology.
[14] Ibid.
[15] Section 3(1)(c) CDPA 1988; *see also Nova Productions Ltd v Mazooma Games Ltd* [2007] RPC 25 (CA).

run, whilst the object code allows for the interpretation of the program for purposes of performing the instructions (and forms the non-literal aspect of the software).[16] Guarda distinguishes between the source and object codes by providing the following explanation for the dual-elements of software:

> "the literary one, the source code written by the programmer using one or more programming languages that can *albeit,* with some difficulties, be associated with the 'traditional 'written text and the 'technological' one which provides functionality (and industrial application).[17]

This quote offers some insight into the present ambiguity. Whilst the protection of source code as literary copyright appears to be accepted, 'with some difficulty' the protection of object code has led to more questions in view of its association with functionality. This proposition has its foundation in section 3(1) of the *Copyright, Designs and Patents Act 1988* (CDPA 1988) which states that a computer program and its embedded data are together recognised as a literary work under copyright law[18]. Furthermore, according to Recital 7 of the Software Directive[19], a 'computer program' is considered to 'include programs in any form including those which are incorporated into hardware'. It also 'includes preparatory design work leading to the development of a computer program provided that the nature of the preparatory work is such that a computer program can result from it at a later stage'.

An analysis of Recital 7 of the Software Directive in light of recent European cases ascertains that the protection is bound to the program code and to the functions that enable the computer to perform its task. This in turn implies that there is no protection for elements without such functions (i.e. graphical user interface (GUI), or "mere data") and which are not reflected in the code. In other words, it appears that functionality in itself is not protected.[20] Put simply, a

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[16] *SAS Institute Inc., v World Programming Ltd* (C-406/10) [2012] 3 CMLR 4, para. 39. The Court of Justice of the European Union stated that: "keywords, syntax, commands and combinations of commands, options, defaults, and iterations consisting of words, figures or mathematical concepts which, considered in isolation are not, as such, an intellectual creation of the author...It is only through the choice, sequence and combination...that the author may express his creativity in an original manner and achieve a result, namely the user manual for the program, which is an intellectual creation" (paras: 66-67). *See also,* K Toft, The case of SAS Institute Inc., v World Programming Ltd [2014] 20(2) *Computer and Telecommunications Law Review*, pp. 59-62 at p. 60.

[17] P Guarda, Looking for a Feasible form of Software Protection: Copyright or Patent, Is that the Question? [2013] 35(8) *European Intellectual Property Law*, pp. 445-454 at p. 445. See also, Waelde et al, *Contemporary Intellectual Property: Law and Policy* (4th ed), pp. 64-65.

[18] CDPA 1988, s 3(1)(b), (c) (as amended).

[19] Parliament and Council Directive 2009/24/EC of 23 April 2009 on the legal protection of computer programs [2009] OJ L111/16, recital (7).

[20] Case C-406/10 SAS Institute Inc, v World Programming Ltd [2012] 3 CMLR 4; *Bezpečnostní Softwarová Asociace – Svaz Softwarové Ochrany v Ministerstvo Kultury* (C-393/09) [2011] ECDR 3

reading of the CDPA 1988, as amended, in view of recent case law implies that copyright protection will attach to the *expression of the computer code* (source code) and will *not extend to the functionality of the software* (object code) *(emphasis added).*

However, Waelde *et al* establish, "arguments that object code is incapable of copyright protection are no longer sustainable". [21] Furthermore, the Court of Justice of the European Union (CJEU) in *Bezpečnostní* concluded that that GUI can be protected as a copyright work if the interface represents the author's own intellectual creation.[22] Yet, it is this point which has given rise to much debate as reflected in various articles and commentaries[23] as emerging technologies tend to blur the line between source and object codes. It is akin to co-creation of creative works made possible by technological means, which in turn, has seen the disappearance of the 'traditional author' and raised questions about the end of ownership, as it was once known.[24] New technologies such as 3D printing once again drives us to re-visit regulatory boundaries between the creator and publisher; author and owner as well as other new areas such as digital design files where the nuance of protection appears to be subtle.

These issues prompt us to look deeper into its protection from the point of view of copyright. In particular, they question, whether design files containing machine-readable instructions are to be perceived as 'data', based on the fact that they provide instructions. Or should they attract literary copyright protection, based on the fact that they encompass preparatory design work leading to the development of a computer program which can result from it at a later stage.

In response, a consideration of three UK cases spanning over three decades, are analysed below in an attempt to shed light on the above questions.

Prior to moving to the analysis, the author offers a diagram of a CAD design document, to assist with the legal analysis. The diagram illustrates a CAD design file, with a simple drawing embodied within it. As with most software packages, the CAD software (*Rhinoceros 3D*[25] in the present case) provides tools as seen on the top and left of the file, which enables a creator

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See also P Guarda, 'Looking for a Feasible Form of Software Protection: Copyright or Patent, Is that the Question?' [2013] 35(8) *European Intellectual Property Review* 445, 447.

[21] Waelde et al, *Contemporary Intellectual Property: Law and Policy* (4th ed), pp. 64-65. This argument succeeded in the Australian case of *Apple Computers Inc. v Computer Edge Pty Ltd* [1986] FSR 537. In New Zealand, the object code achieved copyright as a translation of the source code: *IBM Corp v Computer Imports Ltd* [1989] 2 NZLR 395.

[22] *Infopaq International A/S v Danske Dagblades Forening* (C-5/08) [2010] FSR 20.

[23] *See supra* n. 1.

[24] Aaron Perzanowski and Jason Schultz, The End of Ownership: Personal Property in the Digital Economy (Cambridge, MA: MIT; 2016).

[25] Rhinoceros 3D at https://www.rhino3d.com/ (last accessed 3 April 2018).

to design a 3D model. The section, highlighted in red, illustrates the 'construction graph' which is the written iteration of the 3D model. Where customisation of a 3D model is provided by the designer, the construction graph will also reflect the customisation options, to be executed by a consumer at a later stage. The legal implications of mass customisation, particularly from the context of literary works is considered in Part Three. However, it is important to point out that the more complex the 3D model and its customisation options are, the longer the construction graph will be. For designers, the true value of their 3D model in terms of IP protection, tends to lie in the written iteration of the 3D model (i.e., construction graph).[26] The question is whether the construction graph contains mere instructions to be read by a computer for purposes of printing a 3D model[27], and if so, can such instructions be considered literary works. Where the construction graph presents customisation options, is the situation any different? Parts two and three of this paper attempts to respond to these questions.

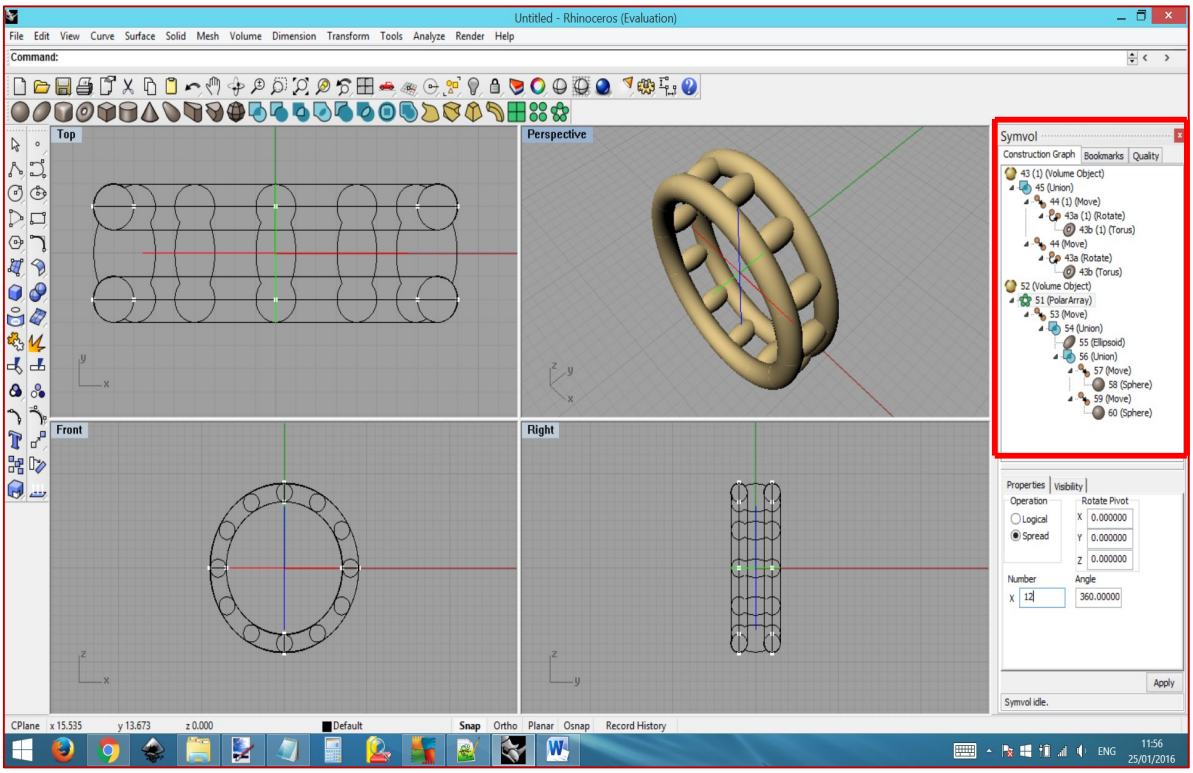

Diagram 1

[26] Findings from the AHRC-funded project, *'Going for Gold': 3D Scanning, 3D Printing and Mass Customisation of Ancient and Modern Jewellery'* (2015-2017) at https://microsites.bournemouth.ac.uk/cippm/2017/03/24/going-for-gold-3d-printing-jewellery-and-the-future-of-intellectual-property-law/ (last accessed 3 April 2018).

[27] H Lipson and M Kurman, *Fabricated: The New World of 3D Printing* (Indiana: John Wiley & Sons, Inc.; 2013), p. 12 - *"a 3D printer without an attached computer and a good design file is as useless as an iPod without music".*

Part Two: Seeking Direction Through Case Law: From Knitting Instructions to Circuit Diagrams and Tartans

Two main questions which will be addressed in this part of the paper:

> **(a)** Is a CAD file the kind of work (literary or artistic) that can attract copyright protection? and
> **(b)** If a CAD file can attract copyright protection, what kind of acts of use or reproduction/copying of a file would constitute infringement?

These questions will be considered in light of three UK cases and for purposes of clarity, the paper will provide a brief overview of the cases and their outcomes first, before proceeding to consider the answers to the above mentioned questions through an in-depth analysis of case law.

Knitting Instructions, Circuit Designs and Tartans: An Overview of Three UK Cases Spanning Three Decades

Knitting Instructions and Knitting Garments: Brigid Foley Ltd v Ellott and Others [1982][28]: In this case of *Brigid Foley Ltd v Ellott and Others*, the plaintiff sought to enforce copyright in a knitting guide. The plaintiff asserted that its artistic copyright in certain knitting guides and a prototype garment had been infringed by garments made and sold by the defendants. The court clarified that "a knitting guide was a piece of paper on which were written various words and numerals, intelligible to those concerned with the production of knitwear, stating how the garments were to be produced".[29] Though one of the defendants, an ex-employee of the plaintiffs had had access to the knitting guides, there was no evidence to show that any of the defendants had had access to the prototype. There were however some striking similarities between the plaintiff's garment (made according to the knitting guide) and the defendant's garment in issue. Held, refusing interlocutory relief, that "there had been no reproduction of the words and numerals in the knitting guides by the defendants' garments".[30] In delivering his judgement, Megarry V-C explored the copyright status 3D products arising from design documents, their standing as artistic works and questioned whether these resulting products are capable of infringing a design document. In concluding that a 3D product

[28] *Brigid Foley Ltd v Ellott and Others* [1982] RPC 433.
[29] ibid at p. 434.
[30] ibid at p. 433.

prototype arising from a design document, does not infringe the design document, the case sheds light on (b) above.

Circuit Diagrams and Schematic Designs: Anacon Corp v Environmental Research Technology [1994] [31]***:*** The case concerned, in part, a claim by the plaintiffs that copyright in the circuit diagram of an electronic dust meter analyser had been infringed by the defendants, who had produced a 'net list'.[32] Alleging that copyright subsisted in their circuit diagram, the plaintiffs alleged infringement of both artistic and literary copyright, which they argued subsisted in their circuit diagram.

Although the Court was not asked to decide the question of whether an actual electronic circuit itself could be an infringement of the literary copyright in an electronic circuit diagram, the judge reasoned that the extent of literary copyright protection in this field must surely now be a matter of some speculation.[33] On the other hand, the Court held that an electronic circuit diagram was a literary work although not an artistic work. As such, this case provides some insight into question (a) above.

Loom Instructions and Plaid Fabrics (Tartans) [34]***: Abraham Moon & Sons Ltd v Andrew Thornber and Others [2013]*** [35]***:*** This case concerned a high-end woollen mill based in Guiseley in Yorkshire and founded in 1837 known as Abraham Moon (claimant)[36], which had designed a plaid fabric called Skye Sage. Another fabric, Spring Meadow, was made by NB Fabrics Ltd, the fifth defendant in the case, and was supplied to a firm called Art of the Loom, directed by the first four defendants.

At the heart of the issue in this case was the literary copyright in the design document and artistic copyright in the Skye Sage plaid fabric. Accordingly, the question was whether Skye Sage was a *protected work*. The interesting point was that the designer of the protected Skye Sage design (Martin Aveyard of Abraham Moon & Sons Ltd) had not drawn it nor used a CAD system; instead he had created a mood board of influences before deciding on the initial

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[31] *Anacon Corp v Environmental Research Technology* [1994] FSR 659.
[32] "A net list is a list of all of the components in a circuit and, in relation to each component, what other components it is connected to, and if necessary, where" *per* Jacob J at p. 661.
[33] J Reynolds and P Brownlow, Increased Legal Protection for Schematic Designs in the United Kingdom [1994] 16(9) *European Intellectual Property Review*, pp. 398-400.
[34] "Plaid fabrics consist of criss-crossed horizontal and vertical bands in multiple colours. Tartans are examples of plaids. Traditional tartan designs use yarns of bold solid colours with the same colours appearing in the warp and the weft. Traditional tartans for use in kilts are made from worsted, a wool processed into long fine fibres. Worsted yarns are unsuitable for upholstery and soft furnishings which require "woollen" yarns" [2012] EWPCC 37, *pe*r Judge Birss, para. 6.
[35] *Abraham Moon & Sons Ltd v Andrew Thornber and Others* [2012] EWPCC 37.
[36] ibid, para 11.

combinations of threads and numbers of threads for each colour and recorded this on a "ticket".[37] In essence, this ticket contained two pages of written instructions, i.e. it contained only words and numbers which provided instructions for the production team on how to set up the loom in order to produce Aveyard's design. In other words, the ticket did not portray any illustrations. In his final judgement, Judge Birss QC opined that the Spring Meadow *ticket* was in fact an infringement of the Skye Sage ticket stamp and concluded that a document with no element of drawing, and simply consisting of two pages of written instructions, i.e. having only words and numbers on them without any illustration, can be regarded as an artistic (graphical) work as well as a literary work.[38] As such, this case of *Abraham Moon* sheds further light on (a) above.

Having set out the facts of the three cases and the issues surrounding them, the paper will now turn to consider the detailed arguments arising from the cases before applying them to the present question of CAD files. At the outset it should be pointed out that whilst *Abraham Moon* and *Anacon* were decided under CDPA 1988, the *Brigid Foley* case, decided in 1982 was considered under the *Copyright Act 1956*. This assists in understanding the development of the copyright status of design documents from 1956 through to 1988 and beyond.

Can Design Documents Containing Instructions Be Considered Literary Works?

Whilst the cases of *Abraham Moon (loom instructions)* and *Anacon (circuit diagrams)* provide some guidance on this point as mentioned above, the case of *Brigid Foley (knitting instructions)* does not really touch on the issue of literary works. Instead the case sheds light on the association between knitting guides and porotypes, which was equally a point of contention in *Abraham Moon* in relation to "ticket stamps" and plaid fabric.

In the case of *Abraham Moon*, the defendants argued that there can be no infringement of literary copyright by making a garment in accordance with instructions. The defendant cited a number of cases[39] to strengthen this point whilst making reference to academic commentary by Laddie, Prescott and Vitoria:

> "The instant problem is quite distinct from the case of a literary work consisting of

[37] ibid, paras 43-35.
[38] *See also Mitchell v BBC* [2011] EWPCC 42 at 25.
[39] *Brigid Foley and Ellot* [1982] RPC 433; *J&S David and Wright Health Group* [1988] RPC 403; *Interlego v Tyco* [1988] RPC 343; *Lambretta Clothing v Teddy Smith* [2003] RPC 41.

> a series of instructions which do not describe an end product but only say how it is to be brought about—a recipe for making a rabbit pie, to take one judicial illustration. There, the end product does not reproduce the work in a material form—to follow the instructions is not to reproduce them, but merely to perform them. To adopt a mathematical expression, the instructions do not 'map on' to the end product. The literary skill and labour has not been taken".[40]
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The claimant put forward the opposing view and relying on the case of *Autospin v Beehive Spinning*[41] established that "reproduction included transforming a computer data file which defines a three-dimensional shape into that article".[42] The claimants also made reference to Article 2 and Recital 21 of the Software Directive[43] and paragraph 43 of *Infopaq*[44] and paragraph 96 of *Painer*.[45]

Summing up, the claimants emphasised that "the Directive envisages the protection of all intellectual creations by the same reproduction right and distinctions between literary and artistic works are no longer justified. So the limitation of three-dimensional copying in s17(3) of the 1988 Act to artistic works was no longer appropriate". [46]

What then was the copyright status of the Skye ticket stamp"? Did the Court consider it to be a literary work? On this point, Judge Birss distinguished between the ticket stamp containing the instructions and the resulting garments arising from it. In this context Judge Birss held that whilst the defendant's Spring Meadow fabric was not a reproduction of the claimant's Skye Sage ticket stamp, the Spring Meadow ticket was in fact an infringement of the Skye Sage ticket stamp.[47] In other words, Judge Birss concluded that a *design document containing numbers and words, whether it be a ticket stamp for a plaid or a computer file for a 3D model, can have literary copyright (emphasis added)*.[48]

In *Anacon,* the Court held that circuit diagrams, whether they be written in code or symbols, attracts literary copyright.[49] Referring to the CDPA 1988, Jacob J opined that a literary work

[40] Laddie, Prescott and Vitoria, para 3.148.
[41] [1995] RPC 683.
[42] [2012] EWPCC 37 at para 98.
[43] Software Directive 2009/24/EC implemented by CDPA 1988 confirmed that for purposes of copyright, the *program* and its *preparatory material* are considered to be one component as opposed to two.
[44] *Infopaq International A/S v Danske Dagblades Forening* Case C-5/08 [2010] FSR 20.
[45] *Painer v Standard Verlags GmbH* (C-145/10) [2012] ECDR 6 (ECJ (3rd Chamber).
[46] [2012] EWPCC 37 at para 98.
[47] ibid, at para 99.
[48] ibid.
[49] [1994] FSR 659 at 660.

includes any work other than a dramatic or musical work and that which is written and can include a table or compilation, a computer program, preparatory design material for a computer program and a database.[50] Elaborating on this point Jacob J further referred to the definition of "writing" as it appears in CDPA 1988 as "any form of notation or *code*, *whether by hand or otherwise and regardless of the method by which, or medium in or on which, it is recorded*, and "written" shall be construed accordingly" *(emphasis added).*[51] As such, Jacob J articulated that whatever is written down, whether it be in code, symbol, hand or otherwise can attract literary copyright.[52]

Interpreting the Act and in agreeing with the plaintiff, Jacob J reasoned as follows:

> "My first thought was that it would be absurd to regard a circuit diagram as a literary work, but the more one thinks about the ambit of that expression, as used in the Act, the more one is driven to the conclusion that provided it is all written down and contains information which can be read by somebody, as opposed to appreciated simply with the eye, the more one sees that that is just what it is. Similarly, musical notation is written down but needs expressly to be taken out of the definition of "literary work". But that which is not expressly taken out remains within it. What one has here is electrical engineer's notation".[53]

As such, the cases of *Anacon* and *Abraham Moon*, strengthens the argument for literary copyright in design documents, including those containing code, symbols, instructions and so on. Applying the above reasoning to 3D CAD design files, it could be argued that a CAD design file containing the instructions for printing a 3D model, represented through a design document containing written symbols[54] as well as a visual image can be considered as a literary and artistic work.

Can Design Documents Containing Instructions Be Considered Artistic Works (as well as Literary Works)?

This is an interesting question and one which was considered in two cases – that of *Abraham Moon* and *Anacon*. Whilst the *Abraham Moon* case clarified that a design document could attract both literary and artistic works, the case of *Anacon* raised some questions in this regard. The specific arguments of each case are considered below.

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[50] Section 3(1)(a)-(d) CDPA 1988.
[51] Section 178, CDPA 1988. *See also*, [1994] FSR 659 at 663.
[52] [1994] FSR 659 at 663.
[53] ibid.
[54] See diagram 1.

In *Anacon*, counsel for the plaintiff argued that a circuit diagram is an artistic work based on three visual aspects. Firstly, the components that are shown on the page, *albeit* by the use of conventional symbols, secondly, where the symbols are placed on the page and thirdly how they are connected together.[55] However, disagreeing with the counsel for the plaintiff, Mr. Whittle, Jacob J established the argument "that the circuit diagram is an artistic work fails because the alleged infringement simply does not look like the artistic work".[56]

On the contrary, in *Abraham Moon*, Judge Birss found that a document with no element of drawing, and simply consisting of two pages of written instructions, i.e. having only words and numbers on them without any illustration, can be regarded as an artistic (graphical) work (as well as a literary work as discussed above). Judge Birss reasoned as follows, citing "visual significance"[57] as important to those who have knowledge in ticket stamps.[58] Therefore Judge Birss concluded that the fact that the ticket was produced by not drawing lines was irrelevant.[59] He went on to say that the ticket is not simply a set of instructions which can be performed on a loom. It is also *a record of an image (emphasis added)*. To further strengthen this point, he cited the need for 'fixation' in literary and artistic works, which in this case was achieved, *albeit,* in the form of numbers and words.

Judge Birss QC clarified the position as follows:

> "I find that the Skye Ticket Stamp [i.e. the two-page document with the loom set-up instructions] is an artistic work within s4 of the 1988 Act. I think it is best described as a "graphic work" within s4(1)(a) and 4(2). Mr Turner submitted that terms like "graphic work" should be given their ordinary meaning. I do not think it is doing violence to the language to regard the ticket as a graphic work. It may be of an unusual sort but it is a record of a visual image".[60]

The same reasoning could be applied to CAD design files. In fact, in *Abraham Moon*, Judge Birss discusses this point. Referring to the artist David Hockney who had created works of art on his iPad, Judge Birss suggested that the artwork could be "ephemeral as they were being created and the images may not even have stayed on the screen all the time as they were

[55] [1994] FSR 659 at 662
[56] *See Anacon Corp v Environmental Research Technology* [1994] FSR 659
[57] "Visually significant" was a phrase that was originally used by Whitford J in *Rose Plastics GmbH v William Beckett & Co (Plastics) Ltd* [1989] FSR 113
[58] [2012] EWPCC 37 at para 118. "Visually significant" was also a phrase used by Lord Oliver in *Interlego v Tyco* [1988] 3 All ER 949
[59] [2012] EWPCC 37 at para 103
[60] [2012] EWPCC 37 at para 107

being drawn".[61] However, the Judge reasoned that "the only thing which makes sense to be referred to as the artist's work … is the computer file recording the image".[62] In this sense, the Court concluded that a document or computer file recording an image, where the image is in fact represented through instructions, can indeed attract artistic copyright. As mentioned above, what is important is the visual significance of the image represented through a design document (or CAD file) to those with knowledge of such documents consisting of symbols, numbers and words.

This applies neatly to the scenario in relation to CAD files, where the instructions contained within a CAD design file will ultimately have visual significance for 3D printing a product. Yet, on the face of it, the design file will be seen as instructions, described in the form of code, which would be meaningless to most lay people and which could be considered as data.[63] In *Abraham Moon*, Judge Birss argues that the "artistic copyright must relate to the content of the work of the artist and not the medium in which it is recorded. It is or should be "content" copyright and not a "signal" copyright.[64] In other words, the visual image of Skye Sage if it was fixed in material form would be protected by artistic copyright. Basing his argument on the above points, Judge Birss established that to deny artistic copyright in this case – despite the fact that the visual image is indeed fixed in a material form – is to confuse the medium with the message.[65] On this basis, Judge Birss concluded that the *Skype Ticket Stamp is an artistic work* (as well as a literary work as discussed above) within section 4 of the CDPA 1988, which can be best described as a "graphic work" under section 4(1)(a) and 4(2).[66] It is submitted that CAD design files are also better described as "graphic works" as opposed to artistic works *per se.* based on the above discussion, and through the application of the cases, confirms that they could be considered as *artistic works* as well as *literary works* based on the visual image and instructions they provide, *albeit,* being symbols, numbers or words.

[61] [2012] EWPCC 37 at para 105
[62] ibid
[63] D Mendis *et al*, The Co-Existence of Copyright and Patent Laws to Protect Innovation – A Case Study of 3D Printing in UK and Australian Law in R Brownsword *et al*, *The Oxford Handbook of Law, Regulation and Technology* (London: Oxford University Press; 2017), chapter 19
[64] ibid, para 106. *See also* Sir R Arnold, Content Copyrights and Signal Copyrights: The Case for a Rational Scheme of Protection [2011] 1(3) *Queen Mary Journal of Intellectual Property*, pp. 272-279
[65] ibid, para 106.
[66] ibid, para 107. Section 4(2)(a)-(b) CDPA 1988 states: "In this Part— "graphic work" includes— (a) any painting, drawing, diagram, map, chart or plan, and (b) any engraving, etching, lithograph, woodcut or similar work".

Can a Product or Article Arising from the Design Document Infringe the Copyright in the Design Document?

The above stated arguments have much significance for the present discussion. On the one hand, Judge Birss' judgement in *Abraham Moon* clarifies that there is literary copyright in documents containing simply numbers and words, whilst on the other hand, he moves away from establishing that the fabric produced by the defendants is a reproduction of the literary work of the claimant.[67] He explains this point as follows: "once made, a fabric would not look the same as it did on a CAD system even if one was used. With CAD, it would not be possible to feel the fabric, which is an important part of the process".[68]

Further insight into this argument is provided in the case of *Brigid Foley*. In this case, an important distinction was made once again by Megarry V-C in relation to a knitting guide and the prototype arising from it. The counsel for the plaintiff argued, relying on section 3(5)(a) of the *Copyright Act 1956* that the garments when produced according to knitting instructions (of various words and numerals on them intelligible to those who understand the production of knitwear) reproduce those knitting instructions in material form. Megarry V-C in his judgement and in responding to the question of whether a prototype product arising from a design document infringes that document, opined:

> "… It seems to me quite plain that there is no reproduction of the words and numerals in the knitting guides in the knitted garments produced by following the instructions. The essence, I think, of a reproduction, is that the reproduction should be some copy of or representation of the original. I do not see how anyone looking at the knitted garment could then say "Well that is a copy of, or reproduction of, the words and numerals to be found in the knitting guide" . . . By a process of counting up the number of stitches and so on, in the knitted garment one might be able to work back and produce the knitting instructions but that is a very different matter from saying that the garment is a reproduction of the instructions".[69]

Megarry V-C emphasises the point further by pointing out that the knitting guide has to be produced first before a prototype can arise from it – not the other way round. He does contend that, if necessary, the knitting guide may be revised, but it is the knitting guide that comes

[67] ibid. *See also*, I Harding, Fashion and Copyright: Weaving our Way Towards Increased Protection [2013) 35(4) *European Intellectual Property Review*, pp. 183-190 at p. 184.
[68] [2012] EWPCC 37 at para 46.
[69] Per Megarry V-C at p. 434.

first.[70] Furthermore, he establishes that "if the prototype is merely copied from the knitting guide, then there is no originality in the prototype: for it is merely produced in a mechanical manner from the instructions contained in the guide".[71]

Therefore, if the resulting garment is not a reproduction of the design document, then does it attract its own copyright? The above discussed cases clearly distinguish between the design file and the resulting product – as two separate items. Whilst it is clear from *Abraham Moon* that a design document can have literary copyright, both *Abraham Moon* and the *Brigid Foley* cases imply the resulting product should be considered as a stand-alone work attracting its own copyright, rather than being a reproduction of the instructions from which it has emerged.[72] As to whether the knitting garment or plaid fabric, attract artistic copyright is left unanswered in both cases. In *Brigid Foley*, Megarry V-C referring to 3(1)(c) of the *Copyright Act 1956* states that he will not attempt to clarify the point of whether artistic copyright applies to garments, which he says is "somewhat of a difficult point" and one which "has been lurking in the law of copyright for many years".[73] In this sense, the cases do not provide guidance on the copyright status of the resulting garments[74] – and it seems reasonable bearing in mind the cases dealt with clothing, which is a complex issue.[75] However, based on the discussion above and taking into consideration 3D models, it can be reasoned, based on section 4(1)(a) CDPA 1988, that 3D models which arise from design files, do attract separate copyright status and in the present context, artistic copyright.[76]

Part Three: Conclusions and Recommendations: 3D Models, CAD Files and Their Copyright Status – In Pursuit of Clarity

The paper undertook an in-depth analysis of selected copyright cases and statutes, to determine the copyright status of 3D design documents and attempted to respond to the question of whether design / CAD files can attract literary and / or artistic works. In answering this question the paper also considered whether the resulting products arising from a design

[70] ibid at p. 435.
[71] ibid.
[72] [1982] RPC 433 at p. 435; [2012] EWPCC 37 at para 106.
[73] [1982] RPC 433 at pp. 434-435.
[74] [2012] EWPCC 37 at para 118.
[75] *Radley Gowns Ltd v Costas Spyrou* [1975] FSR 455; *Burke v Spicers Dress Designs Limited* [1936] Ch 400; *Flos SpA v Semararo Case e Famiglia SpA* Case C-168/09. The latter European case indicated that the national courts may be required by the Information Society Directive 2001/29/EC to provide protection for such works (garments). If the fabric is the "intellectual creation" of a creator, then it should be protected in copyright.
[76] Section 4(1): n this Part "artistic work" means— (a)a graphic work, photograph, sculpture or collage, irrespective of artistic quality. Section 4(2)(b) states "sculpture" includes a cast or model made for purposes of sculpture.

document infringes the copyright in the design document. Answering the first question in the affirmative, and the second in the negative, the paper drew some conclusions which are presented below.

Response to Question 1: A Design Document / CAD File can be Protected as a Literary and Artistic Work

In responding to the first question of whether a design document / CAD file can attract literary and / or artistic copyright protection, the paper sought answers particularly through the cases of *Abraham Moon* and *Anacon*.

The case of *Abraham Moon* clarified that a design document could attract both literary and artistic copyright, even where the design document does not reflect any element of drawing, and consists simply of written instructions. Judge Birss reasoned that the instructions would make sense to those who have knowledge in ticket stamps. At the same time, he focused on the "visual significance" of the ticket stamp arguing that the drawing *per se* was irrelevant but what was important was the portrayal of the 'record of an image' – satisfying 'fixation' in copyright law.

Anacon strengthened the argument for literary copyright through its application to a circuit diagram, although the conclusion was arrived at differently. In this case, Jacob J argued that circuit diagrams, whether they be written in code or symbols, attracts literary copyright. In arriving at his conclusion, Jacob J, focused on the "written" element of the document and argued that whatever is written down, whether it be in code, symbol, hand or otherwise can attract literary copyright.[77] However, in *Anacon*, artistic copyright was rejected.

These two cases, whilst shedding light on the first of the two questions, provides an insight into the protection of design / CAD documents, containing instructions. Whilst the question has been answered in the affirmative, it can reasonably be questioned whether this position can be clarified further. This is particularly relevant from the perspective of literary copyright representing code, symbols, instructions contained within a design document or CAD file as discussed in the cases.

Drawing from the current law itself and in response, the author suggests that further clarity for the protection of CAD files – as design documents – can be drawn from section 51, CDPA. Section 51(3) defines a design document as *"any record of a design, whether in the form of a*

[77] [1994] FSR 659 at 663

drawing, a written description, a photograph, data stored in a computer or otherwise". It is suggested that this definition aptly covers the protection of CAD design files as literary copyright in the context of UK law. Their artistic representation in the form of a 3D model, can be protected through section 4(1)(a) CDPA 1988 which defines an artistic work as *"a graphic work, photograph, sculpture or collage, irrespective of artistic quality ..".* Section 4(2) further defines a graphic work as *"(a) any painting, drawing, diagram, map, chart or plan, and (b) any engraving, etching, lithograph, woodcut or similar work".*

Applying the findings from the cases as well as the relevant sections from CDPA 1988, it can be argued that a design document or a CAD file embodying a 3D model, can be protected as a literary *and* artistic work. However, the implications in the context of computer programs is considered below.

Response to Question 2: A Prototype Product Resulting from a CAD File does not Infringe the Copyright in the Design File

As regards the response to the second question of what kind of acts of use or reproduction/copying of a file would constitute infringement, where a CAD file attracts copyright protection, the paper sought answers through the cases of *Abraham Moon* and *Brigid Foley.*

Both *Abraham Moon* and *Brigid Foley* cases implied the resulting product should be considered as a stand-alone work attracting its own copyright, rather than being a reproduction of the instructions from which it has emerged. Equally, the case of *Brigid Foley* underlined the point that a product made by following instructions is *not* a reproduction of the instructions and so does not infringe copyright in those instructions.

In this context, it also highlighted a limitation pertaining to section 17(3) of CDPA 1988[78], particularly from the point of view of section 51, CDPA 1988. As mentioned above, section 51(1) states that "it is not an infringement of any copyright in a design 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".[79] In other words, while the copyright in a two-dimensional artistic work may be infringed by making a copy of it in three-

[78] Section 17(3): in relation to an artistic work copying includes the making of a copy in three dimensions of a two-dimensional work and the making of a copy in two dimensions of a three-dimensional work.

[79] For an analysis of this section, see also, G Dworkin and R Taylor, By Accident or Design? The Meaning of "Design" Under Section 51 CDPA 1988 [1990] 12(1) *European Intellectual Property Law*, pp. 33-35, at p. 33; and *BL v Armstrong* [1986] 1 All ER 850 at 852.

dimensions, according to section 17(3) CDPA 1988, this is limited by section 51, CDPA 1988.[80] For example, to make a knitted garment or a plaid fabric to someone else's design without permission, is not an infringement of copyright, unless the garments are an artistic work in their own right. However, in both *Abraham Moon* and *Brigid Foley*, this question was left unanswered with Megarry V-C *in Brigid Foley* stating that it is "somewhat of a difficult point" and one which "has been lurking in the law of copyright for many years".[81] Furthermore, where the three-dimensional product is intended for mass production, it is unlikely that they would meet the criteria of 'sculpture' or a 'work of artistic craftsmanship' to attract artistic copyright.[82]

Based on these arguments, it can be questioned whether the resulting products can be considered as "derivative works"? An analogy can be drawn between a ticket stamp or knitting guide containing instructions for producing a plaid fabric or knitted garment, respectively, and a CAD design file containing instructions for digitally manufacturing a 3D model. Similar to the cases of *Abraham Moon* and *Brigid Foley* concluding that the resulting garments were not a reproduction of the design documents, a 3D model arising from a CAD design file, is also not identical to the design embodied within the computer file. This is due to elements such as the material used, heat, the printer and so on.[83] These factors distinguish 3D printed models from other copyright content, particularly those drawn from the entertainment industry. Whilst making a copy of a song, film or game can lead to an identical copy of the original, *albeit* lack of quality in some cases, the same cannot be said of 3D models.

Whilst this paper has attempted to provide clarity to the two main questions as discussed above, it does leave open some further questions for consideration. One such is in relation to the 'construction graph' within a CAD file, in providing mass customisation options.

But … Can a CAD Design File Providing Mass Customisation Options Be Considered a Computer Program?

The 'construction graph' was referred to, in Part One of this paper.[84] To re-cap, the 'construction graph' is the written iteration of the 3D model, which reflects the instructions for 3D printing a 3D model. However, where customisation of a 3D model is provided by the designer, the construction graph will also reflect these customisation options. It is important to

[80] *Squirewood Ltd v H Morris and Co Ltd* [1993] GWD 20-1239 (Outer House, Court of Session).
[81] [1982] RPC 433 at pp. 434-435.
[82] Waelde et al, *Contemporary Intellectual Property: Law and Policy* (4th ed), pp. 359-360.
[83] R Hague and P Reeves, Additive Manufacturing and 3D Printing [June 2013] Issue 55, *Ingenia* pp. 38-45 at p. 39.
[84] *See* diagram 1.

point out, as mentioned above, that as customisation options grow, the longer the construction graph will be. Importantly, what it also means, as submitted by the author, is that the construction graph could potentially be seen as a 'mini computer program' within the large *Rhinoceros 3D* software program utilised in *Diagram 1*. A designer may use a third-party software to design a 3D model for customisation as opposed to their own software. In such a scenario, the question is whether a designer has some protection over their construction graph or whether it is seen to be a part of the bigger third-party software. An analogy from the 2D world, can put this question into context. Where a writer uses third party software such as *Microsoft Word for Mac* to write an academic paper, should the resulting work be considered a creative work belonging to the writer or to a larger third-party software company. Of course, nobody would dispute that the work belongs to the writer.

If so, in a 3D world, can it not be argued that the array of customisation options provided by the designer and executed by a consumer at the time of customisation, adds a new layer of creativity – and in computer language a new layer of 'source code'?[85] In making this argument it is important to distinguish between instructions for 3D printing a complete product, to that leading to an incomplete product which will be later customised. Whilst a design document, containing instructions for printing a complete 3D model can be considered a literary and artistic work as argued above, it is problematic to make a case for it to be a computer program. However, where mass customisation options are presented by the designer, there is a strong case to be made for those instructions to be deemed as a 'mini computer program' in view of the fact that a construction graph is in fact 'preparatory work' which will lead to a computer program arising from it at a later stage.

Re-visiting Recital 7 of the Software Directive[86], can provide some clarity. Recital 7 states that a 'computer program' 'includes preparatory design work leading to the development of a computer program provided that the *nature of the preparatory work is such that a computer program can result from it at a later stage' (emphasis added)*. The accepted interpretation of Recital 7 is that 'the protection is … bound to the program code and to the functions that enable the computer to perform its task. Whilst this may mean that there is no protection for elements without such functions (i.e. graphical user interface (GUI), or "mere data") [87] and which are not reflected in the code, which is the current position, it is argued that providing

[85] *See supra* p. 7.
[86] Parliament and Council Directive 2009/24/EC of 23 April 2009 on the legal protection of computer programs [2009] OJ L111/16, recital (7).
[87] Case C-406/10 *SAS Institute Inc, v World Programming Ltd* [2012] 3 CMLR 4. See also P Guarda, 'Looking for a Feasible Form of Software Protection: Copyright or Patent, Is that the Question?' [2013] 35(8) *European Intellectual Property Review* 445, 447.

customisation options within a construction graph is in fact 'preparatory work' leading to a resulting computer program arising at a later stage. This is because the construction graph provides various functions, to be performed as a set of algorithms (source code) which will be executed through a machine-readable computer language (object code), at the time of customisation, by the consumer.

Yet, a CAD file is not recognised as a literary work in the context of computer programs, in the present UK or EU law.[88] More specifically, the object code is considered incapable of copyright protection. In the context of CAD design files, even if the customisation options within a construction graph were deemed as object code, it gives rise to uncertainty as articulated by Waelde *et al*: "arguments that object code is incapable of copyright protection are no longer sustainable".[89]

However, as the technology continues to grow and the future potential of 3D printing expands through the dissemination of 3D design files, policy makers will need to take note of this gap in the law and consider how to protect designers in the future. In other words, policy makers will need to take note of how to balance the future innovation by providing protection for creators and designers on the one hand and user rights on the other.

Policy Recommendations for the Future

This leads us to assess the present landscape from a coherentist and regulatory-instrumentalist point of view.[90] The debate on the approach taken by coherentists and regulatory-instrumentalists is an interesting one. Coherentism is defined by three

[88] Case C-406/10 *SAS Institute Inc, v World Programming Ltd* [2012] 3 CMLR 4. The Court of Justice of the European Union stated that: "keywords, syntax, commands and combinations of commands, options, defaults, and iterations consisting of words, figures or mathematical concepts which, considered in isolation are not, as such, an intellectual creation of the author...It is only through the choice, sequence and combination...that the author may express his creativity in an original manner and achieve a result, namely the user manual for the program, which is an intellectual creation" (paras: 66-67). *See also,* K Toft, The case of SAS Institute Inc., v World Programming Ltd [2014] 20(2) *Computer and Telecommunications Law Review*, pp. 59-62 at p. 60.

[89] C Waelde et al, *Contemporary Intellectual Property: Law and Policy* (4th ed), pp. 64-65. This argument succeeded in the Australian case of *Apple Computers Inc v Computer Edge Pty Ltd* [1986] FSR 537. In New Zealand, the object code achieved copyright as a translation of the source code: *IBM Corp v Computer Imports Ltd* [1989] 2 NZLR 395.

[90] For a deeper understanding of coherentism, see R Brownsword, InfoSoc2018: Informational Rights, Informational Wrongs and Regulatory Responsibilities [2018] 1 *Bournemouth University Working Paper in Law,* pp. 1-52 at p. 40 at https://microsites.bournemouth.ac.uk/law-review/infosoc-2018-informational-rights-informational-wrongs-and-regulatory-responsibilities/ (last accessed 3 April 2018).

characteristics.[91] First, for coherentists, what matters above all is the integrity and internal consistency of legal doctrine—in the present context, this would be the internal consistency of the law of copyright. Secondly, coherentists are not concerned with the fitness of the law for its regulatory purpose. Thirdly, coherentists approach new transactional technologies by asking how they fit within existing legal categories (and then will make every effort to fit them in). Coherentism is, thus, the natural language of litigators and judges, who seek to apply the law in a principled way.[92]

As Edward Rubin states, the distinctive feature of 'coherentism' is the idea that law forms "a coherent system, a set of rules that are connected by some sort of logical relationship to each other"[93]—or "a system of rules that fit together in a consistent logically elaborated pattern".[94] Where technology challenges the law, coherence is viewed as "an instrumental device that is deployed only when it can be effective".[95]

Brownsword elaborates this point further by stating that "where coherentism informs a proposal for reform, the argument will be that there is a lack of clarity in the law or that there are internal inconsistencies or tensions within the law that need to be resolved".[96] As such, "*coherentism looks up and down, backwards, and even sideways, but not forward. It is not instrumental; it is not about engineering change*"[97] *(emphasis added);* therefore "rather than recognise new types of intellectual property, coherentists will prefer to tweak existing laws of patents and copyright".[98]

On the other hand, regulatory-instrumentalists assess and manage the risks associated with the use of the new technologies with a view to ensuring that the regulatory environment is fit for purpose.[99] As such, regulatory-instrumentalists are not concerned with the internal consistency of legal doctrine, but instead, focus entirely on whether the law is instrumentally

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[91] ibid.
[92] See also, N Petit, 'Law and Regulation of Artificial Intelligence and Robots: Conceptual Framework and Normative Implications': available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2931339 (last accessed 3 April 2018).
[93] E L Rubin, 'From Coherence to Effectiveness' in Rob van Gestel, Hans-W Micklitz, and Edward L. Rubin (eds), *Rethinking Legal Scholarship* (New York: Cambridge University Press; 2017) 310 at 312.
[94] ibid at 313.
[95] ibid at 328.
[96] Op. cit., Brownsword n. 90 at p. 41. For scholarly concerns that include but also go beyond coherentism, see R Brownsword, 'Maps, Critiques, and Methodologies: Confessions of a Contract Lawyer' in Mark van Hoecke (ed), *Methodologies of Legal Research* (Oxford: Hart Publishing; 2011) 133.
[97] ibid at p. 42.
[98] ibid at p. 43.
[99] R Brownsword, 'Smart Contracts: Coding the Transaction, Decoding the Legal Debates' (forthcoming).

effective in serving specified regulatory purposes. Therefore, regulatory-instrumentalists do not ask whether the law is coherent but questions whether it works. Furthermore, "regulatory instrumentalism has no reservation about enacting new bespoke laws if this is an effective and efficient response to a question raised by new transactional technologies. Regulatory-instrumentalism is, thus, the natural language of legislators and policy-makers".[100]

For these reasons, Rubin emphasises that legal scholarship needs to "wake from its coherentist reveries"[101]; and that legal scholars "need to relinquish their commitment to coherence and concern themselves with the effectiveness of law and its ability to achieve our democratically determined purposes".[102]

In the context of CAD files, computer programs and mass customisation, as discussed above, there are tensions within the law that needs to be resolved. The present author submits that the law, as it stands today is not fit for purpose for serving rightsholders entering the 3D printing, software and mass customisation fields. These tensions could be overcome by either tweaking the law to recognise object code in certain circumstances, as literary works as suggested through a coherentist approach or by introducing a sui generis regime of IP protection as a mechanism for protecting creators and providing rights for users through a regulatory-instrumentalist approach.[103] On the one hand it can be argued that a nuanced reworking of these regimes is, in the vast majority of circumstances, will likely be a sufficient response to the present challenges.[104] On the other hand it can also be argued that adopting a regulatory-instrumentalist approach as seen in regimes created for circuit layouts[105] and plant variety rights[106], are at times called for, when new technologies present new IP

[100] ibid.
[101] ibid at 349. For scholarly concerns that include but also go beyond coherentism, see R Brownsword, 'Maps, Critiques, and Methodologies: Confessions of a Contract Lawyer' in Mark van Hoecke (ed), *Methodologies of Legal Research* (Oxford: Hart Publishing; 2011) 133.
[102] Op. cit., Rubin, n. 93 at 350.
[103] ibid.
[104] D Mendis et al, 'The Co-Existence of Copyright and Patent Laws to Protect Innovation: A Case Study of 3D Printing in UK and Australian Law' in R Brownsword et al, (eds.) *The Oxford Handbook of Law, Regulation and Technology* (Oxford: Oxford University Press; 2017), chapter 19.
[105] The Washington Treaty on Intellectual Property in Respect of Integrated Circuits (IPIC) was adopted by the World Intellectual Property Organisation member states in 1989. Although the Washington Treaty has not entered into force, its substantive provisions have been incorporated by reference in the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS Agreement), to a large extent. These provisions deal with, among other things, the definitions of "integrated circuit" and "layout-design (topography)"; requirements for protection; exclusive rights conferred and their limitations; as well as exploitation, registration and disclosure. The TRIPS Agreement provides for additional provision, *inter alia,* on the scope and term of protection.
[106] EC 874/2009 Implementing rules for the application of Council Regulation (EC) No 2100/94 as regards proceedings before the Community Plant Variety Office (17 September 2009) at http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009R0874 (last accessed 3 April 2018).

challenges as was the case with gene sequencing[107]. Either way, it is clear that a change – whether it be from the coherentist approach by tweaking the law or from a regulatory instrumentalist approach by reforming the law completely to provide sui generis right – is needed. Ultimately, how that happens, is a task reserved for the policy makers and legislators. What is needed now, is for further lines of inquiry to be explored and investigated and for the conversation to be taken forward amongst all stakeholders in finding the appropriate solution to present challenges. The words of Wendell Wallach, articulates this point clearly:

> "Bowing to political and economic imperatives is not sufficient. Nor is it acceptable to defer to the mechanistic unfolding of technological possibilities. In a democratic society, we—the public—should give approval to the futures being created. At this critical juncture in history, an informed conversation must take place before we can properly give our assent or dissent".[108]

[107] L Palombi, 'The Genetic Sequence Right: A Sui Generis Alternative to the Patenting of Biological Materials' in Johanna Gibson (ed), *Patenting Lives: Life Patents, Culture and Development* (Farnham, UK: Ashgate Publishing; 2008).

[108] See, W Wallach, *A Dangerous Master* (New York: Basic Books Publishing; 2015) at 10. *See also*, R Brownsword, InfoSoc2018: Informational Rights, Informational Wrongs and Regulatory Responsibilities [2018] 1 *Bournemouth University Working Paper in Law,* pp. 1-52 at p. 40 https://microsites.bournemouth.ac.uk/law-review/infosoc-2018-informational-rights-informational-wrongs-and-regulatory-responsibilities/ (last accessed 3 April 2018).