Unscrewing the Future: The Right to Repair and the Circumvention of Software TPMs in the EU

by **Anthony D. Rosborough***

Abstract: This analysis examines the impact of software technological protection measures ("TPMs") in the European Union which inhibit the repair and maintenance of products. Using John Deere tractors as a case study, this analysis addresses the growing number of products which incorporate computerisation and TPM-protected software into their design and function. In utilising software integration and TPMs, many product designs now allow manufacturers to retain considerable control over the manner of repair and choice of technician. In response, consumers and lawmakers are calling for legal reforms to make self-repair and servicing easier. Both the competition law and moral implications of this residual control held by manufacturers are examined in this analysis. The foregoing raises the question: what are the impediments to establishing a secondary market for repair of products which utilise software TPMs, and what are the implications of those impediments?

The structure of the EU's software TPM framework acts a major impediment to establishing a secondary repair market for these products. The implications of this impediment are both legal and moral. This analysis surveys the development of anti-circumvention law in the international and European contexts before assessing the impact of the US approach to anti-circumvention on global manufacturing and design techniques. In assessing the EU legal framework, the analysis focuses on the inconsequential and distinct legal status given to TPMs which protect software from other types of works. The inability to circulate the means of circumvention acts as a key impediment to establishing a secondary market for repair. Further, the inapplicability of copyright exceptions and limitations to software TPMs, and the legal prohibition on circulation of the means of TPM circumvention, jointly leave little room for proactive policymaking. Through these legal protections, manufacturers can escape the perceived threat posed by TPM circumvention tools and, by extension, undermine independent technicians' ability to carry out their businesses.

In assessing the John Deere case study, the analysis proposes that the refusal to allow circulation of the means of software TPM circumvention may constitute an abuse of a dominant position in the secondary market. In looking to jurisprudence in this area, the analysis explores the degree to which the refusal to provide the means of circumvention could amount to the denial of an essential facility which is indispensable for the secondary repair market. While some distinctions can be drawn between TPM circumvention and the types of intellectual property rights at issue in the EU competition law jurisprudence, the analysis proposes that the market effects are in many ways analogous.

The analysis seeks to establish that consumers' inability to conduct repairs to the products that they own is undesirable for a number of legal, moral and conceptual reasons. By prohibiting self-repair, software TPMs predetermine the relationship between technology, the law and society. This undermines the fostering of a morally responsible and technologically inclined citizenry which engages with and contributes to technological development. The analysis concludes with a call for a review of software TPM protections in the EU along with changes which could alleviate the foregoing market and moral implications while enabling consumers to assert their right to repair.

Keywords: Intellectual property rights; technological protection measures; software; European Union; copyright; right to repair; circumvention; EU competition law; compulsory licensing; secondary market

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A. Introduction & Background

"They are weaker, not stronger: for though we have put wonderful machines in their hands we have preordained how they are to use them."

C.S. Lewis – *Abolition of Man*

1 In the not so distant past, a common feature on most roadways was an institution known as the 'service station'. In addition to providing gasoline and other necessities, service stations offered motorists with an opportunity to stop and speak with a mechanic to diagnose troubles and repair their cars. Though the mechanic would have many of the same tools that motorists have access to in their homes, his or her value is attributable to knowledge and experience. The nature of automotive design also allowed for deductive reasoning in diagnosing problems. For example, a car that would not start as the result of a dead battery might suggest that it is not being charged properly by the alternator. Rough idling and poor acceleration may also indicate the existence of an electrical fault in the car's ignition coil or spark plug wiring. Regardless of the emblem on the bonnet or the manufacturer of the car, the mechanic would use reason, judgment and experience to ensure that motorists were able to get back on the road.

2 By contrast, today's roadways are populated by a much different breed of station -- the 'filling station'. Removed from sight are the once-ubiquitous bottles of engine oil for topping up, spare fan belts, head lamp bulbs, brake fluid, and most strikingly, the mechanic. Gone are the garage doors and hydraulic lifts which allowed mechanics to access cars' underbodies. What resides on the shelves in the modern filling station is an amalgam of junk food, tasteless coffee, lottery tickets and smartphone accessories. In some respects, this devolution of the service station reflects the transformation in automotive design over the past few decades.[1]

3 If the mechanic of yesteryear opened the bonnet on one of today's cars, that hard-earned intuition and deductive reasoning would be of limited use. Instead of the once-familiar sights – the valve cover, engine oil cap, radiator, coolant hoses, brake lines, battery, distributor cap, and so on – what remains visible in today's cars is a series of plastic enclosures held together by non-standard screws and bolts, each connected by a network of sensors to a central computer which runs on proprietary software. This increase in computerisation and the overall tamper-proof approach to automotive design cannot be exemplified any more clearly than by the disappearance of the oil dipstick on recent BMW car models.[2] The message is clear: what is beneath the bonnet is a *system* and consumers should have no role in understanding how it works.

4 The slow extinction of consumers' ability to understand, diagnose and repair complex products is not merely an innocent by-product of how modern products are being designed. It is a conscious decision on the part of manufacturers to ensure that the products they are selling can only be effectively serviced and maintained by them. Given this rather frightening trajectory, the question remains: how do we ensure that the future is not quite so *screwed*? This study proposes that the answer lays in empowering consumers to take charge of their own repairs and maintenance.

5 In making repair and servicing more difficult for consumers, manufacturers are taking refuge in protections offered by copyright. Beyond the commonplace rights of reproduction, performance and other rights falling under the larger copyright umbrella, modern copyright legislation has also come to protect technological protection measures ("TPMs"). These tools, sometimes referred to as "digital locks"[3], impede access to the underlying work protected by copyright. The manner of TPM implementation can vary significantly, ranging from physical controls which prevent the use of "non-approved" products, to software restrictions which prohibit compatibility with non-compliant devices. Spanning the globe, most copyright statutes prohibit the circumvention of such TPMs and the circulation or offering of the means of circumvention.

6 The copyright refuge afforded to product manufacturers is made possible largely due to the more widespread use of software and computerisation to control the workings of various products. Examples include not only cars, but also smartphones, cameras, televisions, hot tub controls, and farm tractors.[4] In increasing reliance

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1 Bryan Grover, 'What will the gas station of the future look like?', THE BOSTON GLOBE (17 January 2017) online: <https://sponsored.bostonglobe.com/rocklandtrust/what-will-the-gas-station-of-the-future-look-like/>.

2 Jonathan Welsh, 'BMW Removes the Dipstick', THE WALL STREET JOURNAL (9 May 2006) online: <https://www.wsj.com/articles/SB114712089483346960>.

3 Michael Geist, 'Anti-circumvention Legislation and Competition Policy: Defining a Canadian Way?' in Michael Geist, ed, *In the Public Interest: The Future of Canadian Copyright Law* (Irwin Law, 2005) at 214.

4 Eberhard Becker et al., *Digital Rights Management: Technological, Economic,*

on software integration and 'onboard computer systems' in product design, manufacturers are able to take advantage of copyright protections for their software and the TPMs they use to protect it. From the perspective of repair-inclined consumers, the result is that products are not only more difficult to repair, but it can be *unlawful* to do so.

7 Though copyright laws recognise very specific and limited circumstances under which circumvention of TPMs is permitted, 'repair' is not commonly one of them. The legislative history of most copyright laws demonstrates that the widespread use of software integration in the products that surround us was not envisioned ten or twenty years ago. This often rigid legal framework governing TPMs means that consumers are left at the whim of manufacturers for repair and servicing, unless they are otherwise able to devise their own (legally questionable) solutions. The increasing inability for consumers to repair and maintain a variety of products and machines raises legal questions concerning the validity of this practice under competition law principles, as well as more profound moral questions regarding the relationship between society, technology and the law. With the expanse of software-integrated technologies around us through the so-called 'internet of things', these implications are only set to become more pressing as times goes on.[5]

8 The focus of this analysis is on the legal and moral implications of the rise in 'unrepairable' products by virtue of TPMs which protect integrated software. The question that the following analysis addresses is: what are the impediments to establishing a secondary repair and service market for TPM-protected products under European Union law, and what are the implications of any such impediments? In drawing normative guidance from the growing 'Right to Repair' movement in the United States and Europe, it will be proposed that the legal and moral validity of software TPM implementation stand on unstable foundations. More specifically, the legal frameworks by which software TPMs in the European Union are supported require scrutiny and review in the context of growing software integration in previously analog devices.

9 This analysis will be comprised of four chapters. The first of which will provide an overview of the right to repair movement on a general level before looking more specifically to John Deere's use of software TPMs in its tractors and farming equipment. Through restricted access to diagnostic software and co-verification or 'activation' of replacement parts, the impact of John Deere's use of software TPMs on the ability to repair will be assessed. The impacts on the extent to which these tools create inefficiencies and deleterious consequences for farmers and independent technicians will be canvassed. Second, the development of the law of TPM anti-circumvention will be surveyed, including the rationale underlying the relevant international frameworks. Particular attention will be given to the United States' implementation of anti-circumvention law with a view to better understanding an approach to product design that renders repair and maintenance of certain products exceptionally difficult. Given the global reach of some of these products, the practical effects of the US approach to anti-circumvention law as felt by consumers in the EU will be investigated. The United States' legal framework for TPM protections offers a useful comparator to that of the European Union because of its approach to exceptions and limitations, along with its broader impact on design and manufacturing of commonly used products. Third, anti-circumvention law in the European Union will be assessed with a particular focus on its application to software. Anti-circumvention law under the Directive 2001/250/EC[6] (the "InfoSoc Directive") as distinguished from the provisions of the Directive 91/250/EEC[7] (the "Software Directive") will be weighed and compared. The challenges faced by those seeking to repair the things that they own as the result of this bifurcated approach will be examined. In assessing the EU's software TPM framework, attention will be paid to John Deere tractor owners as a case study for the purposes of demonstrating the potential difficulties imposed by the prohibition on the circulation of the means of TPM circumvention.

10 Fourth and finally, the broader implications of the protections afforded to manufacturers under the EU software TPM framework will be assessed. This assessment will be conducted both in the context of EU competition law and market fairness for independent repair technicians, and the moral implications with respect to owners' inability to conduct repairs themselves. More specifically, the extent to which John Deere's use of software TPMs constitutes an abuse of a dominant position through the denial of an essential facility for the secondary repair and service market will be examined.

11 It will be proposed that access to John Deere's software and diagnostic equipment through circumvention of their software TPMs is essential for the proper

Legal and Political Aspects (Springer-Verlag, 2003) at 7.

5 Aaron Perzanowski and Jason Schultz, *The End of Ownership: Personal Property in the Digital Economy* (MIT Press, 2016), 135.

6 Directive 2001/29/EC of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the Information Society [*InfoSoc Directive*].

7 Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs [*Software Directive*].

functioning of that market. By prohibiting access to this software through the use of TPMs, John Deere is effectively reserving the entire secondary market for itself and creating a *de facto* monopoly. This runs contrary to EU competition law principles.

12 While John Deere's use of software TPMs may inevitably present issues under US anti-trust law, these aspects can be distinguished from competition law implications in the European Union due to the special status given to intellectual property rights under the EU competition law framework.[8] Further, there are conceptual and policy differences between the exercise of "monopoly power" under the United States' *Sherman Act* and the "abuse of dominant position" under the TFEU framework.[9] While the ultimate objectives of each regime operate in parallel, their prohibitions on unilateral conduct by dominant firms are distinguishable from the perspective of their application and enforcement.[10] There are also notable differences in the normative approach given to market interventionism and the role of regulation.[11] For these reasons, a broader review and analysis of the implications under US anti-trust law will not be addressed in detail.

13 With respect to the moral implications, it will be contended that John Deere's repair-resistant approach to software TPMs denies owners considerable agency in choosing how and when to repair their equipment. In denying consumers the ability to share information, knowledge and tools regarding the circumvention of TPMs for repair purposes, the EU software TPM framework creates for the automation of moral decision-making and places unjustifiable limitations on private property rights. It is contended that John Deere's use of software TPMs results in an undesirable system characterised by near complete reliance on manufacturers by consumers.

14 In sum, this analysis proposes that the European Union's software TPM framework enables manufacturers' retention of considerable control over their sophisticated products. This control is exercised to the detriment of consumers and fair competition in the market for repair and service. John Deere's use of software TPM is particularly apt for this analysis because it demonstrates the extent to which the use of TPMs can affect products that are not normally regarded as having any relation to software. It is demonstrative of how pervasive the effects of this issue can become. Overall, it is proposed that legal framework for software TPMs in the European Union be given greater scrutiny in light of the significant moral and market implications that can arise when they are used to inhibit repair and maintenance.

B. The Growing "Right to Repair" Movement

15 The 'Right to Repair' can mean many things. In the context of intellectual property, it is generally understood as both a defence to otherwise infringing conduct and a positive obligation on behalf of manufacturers to assist consumers in repairing and maintaining products they have purchased. This positive obligation can come in the form of offering to consumers repair documentation, spare parts protected by industrial design and patented special tools needed to perform repairs.

16 The notion of such a right is not an entirely new proposition.[12][13] Until 1988, the right to repair had formed the basis for a longstanding common law defence to industrial design infringement in the UK.[14] This defence remained in place until legislative reforms led to a more permissive framework for third parties.[15] Further, in a relatively recent patent infringement case involving transport containers for liquids[16], the UK Supreme Court recognised a distinction between the unlawful "making" of a patented invention and lawful repair.[17] Similarly, the CJEU has decided that automobile wheel rims,

8 John Lang, 'European competition law and intellectual property rights—a new analysis' (2010) 11 ERA FORUM 411, 422.

9 Harry First et al., 'The United States Competition Law System and the Country's Norms', in Eleanor Fox and Michael Trebilock, eds, *The Design of Competition Law Institutions: Global Norms, Local Choices* (OUP, 2012), 378.

10 Eleanor Fox, 'US and EU Competition Law: A Comparison', in Edward Graham and David Richardson, eds, *Global Competition Policy* (Institute for International Economics, 1997), 353.

11 First (n 9) 379.

12 Gavin Llewellyn, 'Does copyright law recognise a right to repair?' (1999) 21 EIPR 596, 598.

13 Robert Masterson, 'Converting Obsolete Musical Media to Current Formats: A Copyright Infringement Defense Arising from the Right to Repair and Implied Warranty of Fitness' (2009) 82 TEMP L REV 281, 295.

14 *British Leyland Motor Corp Ltd v Armstrong Patents Co Ltd*, [1986] 1 AC 577; [1986] All ER 850 (UK).

15 *Mars UK Ltd v Teknowledge Ltd* [2000] ECDR 99 (UK).

16 *Schutz (UK) Limited v Werit (UK) Limited*, [2013] UKSC 16 (UK).

17 Erika Ellyne, 'What the difference between making versus

as component parts of a complex product, should be excluded from protection as a Community Design in order to allow for third-party repair.[18]

17 Though varying intellectual property regimes have made at least partial accommodation for the needs of consumers and third parties to perform repairs, the rise in consumer consciousness[19] and growing calls for legal reforms[20] have been precipitated by the increasing complexity of consumer products through computerisation and software integration.[21] There is now an expanding coalition of consumers, non-profit advocacy groups[2223], service providers and industry groups[24] calling for 'Right to Repair' reforms. These reforms include allowing for greater choice in choosing independent repair technicians; greater access to repair manuals and diagnostic tools; and for the ability to circumvent protections on device software.[25] The rise in these demands coincide with a growing DIY culture. Indeed, a 2017 study revealed that 77% of EU citizens would rather fix or have their products fixed than to buy new ones.[26]

repair can teach us on the scope of exclusive rights' (2015) 37:8 EIPR 525, 527.

18 *Acacia Srl v Pneusgarda Srl, in insolvency, Audi AG, and Acacia Srl, Rolando D'Amato v Dr Ing h.c. F Porsche AG* (C-397/16 and 435/16), [2017] EUECJ C-397/16; EU:C:2017:992 (CJEU).

19 Matthew Gault, 'Protesters Are Slowly Winning Electronics Right-to-Repair Battles in Europe', VICE (14 December 2018) online: <https://www.vice.com/en_us/article/9k487p/protesters-are-slowly-winning-electronics-right-to-repair-battles-in-europe>.

20 Teresa Nobre, 'The European Parliament should be talking about DRM, right now!', COMMUNIA (11 October 2017) online: <https://www.communia-association.org/2017/10/11/european-parliament-talking-drm-right-now/>.

21 Frank Vahid, 'The Softening of Hardware' (2003) 36 COMPUTER 27, 29.

22 European Environmental Bureau, *Homepage*, online: <https://eeb.org/>.

23 Electronic Frontier Foundation, *Creativity & Innovation,* online: <https://www.eff.org/issues/innovation>.

24 The Repair Association, *We Are Repair,* online: <https://repair.org>.

25 IFixit, *We Have the Right to Repair Everything We Own,* online: <https://www.ifixit.com/Right-to-Repair/Intro>.

26 European Parliament, *Press Release,* "Making durable, repairable goods for consumers and tackling planned obsolescence" (30 May 2017) online: <http://www.europarl.

18 The range of products that are becoming increasingly unserviceable as the result of software integration is broadening. Included are consumer items such as thermostats, home appliances, automobiles, hot tub controls and cameras.[27] Beyond consumer products, key industrial equipment is sometimes impacted in a manner that has strong public interest implications. For example, In the context of the current global health pandemic, respiratory ventilators[28] and other medical equipment[29] essential for combating COVID-19 are subject to myriad software TPMs which present challenges for healthcare providers and technicians. Public representatives in the United States have responded by calling upon manufacturers of ventilators and related equipment to release information related to circumventing TPMs. These efforts are not only desirable, but necessary for the purposes of utilising all available healthcare resources to assist those in need.[30] This urgent and unprecedented situation demonstrates the growing relevance of the right to repair movement as one not only concerned with private consumer rights, but also in safeguarding the public interest.

19 Thankfully, the Internet has made it easier for consumers, the public and third-party repairers to share information[31] and tools which enable modification of computer software for the purposes of repair.[32] In the context of COVID-19, repair advocates

europa.eu/news/en/press-room/20170530IPR76313/making-durable-reparable-goods-for-consumers-and-tackling-planned-obsolescence>.

27 Claude Thompson, ''Right to repair' your phone', *Washington Examiner* (8 February 2019) online: <https://www.washingtonexaminer.com/news/right-to-repair-your-phone>.

28 Paul Detrick, "Hospital Technicians Ignore Copyright Law to Fight COVID-19", *Reason* (13 April 2020) online: <https://reason.com/video/hospital-technicians-ignore-copyright-law-to-fight-covid-19/>.

29 The Repair Association, *Device Companies are Cutting Hospitals Out of the Loop,* online: < https://repair.org/medical>.

30 Ashley Matthews, "Five State Treasurers Call on Manufacturers to Release Ventilator Repair Manuals", *Pennsylvania Treasury* (14 April 2020) online: <https://www.patreasury.gov/newsroom/archive/2020/04-14-Call-On-Manufacturers.html>.

31 John Hartley, 'A Problem of knowledge – Solved?' in Ian Hargreaves and John Hartley, eds, *The Creative Citizen Unbound: How social media and DIY culture contribute to democracy, communities and the creative economy* (Policy Press, 2016), 29.

32 IFixit, *Repair Guides,* online: <https://www.ifixit.com/Guide>.

behind *iFixit.com* have been building a library of repair information and resources specifically aimed at assisting the healthcare sector with ventilator repair.[33] These efforts demonstrate that, with or without the cooperation from manufacturers, consumers, citizens, and public representatives are understanding the importance of repair. Central to this movement is the need to find lawful ways to circumvent software TPMs.[34]

I. How Software TPMs are Hindering Repair

20 In principle, TPMs are meant to act as an additional layer of protection by providing copyright owners with greater control over their content. In some cases, however, the existence of software TPMs only becomes apparent when someone attempts to repair or service the product that incorporates them. These less obvious and concealed uses of TPMs can have particularly negative effects on markets, including secondary repair and service markets, and in doing so leave consumers with fewer choices for repair or servicing.[35]

21 There are very few boundaries which delineate software TPMs. These measures can include the use of encryption, authentication, access control, digital watermarking and tamper-resistant hardware.[36] Software TPMs can also come in the form of hardware that limits the functionality of software or access given to the user.[37] They can also be used to co-verify hardware and software in using system on chip[38] functionality in a manner that restricts the larger functioning of a device. One familiar example of this latter technology is a printer that requires the use of manufacturer-specific ink cartridges to operate.[39][40] Each of these techniques can mean that the use of third-party components or services will disable the device entirely; requiring the repairer to obtain parts or service directly from the manufacturer. Given that it is possible to circumvent any software TPM with enough resources and skill[41], the above techniques should be more accurately understood as 'repair-resistant' software TPMs.

II. Case Study: John Deere Tractors

22 Though the list of products incorporating repair-resistant software TPMs is long and continues to grow, one poignant example of the negative impacts of repair-resistant software TPMs is John Deere tractors. Many farmers who ordinarily live a life characterised by self-reliance and independence still practice the art of repair. They do this in defiance of our increasingly "disposable society", where planned obsolescence dictates much of consumer behaviour.[42] Unfortunately for farmers, the virtue underlying this ethic is becoming increasingly difficult to practice.

23 Farmers are in many ways the original hackers. They have been fabricating, building, rebuilding, tinkering and improvising with equipment for millennia, and this tradition continues.[43] Nevertheless, when one thinks of a farm tractor, the object that comes to mind is not particularly "high tech". Yet, the farm tractors of today are complex systems which rely on integrated computers and software to operate, and John Deere is leading the way.[44] The tools needed to resolve issues with these modern machines are not found in tool shops or farmers' workshops anymore,

33 Kevin Purdy, "Five State Treasurers Demand the Right to Repair from Ventilator Makers", *iFixit* (14 April 2020) online: <https://www.ifixit.com/News/36899/five-state-treasurers-demand-the-right-to-repair-from-ventilator-makers>.

34 Thompson (n 27).

35 Geist (n 3) 220.

36 Ian Kerr, 'Digital Locks and the Automation of Virtue' in Michael Geist, ed, *In the Public Interest: The Future of Canadian Copyright Law* (Irwin Law, 2005), 273.

37 *Kabushiki Kaisha Sony Computer Entertainment Inc et al v Ball et al*, [2004] EWHC 1738 (UK).

38 Tim Hopes, 'Hardware/Software Co-verification, an IP Vendors Viewpoint' (Paper delivered at the Proceedings International Conference on Computer Design, 5-7 October 1998 [unpublished].

39 *Lexmark International Inc v Static Control Components Inc*, 387 F (3d) 522 (2004) (US).

40 Michael Geist, ''TPMs': A perfect storm for consumers', *MichaelGeist.ca,* (31 January 2005) online: <http://www.michaelgeist.ca/resc/html_bkup/jan312005.html>.

41 Ibid.

42 Jeremy Bulow, 'An Economic Theory of Planned Obsolescence' (1986) 101 THE QUARTERLY JOURNAL OF ECONOMICS 729, 729.

43 'Cordless Drill Powers Portable Winch', *Farm Show Magazine* 43 (July 2019) online: <https://www.farmshow.com/view_issue.php?i_id=314&vol=43&number=4&year=2019>.

44 Motherboard, 'Tractor Hacking: The Farmers Breaking Big Tech's Repair Monopoly', YOUTUBE, (1 February 2018) (video) online: <https://www.youtube.com/watch?v=F8JCh0owT4w>.

but instead behind a wall of TPMs safeguarding proprietary software.

24 The TPMs used in John Deere tractors vary in their type and application, but generally include a central computer connected to an array of electronic sensors. These sensors measure and control a range of functions, including engine temperature, GPS location and hydraulic pressure. The onboard computer (known as the "tECU") will shut the entire tractor down if it detects a fault.[45] Problematically, this can occur as the result of a fault in a sensor itself without any underlying mechanical problem.[46]

25 John Deere also relies on software integration for diagnostics. In effect, access to the tECU is required in order to determine the underlying mechanical issue that needs to be resolved. Access to the tECU requires both a proprietary cable and software, neither of which are offered to consumers or independent technicians.[47] Thus, diagnostics which had previously been determined through deductive reasoning and troubleshooting is now information that has become inaccessible.

26 Even further still, disabling the tractor's automatic shut down requires access to the tECU running the proprietary software. Even if a farmer were able to circumvent the TPMs protecting the software, he would also likely need a factory password to effect any changes to the system.[48] The result is that in many cases a farmer or independent service technician is unable to diagnose or repair a tractor that has become inoperative without access to equipment and proprietary software that is held exclusively by the dealer or manufacturer. This effectively precludes farmers' ability to conduct their own repairs.

27 John Deere tractors also use software TPMs to co-verify or "activate" replacement parts.[49] Farmers frequently look for used parts to repair their machinery, and indeed used parts are available for modern John Deere tractors.[50] Nevertheless, installation of these parts without software activation will render the entire tractor inoperative if the tECU is not accessed to activate them. Much to the dismay of farmers, the result is that they often have to purchase new components from John Deere to then be activated by John Deere's technicians.[51]

28 Not surprisingly, the difficulty presented by John Deere's software TPMs has motivated farmers to establish a thriving grey market for used parts, proprietary connectors and software tools that circumvent software TPMs used by the tractor's computer system.[52] Like they always have, farmers are demonstrating their resourcefulness and ingenuity in solving many of the problems created by John Deere's software by sharing information and circumvention tools. In some cases, farmers are even learning to hack John Deere's software.[53]

29 Frustration with the obstacles posed by John Deere's software TPMs led to a group of farmers in the United States to lobby for legislative reform. Farmers became unlikely allies with technology-focused advocacy groups such as the Electronic Frontier Foundation (the "EFF") to lobby for exceptions to US *Digital Millennium Copyright Act* ("DMCA") that prohibit the circumvention of TPMs.[54] After much public and media attention, in 2015 the United States Librarian of Congress provided clarification of the anti-circumvention provisions of the DMCA to allow circumvention of software TPMs used on tractors for the purposes of repair.[55] Despite this positive development, it was not long after this ruling before farmers were reminded of the robust control held

45 Kyle Wiens, 'New High-Tech Farm Equipment is a Nightmare for Farmers', *Wired* (5 February 2015) online: <https://www.wired.com/2015/02/new-high-tech-farm-equipment-nightmare-farmers/>.

46 Ibid.

47 Motherboard (n 44).

48 Wiens (n 45).

49 Motherboard (n 44).

50 John Deere, 'Remanufactured Parts & Components', online: <https://www.deere.ca/en/parts-and-service/parts/remanufactured/>.

51 Motherboard (n 44).

52 Jason Bloomberg, 'John Deere's Digital Transformation Runs Afoul of Right-to-Repair Movement', FORBES (30 April 2017) online: <https://www.forbes.com/sites/jasonbloomberg/2017/04/30/john-deeres-digital-transformation-runs-afoul-of-right-to-repair-movement/#7b08bb6d5ab9>.

53 Motherboard (n 44).

54 Kit Walsh, 'John Deere Really Doesn't Want You to Own That Tractor', EFF (20 December 2016) online: <https://www.eff.org/deeplinks/2016/12/john-deere-really-doesnt-want-you-own-tractor>.

55 US, Library of Congress, *Exemption to Prohibition on Circumvention of Copyright Protection Systems for Access Control Technologies,* 37 CFR 201, Docket No 2014-07 (effective 28 October 2015).

by John Deere when it amended the terms of service associated with its software to prohibit any form of modification.[56]

30 The malleability of the terms of service associated with John Deere's tractors draws attention to the broader issue of the vulnerability of copyright exceptions and limitations to contractual override.[57] The increased use of software TPMs in "smart" products which feature computerisation presents a new forum for rightsholders to rely on freedom of contract to augment the copyright balance as set by legislators. To this end, John Deere tractors are likely an early example of how easily amended software terms of service can be used to undermine both traditional notions of private property ownership as well as legislative attempts to further the public interest dimensions of the copyright system.

31 Despite these challenges, farmers have continued to find ways to circumvent John Deere's software to carry out repairs. In line with these efforts, farmers have also established *farmhack.org*, a global community of farmers that share tools and resources for building and modifying their equipment.[58] Despite the 2015 amendments to the DMCA, the legality of sharing or distributing the means of circumventing John Deere's software TPMs remains murky. As will be discussed in the following Part, the legality of both circumventing software TPMs and distributing the means of doing so can violate various copyright laws in a number of different jurisdictions, including the EU. This legal framework needs more careful consideration in light of the larger objectives of copyright policy and the impact on the secondary repair market.

C. The Development of Anti-Circumvention Law

32 The history of the law enabling TPMs is not entirely linear or straightforward. Through a combination of international agreements, domestic legislation and private ordering mechanisms used by manufacturers, TPMs and their circumvention can be governed by a variety of legal instruments. As their name would suggest, legal protection for TPMs came about as the effect of rapid changes in technological development in the 1980s and 1990s which brought about the advent of digital property.[59] Indeed, this interdependent relationship between TPMs and technological development has not changed. As evidenced by their use in John Deere tractors, the increasing sophistication of everyday products and the increasing reliance on computerisation has been the impetus for a variety of new and unforeseen uses for TPMs.

33 The law surrounding TPMs is best described as "anti-circumvention law" because these legislative provisions principally determine the consequences and lawfulness of TPM circumvention and related activities. Surprisingly, there are comparatively few legal boundaries setting out the limits of what constitutes a TPM in the first place. This ambiguity coupled with the rigorous attempts to curb circumvention of TPMs have created concern and controversy among lawmakers and the general public since their inception. Perhaps predictably, this controversy has generally coalesced around questions of how to appropriately balance the interests of rightsholders, users and other relevant industries.

34 This Part will provide an overview of the origins and development of anti-circumvention law, including the larger international framework. Though the implementation of this framework in the European Union will be more thoroughly canvassed in Part D, the surrounding international framework provides important context for how and why software TPMs are able to be used as impediments to repair. It should be clarified at the outset that, though the framework governing software TPMs in the European Union predates the international treaties addressing TPMs, the co-existence of these regimes creates for additional uncertainty that must be addressed in the context of TPM circumvention for the purposes of repair. Moreover, in addressing this international framework, the impact of the United States' approach to anti-circumvention law will be assessed to demonstrate its impact on manufacturing processes for products that reach global markets. As will be demonstrated, this latter subject is particularly relevant for the software TPM approach utilised in John Deere tractors. Overall, this chapter will seek to establish that the level of protection afforded to TPMs protecting software in the European Union is both high and inflexible. In particular, its lack of exceptions or limitations and its prohibition on the circulation of the means of circumvention present significant challenges for those seeking the ability to repair their equipment, including John Deere tractors.

56 Adam Wernick, 'The 'right to repair' movements wants you to be able to fix your own stuff', PUBLIC RADIO INTERNATIONAL (24 December 2018) online: <https://www.pri.org/stories/2018-12-24/right-repair-movement-wants-you-be-able-fix-your-own-stuff>.

57 Lucie Guibault, 'Copyright Limitations and Contracts: An Analysis of the Contractual Overridability of Limitations on Copyright' (Kluwer Law International, 2002), 207.

58 Farm Hack, *Tools*, online: <https://farmhack.org/tools>.

59 Kerr (n 36) 265.

I. The Pre-World Copyright Treaty Era

35 Most people born before 1990 have experience placing a piece of adhesive tape over two square holes on the bottom of an audio cassette to enable it to be used for recording new music. Without this piece of tape, the shape of the holes on the cassette prevented it from being used to allow for recording over the existing audio. This circumvention technique allowed a cassette with music released by an undesirable artist to be reused to create a 'mix tape'; often by recording newly-released songs from the radio.[60] In its most simple of forms, these holes on cassette tapes were the type of TPMs contemporary to the era in which much of the legal regime surrounding anti-circumvention was established. This period of technological development was also marked by the landmark United States decision in *Sony v Betamax*[61], which was concerned with so-called "dual use" technologies and blank physical media for recording. It is within this technological paradigm and context that modern anti-circumvention laws find their genesis.

36 It is thus perhaps not surprising that the earliest forms of legislative intervention to regulate TPMs were focused in copy-control technologies.[62] As will be discussed in the proceeding Chapter, technical protections applied to software in the European Union were an exception among these early movements. By contrast, the larger international momentum behind anti-circumvention law was not particularly concerned with software. For example, early iterations of the UK's 1988 *Copyright, Designs and Patents Act* at section 296 restricted circumvention of copy-protection incorporated into physical media where it is used to make "infringing copies"[63]. Similarly, in the United States, restrictions were put in place in 1993 to prohibit circumvention or alteration of Serial Copyright Management Systems, which were utilised to restrict copying of digital audio tapes.[64] In accordance with the increasing digitalisation of media throughout the early 1990s, efforts began to coalesce among countries to establish formal and unified recognition for anti-circumvention protections at the international level, with copy-control technologies at front of mind.

II. WIPO and the Emergence of an International Anti-Circumvention Regime

37 By the mid-1990s, the means to access and reproduce protected works had become within the reach of most consumers.[65] Though long-standing manual copying techniques similar to that used to create a mix tape had allowed for relatively simple reproduction and distribution, these processes were time intensive and sometimes difficult. Widespread digitisation of creative works meant that an increasing number of media formats were now easily copied on a relatively large scale and at low cost.[66] Concurrently, extensive WIPO negotiations began to take shape which would later establish the 1996 World Copyright Treaty (the "WCT") and the WIPO Performances and Phonograms Treaty ("WPPT").[67] These negotiations drew reference to earlier discussions surrounding anti-circumvention, including those which took place during the drafting of the 1989 WIPO Model Provisions for Legislation in the Field of Copyright.[68] For industry representatives and lawmakers among the international community, the time was ripe for including protections for TPMs as part of the forthcoming world copyright regime.

38 The WIPO Committee of Experts of the Nice Union was responsible for steering the negotiations leading up to the WCT and WPPT. The Committee did not envision that TPMs would create new substantive intellectual property rights. Rather, TPMs were regarded as a vehicle for aiding in the protection,

60 John Kelly, 'Party like its 1989: What should you do with all those old cassette mix tapes?', WASHINGTON POST (25 February 2018) online: <https://www.washingtonpost.com/local/party-like-its-1989-what-should-you-do-with-all-those-old-cassette-mix-tapes/2018/02/25/d0cfef4e-1a2c-11e8-b2d9-08e748f892c0_story.html?noredirect=on>.

61 *Sony Corporation of America et al v Universal City Studios Inc et al,* 464 US 417; 104 S Ct 774 (1984) (US).

62 Ian Brown, 'The evolution of anti-circumvention law' (2006) 20:3 INTERNATIONAL REVIEW OF LAW, COMPUTERS & TECHNOLOGY 239, 240.

63 *Copyright, Designs and Patents Act,* 1988 c 48 [United Kingdom] at 296 [*CDPA*].

64 *Digital Millennium Copyright Act*, 17 USC § 1002(c) (Supp. V 1993) [*DMCA*].

65 Simon Stokes, *Digital copyright: law and practice* (Hart Publishing, 2014), 11.

66 Pamela Samuelson, 'The New Economy and information technology policy' in Jeffrey A Frankel and Peter R Orszag, eds, *Economic Policy During the 1990s* (MIT Press, 2002), 17.

67 Jorg Reinbothe & Silke von Lewinski, *The WIPO Treaties 1996: The WIPO Copyright Treaty and The WIPO Performances and Phonograms Treaty Commentary and Legal Analysis* (Tottel Publishing, 2002), 139.

68 Brown (n 62) 239.

exercise and enforcement of existing rights as they applied to the newly-established digital environment.[69] As will be demonstrated further in the proceeding Chapters, this distinction is important in relation to the myriad uses for repair-resistant TPMs.

39 The role of TPMs as addressing rapid technological change is further evidenced by the somewhat nebulous notion of a technological "measure"; leaving open the possibility of various tools, mechanisms or approaches which could be taken to protect copyrighted works. The ambiguity in this concept lives on to this day. The precise definition of what constitutes such a "measure" under many domestic legislative legal regimes remains undefined.[70][71] Therefore, from the outset, legal protection for TPMs has been focused on the consequences of circumvention rather than the nature or technology used to implement the protection measure itself.

40 The WIPO negotiations largely took shape around whether the circumvention of TPMs should require knowledge or infringing intent of the person performing the circumvention. The United States advocated strongly for no such requirement, and other parties (including the European Union), advocated for it. In the end, the final text agreed upon was adopted largely from the South African proposal which reflected mostly the European position.[72] Notably, Article 11 provides:

> *"Contracting Parties shall provide adequate legal protection and effective legal remedies against the circumvention of effective technological measures that are used by authors in connection with the exercise of their rights under this Treaty or the Berne Convention and that restrict acts, in respect of their works, which are not authorized by the authors concerned or permitted by law."*

41 Article 11 of the WCT was, except for select free trade agreements[73], the first formal protection for TPMs recognised by any international agreement. An analogous provision is found at Article 18 of the WPPT. The protections for TPMs found in these treaties are distinct from the others in that they constitute wholly new mechanisms[74] within the international copyright framework as opposed to an extenuation of existing norms elucidated in the *Berne Convention.*

42 The final text of the WCT's Article 11 was sufficiently flexible to allow for member states to adopt national legislation that was in conformity with varying domestic intellectual property strategies. It therefore serves as the low water mark for anti-circumvention for two reasons: states are left on their own to define both "adequate legal protection" and "effective" technological measures; and it sets only minimum standards and thereby leaves states the option to domestically legislate more narrow or broad exceptions to the prohibition on circumvention. As will be demonstrated in the proceeding chapters and sections, these two aspects have allowed for divergent approaches and inconsistencies in anti-circumvention law more generally.

III. The United States' Impact on the Use of Software TPMs by Manufacturers

43 In some cases, the underlying policy reasons for adopting a particular legislative measure can be as influential on its manner of implementation as the law itself. This was certainly the case for the United States' expansive approach to anti-circumvention during the WIPO negotiations leading up to the WCT and WPPT. These negotiations served as an opportunity for the United States to put forward an approach to TPMs that had percolated vis-à-vis domestic policy proposals in the mid-1990s. As will be further discussed in this section, the US view of anti-circumvention law has impacted various free-trade agreements[75][76] and shaped the laws of various countries[77][78] since the WCT and WPPT were concluded. This more absolute approach to anti-

69 Mihály Ficsor, *The Law of Copyright and the Internet: The 1996 WIPO Treaties, their Interpretation and Implementation* (Oxford University Press, 2002), 544.

70 *Copyright Act*, RSC 1985, c C-42 [Canada], 41.

71 CDPA (n 63) 296ZF(1).

72 Fiscor (n 69) 544.

73 *North American Free Trade Agreement Between the Government of Canada, the Government of Mexico and the Government of the United States,* 17 December 1992, Can TS 1994 No 2, 32 ILM 289 (entered into force 1 January 1994), 1707 [*NAFTA*].

74 Fiscor (n 69) 544.

75 *Anti-Counterfeiting Trade Agreement,* 15 April 2011, (not in force) [*ACTA*].

76 *Trans-Pacific Partnership Agreement,* 4 February 2016, (not in force) [*TPP*].

77 Madison Cartwright, 'Preferential trade agreements and power asymmetries: the case of technological protection measures in Australia' (2018) 10 THE PACIFIC REVIEW 1, 2.

78 Wenwei Guan, 'Copyright Anti-Circumvention & Free Trade' (2018) 52 JOURNAL OF WORLD TRADE 257, 265.

circumvention law has also enabled manufacturers to incorporate TPM protections in their product designs which have far-reaching effects for consumers globally, including within the European Union. With these considerations in mind, the broader impact of the United States' approach to anti-circumvention law must be considered in conjunction with an assessment of the appropriate framework in the EU.

44 The US policy proposals that influenced its negotiating agenda during the WIPO negotiations came about as the result of the Clinton Administration's commissioning of the *Intellectual Property and the National Information Infrastructure* Report (the "NII Report") in 1995.[79] The NII Report was the impetus for the United States' desire to ensure that every type of work could be protected technologically and that any attempt to circumvent those protections would be made illegal.[80] As the NII Report was focused largely on protecting copyright owners and the content industry within the United States, digital technology was viewed as an explicit "threat"[81] and called for swift and strong legislative intervention -- technological controls on products were key to this strategy.

45 Shaped largely by a hostile view of the digital environment, the US approach to TPMs was to exempt TPMs from recognised exceptions and limitations to copyright and to enact generally broad measures to prohibit circumvention. Arguably, this approach created a *sui generis* right against circumvention that is divorced from the larger copyright framework. Though the United States was not successful in incorporating this approach into the WCT and WPPT frameworks, its particularly rightsholder-centric and *sui generis* view of anti-circumvention law has shaped its domestic approach to TPMs. This view is exemplified most poignantly by the US' legal framework for TPMs found in the DMCA.

46 For the United States, the DMCA was a major milestone in moving its copyright law framework into the digital environment. In 1998, when the DMCA was enacted, it was described as a comprehensive digital copyright bill that would criminalise the "circumvention of technologies that secure digital copies of software, music and videos as literary works."[82] The addition of the DMCA's section 1201 made it both illegal to circumvent TPMs and to traffic in circumvention devices.[83] Though many anti-circumvention regimes prohibit these acts, what made the overall approach in the DMCA distinct from the WCT and WPPT is the apparent extension of TPM protections any such mechanisms which may control "access" to a work.[84] This approach stands in contrast to the WCT and WPPT's notion of a TPM, which is to prevent acts which are not 'permitted by law'. In the years since its enactment, the "access control" interpretation of the DMCA's section 1201 has been the subject of considerable debate among academic scholars[85] and uncertainty remains throughout US jurisprudence.[86]

47 Proponents of the "right of access" theory generally focus their attention on interpretations of the DMCA's section 1201 in the context of neighbouring provisions. In comparison to the WCT's Article 11, which calls for protection of measures that are used "in connection with the exercise of their rights under this Treaty or the Berne Convention..."[87], the DMCA's section 1201(a) prohibits circumvention of a TPM that "effectively controls access to a work protected under this title."[88] In comparing the language of these two provisions, the language in the DMCA suggests that the prohibition on access may not require the existence of any underlying copyright. Skeptics of the "access right" theory point to the fact that accessibility to works has always been effectively controlled and managed through myriad tools within copyright regimes and that TPMs do not provide any substantive change, but rather an expansion of existing power held by

79 US, Information Infrastructure Task Force, *Intellectual Property and the National Information Infrastructure: The Report of the Working Group on Intellectual Property Rights* (US Government Printing Office, 1995) [*NII Report*].

80 Pamela Samuelson, 'The U.S. Digital Agenda at WIPO' (1997) 37 VA J INTL L 369, 381.

81 Robert Arthur, 'Federal Circuit v. Ninth Circuit: A Split over the Conflicting Approaches to DMCA Section 1201' (2013) 17 MARQ INTELL PROP L REV 265, 267.

82 John Haubenreich, 'The iPhone and the DMCA: Locking the Hands of Consumers' (2008) 61 VAN L REV 1507, 1514.

83 Arthur (n 81) 268.

84 Timothy Lee, 'Circumventing Competition: The Perverse Consequences of the Digital Millennium Copyright Act' (2006) 564 CATO INSTITUTE: POLICY ANALYSIS, 8.

85 Thomas Heide, 'Copyright in the EU and U.S.: What Access-Right' (2001) 48 J OF THE COPYRIGHT SOCIETY OF THE U.S.A. 363, 363.

86 *Chamberlain Group Inc v Skylink Technologies Inc,* 381 F (3d) 1178 (2004) (US).

87 *World Intellectual Property Organization Copyright Treaty,* 20 December 1996, 2186 UNTS 38542 (entered into force 6 March 2002), 11 [*WCT*].

88 DMCA (n 64) 1201(a).

copyright owners.[89] To a certain degree, this view is supported by a decision at the District Court level which affirmed the right of copyright owners to "control access to copyrighted materials"[90] outside of the context of TPMs.

48 Leaving this debate aside for the time being, the advent of an access right is important within the context of US anti-circumvention law because exceptions to copyright (such as fair use) do not guarantee access to a work for the purposes of carrying out a permitted act under copyright law.[91] Under an "access control" framework, the circumvention of the measure is prohibited even in cases where the reason for circumvention bears no relevance to copyright. Therefore, opponents of the 'access right' theory view the legal standard for violating this right not as copyright infringement, but rather the mere act of circumvention.[92] Moreover, opponents of the 'access right' theory generally view infringement of this right as a distinct cause of action which is divorced from any of the defences enumerated elsewhere in the DMCA framework.[93]

49 It is not all doom and gloom for fair use advocates in the United States, however. Importantly, the DMCA's section 1201(c) contains a release valve whereby the Librarian of Congress is to consider the anti-circumvention rule's impact on a variety of uses for works that mirror the US fair use framework[94], including education, criticism, parody and review.[95] Under this framework, the Librarian of Congress is to hold proceedings every three years[96] wherein it determines an enumerates exceptions to the prohibition on circumvention. These rulemaking proceedings have occurred on several occasions since the DMCA's enactment, including in 2015 and 2018. The Librarian of Congress review mechanism is an essential part of the anti-circumvention framework in the United States. As will be discussed further in the proceeding Chapter, no such mechanism exists in the European Union and this poses significant challenges for introducing new exceptions that would enable circumvention of repair-resistant software TPMs.

50 Most poignant for this larger analysis, however, is the fact that the DMCA's "access control" treatment of anti-circumvention law enables new approaches to product design where access to integrated software is legally prohibited. The effect of such access-control TPMs is that manufacturers are increasingly able to deny consumers the ability to interact with the inner-workings of their products. As seen in the case of John Deere tractors, this can have profound implications for end-users.

51 The review by the Librarian of Congress offers some relief in the context of the United States market, however, many software-integrated products originating from the United States reach foreign markets and the consequences of repair-resistant software TPMs are externalised. As will be discussed, the European Union is without a legislative mechanism similar to the Librarian of Congress' ruling procedure. With many of the world's most successful and far-reaching technology companies based in the United States are designing their products under the DMCA framework, European consumers are ultimately affected by this regime.

52 Beyond product design, the effects of the access control model from TPMs can have direct legal effects in the EU. History shows us that the United States is willing to apply the DMCA extraterritorially in certain cases. While the efficacy of these applications of the DMCA have been questioned on a number of grounds, there is little reason to believe that circumvention of software TPMs in the EU would not attract similar scrutiny from U.S. law enforcement; particularly where EU-born means of circumvention are made available in the U.S. market.[97] Though the public international law dimensions of the DMCA's extraterritorial application is beyond the scope of this analysis, it exemplifies the very real impacts of the access control conceptualisation of TPMs on foreign markets, including the EU. Therefore, the DMCA approach to TPMs simply cannot be ignored in assessing the appropriate anti-circumvention framework for the European Union.

89 Heide (n 85) 381.

90 *Los Angeles Times v Free Republic,* 56 US PQ (2d) 1862 (CD Cal 2000); 29 Med L Rptr 1028 (2000) (US), 67.

91 Fiscor (n 69) 551.

92 Pamela Samuelson, 'Intellectual Property and the Digital Economy: Why the Anti-Circumvention Regulations Need to be Revised' (1999) 14 BERKELEY TECHNOLOGY LAW JOURNAL 519, 543.

93 Efroni Zohar, 'A momentary lapse of reason: digital copyright, the DMCA and a dose of common sense' (2005) 28 COLUMBIA JOURNAL OF LAW AND THE ARTS 249, 294.

94 Mark Gray, 'New Rules for a New Decade: Improving the Copyright Office's Anti-Circumvention Rulemakings' (2014) 29 BERKELEY TECHNOLOGY LAW JOURNAL 759 at 762.

95 DMCA (n 64) 1201(c).

96 Haubenreich (n 82) 1510.

97 Adam Fuller, 'Extraterritorial Implications of the Digital Millennium Copyright Act' (2003) 35 CASE WESTERN RESERVE JOURNAL OF INTERNATIONAL LAW Re J Int'l L 89.

D. The European Approach to Anti-Circumvention

53 The European Union does not possess a single, Union-wide copyright regime.[98] Instead, it has instituted a patchwork of Directives and Regulations which addresses a variety of subject matters, and some of which touch upon copyright.[99] This stands in contrast to most unitary and federal states in the international community which commonly have a single source of legislative authority for copyright. In addition, EU copyright legislation must be implemented by its member states to be given effect. For this reason, anti-circumvention law in the European Union is both fragmented by subject-matter and varying in its implementation across various member states.

54 With the above caveats aside, it could be said that on the one hand, the European Union's approach to anti-circumvention law mirrors most closely the terms of the WCT and WPPT. On the other hand, however, the European Union's TPM framework predates those agreements and is more onerous; particularly in the case of software. This Chapter will seek to reconcile these two aspects of anti-circumvention law in the European Union. The distinct and inconsequential status given to the Directive 91/250/EEC (the "Software Directive") will be explored with attention given to its more restrictive prohibition on the circumvention of TPMs. Overall, it will be demonstrated that the Software Directive's broad conceptualisation of a "technical measure", lack of exceptions and prohibition on circulating the means of circumvention collectively act as strong impediments to the repair of software-integrated products in the European Union.

I. The Bifurcation of EU Anti-Circumvention Law

55 The European approach to anti-circumvention law is bifurcated in accordance with the subject matter of the protected work. As opposed to the United States' DMCA framework, TPMs protecting computer programs in Europe are governed by the Software Directive[100], and TPMs protecting all other types of copyright are governed by the InfoSoc Directive.[101] The reason for this bifurcated approach is less a matter of policy than it is a function of history. The Software Directive of 1991 was both the first harmonising Directive in the field of copyright[102] and the first to address anti-circumvention. This Directive, which sought primarily to extend copyright protection to computer programs, predates the WCT and WPPT by several years. As elaborated upon in Part C, it was this latter international framework that established the more comprehensive approach to TPMs and their circumvention.

56 In comparing the two Directives, it must be established that the Software Directive operates, in theory at least, entirely separately from InfoSoc. On this point the CJEU has described the Software Directive as having the character of *lex specialis* in relation to all other Directives, including InfoSoc.[103] With respect to more specific TPM protections in these Directives, the clear distinction between the two enactments is made even more clear by recital 50 of the InfoSoc Directive, which provides that:

> *"Such a harmonised legal protection does not affect the specific provisions on protection provided by for Directive 91/250/EEC. In particular, it should not apply to the protection of technological measures used in connection with computer programs, which is exclusively addressed in that Directive..."*

57 The result of the bifurcation of anti-circumvention law in the EU is that TPMs used to protect computer programs are dealt with in accordance with a distinct legal regime from other copyrighted works. One key consequence of this distinction is the fact that the exceptions and limitations to anti-circumvention under the InfoSoc Directive do not apply to the Software Directive.

58 The subject-matter distinction drawn between these two directives is not always straightforward. This is exemplified by the fact that, in some cases, software can be used in conjunction with other works to become "complex works" and therefore fall subject to the InfoSoc Directive's protections. This was the case in *Nintendo v PC Box*[104], where the CJEU was deciding over circumvention tools used to manipulate TPMs on video game consoles to allow for a broader range of media to be played on them. In deciding the appropriate legal framework to assess

98 Thomas Dreier & P. Bernt Hugenholtz, eds, *Concise European Copyright Law* (Kluwer Law International, 2016), 1.

99 Ana-Maria Marinescu, 'EU Directives in the Field of Copyright and Related Rights' (2015) 1 LESIJ – LEX ET SCIENTIA INTERNATIONAL JOURNAL 50, 50.

100 Software Directive (n 7).

101 InfoSoc Directive (n 6).

102 Drier and Hugenholtz (n 98) 237.

103 *UsedSoft GmbH v Oracle International Corp* (C-128/11), EU:C:2012:407; [2013] Bus LR 911, 60-61.

104 *Nintendo Co Ltd and Others v PC Box Srl* (C-355/12) EU:C:2014:25; [2014] EUECJ C-355/12 (CJEU).

these TPMs, the CJEU affirmed that video games constitute complex works which consist of both software and other graphic and sound elements.[105] For the CJEU, the "unique creative value" could not be treated as merely software encryption and therefore the case was decided under the InfoSoc TPM framework.[106] Though the CJEU's rationale is perhaps understandable, it leaves significant ambiguity. In particular, determining exactly when a complex work's creative value becomes unique (and therefore subject to the InfoSoc Directive over the Software Directive) is a difficult standard to use for future determinations.

59 Just as the complexity or multifaceted nature of a work can muddy its treatment as software, so too can its integration with hardware. The EU's bifurcated TPM framework is predicated on the assumption that computer programs can be easily distinguished from the hardware and platforms upon which they run. With increasing convergence of content formats, transmission media and platforms, along with more widespread software integration and "smart" products, this distinction has become more tenuous.[107] As is demonstrated by John Deere's use of TPMs, software can directly govern the functional and utilitarian aspects of products. This fading of the distinction between hardware and software or so-called "softening of hardware" is a feature of ongoing technological advancement and appears likely to continue.[108] It raises the question as to whether John Deere is producing tractors that run on software, or if it is producing software that happens to run on tractors. It therefore calls into question what the "product" actually *is*. As will be further discussed in the following sections, this often-blurry distinction between software and hardware has significant implications for repair-resistant software TPMs in the European Union.[109]

II. The EU Software Directive's TPM Framework

60 The impetus for the Software Directive was the European Commission's 1988 "Green Paper on Copyright and the Challenge of Technology"[110] (the "Green Paper"). The Green Paper was largely concerned with piracy, home copying of audio and film recordings and the protection for computer programs.[111] Given that the market for computer programs in 1988 was in its fast-growing infancy, the European Commission recognised that failure to recognise them as literary works risked fragmenting the internal market. Accordingly, the Green Paper put forward several recommendations for the protection of computer programs; many of which were later incorporated into the Software Directive.[112]

61 Extending copyright to the realm of software was not without controversy. Similar to the US' NII Report, the legislative proposal that followed the Green Paper caused for difficult debates and lengthy negotiations to reach a compromise for the protection of computer programs.[113] The crux of this controversy was partially addressed in the Green Paper itself, including a caution against excessive copyright protection for "purely functional industrial designs and computer programs". The Green Paper also warned that failure to limit protection for these works can amount to "a genuine monopoly, unduly broad in scope and lengthy in duration."[114]

62 In many ways, the *lex specialis* character of the Software Directive reflects these difficult compromises and debates. Indeed, subsequent Directives have left the Software Directive's framework intact by placing their own exceptions and limitations from outside the reach of computer programs.[115] Regrettably, this means that judicial interpretations of exceptions and limitations on TPM protections under the InfoSoc Directive do not

105 Ibid 23.

106 Nintendo v PC Box (n 104).

107 Irini Stamatoudi & Paul Torremans, eds, *EU Copyright Law: A Commentary* (Edward Elgar Publishing, 2014), 91.

108 Vahid (n 21) 33.

109 Pamela Samuelson, Thomas Vinje & William Cornish, 'Does copyright protection under the EU Software Directive extend to computer program behaviour, languages and interfaces?' (2012) 34 EIPR 158, 161.

110 EC, *Green Paper on Copyright and the Challenge of Technology – Copyright Issues Requiring Immediate Action,* (1988), COM (88) 172 (EC, 1998) [*Green Paper*].

111 Ibid 1.6.2.

112 Stamatoudi & Torremans (n 107) 91.

113 Stamatoudi & Torremans (n 107).

114 EC Green Paper on Copyright (n 110) 1.3.5.

115 InfoSoc Directive (n 6) recital 50.

provide much assistance in the case of software.[116] Though the CJEU held that manufacturers must be able to show[117] that their implementation of TPMs is 'proportionate' and 'do not unreasonably exclude legitimate uses' in *Nintendo v PC Box*[118], such caveats do not apply to software TPMs.[119] This inconsequential status of the Software Directive is unfortunate, as such limitations to software TPM protections would be extremely beneficial for providing consumers (including farmers) with access to the means of software TPM circumvention.

63 While the non-applicability of exceptions and limitations to copyright creates inconsistencies between the applicable exceptions, the Software Directive's framework for TPM's also creates for inconsistencies in the level of protection. For example, Article 7(1)(c) of the Software Directive prohibits:

> *"...any act of putting into circulation, or possession for commercial purposes of,* **any means** *the* **sole intended purpose** *of which is to facilitate the unauthorised removal or circumvention of any* **technical device** *which may have been applied to protect a computer program."*

[Emphasis added]

64 Article 7(1)(c) is the only provision in the Software Directive that directly addresses TPMs. Though the provision itself is brief, it raises a number of questions for analysis. Notably, Article 7(1)(c) does not prohibit the act of circumvention itself, but more specifically, the act of circulating the means of circumvention. This distinction is important and, as will be discussed in the following section, it has significant implications for circumventing repair resistant TPMs.

This distinction also stands in contrast to the clear prohibition on the act of circumvention found in the InfoSoc Directive.[120]

65 Curiously, the Software Directive does not define "technical device". By contrast, the InfoSoc Directive includes a more thorough and precise definition of 'technological measure' found at Article 6(3):

> *"...'technological measures' means any technology, device or component that, in the normal course of its operation, is designed to prevent or restrict acts, in respect of works or other subject-matter, which are not authorised by the rightholder of any copyright or any right related to copyright as provided for by law or the sui generis right provided for in Chapter II of Directive 96/9/EC."*

66 Therefore, the notion of a 'technical device' under the Software Directive's framework remains broader than the 'technological measure' conceptualisation under the InfoSoc Directive. All that is required in order to fall subject to protection under the Software Directive is that the technical device 'protect a program'; regardless of whether it is actually integrated into the program itself.

67 The degree to which the technical measure must be integrated into the software it seeks to protect was clarified somewhat by the UK Court of Chancery's *Sony v Ball* decision[121]. In that case, the Court of Chancery held that the physical chips constituting the random-access memory ("RAM") of a Sony Playstation were capable of constituting a "technical measure" in the context of "mod chip" installation. The Court affirmed that the technical measure need not be based in the software itself so long as its function is to protect software.

68 The language "any means" appears to be quite broad and suggests that the tool for circumvention need not be restricted to hardware or software. This calls into question whether services or information that provide mere instructions for circumventing would also constitute "means" of circumvention. While not determinative of the issue, the Finnish Supreme Court held in *Abobe Systems*[122] that instructions for circumventing software protections which prohibited regular updates for unlicenced copies of software did not amount to "means". Though this decision can be distinguished from the Software Directive somewhat based on distinct wording in the Finnish Copyright Act, the holding nevertheless raises doubt over documentation or instructions

116 Thomas Heide, 'Copyright, Contract and the Legal Protection of Technological Measures – Not the Old Fashioned Way: Providing a Rationale to the Copyright Exceptions Interface' (2002-2003) 50 J OF THE COPYRIGHT SOCIETY OF THE U.S.A. 314, 316.

117 Heather Newton, Andrew Moir & Rachel Montagnon, 'CJEU increases burden on manufacturers of games consoles to prove the unlawfulness of devices circumventing technological protection measures and that their TPMs are proportionate' (2014) 9 JOURNAL OF INTELLECTUAL PROPERTY LAW & PRACTICE 456, 456.

118 Nintendo v PC Box (n 104) 30.

119 Tito Rendas, 'Lex specialis(sima): video games and technological protection measures in EU copyright law' (2015) 37 EIPR 39, 39.

120 InfoSoc Directive (n 6) 6(1).

121 Kabushiki v Ball (n 37).

122 *Adobe Systems Inc v A Software Distributor* [2004] ECDR (30) 303 (Finish Supreme Court).

falling subject to the anti-circulation provision.

69 Finally, the requirement that the means have the "sole intended purpose" to circumvent a technical measure is a much higher standard than the stipulation in the InfoSoc Directive.[123] The latter requires only that the device be "primarily designed for the purposes of circumvention", or are "promoted, advertised or marketed for the purpose of circumvention". [124] In comparing these two provisions, it is possible that the Software Directive leaves open the possibility of promoting and advertising the means of circumvention so long as that is the sole intended purpose for such means. On this point, it remains to be seen how the 'intended purpose' of the means is actually determined in practice. Unfortunately, there remains a need for caselaw and judicial comment in interpreting the outer limits of this requirement.

70 In comparing the overall framework in the Software Directive to the US DMCA, an important distinction must be addressed. Namely, the Software Directive is without any mechanism analogous to the Library of Congress' review of exemptions under section 1201 of the DMCA. The result is that the framework for circumventing software TPMs in the EU cannot easily respond to technological and societal change. Put in more polemic language, it is fixed in a bygone software paradigm that could not have envisioned the modern uses for software or its integration into everyday products. Moreover, as the Software Directive requires EU member states to effect implementation of its terms, making any changes to this framework through a mandatory review process would be logistically difficult as the application of its framework is legislatively fragmented among member states.

71 As a whole, the Software Directive's exemption from the exceptions to copyright found in the InfoSoc Directive coupled with the lack of a mandatory review provision renders the level of protection afforded to software TPMs in the European Union particularly strong. Though the Software Directive permits independent acts of circumvention, its broad conceptualisation of a 'technical measure' combined with the prohibition on the means of circumvention jointly act as a significant impediment for overcoming the impacts of repair-resistant software TPMs.

123 InfoSoc Directive (n 6) 6(2)(c).

124 Stamatoudi and Torremans (n 107) 141.

III. Analysis: Circumventing John Deere's TPMs in the European Union

72 As outlined in Part B, farmers in the United States are challenged to repair their tractors as the result of John Deere's use of software TPMs. In the same vein, it is worthwhile to assess the hurdles that would be faced by farmers in the European Union. This question is not entirely hypothetical. Though based in the United States, John Deere has a truly global market reach for its tractors and holds the largest market share in Europe.[125] Tellingly, the software commonly used by American farmers in Nebraska to circumvent the TPMs on their John Deere equipment originates from Ukraine.[126] While the Right to Repair movement has often coalesced around the John Deere tractor situation in the United States, farmers in the European Union are not immune to the causes of these concerns or the effects of software TPMs. Accordingly, the impediments caused by the use of software TPMs must also be assessed under the EU framework.

73 As opposed to the United States' prohibition on acts of circumvention, the obstacle for farmers in the EU with John Deere equipment is the Software Directives' prohibition on *circulation of the means* of circumvention. The Software Directive contains no prohibition on farmers in the European Union devising their own solutions for circumventing software TPMs. At first blush, the EU framework may appear to be more permissive than that of the United States, but as will be seen, this is not necessarily the case. Prohibiting circulation of the means of circumvention creates for numerous legal, market and moral implications which will be assessed further in Part E. In such cases where TPMs are rendering crucial operating software or 'firmware' beyond reach, the ability for independent technicians to utilise tools and software modifications is essential for their services to have any practical effect.

125 Jim Breen, 'Tractor sales: Who topped one of Europe's biggest markets in 2018?', AGRILAND (10 January 2019) online: <https://www.agriland.ie/farming-news/tractor-sales-who-topped-one-of-europes-biggest-markets-in-2018/>.

126 Jason Koebler, 'Why American Farmers Are Hacking Their Tractors with Ukrainian Firmware', VICE (21 March 2017) online: <https://www.vice.com/en_us/article/xykkkd/why-american-farmers-are-hacking-their-tractors-with-ukrainian-firmware>.

74 The unlawfulness in circulating the means of circumvention is made more prominent by the ways in which John Deere is using TPMs. For this reason, the situation involving farmers and their John Deere tractors requires more than the right to perform individual acts of circumvention. These TPMs are effectively protecting the software that controls the tractor and, by extension, the machine itself. This purely utilitarian dynamic of the software changes the practical significance of the TPM, the barriers it presents and the subject of its protection. Indeed, this was precisely the type of undesirable use for TPMs that was cautioned by the EU's Green Paper.[127]

75 Practically speaking, without the ability to circulate the means of circumvention, farmers may possess a *right* under EU law to circumvent the software TPMs, but they will often not have the *ability* to do so. Though farmers have demonstrated ingenuity and have found creative solutions to problems for millennia, it is hardly reasonable to expect each of them to develop their own means of circumvention. However resourceful and inventive farmers may be in spirit, they must be able to share the benefit of their devised solutions. Therefore, if the policy goals of the Right to Repair movement are to be recognised by anti-circumvention law in the European Union, sharing tools and providing assistance must be part of that framework.

E. The Implications of John Deere's Repair-Resistant Software TPMs

76 Repair-resistant software TPMs are put in place by manufacturers because they are effective. The effect of these protections, however, are far reaching. From the perspective of independent repair and service technicians, John Deere's software TPMs run the risk of precluding the ability to run a business. Without legal access to the tools to circumvent the TPMs and the ability to offer those means as part of their services, John Deere effectively reserves for itself the entire market for repair and service.

77 Alternatively, from an individual consumer perspective, repair-resistant software TPMs blur the lines between ownership and a license to use. If the TPMs protecting software in everyday products and appliances inhibit our ability to do with them as we wish, it raises the question – do we really own our things? Questioning the very nature of ownership in this way is not outlandish or sensational. Indeed, in submissions before the US Librarian of Congress in relation to proposed expansion of law TPM circumvention in 2015, John Deere's representatives alleged that John Deere tractor owners do not actually own their tractors. Instead, John Deere's representatives alleged that tractor 'owners' receive an "implied licence for the life of the vehicle to operate the vehicle."[128] It would seem as though TPMs used in this way are part of a larger transition in the relationship between manufacturers and consumers.

78 In diluting the concept of ownership through rigid defence of repair-resistant software TPMs, manufacturers such as John Deere deny individual consumers a portion of their own agency by preventing them from learning, repairing and fixing products that they own. To a certain degree, this automates the individual consumer's decision-making process in determining the morality of their conduct. Can there be excusable grounds for manipulating the tractor's tECU software? Ultimately consumers will not be able to make this determination for themselves because the TPM precludes the question from ever arising.

79 The following Part provides an overview of these implications from the market or competition perspective as well as the individual owner or consumer perspective. With respect to fair competition in the market, this Part will explore the extent to which John Deere's use of software TPMs amounts to an abuse of a dominant position by failing to provide an essential facility to independent repair technicians. The essential facility in this regard is the access to the software protected by the TPM. The particulars of this notion will be more thoroughly canvassed in following analysis. Second, from the perspective of individual consumers, this Part will propose that repair-resistant software TPMs deny owners a significant degree of personal agency in choosing when, where and how to repair their own property. They place the moral justification for access to and manipulation of proprietary software outside the realm of decision-making by consumers. In doing so, software TPMs reduce the moral intelligence of consumers by automating the permissibility of their conduct. It will be proposed that this categorical denial of consumers' moral decision-making vis-à-vis software TPMs has deleterious consequences for society and the objectives of copyright law.

80 In sum, it will be contended that the market effects of repair-resistant software TPMs necessitates a review of anti-circumvention policy. Without a malleable and responsive framework analogous to the United States' Librarian of Congress reviews, the EU's

127 EC Green Paper on Copyright (n 110) 1.3.5.

128 Darin Bartholemew, 'Long Comment Regarding a Proposed Exemption Under 17 USC 1201' (Submissions on behalf of John Deere before the Librarian of Congress Rulemaking, 2014), online: <https://www.copyright.gov/1201/2015/comments-032715/class%2022/John_Deere_Class22_1201_2014.pdf>.

treatment of software TPMs risks becoming tone deaf to the myriad previously unforeseen ways in which these tools are being used by manufacturers. Should such an opportunity for legislative review occur, the market and moral implications addressed in the following sections should be taken into consideration.

I. Market Implications: The Anti-Competitive Impacts on the Secondary Market

81 Though the legal protection for software TPMs is enshrined in the Software Directive, the market may require protection *from* software TPMs in some instances. The appropriate framework to explore this question is under EU competition law. Unfortunately, an extensive search at the time of writing reveals a paucity of caselaw in the European Union involving a challenge to TPMs or DRM systems as a breach of competition law. While analogous issues arose in *Synstar Computer Services v ICL*[129] in relation to computer server software and hardware bundling, the proceedings were stayed before reaching the UK competition authorities.[130] Nevertheless, it is theoretically possible that conduct enabled by software TPMs could run afoul of competition rules.[131] Indeed, John Deere's software TPM implementation demonstrates that such controls can directly inhibit the ability for owners and independent repair technicians to provide services and activate parts. Though a robust overview of EU competition law is beyond the scope of this analysis, the following is a brief survey of the key EU competition law issues that may apply to John Deere's use of software TPMs in its products. It must be made clear that the competition law jurisprudence addressing intellectual property is sparse and remains largely unsettled. Nevertheless, the following discussion explores the extent to which John Deere's use of software TPMs may constitute an abuse of a dominant position in the secondary repair and service market.

82 The legal inquiry surrounding the abuse of a dominant position focuses on the extent to which John Deere is using software TPMs to unfairly stifle competition while being the largest player in the secondary repair and service market. The prohibition on the abusive use of dominance is governed by Article 102 of the Treaty on the Functioning of the European Union ("TFEU"). That provision states:

> *"Any* **abuse** *by one or more undertakings of a* **dominant position** *within the internal market or in a substantial part of it shall be prohibited as incompatible with the internal market in so far as it may affect trade between Member States."*[132]

[Bolding and underlining added]

83 It must be borne in mind that all intellectual property rights ("IPRs"), by their monopolistic nature, effectively enable some level of exclusion or protection from competition in a given market. In assessing this apparent paradox, the CJEU has clarified that the mere exercise of exclusive rights under an IPR does not amount to dominance,[133] but nevertheless, the ownership of an IPR and dominance may coincide under the right conditions. Further, dominance *per se* is not problematic under competition rules, but only where such dominance is occasioned by 'abuse'. In this regard, the competition rules do not apply to the exercise of IPRs in and of themselves, but only to the extent that they are used by a dominant undertaking as an 'instrument of abuse'.[134]

84 The first matter to determine is whether John Deere is in fact a 'dominant undertaking' in the context of the secondary repair and service market. The CJEU has defined dominance as "a position of economic strength enjoyed by an undertaking which enables it to prevent effective competition", and having "...the power to behave to an appreciable extent independently of its competitors, its customers and ultimately of its consumers."[135] While in some cases dominance is established through an empirical analysis of market share[136], a presumption of dominance can also be found where the mere holding of an IPR presents a significant barrier to market entry.

129 *Syndtar Computer Services (UK) Limited v ICL (Sorbus) Ltd.*, [2001] UKCLR 585; [2001] CP Rep 98 (UK).

130 Stokes (n 65) 98.

131 Ibid.

132 *Consolidated Version of the Treaty on the Treaty of the Functioning of the European Union*, [2008] OJ C 115/47, 102 [*TFEU*].

133 *Deutsche Grammophon GmbH v Metro-SB-Grossmarkte GmbH* (C-78/70), [1971] ECR 487, [1971] CMLR 631 (CJEU), 16.

134 Steven Anderman and Hedvig Schmidt, *EU Competition Law and Intellectual Property Rights: The Regulation of Innovation* (New York: Oxford University Press, 2011), 6.

135 *United Brands Company and United Brands Continental BV v EC Commission* (C-27/76), [1978] ECR 207; [1978] 1 CMLR 429, 38 (CJEU).

136 Anderman and Schmidt (n 134) 59.

85 One example of this dynamic is in the case of spare parts that are protected by design rights. Notably, in *CICRA & Maxicar v Reneault*[137], at issue was the design right for bodywork components of vehicles which had a functional shape and for which there were no substitutes. Manufacturers of 'aftermarket' parts could not produce a substitute without infringing on the design right. In assessing dominance, Advocate General Mischo reminded the Court that in such cases where the subject matter of an IPR cannot be substituted, it is 'beyond doubt' that the manufacturer holds a dominant position.[138] Similar reasoning was provided by the Advocate General in *Volvo v Veng*.[139]

86 While distinguishable in some respects, John Deere's software TPMs could be analogised to the design rights over functional automobile components in the above cases. In particular, many of John Deere's replacement parts cannot be activated (and by extension John Deere equipment cannot be serviced) without first circumventing the software TPMs embedded in the tECU's operating system. In this respect, there are no substitutable options for repair or replacement which do not encroach upon the IPR underlying the TPM. Though individual and non-commercial acts of circumvention are permitted under the Software Directive, this does not alleviate the larger competition impediments imposed on the secondary repair and service market by the TPMs. Above all, John Deere's software TPMs prevent effective competition in this market and enable John Deere to act independently of its competitors. Irrespective of the approach taken to establish dominance, the above reasoning suggests that John Deere could be found to hold a dominant position with respect to the secondary repair and service market for its products.

87 The second matter of inquiry under Article 102 of the TFEU is to determine whether John Deere is using its software TPMs as an instrument of abuse. This inquiry focuses on whether its actual use of TPMs impairs 'effective competition' in the repair and service market.[140] Just as the existence of an IPR does not amount to holding a *prima facie* dominant position, more than mere ownership of the right is required to establish abuse. Nevertheless, the CJEU affirmed in the widely cited *Magill* case that in 'exceptional circumstances', the exercise of the exclusive rights provided by IPRs, and refusal to licence those rights, can amount to abusive conduct.[141]

88 In *Magill,* the conduct under consideration was a television broadcasters' refusal to provide broadcasting listing information protected by copyright to the publisher of a TV guide. Importantly, the broadcasters did not produce a TV guide of their own. Seeking relief, Magill, the publisher of the TV guide, sought an order under Article 102 of the TFEU for a compulsory licence of the listing information. The dispute made its way to the CJEU which found that, despite the fact that (generally) the exercise of IPRs cannot in and of themselves be abusive, there are 'exceptional circumstances' in which this may be the case.[142] The CJEU found that the necessary 'exceptional circumstances' existed on the facts of the case in *Magill* for three reasons: there was no potential substitute to a licence in producing the TV guide; there was no 'objective justification' for the refusal of the licence; and thirdly, the broadcasters were 'reserving for themselves' the secondary market for weekly television guides.

89 The CJEU in *Magill* also built upon the 'essential facilities' concept that was established in the earlier decision of *Commercial Solvents.*[143] At its core, the essential facilities doctrine addresses conduct by a dominant undertaking in denying access to an essential product or service and in doing so, precluding the existence of a downstream or secondary market. In order to satisfy the 'essential facilities' framework established in *Magill,* it must be shown that the dominant undertaking: owns an indispensable product or service for a secondary market; holds a *de facto* monopoly; and by refusing to licence the IPR, the undertaking reserves for itself the secondary market by excluding all competition.[144] While the original conceptualisation of the essential facilities doctrine did not contemplate

137 *CICRA et Maxicar v Renault* (C-53/87), [1988] ECR 299. [1990] 4 CMLR (CJEU).

138 Ibid, 54.

139 *AB Volvo v Erik Veng (UK) Ltd* (Case 238/87), [1988] ECR 6039; [1988] ECR 6211 (CJEU).

140 *Nederlandsche Banden-Industrie Michelin v Commission* (C-322/81), [1983] ECR 3461; [1985] 1 CMLR 282 (CJEU).

141 *Radio Telefis Eireann (RTE) and Independent Television Publications Ltd (ITP) v Commission of the European Communities* (Magill) (C-241 and 242/91P), [1995] ECR I-743; [1995] 4 CMLR 718 (CJEU).

142 Ibid, 50.

143 *Istituto Chemioterapico Italiano S.p.A. and Commercial Solvents Corporation v Commission of the European Communities* (C-6 and 7/73), [1974] ECR 223; [1974] 1 CMLR 309 (CJEU).

144 Anderman and Schmidt (n 134) 105.

IPRs specifically[145], subsequent caselaw in this area has continued to apply this framework to the intellectual property context.[146]

90 The essential facilities doctrine seems to be reasonably intuitive upon first reading. Nevertheless, it leaves certain ambiguities with respect to when a product or service will be recognised as an essential facility for *another market* instead of merely being necessary for *another product in the same market*. This distinction is important. Viewed in the context of John Deere's software TPMs, this ambiguity is given even greater prominence. For example, if it can be argued that access to the software protected by the TPMs is part of the same 'product' as the tractor (and therefore within the same market), it may prove difficult to contend that software behind the TPM is an 'essential facility' for a *secondary market*. In the alternative, if it is found that access to the tECU's software is a separate *product or service* which forms an essential facility for the secondary repair market, a finding of abuse may be reached more easily. The result is that, to a large degree, the determination of the essential facilities issue for John Deere's software TPMs will depend on how the product is defined. Indeed, the ambiguity in this regard addresses the larger question posed in this analysis: what exactly do farmers 'own' when they purchase these machines?

91 In assessing the above ambiguity, it can be envisioned that John Deere and independent repair technicians would take opposite views on the answer to these questions. Independent repair technicians would presumably allege that the tECU's software is a diagnostic and repair tool which forms the basis of a distinct service or product from the tractor itself. John Deere, on the other hand, would likely contend that its proprietary software behind the TPMs is part and parcel of the tractor itself and are integral parts of the same product. The debate and resulting ambiguity are in need of further interpretation and clarification by the judiciary and competition authorities; particularly so in light of the increasing integration of hardware and software. John Deere's use of TPMs points to the fact that the essential facilities doctrine (though capable of extending to IPRs) sometimes struggles with identifying the relevant product and market with precision where hardware and diagnostic software are integrated.

92 Operating on the assumption that indeed the tECU software and the tractor itself *are* separate products in the context of the essential facilities doctrine, access could be compelled by competition authorities on two grounds. First, access to the software is indispensable for independent repair technicians to enter into the secondary repair and service market and there are no reasonable substitutes. Though substitutes may exist in the form of unofficial or hacked software which can be used instead of the proprietary software installed by John Deere, this necessitates unlawful circulation. Secondly, by putting in place these TPMs, John Deere is discriminating between new entrants to the repair and service market and its own service providers for the purposes of eliminating competition. Based on the findings in *Magill* and *IMS*, either of these factors could be influential in a finding of abuse. Even though protections for these TPMs do not amount to abuse *per se*, where independent repair technicians are wholly dependent on the IPR's subject of protection to conduct their business, dominant undertakings such as John Deere may be required to licence or to provide access.

93 In the caselaw following *Magill* and *IMS*, however, some caveats have developed in relation to dominant firms limiting the development of new products. Notably, in the lengthy *Microsoft*[147] decision, the Court of First Instance clarified that the 'new product' rule is intended to protect consumers from the suppression of entirely new products or services, and not necessarily those which the dominant firm already offers.[148] Given that the *Microsoft* decision was concerned largely with interoperability as between parallel software products, it can be distinguished somewhat from cases where repair and servicing of software-integrated products is at issue. Nevertheless, the Court of First Instance's emphasis on the need to *maintain* plural sources of innovation is telling. This calls into question whether the 'essential facilities' and 'new products' reasoning would apply in cases where a manufacturer is able to preclude any secondary sources of innovation from developing to begin with. Further still, it calls into question whether the reasoning from *Magill* and *IMS* would apply in cases where the competition being allegedly curtailed is not necessarily innovative, but service oriented.

94 In any event, while the ability to circumvent TPMs can be conceptually distinguished from the software licencing seen in the above cases, the end-effect on the secondary repair and service market can be the same. Just as the reasoning surrounding the essential facilities doctrine in *Commercial Solvents* and

145 Ian Eagles and Louise Longdin, *Refusals to Licence Intellectual Property: Testing the Limits of Law and Economics* (Hart Publishing, 2011), 153.

146 *IMS Health GmbH & Co OHG v NDC Health GmbH & Co KG (IMS)* (C-418/01), [2004] ECR I-5039, [2004] 4 CMLR 1543 (CJEU).

147 *Microsoft Corp v Commission of the European Communities* (T-201/04) EU:T:2007:289; [2007] ECR II-3601 (CFI) [*Microsoft*].

148 Steven Anderman, "Microsoft v Commission and the interoperability issue", 30:10 *EIPR* 395, 397.

Magill were broadened to include IPRs, it is equally possible that this reasoning could be extended to the circumvention of software TPMs. At its core, the essential facilities doctrine is concerned with *access*. Where John Deere is able to preclude competition in the secondary repair market, the above reasoning suggests (albeit with some caveats) that John Deere could be found to have abused its dominant position.

II. Moral Implications: The Denial of Agency

95 Beyond the effects on fair competition in the market, repair-resistant TPMs can have broader implications for individual owners. In particular, software TPMs used to inhibit repair of complex products and machinery reduces the capacity for individual owners to conduct repairs themselves. Beyond the economic drawbacks of this reality, the denial of owners' agency to perform these repairs themselves brings into focus deeper moral issues. This section contends that the software TPM framework in the European Union does not go far enough in allowing owners to circumvent software TPMs. It will be argued that the prohibition on the circulation of the means of circumvention precludes the ability for independent owners to share knowledge and information that contribute to a larger 'repair culture'. In taking advantage of this legal framework and using TPMs to inhibit repair, the following brief analysis proposes that manufacturers such as John Deere are denying owners individual agency to conduct repairs. This denial of agency undermines a sort of moral intelligence of consumers by predetermining the validity of their conduct. In turn, this ensures technological supremacy which ultimately renders consumers and the broader society more dependent on manufacturers and their systems of distribution.

96 The Software Directive's prohibition on the circulation of the means of circumvention is deeply problematic. The 'right' to repair must not be conflated with the ability to do so. As has been addressed in the foregoing chapters and sections, merely allowing circumvention is not enough. The TPM framework in the EU leaves the actual task of circumvention to consumers, even in cases where it is for socially beneficial reasons. Nevertheless, the EU TPM framework is without a requirement for rightsholders to actually *facilitate* circumvention by providing the means to do so.

97 The importance of the distinction between the self-help remedy currently available under the Software Directive and a positive duty to facilitate circumvention is difficult to overstate. The status quo means that software TPMs become the default private ordering rule, and circumvention is permitted only where it is successful. Effectively, this means that only the most technologically sophisticated and inclined consumers can benefit from the rule's exception. Thus, the framework for software TPMs in the EU is not concerned with the ability to circumvent TPMs, but merely makes it 'permissible to try'. The broader moral implications of this are significant.

98 The ability to conduct repairs to one's own property is not ordinarily thought to have a deeper moral significance, but it can on a number of levels. After all, every system of property rights must be infused with deeper moral significance in order to survive.[149] Moreover, our relationship to the things around us can have a profound impact on our sense of self. As Martin Heidegger contended in *Being and Time,* understanding the workings of the world around us can enrich our sense of being.[150] By extension, the handling, using or taking care of things provides us with deeper knowledge of ourselves and our relationship to the world. Software TPMs interfere with this relationship by denying the ability to understand the things (and by extension the world) around us. This, in turn, creates a culture of technological dependence and betrays the natural debts we owe to each other and to the world which we have collectively built.[151] To be responsible for our world, we must understand how it works -- this must include the ability to share knowledge, tools and understanding.

99 Autonomy must not be equated with agency. Though it can be argued that our interaction with repair-proof modern devices relieves us from the burden of understanding their inner workings, it also protects us from failure. This, we may feel, grants autonomy by providing freedom and liberation from the headaches of technology and the toils of manual labour. This view of freedom is both empty and rooted in a consumerist logic that ultimately precludes agency in a world of technological devices.[152] Alternatively, by becoming agents and 'masters of our own stuff', we become not merely those who 'consume', but also those who create, invent, use, participate and find solutions for the benefit of others.[153] This type of

149 Thomas W Merill & Henry E Smith, 'The morality of property' (2007) 48 WILLIAM AND MARY LAW REVIEW 1849, 1849.

150 Martin Heidegger, *Being and Time* (Blackwell Publishers, 1962), 98.

151 Matthew Crawford, *Shop Class as Soulcraft: An Inquiry Into the Value of Work* (Penguin, 2009), 205.

152 Ibid.

153 Ibid.

agency embodies precisely the values that underpin the consequentialist view of copyright and its larger societal objectives. Therefore, albeit with some irony, the antidote to slavish materialism is precisely a better understanding of the material world around us. Yet software TPMs used to prohibit repair and maintenance deny us the ability to exercise these facets of our agency, and by extension, to share our knowledge and understanding for the benefit of everyone.

100 Software TPMs also predetermine the morality of consumer conduct. As Professor Lawrence Lessig wrote in *Free Culture Big Media,* "The opposite of a free culture is a 'permission culture' – a culture in which creators get to create only with the permission of the powerful, or of creators from the past."[154] As for 'culture', Lessig refers to not only creative and expressive culture that underlays the arts and innovation, but to the relationship between humanity, technology and the law.

101 The widespread use of software TPMs which prohibit the ability to repair facilitate this undesirable 'permission culture'. It is hardly hyperbolic to suggest that on this trajectory, TPMs will eventually become more recognisable for what they permit rather than what they prohibit.[155] Therefore, by predetermining which conduct is acceptable, software TPMs may reduce our ability to act as our own moral agents.[156] Indeed, copyright frameworks have always been shaped by informal norms and notions of fairness regarding the scope of protection and balancing of rights. Software TPMs can disrupt this balance by moving the software and products into which they have been integrated outside of our range of moral decision-making.[157] This undermines the moral intelligence of consumers and creators by denying the opportunity to judge the appropriate relationship between the law, technology and morality.

102 Finally, the ultimate power and control held by manufactures through the use of software TPMs creates economic dependence that can in some respects be described as feudal or 'neo-colonial'.[158] Despite the conceptual distinction between the 'thing' and the 'work', software TPMs enable manufacturers to reserve rights and significant control over the property of others. For instance, manufacturers can arbitrarily determine that certain features or entire products are obsolete and require software or hardware updates. They can also render entire products or machinery (as they have in the case of John Deere) inoperative through software controls that cannot be readily or easily circumvented. This guarantees a relationship of almost complete economic dependence. By directly controlling how consumers interact with these products and possessing unilateral control over fees and servicing, legal protection for software TPMs enable manufacturers to defy the logic of consumer protection and act similarly to feudal lords.[159] This can hardly be said to portray an ideal (or even reasonable) balance between owners and users of intellectual property in the 21st century.

103 In sum, the moral implications of legal protection for software TPMs are significant. It is unlikely that these profound implications could have been envisioned during the genesis of the Green Paper and the Software Directive. Nevertheless, by denying consumers and copyright users the ability to share knowledge and understanding of the inner workings of these products, this legal regime denies the opportunity to better understand the world. This reduces the ability of individuals to act as their own moral agents in a world increasingly governed by technology and the law that protects it. The framework that supports these tools allows for the morality of conduct to be largely predetermined and creates for a relationship of dependence and control. It ensures that private manufacturers carry on as rule-makers. Protected by the Software Directive as they are, these TPMs enable a form of social control. As policy experts and lawmakers review this legal framework, it is proposed that these broader social and moral implications of software TPMs be reconsidered.

F. Conclusion

104 The legal framework for software TPMs in the European Union is problematic. It was established during an era where software and hardware were

154 Lawrence Lessig, *Free Culture: How Big Media Uses Technology and the Law to Lock Down Culture and Control Creativity* (Penguin, 2004), xiv.

155 Kerr (n 36) 251.

156 Ibid.

157 Lametti, 'How Virtue Ethics Might Help Erase C-32's Conceptual Incoherence' in Michael Geist, ed, *In the Public Interest: The Future of Canadian Copyright Law* (Irwin Law, 2005), 334.

158 Andreas Rahmatian, 'Neo-Colonial Aspects of Global Intellectual Property Protection' (2009) 12 THE JOURNAL OF WORLD INTELLECTUAL PROPERTY, 58.

159 Ibid 59.

conceptually separated as distinct products and markets. With the increase in software integration and 'onboard computer' design, many modern devices are beginning to take the backseat to the software that controls them and farm tractors are merely one example. If at one point in time it could be said that John Deere's tractors 'run on software', it is probably more accurate to say that in today's environment, the software merely happens to 'run on tractors'. Indeed, this phenomenon is pervasive. The utilitarian and essential nature of the software is such that the effect of protection against acts related to circumvention is much broader than mere copy-protection or object code reproduction that is addressed by the Software Directive. In effect, these software TPMs are like a second set of keys retained by the manufacturer. The *corpus mechanicum* and the *corpus mysticum* are becoming one and the same.

105 The ability for consumers and independent technicians to repair and service products is beneficial on a number of levels. For one, it increases the longevity and service life of various products, which reduces costs for consumers. Second, it reduces waste and obsolescence of otherwise well-performing equipment or products. Third, it creates for a thriving secondary market for repair and service that can spur employment, knowledge-sharing and other social benefits. Overall, the European Union should take seriously the right to repair and should view software TPMs as a hinderance to taking advantage of these social and economic benefits.

106 The prohibition on the circulation of the means of software TPM circumvention is problematic for owners because the sharing of information, know-how and tools is essential for the development of an educated and responsible repair culture. As the case of John Deere shows, the choice of repair technician and the ability to use substitute parts can reduce costs and shorten periods where equipment is not operational. For independent repair technicians, the prohibition on the circulation of TPM circumvention means is effectively a roadblock to market access. It restricts the ability to lawfully repair or maintain these machines to the dealer or approved technicians only. This limits the options for consumers while creating significant negative effects on competition. As canvassed in Part E, it may also constitute an abuse of a dominant position by denying an essential facility for the secondary repair and service market.

107 The benefits of technological advancement can only truly be realised if individuals can interact with and contribute to the high-tech world that surrounds them. Otherwise, the autonomy provided by ubiquitous and increasingly sophisticated products risks becoming an empty promise that ultimately pacifies and weakens us; our relationship with technology becomes predetermined. Undoubtedly, the practical limitations imposed by the size, computing power and capabilities of computers at the time of the EU Software Directive's enactment can hardly be said to remain in place today. To this end, software TPM law in the European Union is worth revisiting in light of the myriad new uses for which software is being used throughout consumer products and industrial design. Any such legal reforms must strongly take into consideration the growing consumer right to repair as the basis for a lawful exception to the prohibition on the circulation of the means of TPM circumvention.