Introduction

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In this volume, we explore the challenges that emerging technologies and new technology-driven practices pose for traditional notions of intellectual property law and policy. There is an intimate relationship between intellectual property law and new technologies as intellectual property law has always evolved in response to technological change. In the fifteenth century, the invention of the printing press was a catalyst for the granting of printing privileges. A more recent example is the development of anti-cybersquatting regulations once the internet became a commercial reality. One may argue that almost all substantial revisions of intellectual property law have been impelled by technological innovation.

Due to the nature of regulation, intellectual property law is always a step or two behind technological development. Moreover, law evolves in a reactionary manner. Often law reform focuses on harnessing the potential benefits of a new technology or preventing an erosion of rights posed by a specific technological development. This has often led to technology-specific regulation and a distortion of the balance between private and public rights. Intellectual property law has neither subscribed to the notion that analogue and digital regulation should be functionally equivalent nor that media neutrality should be maintained.

In this volume, we discuss the disparate manner in which intellectual property law has responded to the challenges posed by innovation and technology-driven practices. We offer perspectives across the intellectual property law spectrum, including some that are long-standing (e.g. patenting in the life sciences and regulation through code) and some that are more recent (e.g. the new generic top-level domains (gTLDs) and data mining). We examine the impact of technology on intellectual property law from different perspectives and through the prism of various new technologies. Questions that are posed include: is the law evolving fast enough; is the law evolving in the right direction; and is the regulation of an emerging technology supported by sound policy objectives?

In Part I of the book the authors explore whether the regulation of new technologies fundamentally alter the object and purpose of intellectual property law, including the balance of interests. The interrelationship between intellectual property law, access to information and data privacy forms the backdrop of the contribution by Margaret Ann Wilkinson. In this chapter she argues that there is a need to re-examine the nature of intellectual property and in particular the notion that the protection of confidential information and data protection belong within the construct of intellectual property.

Wilkinson notes that evolving technology is merely a catalyst, which reveals the systemic underlying tensions in the law, namely the rise of a triad of interests (individual, corporate and societal) that has replaced the original dual intellectual property environment of interests of the individual and society. She concludes that there should be a demonstrable balance between individuals, society and corporations before any expansion of the rubric of intellectual property law is contemplated.

Hong Xue's chapter addresses the evolving role of domain name registrars and registries. Registries and registrars can no longer fulfil their functions (i.e. the registration of domain names) in a technical manner and on a 'first come first served' basis. The management of the Domain Name System (DNS) has evolved from a modest undertaking to its current explosive expansion through the new gTLD programme adopted by the Internet Corporation for Assigned Names and Numbers (ICANN). This is the single most important development since the privatisation of the DNS in 1998.

ICANN created a series of right protection measures (RPMs) to prevent the registration of abusive domain names to get a toehold in the new gTLD programme. These RPMs require all new gTLD registries to offer multiple safeguards, primarily for intellectual property rights. Xue notes that the RPM obligations create intermediary liability for registries and registrars for intellectual property infringement without any safe harbour provisions. She raises the concern that this emerging intermediary liability has apparent chilling effects on freedom of expression. She also notes that the liability regime applies irrespective of the balance of interests such as the fair use of copyright works or the legitimate use of trademarks.

In her chapter, Ana Nordberg explains that technologies offer a myriad of therapeutic benefits and offer possible applications for human enhancement, through nanotechnology, synthetic biology and gene editing. Human enhancement is a controversial topic and there is a growing debate concerning the boundaries between treatment and enhancement. Nordberg notes that some perceive human enhancement as unethical, and

a threat to human dignity; others have argued that it may pose a danger to public health.

At the heart of Nordberg's discussion is the role that patent law could, or should, play to address the impact of human enhancement on society. She notes that patent law is hardly the most appropriate legal tool to regulate individual uses of technology. She concludes that a broad and interdisciplinary dialogue beyond the role of patent regulation is necessary to address the legal, social and economic implications posed by these techno-enabled possibilities.

In the last chapter in Part I, Milton Lucídio Leão Barcellos discusses the impact of new technologies on patent law, specifically the interpretation of claims. He notes that patent claim construction fulfils two important functions: it places boundaries on the patentee's patent; and it provides clear notice to allow the public to avoid the infringement of the patent. The focus of this chapter is on the problem–solution approach to patent interpretation and the challenging implications that may arise when facing new (and even old) technologies.

Barcellos notes that there is an inter-dependency between the need to define the scope of a patent clearly and the usefulness of the problem–solution approach to claim interpretation. He notes that the methodological approach to the inventive step requirement is especially problematic when facing new technologies. He concludes that a strong focus on the problem–solution approach, together with dynamic claim interpretation, can reduce the unnatural uncertainty in the patent system as a whole.

In Part II of the book, the authors address the impact of digital technologies on copyright law and policy. Digital technology has fundamentally altered the traditional copyright conventions and copyright law and policy have responded to this 'digital dilemma'. Part II illustrates that despite comprehensive law reform, copyright law continuously faces new challenges, and old challenges arise under new disguises. Two pervasive issues remain present. First is the question of whether 'digital is different' from a copyright perspective. Second, is technology-specific regulation at the heart of the difficulties experienced by copyright law to address new media and means of exploitation? The value of adhering to the principle of media neutrality and to adopt a functional equivalent approach in dealing with copyright issues are raised by several authors, albeit not directly.

The principle of technology neutrality is central to the chapter by Rebecca Giblin and Jane C. Ginsburg. The authors analyse the rationale on which courts in the US and in other jurisdictions adjudicate copyright infringement. They note that the legality of reproductions is determined

in the main by the answer to the question of ‘who made’ the copies, with no room whatsoever for consideration of factors such as the nature of the use, or whether that use might harm the copyright owner’s markets. The application of the public performance right also largely turns on ‘who does the act?’, since the determination of the actor then affects the assessment of whether the audience is ‘the public’ or not.

Giblin and Ginsburg maintain that this focus on the ‘wrong’ questions in analysing liability for infringement of the reproduction right and the public performance right distorts copyright law. They note that liability should not depend on secondary questions such as who did the act, as this enables third parties to deploy innovative business models and new technologies to sidestep liability. The authors maintain that ‘asking the “right” questions’ should lead to principled conclusions about the legal effects (if any) of the alleged infringing acts. Asking the right questions can also include following a functional equivalent approach in analysing copyright infringement.

Johan Axhamn notes that challenges to the copyright system related to the territoriality of copyright have been highlighted by recent technological developments, especially digital online networks such as the internet. In his chapter, Axhamn describes and analyses the cross-border provisions in the Marrakesh Treaty,¹ and the Orphan Works Directive² and relate them to the principle of territoriality and traditional means of balancing the rights of rightholders with public interests through exceptions and limitations. The premise of his analysis is that the current system of international protection of copyright is dependent on respect for the level of minimum protection and the principle of national treatment set out in the conventions.

He notes that the cross-border exchange system introduced by the Marrakesh Treaty is aimed at lowering transaction costs associated with the making and supplying of accessible format copies. However, it also erodes the principles of territoriality and national treatment. He therefore concludes that the cross-border exchange and importation provisions in

¹ The Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired or Otherwise Print Disabled (adopted by the Diplomatic Conference to conclude a treaty to facilitate access to published works by blind, visually impaired and print-disabled persons in Marrakesh, on 27 June 2013).

² Directive 2012/28/EU of the European Parliament and of the Council of 25 October 2012 on certain permitted uses of orphan works, OJ L 299, 27 October 2012.

the Marrakesh Treaty are a hazardous precedent for the safeguarding of copyright norms at the international level.

'Browsing', 'linking' and 'framing', though in essence navigation tools, have implicit copyright implications. Through browsing, multiple temporary copies may be made on the user's computer screen and in the internet 'cache' memory of that computer's hard disk, and linking and framing are both methods of making third-party content available. In her chapter, Irini Stamatoudi focuses on how the European Court of Justice has addressed the copyright implications of 'browsing', 'linking' and 'framing'. Her focus is, in particular, whether these acts fall within the rightholders' absolute and exclusive right of communication to the public or the making available right. The 'communication to the public' right is central to current business models and this right is implicit in the way we currently access and exchange information. The 'communication to the public' right also encompasses the 'making available to the public' right as provided for in the Information Society Directive.³

Stamatoudi notes that the Court's role has been of great importance in harmonising European Union copyright norms by clarifying that all forms of linking are permissible as long as the links are to content that has been made freely available to anyone online. She concludes that linking, framing and browsing on the internet are clear cases where reality and practice prevail. The Court adopted a proactive and permissible approach and attained a balance of interests, which supports the free flow of information on the internet and freedom of expression. She notes that, most importantly, the Court has finally come to grips with the copyright challenges arising from new technologies and practices.

Tatiana-Eleni Synodinou addresses recent case law and legislative developments in Europe regarding intermediaries' liability in Europe. She notes the issue of intermediaries' liability in Europe appeared to have been settled by the creation of a 'safe harbour' regime in terms of the E-commerce Directive.

Recent case law has highlighted the importance of the proper balancing of fundamental rights and diligence on the part of intermediaries regarding flagrantly unlawful activities. Article 13 of the Proposal for a Directive on Copyright in the Digital Single Market⁴ proposes the use of effective content recognition technologies. Synodinou notes that this will affect users' privacy and the balance of interests of rightholders.

³ Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society. OJ L167/10, 22.6.2001.

⁴ Brussels, 14.9.2016 COM(2016) 593 final 2016/0280(COD).

Technological neutrality and the balance between technology and the interests of users is central to managing the copyright challenges that arise from text and data mining (TDM). TDM is in essence automatic processes that aim to extract information from digital datasets. TDM is important for a number of applications that we use without a further thought such as geo-location information used by navigation software. Paweł Kamocki believes that TDM is central to the debate about the future of intellectual property law.

Kamocki is of the opinion that copyright law should not address non-consumptive use. He proposes a carve-out for non-consumptive use through the redefinition of exclusive rights. The non-consumptive use approach is preferred to a statutory exception as private actors can overcome exceptions and limitations through contractual provisions or technological protection measures.

Technological developments and new innovative solutions will continue to challenge intellectual property law. The authors' varied perspectives on current issues are thought-provoking and contribute to scholarship. It is clear that a balance of interests remains at the heart of the debate, and that intellectual property regulation of new technologies should strive towards media parity and technological neutrality.