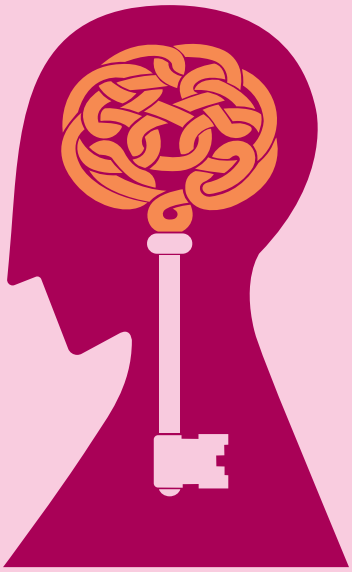
INTELLECTUAL PROPERTY IN THE DIGITAL AGE



Islambek Rustambekov, Said Gulyamov,
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Preface

This book is one of the outcomes of two years of academic collaboration between Roma Tre University and Tashkent State University of Law (TSUL). It is part of a dialogue between the two institutions, which aims to broaden cooperation and collaboration between academic institutions in Italy and Uzbekistan. In particular, it is our hope that it will form part of broad programme of educational, cultural and economic exchanges between our two countries.

The first memorandum of understanding between Roma Tre and TSUL was signed in September 2022. Subsequently, scholars from each institution have participated in joint conferences on topics such as predictive justice, the law of the outer space, and the digitalization of legal studies. The mobility agreement between the two institutions ensures that exchanges are not, however, limited to members of academic staff. There is a regular exchange of students between Rome and Tashkent and current negotiations between the two universities are paving the way for the establishment of a joint double degree.

The list of collaborative activities between our two institutions is too long to be included in full in this preface. However, the following important highlights give some flavour of our joint activities. In the last couple of years, three professors and two members of TSUL administrative staff visited Roma Tre, taking part in lectures and other activities. Professor and current acting TSUL vice-rector Islambek Rustambekov also attended a scholarly meeting organized by Roma Tre on "European Lawyers and Innovative Teaching Rome" in January 2023. In turn, professors from Roma Tre have made academic visits to TSUL. Professor Giacomo Rojas Elgueta attended a Conference on "Development of Private International Law in Uzbekistan" in November 2022. Professor and current pro-Rector for internationalization Giorgio Resta took part in the Third International Legal Forum "Tashkent Law Spring" organized by the Uzbek Ministry of Justice in May 2023. Professor Sirio Zolea took part in the Conference on "Legal Tech, Education and Digital Transformation of Law" in February 2023. Events jointly organized by Roma Tre and TSUL have included the following: a seminar on "Digitalisation of Justice and Predictive Justice" organized at Roma Tre Law Department in May 2023; the meeting "A Bridge Between Italy and Uzbekistan. Academic Collaboration in the Age of Reforms", with the participation of the Ambassador of Uzbekistan

in Italy Abat Fayzullaev in May 2024; and a Summer School on "Cyber Law. Exploring the Legal Landscape of Cyberspace" organized at TSUL in June 2024. With respect to student mobility, the first four TSUL students joined the Department of Law of University Roma Tre in the second semester of academic year 2023-2024, while ten are expected to come for the first semester of academic year 2024-2025. Generous EU funding within the framework of Erasmus KA171 program, which Roma Tre gained thanks to the essential contribution of TSUL International Department, will support and facilitate these exchanges.

The regulation of cyberspace, which was the focus of the first joint Roma Tre/TSUL Summer School, is a particular strategic interest underpinning the cooperation between the two universities. Scholars from Roma Tre Law School have developed an important profile in this area. For some years they have worked at a comparative level on the complex issues raised by data privacy, data governance, and artificial intelligence, in the context of the European and international regulatory frameworks. Intellectual property law, which has also been a focus of European and international regulatory attention, is also a critical part of the regulation of cyberspace. Overall, the constant expansion of intellectual property rights at national, regional and global levels raises questions about the coherence of legal regulation in relation to new technologies. In particular, intellectual property rights appear to be in structural tension with multi-level regulatory approaches to data sharing and socialization of data governance. A focus on intellectual property issues is, therefore, an important part of our joint research focusing on the need to improve legal coherence and balance the relationship between legal rights in the information economy.

As Uzbekistan and the other countries of Central Asia enter the global economy, there is an increasing interest in intellectual property law, and its transnational impact. Intellectual property rights are regarded as forming part of the process of transition from a socialist legal model to a system of law that supports the integration of local economies into the global market and is capable of regulating the domestic information and data economy. Eurasian experiences of regional integration, such as the Shanghai Cooperation Organization, also enhance comparative legal responses to the technical and political challenges of the global information and data economy. The collaboration that underpins this book is not only aimed at supporting the teaching of intellectual property law to undergraduates, it is also an attempt to describe and assess – in a style accessible to law students in the developing world – the particular

challenges in the transnational regulation of intellectual property. It sheds light on the way in which intellectual property rights, as a global phenomenon, influence local and regional legal cultures, producing a multidirectional hybridization of legal models.

This book is published by Roma Tre Press for the series "Consumatori & Mercato". It demonstrates the commitment of the Department of Law at the University Roma Tre to contribute to a dialogue that supports the challenges that the Uzbek higher education system and Tashkent State University of Law are facing in this phase of the modernization process. It finds its place in the context of the varied range of collaborative activities between the two institutions that aim to broaden the horizons of the next generation of lawyers in Europe and Central Asia.

Simone Benvenuti
Fiona Elizabeth Macmillan
Sirio Zolea

CHAPTER I

INTRODUCTION TO INTELLECTUAL PROPERTY

1. *Concept and types of intellectual property*

Intellectual property (IP) refers to creations of the mind, such as inventions, literary and artistic works, designs, and symbols, names and images used in commerce (World Intellectual Property Organization [WIPO], n.d.). IP is protected by law through patents, copyright, trademarks, industrial design rights and trade secrets. These exclusive rights allow creators and owners of IP to benefit from their works (Ruse-Khan, Jaeger, Kettiger & Kur, 2011). IP protection is important because it provides incentives for innovation and creativity, which drives economic growth and human development. By granting limited monopolies, IP laws allow creators to recoup investments and earn fair returns on their works, providing motivation for undertaking risky and expensive projects like research and development (Lemley, 2015). At the same time, the public benefits from the diffusion of knowledge and increased cultural and technological progress.

On an individual and business level, IP is a crucial asset and source of competitive advantage in the modern economy (Hall & Harhoff, 2012). Firms use patents, trademarks and trade secrets to appropriate returns on R&D expenditures, build and safeguard reputations, and prevent copying from competitors. Copyright protects original works and provides income streams for creators through licensing. Without IP protections, it would be difficult for companies and individuals to profit from innovation and creativity. Weak IP regimes have been linked to lower levels of foreign direct investment, R&D spending, and technology transfer (Branstetter, Fisman & Foley, 2006). However, overly broad and rigid IP laws may also impede innovation by limiting access to knowledge and follow-on improvements (Bessen & Meurer, 2008). Therefore, balance is required. Overall, appropriate IP protections provide incentives needed to spur

innovation and creativity, driving economic and social progress.

The four main types of IP are:

- *Patents* - Provide exclusionary rights over inventions, protecting new and non-obvious products, processes and designs. Anything that does not constitute the solution to a technical problem and that is not industrially applicable is not patentable. Plant varieties and inventions whose application would be contrary to public order or morality are also excluded from the patent. Patents typically last 20 years from filing (WIPO, n.d.). Key international agreements governing patents include the Paris Convention (1883) and Patent Cooperation Treaty (1970).
- *Trademarks* - Protect signs, symbols, names, logos and other brand identifiers used to distinguish products and services in commerce. Trademark rights arise through use and registration, and may last indefinitely with renewal (WIPO, n.d.). In particular, any natural or legal person who has interest in registration can file the trademark and, in many countries, it has a duration of 10 years, renewable indefinitely by renewing the application original registration. The Madrid System facilitates international trademark registration. It was established under the Madrid Agreement relating to the International Registration of Trademarks (1891) and the Protocol relating to the Madrid Agreement (1989).
- *Copyright* - All works of human creativity are protected by this legislation, adapting to the evolution of times up to including the most current creations. It grants exclusive rights over literary, artistic, musical and dramatic creations like books, songs, films and plays. Copyright generally lasts for the creator's life plus 50-70 years. Major international copyright treaties include the Berne Convention (1886) and TRIPS Agreement signed in 1994 (WIPO, n.d.).
- *Trade secrets* - Protect confidential and proprietary information like manufacturing processes, customer data, recipes and source code that provides a competitive edge. So Trade secret focus on the **information** related to productive activity or to business organization. Trade secrets remain protected as long as secrecy is maintained (Lemley, 2015). No formal registration is required. The TRIPS Agreement requires all WTO members to have laws criminalizing trade secret theft.

While the specifics vary across jurisdictions and IP forms, all are time-limited property rights that give creators control over and ability to profit from their intangible goods in exchange for disclosing details to the public

to enable follow-on innovation (Schultz & Madigan, 2016). Without IP protections, companies would have insufficient incentives to invest in generating ideas and content that benefit society.

To have an overall perspective it can be stated that:

- *Patents* - Chemical formulas, industrial processes, mechanical devices, pharmaceuticals, computer chips, algorithms, business methods
- *Trademarks* - Brand names (Coca-Cola, Nike), logos (Apple, McDonalds), slogans ("Just Do It"), product packaging and designs (Coca-Cola bottle)
- *Copyright* - Books, songs, films, artwork, photographs, sculptures, architectural works, maps, technical drawings, computer software and code
- *Trade secrets* - Manufacturing processes (WD-40 formula), soft drink recipes (Coca-Cola recipe), source code, customer lists and data, proprietary algorithms (Google's PageRank). Patent holders have the exclusive rights to make, use, sell or import the invention, and prevent others from doing so, for up to 20 years (WIPO, n.d.). This facilitates commercialization and allows recovery of R&D investments. Trademarks provide exclusive use of brand identifiers to protect reputation and prevent consumer confusion. Registration gives nationwide priority over later users. Copyright grants economic and moral rights over original works for 70+ years, enabling licensing and control over copying, adaptations and public performances. Finally, trade secret protection allows perpetual control over confidential information that derives value from secrecy. Firms use NDAs, security protocols and internal controls to prevent misappropriation. IP protections enable rightsholders to profit from their intangible goods and prevent unfair appropriation.

The processes for securing different IP rights vary:

- *Patents* - Inventors file applications describing inventions with patent offices like USPTO. Examiners review prior art to assess novelty, non-obviousness and utility. If approved, exclusive patent rights are granted for up to 20 years from filing. Maintenance fees sustain protection.
- *Trademarks* - Applicants submit identifying marks to trademark offices like USPTO along with specifications of associated products/services. Examiners evaluate distinctiveness and conflicts with prior marks. Accepted marks are registered on the Principal Register, providing nationwide priority. Renewal every 10 years sustains protection.
- *Copyright* - Arises automatically upon creation of original works fixed in tangible media. Registration with US Copyright Office provides

benefits like statutory damages and shifts the burden of proof in infringement suits.
- *Trade secrets* - Derive protection by maintaining confidentiality through NDAs, access controls, encryption etc. No registration needed but should be protected through reasonable secrecy measures.

More complex works like pharmaceuticals and software may utilize multiple forms of IP in combination (patents, copyright, trade secrets) for comprehensive protection.

While all IP rights promote innovation by preventing duplication, key differences exist:

- *Subject matter* - Patents cover functional inventions; trademarks protect brand identifiers; copyright addresses creative works; trade secrets encompass confidential information.
- *Requirements* - Patents mandate novelty and non-obviousness; trademarks distinctiveness; copyright originality. Trade secrets just need secrecy.
- *Rights conferred* - Patents provide strongest monopolies; trademarks prevent consumer confusion; copyright limits reproductions; trade secrets prevent misappropriation.
- *Duration* - Patents expire after 20 years; trademarks renew indefinitely; copyright lasts 70+ years; trade secrets perpetual until revealed.
- *Process* - Patents and trademarks require registration; copyright automatic; trade secrets through secrecy measures.

In summary, patents offer the strongest monopolies but are hardest to obtain, whereas copyrights arise easily but are more limited in scope. Trademarks renew indefinitely but only protect brand identifiers. Trade secrets have potentially unlimited duration but require secrecy maintenance. Companies utilize combinations tailored to their needs and assets.

Some major IP controversies include:

- *Patent litigation* - Critics argue excessive litigation, particularly in software and electronics, creates legal uncertainties that hinder innovation (Bessen & Meurer, 2014). But stronger rights may spur innovation despite litigation risks.
- *Copyright terms* - Extending copyright from life+50 years to 70+ years to address digital piracy arguably over-protects works and limits. But longer terms could also incentivize new creations.
- *Access to medicines* - Strong patent protection for pharmaceuticals enables recouping R&D costs but reduces drug access for the poor. Compulsory licensing and tiered pricing seek balance (Chien, 2003). Traditional knowledge - IP systems largely evolved around Western

notions of invention and authorship, arguably inadequately protecting indigenous creations like folk remedies and artworks (Carpenter, Katyal & Riley, 2009). New regimes may be needed (di Blase, 2007).

- *Online piracy* - Digital technologies facilitate piracy, straining copyright law. Stricter protections could limit platforms and fair uses (Depoorter, 2013). New models like streaming may obsolete piracy concerns.

Overall, more nuanced frameworks tailored to digital realities can help balance creators' rights, follow-on innovations, and public access. No perfect solution exists given competing priorities. Reasonable compromises grounded in empirical evidence are needed.

While IP protections aim to spur innovation by preventing free-riding, excessively rigid regimes may inadvertently inhibit further innovations. Strong patent rights early in R&D processes may preempt follow-on inventions and cumulative innovation (Murray & Stern, 2007). Overly broad software patents also have questionable impacts on innovation (Bessen & Hunt, 2007). Similarly, very long copyright terms limit public domain access that often seeds new creations. Properly calibrating IP systems to balance ex ante incentives for original inventions and ex post costs of monopolies requires considering:

- Strength and duration of protections
- Transparency and predictability of IP regimes
- Safeguards like fair use, compulsory licensing
- Subsidies, prizes and non-IP incentives

Empirical analyses of industries with varying IP regimes can inform optimal calibration (Moser, 2013). Recent patent reforms like the America Invents Act demonstrate ongoing efforts to tailor IP to promote cumulative innovation. Overall, Dynamic balancing is needed to incentivize early creators while enabling future innovators.

Several major trends are shaping the evolution of IP protections:

- *Global harmonization* - International treaties like TRIPS have established minimum IP standards and protections globally, constituting a significant strengthening, especially in developing countries (Barton, 2000). But controversy exists around impacts.
- *Technological change* - Digital technologies have strained copyright regimes, and IP regimes in general (Alice Corp. v. CLS Bank International, 573 U.S.- 2014), necessitating major adaptations like the DMCA's anti-circumvention measures (Depoorter, 2013). Emerging technologies will continue posing policy challenges (Allen

v. Cooper, 589 U.S.- 2020).

- *Litigation and trolling* - The volume and costs of IP lawsuits have risen sharply, particularly in the US, necessitating reforms to the patent litigation system (Bessen & Meurer, 2014). In addition to some important interventions by the Supreme Court (TC Heartland LLC v. Kraft Foods Group Brands LLC, 581 U.S.- 2017), anti-troll measures are being implemented.
- *Access models* - Open licensing models like Creative Commons provide greater public access to copyrighted works. Compulsory licensing also broadens access for patents in vital areas like healthcare (Chien, 2003).
- *Internationalization* - The growth of global supply chains and cross-border ownership of IP assets increases the need for international coordination and enforcement (Helfer, 2004).

IP law is adapting to balance creators' rights, follow-on innovation, and public access in light of changing economic and technological realities. Further evolution will likely continue.

IP plays a crucial role in the information economy driven by digital technologies and intangible goods. Patents facilitate appropriating returns on software inventions and internet business model patents help monetize online platforms (Bessen & Meurer, 2008). Copyright enables licensing revenue models for digital content while preventing piracy. Trademarks denote online brand reputations, with domain name protections. Database rights safeguard compilations of data. However, IP regulations require constant adaptation to new technologies that strain existing laws. Rights must be calibrated to provide incentives without unduly limiting cumulative innovation or public access to knowledge goods. IP fuels information economy prosperity but demands nuanced, responsive policymaking to keep pace with technological change. Global coordination on IP also grows increasingly important in digitally interconnected markets. Overall, IP remains fundamental for creativity and innovation but must evolve to effectively govern intangible information goods and promote continued dynamism.

2. *History of the development of the Institute of Intellectual Property*

The origins of modern intellectual property (IP) law can be traced back centuries, but the foundations were laid during the rise of modern capitalism and industrialization in Europe. Although the precursors of the original laws on intellectual property can be traced back to some ancient civilizations, especially Greece and Rome, where various forms of protection were granted to inventors, artists, artisans, the history of intellectual property is the history of the modern world because economic development and development of the protection of IP rights have exercised mutual influence over time. Early privilege systems reserved exclusive rights like patents on inventions to certain individuals or guilds (Machlup & Penrose, 1950). The 1624 English Statute of Monopolies restricted broad royal grants of privileges but allowed exceptions for patents on new inventions (Ladas, 1930). This helped incentivize innovation and gradually shift patent rights into the legal domain rather than royal prerogative. Early copyright also emerged in England through the 1710 Statute of Anne, which vested rights in authors rather than publishers (Deazley, 2006).

Trademark rights similarly arose to protect commercial reputation during this expansion of commerce, while trade secrets have ancient roots but gained prominence during industrialization (Bone, 1998). The intensification of research and development and creative activity during the 19th century led to demands for strengthening IP protections nationally and internationally. The 1883 Paris Convention for the Protection of Industrial Property was a landmark treaty that enabled patent priority claims across member countries (Bodenhausen, 1969). The 1886 Berne Convention did the same for copyrights. These foundations were gradually built upon in the 20th century.

Traditionally, in common law countries the foundations on which the protection of intellectual property is based are linked to the doctrine of utilitarianism and the function of the protection of intellectual property is to encourage human inventiveness where public interests are relevant. Instead, in civil law countries, recalling Hegel's theory of the person, intellectual property rights are closely linked to the figure of the inventor. Overall, IP rights formalized gradually over centuries to protect innovators and creators amid the rise of commerce, industry, and global trade. Initially privileges granted by rulers, IP rights were codified into statutes and treaties that still form the basis of modern regimes. But the systems continue to evolve in response to changing technological and economic

realities. For example, in the 19th century it was doubtful whether a photograph could be considered an expression of human creativity or the result of a mechanical process. It was the US Supreme Court that resolved the debate by recognizing the authorial nature of photography (Burrow-Giles Litographic Co. v. Sarony 111 U.S. 53 -1884).

Patent law milestones include early Venetian and English statutes limiting broad privileges, the 1624 English Statute of Monopolies allowing inventor patents, and the 1790 US Patent Act which enabled the US patent system (Walterscheid, 1996). Subsequent acts increased patent office resources and expertise. The 1836 Patent Act introduced thorough examination procedures. 20th century acts like the 1952 Patent Act expanded subject matter like chemical processes while creating the Court of Appeals for the Federal Circuit to harmonize patent jurisprudence.

Trademark milestones include the first US trademark registration in 1870, the 1946 Lanham Act which codified federal protections, and the 1988 Trademark Law Revision Act, which aligned US law with international treaties (Barnes, 2011). Digital domain name protections were added in the 1990s-2000s.

Copyright milestones include the 1710 Statute of Anne in Britain and the 1787 US Constitution empowering Congress to grant copyrights. The 1831 Copyright Act increased terms and 1856 Act mandated registration and notice. Major 20th century expansions occurred in 1909, 1976 and 1998 to address new technologies and terms.

These foundations enabled the expansion of IP protections amid industrialization and technological changes like audio recordings and software. Further evolution continues today to address issues like online piracy.

The underlying rationale for IP systems is providing incentives for innovation and creativity which benefit society but require investments that may not occur without government protections. In fact, intellectual property can hinder the use of knowledge by others, particularly those who cannot afford to pay licenses or royalties. Patents grant temporary monopolies over inventions so innovators can recoup R&D costs that often require substantial time and funding (Schacht, 2011). This incentivizes risky research investments needed for technological progress. Copyright provides creators exclusive rights to profit from works whose reproduction is easily duplicated absent protections. Trademarks secure brand investments that denote consistent quality. Trade secrets recognize companies' proprietary interests in confidential data that derives value

from secrecy. Without these limited property rights, underinvestment in intangibles would occur due to free-riding. IP laws spur innovation and creativity through incentives. They reflect a social contract between creators and the public.

IP law evolved somewhat differently across regions based on specific conditions:

- *Europe* - Early privilege systems and guild controls led to gradual statutory codification of patent and copyright laws during industrialization, as well as international agreements like the 1883 Paris and 1886 Berne Conventions (Machlup & Penrose, 1950).
- *United States* - Strong constitutional protections and an openness to new technologies like software led to expansive US IP laws and global influence (Ben-Atar, 2004).
- *Developing nations* - Often introduced IP laws later, during decolonization or as required by agreements like TRIPS. Tensions exist around western-style IP regimes (Sell, 2003). This is particularly evident in the pharmaceutical sector. Some developing countries tend to distance themselves from Western intellectual property regimes with the aim of significantly lowering drug prices.
- *Asia* - Weaker IP traditions but strengthening laws and enforcement lately, especially in Japan, Korea and China amid rapid innovation (Peng et al., 2017).

IP regimes continue to converge globally, driven by technology diffusion, multinational corporations, and international treaties. But some national differences remain based on unique histories and local environments.

While the fundamental frameworks remain similar, IP laws have expanded significantly over time:

- *Duration* - Patent and copyright terms have lengthened dramatically, from 14 years in early statutes to 20+ years for patents and life + 70 years for copyrights today.
- *Scope* - Coverage has expanded to new technologies like software, biotech, and business methods that were not envisioned originally. For example, Diamond v. Chakrabarty (1980) was the ruling with which the US Supreme Court allowed the patenting of genetically modified organisms.
- *Internationalization* - IP treaties like TRIPS have created uniform global standards and protections where national laws varied greatly before.

However, some principles remain, like the ultimate goal of enhancing

innovation and creativity through balanced protections. Early IP statutes were more limited in addressing local industries and simpler technologies but provided foundations for today's comprehensive regulations that now govern a knowledge economy. Further evolutions will likely continue adapting IP to new realities (Ricolfi, 2015).

Major technological shifts have often precipitated changes and expansions in IP law:

- Industrialization spurred the patent system to incentivize investments in machinery and processes (Khan, 2005).
- The printing press enabled rapid duplication, requiring the development of copyright to protect authors (Deazley, 2006).
- Recorded music created new licensing and piracy challenges under copyright (Towse, 2008).
- Software presented difficulties shoehorning code into either copyrights or patents, resulting in sui generis protections (Burk, 2008).
- Biotechnology's ability to manipulate life forms posed patent eligibility questions (Crespi, 2007).
- Digital technologies facilitated easy copying, necessitating copyright adaptations like the DMCA (Depoorter, 2013).

Technology will continue shaping IP laws, as inventions create ambiguity about applying existing statutes and opportunities for new legal protections. Policymakers must balance creators' interests against monopolistic constraints on follow-on innovation.

To summarize the highlights of what has been said so far, it is possible to make the following schemes.

1) Landmark IP national legislation includes:

- The 1624 Statute of Monopolies, limiting English crown privileges and permitting inventor patents (Hulme, 1896).
- 1710 Statute of Anne, Britain's first copyright law (Deazley, 2006).
- 1870 US trademark registration system.
- 1887 US design patent provisions.
- Bayh-Dole Act (1980) is a U.S. federal law allowing federally-funded research patenting in USA.
- Hatch-Waxman Act (1984) is a U.S. federal law governing patented pharmaceuticals.
- Copyright Term Extension Act (Sonny Bono Act, 1998) extends copyright terms in the United States.
- America Invents Act (2011), switching US to first-inventor-to-file.

2) Major key US Supreme Court cases include:

- Diamond v. Chakrabarty (1980), allowing patents on genetically modified organisms.
- Diamond v. Diehr (1981), permitting software patentability despite algorithms being abstract ideas.
- Alice Corp v. CLS Bank (2014), restricting software and business method patents.
- Mayo v. Prometheus (2012), heightening biotech patent eligibility requirements.

These acts and cases adapted IP law to new technologies, addressed abuses, amended patent review processes, and balanced stakeholder interests - though debates persist on optimal policies. Further evolution will likely occur.

3) From the 1883 Paris and 1886 Berne Conventions which enabled international patent and copyright priority claims, international IP agreements have expanded protections and harmonization:

- *TRIPS* (1994) - Required WTO members implement minimum IP standards covering patents, copyrights, trademarks, trade secrets, and more (Barton, 2000). Controversial for mandating western-style regimes globally.
- *Madrid Protocol* (trademarks, 2006) - Allows trademark registration and maintenance across 120+ member nations through WIPO's International Register (Fryer, 2011). Enhances multinational protection.
- *Marrakesh Treaty* (copyright exception for blindness, 2013) - Requires member states adopt copyright exceptions allowing conversion of works to accessible formats for visually impaired persons (Rogan, 2014). Improves access.
- *Beijing Treaty* (audiovisual performances, 2012) - Grants performers economic rights over recorded audiovisual performances like films across member states (Yu, 2014). Strengthens rights globally.

These treaties balance expanding protections for rightsholders with safeguards for public interest like access for disabled persons. But critics argue further recalibration is needed to account for development needs. Ongoing international coordination will remain crucial for IP in a globalized economy.

4) IP law has navigated major controversies over its evolution:

- Early privilege grants by monarchs were often overly broad, stifling economic activity and necessitating restrictions (Machlup & Penrose, 1950).

- Rapid industrialization led to a patent explosion, including over inventions already in widespread use, requiring reforms (Khan, 2005).
- Copyright's expansion to new technologies like radio and recordings disrupted established industries, resulting in clashes (Towse, 2008).
- Software and biotech patentability created bubbles followed by eligibility restrictions after litigation soared (Burk, 2008; Crespi, 2007).
- Developing countries face dilemmas balancing incentives for innovation versus affordability of medicines and knowledge goods (Chon, 2006).
- Digitization and the internet enabled unprecedented copying, challenging copyright regimes (Depoorter, 2013).

Through careful balancing of creator incentives, follow-on innovation, public access, and international coordination, policymakers aim to tailor IP laws to foster continued innovation and creativity. But risks remain, requiring ongoing prudence and evidence-based reforms.

5) Key critiques of current IP regimes include:

- Excess litigation around software, smartphones, and generic drugs increases costs and hinders innovation (Bessen & Meurer, 2008; Mossoff, 2013).
- Overly broad and vague software and business method patents enabled harmful "patent trolls" (Federal Trade Commission, 2016).
- Copyright terms are too long, limiting access to public domain works that spur creation.
- IP enforcement measures like website blocking and search engine delistings also restrict legal speech (Bridy & Ducharme, 2015).

Proposed reforms include:

- Stronger patentability requirements and litigation process reforms to improve quality and reduce costs (Federal Trade Commission, 2003).
- Shorter, more differentiated copyright terms between commercial works and original expression.
- Improved databases and expert examiners to prevent vague software and e-commerce patents (Burk & Lemley, 2003).
- Enhanced public domain provisions mandating digitization and availability of out-of-print copyrighted works (Samuelson, 2016).
- User safe harbors and fair use exemptions in copyright to enable innovation platforms (Depoorter & Walker, 2015). In this sense can

be mentioned Google LLC v. Oracle America Inc. (2020), case in which the US Supreme Court said that Google's use of Java code took place according to the principle of fair use according to the law.

Reasonable reforms aim to recalibrate IP systems to current realities, balancing rights, access and transaction costs. Consensus remains elusive but evidence-based adjustments may improve on current regimes.

3. *The Importance of Intellectual Property in the Digital Age*

The rise of digital technologies like software, databases, and the internet fundamentally impacted intellectual property by challenging established IP paradigms centered around physical goods (Pascuzzi, 2020). Copyright law faced massive upheaval, as digitization enabled rapid, perfect copying and distribution that strained existing protections (Depoorter, 2013). The internet posed unprecedented enforcement difficulties for preventing copyright infringement of music, films, books and more.

Software's dual patent and copyright eligibility caused confusion until sui generis protections emerged. Questions arose around patenting computer programs given algorithms' abstract nature (Bessen & Hunt, 2007). In this sense, can been mentioned Gottschalk v. Benson (1972), leading case of the US Supreme Court on the question if computer programs can be patented. Trademarks expanded into new realms like domain names and social media handles. Trade secrets faced growing risks from hacking and data leaks. Overall, digitization necessitated major IP adaptations as the economics of reproduction, distribution, and infringement fundamentally shifted. Policymakers continue attempting to balance creator incentives with follow-on innovation in the digital environment.

Software patents increased rapidly following decisions like Diamond v. Diehr (1981) in which the U.S. Supreme Court affirmed patentability despite algorithms being abstract ideas (Bessen & Hunt, 2007). This enabled patents around software functions, interfaces, and business methods implemented via code, leading to patent thickets. Digital trademarks emerged as valuable online branding tools, including domain names, social media handles, and app icons. The growing value of digital branding also led to cybersquatting issues.

Online copyright issues arose as file-sharing sites like Napster enabled mass copyright infringement of music, challenging traditional distribution models (Depoorter, 2013). Video and book piracy concerns grew with

subsequent sharing platforms. User generated content also posed questions about derivative works and fair use exemptions (Macmillan, 2018). Copyright law continues struggling to adapt to the digital environment.

IP enforcement online faces multiple challenges:

- Anonymity and jurisdictional issues across borders make prosecuting infringers difficult compared to physical goods piracy (Yar, 2005). In this sense, interesting is Google Inc v. Equustek Solutions Inc (2017), a decision of the Supreme Court of Canada that dealt with the authority to issue injunctions against foreign companies.
- The sheer volume and ubiquity of piracy on user generated platforms like YouTube strains enforcement resources (Giblin, 2014).For example, the EU Court of Justice, through its judgment of 30 April 2024 in case C-470/2021, stated that European Union law does not preclude national legislation authorizing the competent public authority, with the sole aim of identifying the person suspected of having committed a crime, to access data linked to civil identity corresponding to an IP address.
- Technologies like VPNs, private forums, and dark web markets obscure activity and identities, hampering investigations.
- Website takedowns are often ineffective against mirror sites and shifting domains. Critics argue concerns also exist around freedom of expression (Bridy & Ducharme, 2015).
- Focusing narrowly on individual infringers is ineffectual given scale; structural solutions around business models may be needed.
- Legal compartmentalization between patents, trademarks, copyrights creates enforcement gaps in the digital environment.

Strong encryption, anonymizing technologies, jurisdictional complexities, and limited resources all constrain IP protections online. Both law and technology need to evolve to address enforcement challenges.

Emerging technologies continue shaping adaptation needs in IP regimes:

- AI generative art and music pose authorship and ownership questions that current IP paradigms don't directly address. For example, it can be recalled that in 2024 the US Patent Office published guidelines that exclude AI as an inventor, exalting the central role of human creativity in the inventive process.
- 3D printing's decentralization enables widespread patent and copyright infringement of physical goods designs (Lipson & Kurman, 2013).
- DNA sequencing and synthetic biology's manipulation of lifeforms

have complex biotech patent impacts (Paradise et al., 2005).
- Big data analytics and machine learning implicate copyrights, database rights, and trade secrecy around proprietary datasets (Dinwoodie & Dreyfuss, 2019).
- IoT and embedded software expand avenues for infringing patented technologies. Interoperability and fair use safeguards may be warranted (Weber, 2010).

Ongoing legal uncertainty and legislative lags exist while courts and policymakers play catch up in addressing new technologies not envisioned when crafting current statutes. Proactive reforms will be needed.

Evaluate controversies surrounding file sharing, streaming, and downloading.

Unauthorized downloading and streaming implicate major controversies:

- Copyright holders argue piracy critically undermines creative sector revenue streams like music, film, books, and software (Higgins, 2007). Empirical research confirms negative impacts on media sales (Smith & Telang, 2016).
- Proponents counter that evidence on harms is mixed, and sharing may expand audiences and generate sales. Some artists directly enable sharing to gain exposure.
- Developing country access advocates view IP limits as knowledge barriers, necessitating flexibility (Chon, 2006). But compromising rights risks disincentivizing creation.
- Digital locks like DRM prevent copying but face consumer resistance. Platforms like iTunes show alternative models are viable (Jobs, 2007).

No consensus exists on piracy harms or optimal policies. Most experts agree some downloading for personal use should have exceptions, but commercial scale piracy unambiguously harms creative industries. Differential pricing and new platforms may curb infringing activity.

Various proposals aim to modernize IP for the internet era:

- Rethinking copyright terms and scope to appropriately protect digital works, such as using shorter terms for software and data (Ku et al., 2008).
- Establishing intermediary liability safe harbors to enable legitimate internet platforms while incentivizing anti-piracy efforts (Depoorter & Walker, 2015).
- Improving patent quality through expert examiners familiar with software prior art to prevent vague, invalid patents (Burk & Lemley, 2003).

- Enabling cross-licensing and patent pools around standards like Wi-Fi to prevent patent thickets hampering follow-on innovation (Baron & Gupta, 2018).
- Embedding machine readable copyright licenses and permissions directly into media files to ease online enforcement (Samuelson & Opsahl, 1999).
- Allowing circumvention of DRM for lawful personal uses, balanced against protections (Herkko et al., 2021).
- Incentivizing voluntary collective licensing and other innovative distribution models as alternatives to piracy (Handke et al., 2015).

Reasonable reforms aim to balance rights and access to further creativity in the digital environment. But recalibrating IP regimes remains complex given competing stakeholder incentives.

IP profoundly shapes innovation, creativity, and public welfare:

- Patents provide incentives for high-risk R&D investments that may not occur otherwise, but can also create monopolies hampering cumulative innovation (Moser, 2013).
- Copyright enables monetization of creative works through licensing while allowing fair uses like commentary and education. But excessive copyright may restrict follow-on works and access.
- Trademarks secure brand investments and prevent consumer confusion, but overly broad rights may also impede competition (Dogan & Lemley, 2004).
- Trade secrets recognize proprietary data rights but opaque protections advantage insiders and may inhibit idea flows.

Appropriately balancing exclusivity to incentivize creators against access, competition, and follow-on innovation defines effective IP policy. But optimal calibration remains challenging. Evidence-based reforms aimed at societal welfare improvements are needed.

IP regimes are evolving to address new technologies:

- AI algorithms and outputs may not clearly qualify for patents or copyright absent legal clarification of human versus machine authorship. Sui generis AI rights are proposed
- Biotech inventions like CRISPR gene editing pose patent eligibility and disclosure challenges given the unpredictable results of biological interventions.
- Big data and data mining output draw on myriad sources, raising questions about database copyrights and trade secrecy over aggregated data (Dinwoodie & Dreyfuss, 2019).
- Technical software interfaces may require patent pools and open

standards to enable interoperability and cumulative innovation (DeKorte, 2006).

Tailoring IP to emerging technologies balances incentivizing risky cutting-edge R&D with safeguarding follow-on innovation. Recent cases like Association for Molecular Pathology v. Myriad Genetics indicate progress adapting biotech patents. Further thoughtful evolution of IP is needed for new technologies.

Analyze IP issues for collaborative platforms, social media, user generated content.

Web 2.0 collaborative platforms also raise IP challenges:

- User generated content like YouTube videos often derive from copyrighted works, requiring clarification of remix rights and fair use defenses. Automated filtering poses risks.
- Social media IP concerns include trademark infringement through handles, ambush marketing in posts, and unauthorized sharing of copyrighted images. Notice and takedown procedures are commonly used.
- Wikis, open source projects and crowd-sourced initiatives involve IP contributions from many creators, necessitating licensing models that preserve openness while respecting rights (Katz, 2006).
- Aggregators like Google that display copyrighted snippets require frameworks balancing indexing access with licensing revenue for creators (Tushnet, 2014).

Adapting IP to enable emerging internet platforms remains crucial for both innovation and creative industries. More flexible rights balanced against user safe harbors may be warranted.

Best practices for legally capitalizing on IP in the knowledge economy include:

- Patenting core software features, algorithms and internet business methods to protect competitive advantages, while being wary of thickets (Bessen & Meurer, 2008).
- Registering trademarks for branding elements like domain names, apps, social media accounts, and slogans to establish national priority against infringers (Khoury, 2021).
- Licensing copyrighted digital content through platforms like iTunes that discourage piracy while providing flexible access models (Jobs, 2007).
- Using non-disclosure agreements and cybersecurity measures to protect proprietary data like customer profiles, source code, and technical documentation as trade secrets (Rowe, 2005).

- Considering defensive publications to prevent competitors from patenting related inventions in rapidly evolving fields like high tech and pharma (Johnson, 2018).
- Pursuing cross-licensing and patent pooling arrangements around technical standards and platforms to preserve access (Stryszowski, 2022).
- Exploring collective rights organizations and voluntary licensing schemes that provide simpler ways to license content while generating revenue streams (Handke et al., 2015).

Firms able to deftly navigate emerging areas of IP law while pursuing licensing opportunities and protecting intangible assets will have strategic advantages in knowledge-based industries.

4. *International agreements in the field of intellectual property*

There are several major international treaties and agreements that establish global frameworks for intellectual property (IP) rights and protections. The foundational treaties include the Paris Convention for the Protection of Industrial Property (1883) and Berne Convention for the Protection of Literary and Artistic Works (1886), which enabled international patent and copyright claims to be filed and mutually recognized between member states (May, 2007). However, these did not mandate substantive IP laws. The World Intellectual Property Organization (WIPO) administers both conventions as well as the Patent Cooperation Treaty (PCT, 1970) which facilitates international patent applications.

More recent and comprehensive international IP agreements are the World Trade Organization's (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS, 1994) and WIPO Copyright Treaty (WCT, 1996). TRIPS obligates all WTO members to meet minimum standards for IP protection encompassing copyrights, trademarks, geographical indications, industrial designs, patents, integrated circuit layout designs, and undisclosed information (Maskus, 2000). The WCT addressed technological advances by prohibiting circumventing digital rights management (DRM) and expanding copyright to computer programs (Reinbothe & von Lewinski, 2002). These treaties significantly strengthened and harmonized global IP laws, but remain controversial particularly for developing nations.

The Berne Convention for literary and artistic works was initiated

in 1886 to require member states to recognize copyrights established in other members, replacing cumbersome bilateral agreements (Ricketson & Ginsburg, 2006). It helped authors secure international protection. Originating in France, the Berne Convention reflected continental European concepts of strong authors' moral rights. It underwent revisions to expand protected works and rights. Berne established minimum copyright terms and prohibited formalities limiting rights. However, enforcement mechanisms were limited.

The 1994 TRIPS agreement emerged from the Uruguay Round of trade negotiations with the goal of reducing impediments to trade by strengthening IP protections (Sell, 2003). Lobbying by multinational corporations from IP-intensive industries like pharmaceuticals and software pushed for protecting investments against infringement in developing countries. While building on Berne, TRIPS went much further in mandating that all WTO members implement specific IP laws. It remains controversial for imposing western regimes on developing nations that often lack IP capacities. But supporters argue TRIPS spurs innovation globally by securing returns. The treaty reflects ongoing tensions between IP as a trade issue versus protecting public knowledge access.

Major IP protections mandated by international agreements include:

- *TRIPS* - Copyright terms of life plus 50 years; patent protection for products and processes for 20 years; compulsory licensing restrictions; integrated circuit protections (Maskus, 2000).
- *Berne Convention* - Automatic protection without formal registration; minimum copyright term of life plus 50 years; moral rights safeguards; fair use-style exceptions; national treatment principle (Ricketson & Ginsburg, 2006).
- *WCT* - Adapting Berne copyright for digital works; prohibiting DRM circumvention; equal treatment for software copyrights (Reinbothe & von Lewinski, 2002).
- *Paris Convention* - Equal treatment and priority for foreign patent applicants; protections for industrial designs, trademarks, trade names, and geographic indications (Bodenhausen, 1969).

They aim to provide minimum substantive standards globally for securing IP rights and prevent uncompensated use. TRIPS establishes enforcement mechanisms within the WTO's dispute settlement system. Critics argue greater policy flexibility is needed particularly for developing countries.

International IP agreements have generated significant controversy:

- *Impacts on access to knowledge* - TRIPS raising patent protection

reduced access to medicines for poor countries unable to afford costs (Chon, 2006). Compulsory licensing flexibility was added. Similar issues affect access to journal articles and educational materials.

- *Development concerns* - TRIPS imposed standards better suiting advanced economies with established IP frameworks, raising implementation costs for developing nations.
- *Policy sovereignty* - Binding external IP rules constrain domestic policy flexibility and reform, limiting adapting laws to local conditions (Sell, 2003).
- *Copyright scope* - Anti-circumvention provisions of the WCT reduce exercising copyright exceptions like fair use (Geist, 2005). This may hamper innovation.
- *Enforcement mechanisms* - WTO dispute settlement pressures compliance with TRIPS, reducing policy space for signatories (Kur & Grosse Ruse-Khan, 2009). Some view this as overreach.

While expanding IP rights globally spurs creation through secure returns, appropriate balances with public access and development needs remain vital. The treaties are still evolving.

Nations face challenges reconciling domestic IP laws with international treaty obligations:

- Conflicts of law may emerge between national statutes and treaty provisions, requiring resolution (Dinwoodie, 2007). Constitutional challenges can result.
- Significant legal and institutional reforms may be needed to comply, straining capacities of developing countries in particular.
- Balancing stakeholder interests - Local creators, consumers, and industries often hold diverse IP priorities, complicating unified international standards (Sell, 2003).
- Uniform application - Similar treaty language still allows implementation variations between countries due to legal interpretative differences (Kur, 2009).
- Technological change - New technologies and rights like software patents keep arising, requiring updating treaties or creative application to evolving circumstances (Samuelson, 1997).
- Enforcement discrepancies - Capacity gaps, especially for developing nations, lead to uneven enforcement, undermining standards (Dreyfuss & Frankel, 2014).

Regular treaty revisions, dispute settlement, capacity building assistance, policy dialogue, and coordination help reconcile national and international IP frameworks. But tensions persist given changing conditions.

Developing countries face particular IP issues:

- *Institutional capacity* - Many developing nations lack effective IP laws, patent offices, courts, and enforcement to implement international standards. This enables exploitation.
- *Policy autonomy* - External IP rules often poorly suit local conditions but allow little adaptation (Sell, 2003). Unique development needs exist.
- *Access to knowledge* - Strong IP raises prices for copyrighted learning materials and patented medicines, reducing access to knowledge goods (Chon, 2006).
- *Local innovation* - Traditional knowledge like folk remedies may require alternative protections not well recognized (Carpenter et al., 2009).
- *Technology transfer* - Strong IP may slow diffusion from advanced economies and participation in innovation (Maskus, 2000). Weaker rights can enable easier imitation and building capabilities.
- *Public interest* - IP-balanced copyright exceptions or patent exclusions for key needs may be warranted based on development levels.

TRIPS permits certain flexibilities like compulsory licensing that can help reconcile IP protections with development objectives. But navigating international agreements remains challenging for many developing states.

Key international organizations governing IP include:

- *WIPO* - UN specialized agency administering major IP treaties; provides development assistance and legal-technical support; protects indications of source and origin (Madiega, 2019).
- *WTO* - Oversees TRIPS as part of broader trade accords; handles disputes over TRIPS compliance through binding settlement system (Sell, 2003).
- *UNCTAD* - Research and policy analysis on IP's development impacts and flexibilities for developing nations (UNCTAD, 1975).
- *WHO* - Facilitates differential patent protections for pharmaceuticals between developing and developed countries (Velásquez, 2011).
- *UNESCO* - Promotes balancing copyright with enhancing access to information and education globally, especially in developing countries (UNESCO, 2021).

While WIPO and WTO provide core global IP governance, other bodies advocate for public interest considerations. Ongoing coordination is required to align IP with broader social objectives like access, innovation, and development. But organizations weighted towards IP producers still dominate (Sell, 2003).

International IP agreements have had varied consequences:

- *Innovation* - Stronger protections likely increased returns and incentives for innovation, but impacts remain empirically ambiguous (Park & Ginarte, 1997). Additional factors influence innovation.
- *Trade* - Increased IP rights may facilitate trade in knowledge goods between advanced economies but also widen knowledge gaps (Maskus, 2000).
- *Public welfare* - Effects on public access to knowledge are mixed, with increased costs but potentially more creativity (Chon, 2006). Distributional impacts favor producers over users.
- *Development* - IP-exporting nations have benefitted more than developing countries which face higher IP implementation costs. Impacts on growth are uncertain.
- *Harmonization* - International accords advanced substantive and procedural harmonization, but much heterogeneity remains between countries' IP regimes (Dinwoodie, 2007).

Overall assessments depend on weighting producer interests in securing returns versus user concerns about costs and access restrictions. But treaty impacts likely favor net IP exporters (developed nations) more than importers (most developing countries) (Dreyfuss & Frankel, 2014). More empirical assessment is needed.

Various reform proposals aim to rebalance international IP frameworks:

- *Differentiation* - Providing flexibility for developing countries to tailor IP laws to local needs, such as shorter terms or access-related exemptions.
- *Rights* - Incorporating protections for traditional knowledge and access rights more systematically into treaties (Carpenter et al., 2009).
- *Public interest* - Formalizing copyright exceptions, compulsory licensing provisions, and protections for educational fair use into agreements (Chon, 2006).
- *Scope* - Limiting patentability of software, business methods, and biotech substances to restrain negative impacts.
- *Enforcement* - Reducing IP enforcement pressures on developing nations until adequate implementation capacity exists (Sell, 2003).
- *Transparency* - Openly assessing economic impacts of extending or restricting IP protections in future treaty negotiations (Geist, 2005).
- *Safeguards* - Ensuring provisions that expand rights, like WCT's anti-circumvention rules, contain adequate balancing user protections.

Reasonable reforms seek to recalibrate one-size-fits all IP standards

into a more development-sensitive framework while still incentivizing innovation globally.

The global IP landscape continues evolving:

- Developing country influence is growing, as emerging economies focus more on knowledge goods exports and IP protections (Peng et al., 2017). But tensions with public access priorities persist.
- Multilateral coordination remains vital but faces challenges from fragmented national laws, special interests, and lack of consensus on appropriate rights (Geist, 2005).
- Technological changes, from software to biotech to AI, keep creating new objects that require IP protections and international coordination.
- Efforts to enhance enforcement through trade agreements and institutional capacity building help strengthen IP protections (Khoury, 2021). But critics argue more balance is needed.
- Moves to incorporate IP into broader bilateral and regional trade pacts signal enduring efforts to entrench standards (Sell, 2003). But countercalls seek change.

Fundamental divisions remain between IP exporters wanting strong protections and importers concerned about costs, access, and policy flexibility. But growing economic integration will likely sustain cooperation, albeit with ongoing struggles to achieve balances.

5. *Intellectual property, which scenarios?*

As a result of the discussion so far, it is necessary to outline the future scenarios of intellectual property. New technological trends bring to light issues concerning intellectual property. Indeed, in the era of digitalization, the question arises as to how the intellectual property system can adequately promote and protect technological progress.

Intellectual property (IP) plays a key role in innovation-driven economies by providing incentives and protections to spur investments in knowledge creation and technology development. IP rights like patents, trademarks, and copyrights enable companies to profit from intangible assets and new inventions through exclusivity and licensing models. This provides motivation for undertaking risky, expensive research and development projects that may not occur otherwise without the ability to recoup investments. There is a demonstrated correlation between strong IP protections and higher innovation rates across countries, as measured by

indicators like patent filings and productivity growth.

IP systems aim to address underinvestment problems in innovation by granting temporary monopolies over new creations to ensure adequate returns that incentivize continued investment. Absent such exclusivity, competitors could quickly copy new technologies and creative works, dissipating profits and disincentivizing risky R&D spending. However, excessive restrictions imposed by IP can also hamper follow-on innovation and cumulative progress. Therefore, achieving an optimal balance between providing incentives for pioneers and enabling access for subsequent innovators is crucial for maximizing innovation and economic advancement.

Tailored IP frameworks that appropriately reward trailblazing research and creative endeavors that require substantial investments, while also allowing competitors to build on existing knowledge, can foster a thriving innovation ecosystem. But determining the right calibration is challenging. Assessing empirical evidence across countries and industries with varying IP regimes can help inform policies that optimally balance incentives for pioneers against access for follow-on innovation. With balanced IP systems, companies can profit from knowledge-goods investments while competition still drives incremental advances.

Patents in particular provide powerful incentives for impactful innovation by conferring exclusive rights over novel inventions, allowing inventors to recoup the substantial investments required for undertaking pioneering R&D projects. For example, pharmaceutical patents enable drug companies to profit from their costly clinical trials and drug development programs by preventing generic competition during the 20-year patent term. This market exclusivity motivates costly, risky research that likely would not occur otherwise when returns are uncertain. Trademarks protect investments that companies make in establishing strong brands and reputation, providing recourse against copiers who would erode consumer trust and discourage brand development. Copyright law allows monetization and licensing of creative works like films, books, and software, enabling creators to profit from their expressive works despite the ease of copying in the digital age. Each form of IP fundamentally aims to prevent free-riding and solve investment underprovision problems by excluding imitators who could diminish innovation returns and incentives for knowledge-goods producers. However, there are risks of crafting IP rights that are excessively broad or rigid, which could hamper follow-on innovation and cumulative progress. Therefore, balance and proportionate

protections are crucial. But properly tailored patents, trademarks and copyrights play an essential role in funding creativity and invention in market economies.

Savvy companies use varied strategies to legally leverage IP rights for strategic advantage against competitors: Building strong patent portfolios in core technological areas allows firms to erect competitive barriers, generate licensing revenues by externalizing inventions they do not directly commercialize, and gain leverage in cross-licensing negotiations. Firms can also purchase patents from external inventors to integrate into their products and services. Copyrighted works like software can be dual licensed for both open source community usage and commercial proprietary development, while still maintaining key source code as a protected trade secret. Registering trademarks for brand names, slogans, distinctive packaging, and other visual elements helps establish corporate identity in the minds of consumers, providing legal recourse against copycats who try to create confusingly similar markings and erode brand integrity. Robust use of non-disclosure agreements, cybersecurity technologies, and internal access controls helps preserve the confidentiality of proprietary data like manufacturing techniques, customer profiles, and source code as protected trade secrets. Other proactive IP strategies include pursuing defensive publications to preempt competitors from patenting related inventions in rapidly evolving fields like pharmaceuticals and high technology. Firms that adeptly leverage IP rights tailored to their specific business environment and strengths can gain lasting competitive advantages over rivals. However, IP strategies require careful cost-benefit analysis regarding risks like litigation exposure, disclosure tradeoffs, and potential negative impacts on cumulative innovation that could occur from monopoly protections that are overly broad.

While patents, trademarks and copyrights establish formal legal rights through registration, trade secrets depend on firms proactively taking reasonable measures to preserve confidentiality. This leads to unique challenges in protecting proprietary data as secret information, including:

The lack of formal registration makes trade secret boundaries ambiguous. Unlike registered IP rights, firms must prove they took reasonable secrecy precautions in any litigation to enforce trade secrets, raising evidentiary burdens. Excessive constraints on employees to maintain secrecy can hamper collaboration, but inadequate safeguards also endanger proprietary data. Reverse engineering and employee mobility enable legally divulging secrets, necessitating contractual protections like non-competes.

However, such constraints also limit cumulative innovation. Accelerating cyberespionage by state-backed and criminal hackers has made trade secrets increasingly vulnerable, requiring investments in data security and monitoring of underground dark web markets where secrets often appear. Big data algorithms utilizing aggregated public and proprietary information sources create uncertainties around legal rights to data sets and analytical output. Requirements to disclose confidential data during regulatory review processes like pharmaceutical trials necessitate balancing trade secrecy against transparency imperatives for sound policymaking.

Firms must thoughtfully balance the internal openness required for effective collaboration against rigorous controls needed to protect proprietary knowledge assets. Robust cybersecurity programs, non-compete agreements, due diligence in partnerships, and employee compliance training help prudently safeguard valuable trade secrets while allowing operating latitude. Ongoing monitoring for new threats is crucial.

Leading practices for effectively managing IP portfolios and transferring technologies include:

Regularly conducting IP audits and cataloging intangible assets to identify hidden risks and opportunities within patent, trademark and copyright holdings. Securing new inventions and creative works through patenting, trademark registration and asserting copyright early to properly establish legal protections and prevent public disclosure issues that would forfeit rights. Developing clear IP licensing policies and external partnership programs helps monetize innovations that are not directly commercialized by the originating firm itself, while also generating supplemental income. Exploring creative licensing models around technical standards, like patent pooling arrangements, can help solve problems of patent thickets inhibiting follow-on innovation. Pursuing strategic alliances, joint ventures, mergers and acquisitions enables integrating complementary IP assets from other companies and research partners. Institutionalizing respect for IP through worker training and internal policies and manuals helps prevent inadvertent knowledge leakage that undermines trade secret rights. Monitoring competitive patenting and publication activity for early signs of IP conflicts or infringement risks. Identifying partnership and licensing opportunities for transfer based on technology strengths of external parties.

Sophisticated IP management tailored to a firm's specific innovation-based business model and strengths allows strategically cultivating lasting competitive advantages while responsibly exercising temporary monopoly

rights. Developing technology transfer and commercialization pathways also help maximize return on R&D investments.

While IP systems aim to incentivize innovation by preventing free-riding imitation, policy levers exist for balancing protections against access to knowledge:

Copyright reform proposals argue for truncating terms for commercially valuable works versus original artistic expressions, given that financial incentives are less necessary to motivate commercial endeavors. Requiring copyright registration procedures, rather than automatic rights, would facilitate enlarging the public domain of creative works over time. Fair use exemptions in copyright law permit unauthorized reproduction for research, commentary, educational purposes and other uses deemed socially beneficial, expanding access. Patent law contains flexibilities like compulsory licensing provisions that allow public interest access to patented inventions like pharmaceuticals, through negotiated royalties, while preserving innovator incentives. In this sense, can been mentioned case *Eli Lilly and Company v. Medtronic, Inc* (1990) in which US Supreme Court was asked whether activities that as a rule constitute a patent infringement are instead allowed if used to provide the public administration with useful information to market a medical device. Government use rights enable public sector non-commercial usage of patents without licenses during emergencies or other critical circumstances. Similarly, research exemptions facilitate experimental use of patented technologies to boost scientific progress. Carefully limiting patentable subject matter to exclude basic scientific knowledge, abstract ideas, and natural substances helps preserve open access and limits over-privatization. Open licensing schemes like Creative Commons expand content reuse and remix opportunities while still respecting author attribution interests.

Such balanced policies aim to maintain adequate incentives for innovators and creators while ensuring reasonable downstream access for follow-on innovation and public interest needs. But determining precisely where to draw limits in IP systems to optimize knowledge production and access remains challenging.

Current patent reform proposals aim to improve quality and better align the system with its constitutional purpose to promote science and useful arts:

Tightening patentability standards and improving prior art examination rigor would enhance validity and prevent the opaque "patent trolls" that have emerged particularly around software and business methods. Opposition

proceedings allowing third parties to efficiently challenge issued patents would cost-effectively weed out bad patents compared to litigation after issuance. Reforming venue rules and liability structures would reduce excessive litigation that has arisen recently and neutralize forum shopping. Facilitating collaborative licensing models around standards, such as patent pooling arrangements, can prevent monopolistic patent "thickets" where overlapping rights and holdouts hamper cumulative innovation. Reducing injunctive relief in favor of compensatory royalty rewards, especially for minor features, would enable competition and follow-on advances. Tighter constraints on patentable subject matter eligibility in fields like software and biotech would limit overbroad patents that hinder progress.

Sensible reforms to improve patent quality, reduce unnecessary litigation, and appropriately tailor protections seek to make the system better promote cumulative innovation. But achieving meaningful consensus on optimal reforms remains challenging given competing incentives between varied patent stakeholders across industries.

IP profoundly shapes opportunities for entrepreneurship and small businesses in both positive and negative ways:

While patents enable small innovators to capture returns from their inventions by blocking imitation, the fixed costs of patent prosecution can deter startups with limited resources. Maintaining trade secrecy may better suit some innovative startups focused on iterative improvements. Registered trademarks help fledgling firms establish brand identity and reputation, though some limitations exist to prevent customer confusion with senior marks. Copyright arises automatically to protect creative works like software, but limited terms constrain monetization periods for small entities. Weak enforcement capacity hampers small firms' ability to defend IP rights against large competitors. But overreaching IP restrictions also impede competition, market entry and cumulative innovation by less resourced startups.

Overall, calibrating IP protections to balance incentives against disclosure tradeoffs and competitive barriers is crucial for dynamic entrepreneurship ecosystems and growth. Both excesses and inadequacies in IP systems create hurdles for small, innovative firms compared to incumbents. Tailoring regimes to specific industry needs can help promote innovation.

IP poses unique strategic challenges for publicly-funded academic and non-profit research institutions:

Patents on federally-funded university discoveries must balance

generating licensing revenue to sustain technology transfer offices against preserving norms of open science and broad access to foundational discoveries. Overuse of confidentiality agreements and trade secrecy controls seems contradictory to academic missions based on publishing and open dissemination. Broad faculty copyright assertions over research publications and course materials also conflict with ideals of unfettered knowledge circulation. Asserting trademark rights over university names, symbols and mascots raises debates regarding commercialization of education. An overemphasis on maximizing licensing income from a narrow subset of commercially-viable inventions may deprive society of broader welfare gains from unfettered idea diffusion.

Therefore, crafting policies that treat upstream, pre-competitive research discoveries differently from applied downstream inventions helps align social missions and financial sustainability for public research enterprises. Reserving patents for nearer-term commercial applications while publishing more basic advances sustains open science while still enabling revenue streams. Differentiating IP strategies based on proximity to societal impact is crucial.

Various guidelines enable creatively leveraging IP while remaining ethical and socially responsible:

- Respecting others' IP rights through licensing content and technologies rather than infringing.
- Avoiding overly broad patents and copyrights that unjustifiably restrict follow-on innovation.
- Considering flexible licensing models to enhance access where affordability barriers exist.
- Conducting and disseminating research transparently to earn trust underlying trade secrets.
- Securing informed consent for collecting personal data and respecting privacy.
- Adhering to clear authorship and attribution standards when publishing or commercializing collaborative work.

Firms able to align profit goals with broader norms of fairness and proportionality when capitalizing on temporary monopoly rights can sustainably leverage IP while generating private and public value. But balancing financial incentives against social impacts involves ongoing judgment. Legal incentives should be reinforced by ethical mores valuing cumulative innovation.

Conclusions for Chapter 1

Intellectual property systems play a crucial role in promoting innovation, creativity, and economic prosperity by providing incentives for undertaking risky investments in knowledge creation and technology development. However, crafting optimal IP regimes involves complex trade-offs between rewarding innovators and creators to incentivize further progress, while also ensuring reasonable access to knowledge that enables follow-on innovation and fulfills public interest needs. Nuanced IP frameworks aim to balance these competing goals.

Fundamentally, patents, trademarks, copyrights and trade secrets establish time-limited property rights over intangible assets and inventions, enabling rightsholders to profit from their works through exclusivity and licensing. These protections solve underinvestment problems caused by free-riding imitation that would dissipate incentives for costly knowledge-goods production. Patents confer monopolies over novel inventions to allow recouping R&D outlays, motivating future research spending. Copyright law grants creators exclusive rights over expressive works, enabling licensing revenue despite the ease of digital copying. Trademarks secure brand investments against confusion and imitation. Trade secrets recognize propriety interests in confidential data.

Each IP right provides incentives that spur innovation and creativity. However, excessive restrictions can also hamper cumulative progress and follow-on innovation by limiting access to knowledge. Overly broad patents may preempt future advances, while lengthy copyrights limit public domain access. Therefore, balance is essential. But appropriately structured IP protection fundamentally underpins knowledge-based economies. Firms able to strategically leverage tailored IP portfolios attuned to their industries gain lasting competitive advantages.

Digitization has profoundly impacted IP by enabling rapid copying and distribution that strains traditional protections. Software's dual patent and copyright eligibility caused confusion until specialized rights emerged. The internet's decentralized architecture created unprecedented enforcement challenges against piracy. However, digital technologies also present new IP monetization opportunities and licensing models if balanced against user rights. Online copyright, trademark, and patent disputes continue growing as IP law adapts to the digital environment (Caso & Giovannella, 2015). Emerging technologies like artificial intelligence, synthetic biology, and 3D printing pose further IP challenges still being resolved through legislation and caselaw.

International IP agreements have strengthened and harmonized standards globally, reflecting increased integration, but remain controversial regarding impacts on innovation incentives versus access to knowledge. TRIPS obligated WTO members to implement minimum IP protections, representing a landmark victory for IP-exporting nations like the U.S., but it has been critiqued for restricting policy flexibility, especially by developing countries. The Berne and Paris Conventions enabled reciprocal international copyright and patent protections among member states. WIPO, WTO, and other bodies administer this complex global IP governance regime. Ongoing international coordination balances expanding rights with safeguarding public interests.

IP profoundly affects entrepreneurship, technology transfer, and cumulative innovation. Strong patent rights incentivize risky technology research but may also create thickets hampering follow-on advances if overreaching. Copyright and trade secrecy facilitate appropriating returns from creative works and data while enabling licensing revenue, but excessive controls restrict access and competition. Sui generis protections are evolving for emerging technologies like AI creations that do not fit current IP paradigms. Universities and public research institutions grapple with conflicting objectives around maximizing licensing revenue from publicly-funded discoveries while preserving open dissemination norms.

Thoughtful policy reforms aim to tailor IP systems to current realities by improving quality, considering differentiated protections and exceptions based on technology needs, updating enforcement procedures, and enhancing access pathways. However, consensus on optimal reforms remains elusive given competing stakeholder incentives. IP frameworks continue evolving across nations to balance returns that incentivize creators against broader knowledge diffusion. Firms able to adeptly navigate IP's complexities can sustain innovation-based advantages. But prudent IP strategies also require avoiding overreach that unduly restricts competitors and public access. IP regimes incentivize innovation and creativity but must be periodically recalibrated to keep pace with technological and social change.

In summary, intellectual property plays a foundational yet complex role in the knowledge economy. IP systems have strengthened significantly, both nationally and globally, reflecting the increasing value of intangible information goods. However, thoughtfully balancing incentives for pioneers against public access and follow-on innovation remains challenging. Adapting IP for the digital age while extending protections to emerging technologies continues. With prudent reforms, IP can continue promoting

innovation and creative flourishing while avoiding monopolistic abuses. IP provides a cornerstone for prosperous technology and creative sectors, but requires nuanced evolution to best serve societal needs. Ongoing evidence-based assessment and balanced policymaking will be crucial for optimizing IP regimes.

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CHAPTER II

COPYRIGHT IN THE DIGITAL ENVIRONMENT

Summary: 1. Objects and subjects of copyright – 2. Free use of works on the Internet – 3. Copyright protection on the Internet – 4. Collective copyright management in the online environment – 5. Copyright for computer programs and databases – Conclusions for Chapter II – References.

1. *Objects and subjects of copyrigh*

Copyright is a legal framework that grants creators of original literary, artistic, musical, and other creative works certain exclusive rights for a limited time period. The creator or copyright holder retains economic rights allowing them to derive financial benefit from their work through reproduction, distribution, public display or performance, and creation of derivative works. Copyright law aims to balance incentives for creativity against public interest in accessing knowledge and culture (Lessig, 2004).

The categories of works protected under copyright are broad and evolving. They encompass traditional works such as books, poems, plays, lyrics, paintings, photographs, films or architectural designs as well as newer ones like software codes, databases, fashion designs, and digital creations. The Copyright Act in the United States offers protection to "original works of authorship fixed in any tangible medium of expression" (Copyright Act, 1976). International copyright frameworks from the Berne Convention (1886) to the TRIPS Agreement (1995) outline protections for literary, artistic, dramatic and musical works. Additional protected subject matter varies across jurisdictions.

Ideas, facts, processes, methods, concepts themselves are not protected by copyright as such: it occurs an original expression describing or embodying them. Useful items showing an intrinsic utilitarian function rather than creative expression may only receive limited copyright protection for separable artistic elements. Published and unpublished works enjoy protection once fixed in a tangible form. Registration and notice are generally not required but do provide advantages like establishing *prima facie* validity. The scope of protectable subject matter remains flexible and continues expanding into new mediums.

Original works which are protected by copyright are the literary ones,

as novels, poems, short stories, textbooks or reference books; dramatic literary works like plays, screenplays or scripts; nonliterary written works as lectures, sermons or speeches; artistic works, which include photographs, paintings, drawings, sculptures, crafts, architectural works and technical drawings; and musical works ranging from song lyrics and compositions to operas and musical accompaniment.

Originality is considered an indispensable component of copyright law, even if no international treaty provides an explanation of its meaning nor an indication of the minimum level it has to reach to the rise of copyright (Margoni, 2016). The originality requirement for copyright means works must exhibit a minimal degree of creativity in selection, coordination or arrangement of elements rather than just industry skill or labor. For literary works, creativity may manifest in plot, theme, setting, sequencing, or character development. Artistic originality often lies in composition, lighting, perspective, framing choices. Musical creativity involves rhythm, harmony, melody, structure.

Copyright protection does not extend to titles, names, short phrases, slogans, or works lacking sufficient originality. Mere reproductions of public domain works also receive limited rights not extending to the underlying work.

Computer software including source code, object code, interfaces, structure, sequence, organization, algorithms, programming language, and documentation can be protected by copyright as literary works (Copyright Act, 1976). This covers operating systems, applications, firmware, code libraries, scripts, modules, plugins, templates, and toolkits. Nonliteral elements like class hierarchies, architecture, interfaces, look-and-feel remain protected even when code is rewritten (Whelan v. Jaslow, 1986).

Software copyrights protect the expressive elements like logic, structure, interfaces, not the underlying processes, computing methods intrinsically useful. Interoperability concerns have led to interface copying exceptions for reverse engineering purposes. Reimplementing the same interfaces and APIs in new code can still infringe. Code without substantial originality in structure or organization may lack adequate creativity for protection. Short code snippets risk losing protection under the merger doctrine.

Original databases containing compilations of data, facts or information also enjoy copyright protection stemming from selection, coordination and arrangement of contents. The raw data itself is not protected, only the structure and organization are (Feist v. Rural, 1991). *Sui generis* database rights also protect sweat-of-the-brow database investment.

Copyright provides certain exclusive rights to the creator or rights holder, subject to limitations like fair use and fair dealing. Core rights include reproduction, distribution, public performance, public display, and derivative work creation. This allows the rights holder to control copying, sharing, selling, licensing, transmitting, exhibiting, presenting, adapting, translating their work. Making a work available online implicates distribution and display rights. Performance rights apply to literary, musical, dramatic, audiovisual works. Architectural work rights prevent unauthorized construction from protected plans.

Rights holders enjoy broader moral rights and related rights in certain jurisdictions. These include attribution, integrity, disclosure, withdrawal, resale royalty rights (Berne Convention, 1979). Protections vary based on national law. Rights holders may authorize others to exercise their rights through licensing agreements. Copyrights are transferable and assignable via contracts, bequests, corporate transfers, though moral rights remain with the creator. Collective rights management helps administer public licensing and royalty collection.

Core economic rights allow authors to commercialize their works across media and markets. Distribution and reproduction rights control access and copying. Display and performance rights cover exhibitions and presentations. Adaptation rights govern created derivative works as translations or movie or TV adaptions. These rights allow their holder an exclusive use while they are balanced with some limits like fair use or compulsory licensing.

The author or creator of a work is the original copyright holder. When the contribution of each author is not distinct from that of the other(s), jointly created works entail joint ownership. Otherwise, if the authors can distinguish their roles in the creation of a work they are individually considered author of the part they made, e.g. in case the music and the lyrics of a song are written by two different people. In the US, it is true in so far as the contribution of each author is not interdependent, thus this example could not work under US law which considers the song as a single musical work (Ginsburg, 2018). Employers own rights in works made by employees within the scope of their employment. Differently, commissioned works belong to the artist, and not to the commissioner, unless it is contractually specified and settled. Acquiring a copy or the original of a creation in any case transfer the copyright too, but their owners are entitled to transfer ownership or grant licenses through written agreements.

Work-for-hire status has posed issues for freelancers, independent contractors, artists consigning works (American Society of Media Photographers v. Mattel, 2016). Some jurisdictions now provide protection against unremunerated transfer of rights. Trademark rights may remain with creator regardless of copyright transfer. Companies increasingly use assignments to gain full rights from creators. Digital collaborations with user contributions stir ownership debates. Open content licenses preserve key rights for public use.

Transfers and exclusive licenses must be in writing and signed. Nonexclusive licenses can be oral or implied from the owner's behavior. Licenses are limited to granted rights and may impose conditions like attribution. Transferring copyright ownership requires conveying the entire bundle of rights.

Digital technologies enable rapid repeating creation processes as is not easily feasible when realizing traditional static works protected under copyright frameworks. Constant software updates, crowd-sourced wikis, social platforms with ephemeral content, aggregated news feeds pose questions. When are incremental contributions substantial enough for new rights? Who owns rights in AI co-creations where human input is limited? How to track inputs across collaborative digital works?

Open source and Creative Commons licensing form new creator-user compacts well suited to digital works (Creative Commons, 2001). Share-alike provisions propagate open permissions downstream. But licenses may be hard to enforce globally online. Blockchain-based smart contracts and immutable ledger records help to establish provenance and transfers. But non-fungible tokens make high velocity resales opaque. Global streamlined registry systems could assist. Data rights should enable value sharing while limiting Information monopolies. More nimble copyright principles are needed for digital works in progress.

The boundaries and fixity of traditional copyrightable works do not map neatly to fluid, iterative digital creations. Version control systems and platform terms try delineating rights in incremental additions but uncertainties abound. Implied licenses facilitate reuse of some collectively authored content like open source software. But customized adaptations and commercialization require clear permissions. Blockchain attribution registries have promise to incentivize shared digital authorship. More adaptable protections are needed for living works undergoing constant changes.

AI systems creating original works stir debates about legal rights and

protections. Machine learning techniques apply neural nets trained on vast data corpora to generate novel outputs. But copyright law centers on human creators. AI currently lacks legal personhood to claim rights. Training data rights remain with sources. Companies deploying AI may claim ownership as works made for hire. But this discourages data sharing needed to advance AI. Shared data pools with royalty flows back to sources are proposed.

Nowadays, it is possible to distinguish different types of AI-produced works, depending on the degree of human intake in their creation, especially: AI-assisted works, meaning that artificial intelligence is only used to facilitate, improve or refine a work originating from a human intellectual effort. The work as well as the related copyright is granted to the human author who has made free and creative choices during the creation; and AI-generated works, in which human intervention is actually missing as limited to the pre-production stage (e.g. writing the source code or selecting the objectives that AI will reach by itself), thus conducting to an intense debate worldwide on if and how to grant copyright (Iaia, 2022).

Wikis, social networks, crowdsourced initiatives involve collaborative digital authorship. Individual contributor rights versus platform owners' rights require better definition (Grimmelmann, 2009). Implied licenses should prevent misappropriation of co-created content. Blockchain attribution registries promise to log inputs for incentive allocation (Raval, 2016). But business models based on voluntary user data sharing remain untested. More frameworks recognizing collective rights in collaborative works are needed for equitable incentives.

AI authorship poses an open question as machines gain creative capabilities. Some argue AI creations should enter the public domain freely while others propose vesting rights in the training data creators. Practical difficulties arise in assigning percentages of rights across multiple data sources. Shared data pools allowing broad access with revenues flowing back to sources offers one potential solution. For collaborative works, clarifying individual versus platform rights and using blockchain to log micro-contributions could indeed enable a fairer value distribution. More fluid copyright frameworks will be needed for increasingly autonomous digital authorship.

National laws prescribe copyright terms lasting author's life plus, usually, at least 50 years. In the US, corporate works get 95 years from publication or 120 years from creation (Copyright Act, 1976). Policy seeks to balance incentives for creation against public access. Works enter the

public domain when these terms expire, enabling their unrestricted use. But multiple term extensions have delayed public availability, as happened through the Copyright Term Extension Act of 1998. Only works from early 20th century are already in the US public domain. Orphan works with indeterminate rights status also face barriers to public use (U.S. Copyright Office, 2015).

Digital technologies warrant rethinking copyright terms. Locking away vast 20th century cultural outputs for decades poorly serves digital access and remixing (Boyle, 2008). Registered works could incentivize shorter renewable terms over long defaults. Thus, differential terms for commercial versus noncommercial uses are proposed (Lessig, 2004). Greater emphasis on supporting vibrant public domains is desirable in the digital age. Legal deposit of works could also aid preservation and access (Korn, 2009). Policymakers should reassess term optimality in light of digital impacts on creative reuse.

Critics argue that lengthy copyright terms derived from print-era conditions are excessive in the digital context. The marginal incentives for creating new works decline while the costs of locking up old works rise. Renewal requirements could filter out low-value works from automatic protection. Differential terms for commercial uses are also proposed to maintain incentives while opening noncommercial access. Legal deposit mandates would aid digital preservation and access. Shorter, flexible terms better balance incentives, access, and support cumulative creativity in the information age.

Items with intrinsic utilitarian function generally enjoy thinner copyright protections. Useful articles like garments, gear, appliances, vehicles embody industrial design, though separable creative adornments may qualify. Protecting industrial products mainly serves patent law goals. But design piracy concerns have led to some copyright protection advances. Vessel hulls now enjoy 10 years protection against molding from drawings (Vessel Hull Design Protection Act, 1998). Fashion design bills perennially arise seeking protection against knockoffs (Innovative Design Protection Act, 2012).

Critics argue copyright overreach into utility patents territory will bottleneck incremental innovation (Raustiala & Sprigman, 2012). *Sui generis* frameworks better balance incentives and access. The EU grants unregistered 3-year design rights against copying (Council Regulation 6/2002, 2001). But fashion trends often fade very quickly, so longer terms mainly protect elite luxury brands. More non-protectionist support for

emerging designers would be a great boost for their work. Overall, restraint is required in granting copyrights for primarily functional articles to avoid undermining competitive access.

Even if copyright only protects original expression and not mere ideas, some functional designs like clothing also enjoy protection for separable creative elements. Critics argue extending copyrights too deeply into industrial design stifles competition and cumulative improvements. *Sui generis* regimes better balance incentives and access. EU design rights protect aesthetic elements of useful articles against imitation. But fashion's quick cycles limit benefits of long terms. Restraint is prudent in granting copyrights on primarily functional items to maintain competitive access.

Rapid digitization compels rethinking traditional copyright foundations. Calls for overhauling statues arise alongside piecemeal expansion efforts (Litman, 2001). Creating unified digital copyright frameworks globally remains challenging given varying national laws and WIPO treaties harmonize international baseline rights only partially (WIPO Copyright Treaty, 1996). But demands grow for a next-generation copyright regime.

Some authors propose compulsory licensing models following patent law to ease licensing for digital uses (Fisher, 2004); while others urge limiting protections for non-expressive works like databases (Reichman & Samuelson, 1997). Implied license doctrines require clarification amid murky norms for internet sharing (Elkin-Koren, 2016). Further unifying protection terms across jurisdictions would aid digital works flowing across borders (Ricketson & Ginsburg, 2006). Weighing enhanced rights against preclusive effects on follow-on innovators is critical. Copyrightable subject matter warrants careful evolution to incentivize creativity in the digital age while promoting cumulative innovation.

The creation and the dissemination of digital works is straining traditional copyright paradigms. Calls to overhaul statutes vie with expansionary pressures. Global harmonization remains challenging with disparate national laws. Compulsory licensing and thinner protections for non-expressive works are proposed to ease licensing burdens. Clarifying implied license norms would aid internet reuse. More unified terms at the international level could support global digital distributions. Balancing rights against preclusive effects and follow-on creativity is critical when updating copyrightable subject matter.

2. *Free use of works on the Internet*

The doctrines of fair use and fair dealing allow limited use of copyrighted works without permission for purposes like criticism, commentary, news reporting, teaching, scholarship or research. Fair use originated in the US while fair dealing is used in the Commonwealth countries (Copyright Act, 1976; Copyright, Designs and Patents Act, 1988). These two doctrines aim to balance copyright protections against free expression and information access interests. Fair use is flexible, evaluating some peculiar factors in a case-by-case analysis; while fair dealing relies on specific statutory exemptions like quotation.

Fair use and fair dealing exempt certain reproduction of copyrighted content from infringement, functioning as affirmative defenses to claims (Lessig, 2004). Fair use is an equitable rule of reason standard in the US, assessing four factors: 1) purpose and character of use; 2) nature of work; 3) amount and substantiality used; and 4) market effect. Fair dealing is more circumscribed, delineating specific purposes like news reporting, criticism, and research (Copyright Act, 1976; Copyright, Designs and Patents Act, 1988). Fair use offers a wider scope for interpretation based on the context and equities. Both aim to uphold copyright's purpose while allowing latitude for public interest uses.

The fair use and fair dealing limits on copyright exclusivity serve vital free speech purposes like news reporting, commentary, scholarship, and parody (Aufderheide & Jaszi, 2018). Without these carve outs, copyright could stifle some discourses and impede scientific research. But the flexible nature of fair use in particular provides little *ex ante* certainty compared to enumerated fair dealing exemptions. Striking an optimal balance remains challenging, but some minimum space for unlicensed referential uses is widely agreed as critical for maintaining free expression.

Using copyrighted material for the above-mentioned purposes may qualify as fair use, especially if the recontextualized use is able to transform the original purpose and character of the work (Copyright Act, 1976; Mattel v. Walking Mountain, 2004). Limited quotations within commentary or criticisms fall under fair use, provided that the substance is not reproduced. Similarly, news reporting may utilize limited portions for informational purposes.

Parodies leverage the familiarity of a known work to humorously comment on something else, enjoying fair use protection even though derivatives normally require permission (Campbell v. Acuff-Rose,

1994). Academic quotation for scholarship, education, or research is more justified than commercial uses (Authors Guild v. Google, 2015). Appropriate attribution is recommended when reproducing copyrighted content to acknowledge the original creator. But excessive quoting or reuse that undermines a work's market can still result in infringement.

Fair use allows reproduction of limited portions for public interest purposes without permission (Aufderheide & Jaszi, 2018). Commentary, news, criticism and scholarship rely on some ability to refer to the original works they analyze or report on. Parodies uniquely recontextualize known works for humor. While permissions are always safer, the law permits some unlicensed borrowing for vital public discourse, subject to context-specific assessments of fairness.

Fair use and fair dealing face new questions when applied to activities like indexing web pages, linking online content, reposting social media excerpts, aggregating news snippets or embedding copyrighted media in blogs. Courts have found search engine crawling and caching of websites to be fair use supporting the core functionality of indexing the web (Field v. Google, 2006). Linking to lawful content generally raises no copyright issues.

Social media reposting of images or videos can be protected as fair use if sufficiently transformed with new commentary (Stephanie Lenz v. Universal, 2015). While the Internet produce easy sharing, fair use relies on case-specific analysis.

Web search indexing, linking to lawful sites, and social commentary with shared media receive fair use backing, while news aggregation, extensive music/video streams and verbatim copying do not as such.

Fair use is context-specific, but guidelines help to steer lawful practices online (Aufderheide & Jaszi, 2018). Limiting reproductions to appropriate portions for the intended use and adding transformative commentary or repurposing aid fair use claims. Proper attribution and linking to originals acknowledge the source rather than replacing it. Avoiding advertising around republished excerpts distances fair uses from commercial exploitation. Legal review helps assess risks for closer calls.

Relying on fair use involves some uncertainty but thoughtful practices can bolster claims: utilize only reasonable excerpt lengths, link to originals, add value through commentary, properly attribute source materials, avoid usurping commercial distribution channels. Fair use operates on an equitable sliding scale. The strongest cases involve transformative uses incorporating limited original content for entirely new purposes like

parody or analytic scholarship.

Fair use is not infinitely elastic. Commercial usages exceeding bare necessity have least fair claim, as do uses directly competing with or undercutting the original. Reasonable snippet lengths vary: a longer musical excerpt likely requires more justification than a single paragraph of text. But even extensive uses may be sustained where highly transformative. Thoughtful fair use practices thus both respect authorship and carve out latitude for public commentary.

Widespread online file-sharing, downloading, and streaming have disrupted entertainment industry business models built around copyright exclusivities over reproducing, adapting, and publicly performing creative works (Lessig, 2004; Sterk, 1996). Personal copying exceptions face questions of scale as digital networks globally distribute unauthorized copies. Industries argue piracy has significantly damaged revenues while advocates assert enforcement overreaches, chilling lawful speech (Siwek, 2007; Patry, 2009).

In the US, limits on liability for Internet service providers protect platforms for user activities (Digital Millennium Copyright Act, 1998). But illegal sites get blocked for copyright infringement through court orders or voluntary initiatives. The statute sets some requirements to a host service provider's qualification to be exempted from liability, as follows: it must not have awareness of the breach nor of the facts or circumstances from which it originates; moreover, when the host can control the users' activities, it must not receive any financial benefit directly attributable to the infringement itself. In any case, once the host has knowledge of the violation, it must act expeditiously to solve it. Digital rights management (DRM) also seeks to control use of downloaded media. Consumers often bypass DRM, provoking legal battles around circumvention technologies. Calls persist for innovative business models adapting to digital dissemination realities. Ongoing uncertainties between enabling technologies and infringing uses continue despite enforcement efforts.

Unauthorized online distribution undoubtedly disrupts traditional content monetization while arguably expanding audience reach (Smith & Telang, 2012). But speech should not face prior restraint absent clear illegality. Technical barriers also risk fair use chill. There are no perfect solutions, but moderation remains wise. More flexible consumer offerings and appropriate personal use carve-outs can complement measured enforcement against egregious piracy.

Digital technologies that complicate conventional copyright law

frameworks have prompted calls for reform, but consensus remains elusive (Litman, 2001). Proposals range from strengthening rights against circumvention to mandating technical protection measures, while others advocate expanding fair use latitude or compulsory licensing systems (Fisher, 2004). Global harmonization of disparate national rights and exceptions also poses challenges.

Some authors argue limited private copying exemptions should be universally upheld as vital free speech protections separate from mass piracy. Others instead contest expansive defaults given the global reach of digital transmissions. But compromises like graduated response systems balancing user due process with escalating sanctions struggle to satisfy stakeholders (Yu, 2010). Rapid evolution continues outpacing legislative fixes.

Realigning copyright to the digital era provokes competing visions. Entrenched interests understandably resist disruptive changes undermining successful models. But rigid regimes risk to stifle emerging opportunities. Technical controls require balance against fair use hazards. More flexible tiered rights could sustain incentives while enabling innovations. Consensus depends on bridging gaps between established creatives, emerging intermediaries, and the public interest.

Applying analog-era copyright doctrines to rapidly changing digital technologies raises difficult challenges (Aufderheide & Jaszi, 2018). Fair use evolved to judiciously limit rights in special cases, not function as a broad sharing privilege. But social norms around digital copying often assume greater freedoms. Defining infringement also grows complex as remix culture proliferates. Rights management systems gaining granular control further constrain incidental uses like format shifting.

Automated copyright enforcement algorithms on platforms struggle to replicate nuanced fair use judgments, frequently over removing lawful uses in the name of safety (Urban et al., 2017). Various reform proposals aim to strengthen fair use in digital contexts, from emphasizing transformative uses to designating personal copying zones exempt from infringement. However, easy digital dissemination gives pause toward overbroad exemptions outside purely personal spheres. Calibrating appropriate freedoms and controls remains an ongoing challenge.

Fair use is a judicial standard requiring case-by-case balancing of equities, not an unfettered license for digital free-for-alls. But neither should lawful expression be collateral damage in automated anti-piracy sweeps. Contextual flexibility has become harder to reconcile with

pervasive technologies enabling mass propagation. Thoughtful oversight and review can counteract overzealous automations policing incidental uses. Well-crafted legislation also has a role clarifying zones of acceptable personal and educational fair uses.

Digital networks have enabled exponential growth in online sharing of content, both lawful and not. The effects on creative markets remain harshly debated. Industries assert piracy undermines revenues and investments in producing new works (Siwek, 2007). But evidence on impacts is mixed, complicated by shifting consumer preferences toward streaming services. Wider dissemination does not directly equate to lost sales, but may erode licensing value. Disaggregating positive and negative impacts of broader distribution presents empirical challenges.

For most individual acts of infringement, effects are likely minimal. Unauthorized personal enjoyment rarely equates to substituting purchases. Aggregate impacts grow more concerning. Yet pricing, delivery mechanisms, and inherent public goods aspects of digital works also shape markets (Smith & Telang, 2012). Adopting restrictive policies in hopes of restoring pre-internet conditions appears futile. But neither can creators sustain vital output without reasonable recompense. Navigating change equitably remains an ongoing balance.

Copyright holders utilize various approaches to legally distribute content online by licensing streaming services, authorizing downloads, or directly monetizing works through advertisements and subscriptions. Strategies include windowing releases across formats, bundling offerings, and negotiating variable licensing terms to maximize revenues. Enforcing exclusivity against unlicensed access complements legal distribution models. Critics argue fragmented services, release delays, restrictive DRM negatively impact consumer experience relative to infringing sources.

Succeeding in digital markets requires adapting to transformed realities. Early DRM schemes overreached, frustrating paying users (Gopal et al., 2006). Gradually, more convenient offerings emerged at reasonable prices. Spotify's subscription model succeeded by aggregating expansive catalogs. Video streaming followed suit, although exclusivity battles persist. Leveraging viral social promotion can boost legal distribution. Persisting frustration around fragmented availability in turn spurs piracy. User experience remains vital. More unified access to digital content through convenient, reasonably priced multi-platform services continues having promise to effectively counter infringement.

Widespread unauthorized use of copyrighted works online raises

ethical questions. Downloaders often rationalize infringement as victimless or forced by lack of legal access. But legality and ethics do not perfectly overlap. Creating vital cultural works and knowledge resources requires support. Circumventing payments for personal enjoyment contravenes creators' rights, even if undetected. However, sharing small unincorporated snippets for commentary is broadly accepted as within reasonable fair use bounds, subject to context.

Ethical obligations should temper absolutist views of enforceable copyrights, just as legal rights temper unbridled sharing norms. Nuanced perspectives recognize many unauthorized uses fall into a gray zone, neither wholly right nor wrong. However, structured creative sectors cannot thrive if professional creators cannot reap reasonable benefits from their work. Sustainable ecosystems ultimately rely on cooperation and trust more than adversarial posturing. Sincere efforts at equitable content licensing and reasonable use exemptions offer a mutually beneficial path.

3. *Copyright protection on the Internet*

Copyright holders use various technical and legal strategies to protect works distributed online and enforce rights against unauthorized usage. Technical protection measures include digital rights management (DRM) systems that control access to and usage of digital content through encryption, watermarking, limited installations, and platform restrictions (Bechtold, 2016). Legal protections involve website terms of use, clickwrap user agreements, and computer intrusion laws. Rights holders also pursue direct action against infringing sites and services via lawsuits, cease-and-desist demands, and referral to Internet intermediaries.

Rights holders increasingly rely on code-based protections reinforced by anti-circumvention laws to control usage of digital works (Digital Millennium Copyright Act, 1998). DRM limits copying, transferability, usage time windows, and integrates paywalls for monetization. Watermarking embeds owner ID for tracking leaks. Terms of use backed by computer intrusion laws also give recourse against prohibited access. When self-help measures fail, copyright holders demand removal and blockade infringing sites through various channels.

Digital rights management (DRM) technologies allow copyright holders significant control over access to and usage of digital works

through encryption, watermarking, limited installations, and ties to proprietary platforms or devices. Common forms of DRM include product keys, limited transfers across authorized devices, copy prevention, print restrictions, closing analog loopholes like screenshotting, and integration with subscription access systems.

DRM provides strong protections but faces consumer resistance for restricting fair uses and impeding portability. For example, the Digital Millennium Copyright Act prohibits DRM circumvention even for legal purposes. Movement toward platform-agnostic formats with less invasive tracking like digital watermarking continues. But shifting availability models like cloud gaming could enable more granular conditional access controls. DRM thus affords rights holders capabilities akin to controlling physical goods, presenting policy tensions around fair use.

Copyright holders deploy website terms of use, clickwrap user agreements, and computer intrusion laws to buttress rights online. Terms of use establish allowed usage when accessing content, reinforced by laws penalizing unauthorized computer access (Computer Fraud and Abuse Act, 1986). Clickwrap agreements require consent to terms as a precondition for access. These self-help measures allow rights holders to delineate permissions and prohibit specific activities.

The legal enforceability of browse wrap or clickwrap terms remains contextual. Simply posting terms without required assent is weaker. But evidence of usage after prominent notice may bolster validity. Contract principles like unconscionability also constrain overreach. At minimum, terms provide notification of rights. But ambiguity around implied assent could benefit from further legislation to add clarity for online agreements. Overall effectiveness depends on courts upholding reasonable notification-based contracts limited to access terms.

Copyright holders have various legal and administrative options to enforce rights against online infringement. Direct lawsuits target major violators like illegal streaming and download platforms. Content removals and account termination procedures enacted through platforms' repeat infringer policies offer efficient enforcement (Digital Millennium Copyright Act, 1998). Search engine delistings starve sites of discoverability. Payment processors and ad networks can also cut financial lifelines. Court injunctions authorize blocking entire websites. Voluntary industry initiatives provide additional avenues to suppress infringing activity.

Lawsuits impose heavy damages but only reach larger actors. Matching the ubiquity of online infringement requires leveraging Internet

intermediaries (Bridy, 2011). Strong notice-and-takedown regimes expedite content removals, although counter-notice appeals protect lawful uses. Advertising restrictions and payment blockades supplement direct enforcement means. Domain name suspensions, IP address blocking, and search engine delistings also deter infringing sites. But all mechanisms require balancing effectiveness against speech concerns and procedural fairness.

Enforcing copyright online confronts difficulties identifying and locating responsible parties across global networks. Infringing content and sites frequently conceal or falsify identifiers and geography using proxies, encryption, domain hopping or darknets. Proving individual acts of direct infringement through IP addresses rarely succeeds given multiple attribution possibilities. Linking sites to culpable operators involves guesswork absent subpoenas and forensics. Jurisdiction poses added complexities when alleged infringers and computer infrastructure span nations.

Notice-and-takedown processes depend on properly identifying offending material, often challenging at scale (Urban et al., 2017). Website owner identities also obscure through WHOIS privacy services and lax domain registrar validation. Obscuring tactics like IP masking and peer-to-peer distribution create further technical obstacles. Infringement discovery thus relies heavily on cross-referencing clues through search, social media, payment and ad affiliates. But gaps remain between what violations are discoverable and provable.

Numerous measures seek to streamline enforcement and expand remedies against pervasive online copyright infringement, though implications for lawful uses require weighing. Expanding intermediary liability could accelerate take-downs but risks over-removal of legal material. Stronger repeat infringer policies provide incentives, but may undermine appeal rights. Standardizing notice-and-takedown formalities including submitter verification could improve accuracy. Blacklisting ingredients like bank and ad chokepoints build leverage but allow little recourse.

Greater cooperation from intermediaries enables more efficient enforcement, but risks over-enforcement without transparency and accountability safeguards (Gervais, 2012). Certified trusted notifier programs promise more targeted referral, provided certifying organizations have adequate oversight. Domain seizures impact law-abiding users. Graduated response regimes automatically escalating penalties against

alleged infringers remain controversial. Overall, balancing effectiveness, speech protections, and due process present continued challenges.

Internet intermediaries like social platforms, search engines, and web hosts are well positioned to cooperate on copyright enforcement given their content control capabilities. Hosting and sharing platforms use notice-and-takedown processes per the Digital Millennium Copyright Act's safe harbors, balancing efficiency and lawful use protections (Digital Millennium Copyright Act, 1998). Search engines voluntarily demote infringing sites amid PR pressures. Other intermediaries restrict advertising and payment services for identified pirates.

Intermediaries have resisted liability expansion over concerns about undue burdens policing user content and risks to legal material (Gantchev, 2013). Some accommodate trusted submitter programs and proactive anti-piracy filtering to accelerate enforcement, although transparency and appeal mechanisms remain debated. Continuing issues around properly scoped obligations, procedural fairness protections, and consistency across intermediaries persist, but also pressure for greater cooperation continues to grow.

Injunctions and administrative orders to restrict access to entire websites deemed pervasively infringing have prompted speech concerns, although courts increasingly issue such remedies. Over-blocking lawful content, difficulties correcting errors, and lack of transparency around blacklists present critics' objections. On the other hand, site operators evading laws through domain-hopping provoke demands for stronger measures against systematic piracy enabling flagrant infringers.

Critics assert website blocking establishes overbroad censorship infrastructure without due process. But judicial oversight and exemption processes provide procedural safeguards. Counter-arguments contend site blocking simply enforces court judgments targeting business models fundamentally sustaining on infringement, analogous to shutting down unlawful brick-and-mortar enterprises. However, collateral constraints on lawful speech merit careful weighing. Narrowly tailored, procedurally transparent injunctions offer the best path balancing piracy concerns against open Internet principles.

Pursuing online copyright enforcement through methods like automated content filtering, domain blocking, and intermediary liability expansion risks unintended consequences for legal activities. Legally ambiguous uses in the fair use grey zone face high risks of over-removal when platforms apply stringent automatic protections. Access barriers

impact lawful material on infringing sites. Financial blockades also lack nuance. Without careful precautions in enforcement mechanisms, even well-intentioned efforts generate chilling effects on legitimate uses.

Over-removal of disputed material remains a widely observed phenomenon stemming from platforms' incentives to avoid any legal risk (Urban et al., 2017). Financial blockades have frozen accounts of lawful content creators like remix artists. Domain blocking fails to discriminate within sites' contents. Fair use relies on context-specific analysis difficult to automate. Efforts to streamline enforcement through ratcheting intermediary obligations, proactive filtering, and automated remedies thus engender risks to lawful expression. Protecting legitimate uses requires transparent processes and correcting over-blocking errors.

Consider balanced approaches that protect copyrights and Internet freedoms.

Reconciling copyright protections against rampant digital infringement with retaining latitude for lawful uses like fair use, open source ecosystems, commentary, and parody presents persistent policy challenges in the online environment. But through careful balancing of remedies, procedural safeguards, and carve outs, enforcement regimes can achieve reasonable effectiveness without unduly compromising speech freedoms and the open Internet.

Balanced approaches entail nuanced remedies targeting only clearly infringing activity, transparent processes allowing appeals and corrections, exempting lawful uses like commentary from automated filtering, ensuring blocking mechanisms restrict only infringement-focused sites, limiting collateral financial effects on legal content, and mandating accommodations for fair use in digital rights management. Infringement detection and enforcement may progress but never perfection. Protecting legal uses should take priority over marginally greater enforcement reach. With careful precautions and oversight, copyright protections need not come at the expense of Internet freedoms.

4. *Collective copyright management in the online environment*

Collective rights management organizations, generally known as collecting societies, play a vital role in the administration of copyright licensing and royalty collection for categories of works and rights holders.

Key functions include negotiating licensing rates and terms for certain uses, granting licenses to access works, monitoring usage, and distributing royalties to authors (Gervais, 2012). They provide a centralized administration when individual rights management is unfeasible. Represented sectors include music performance, literary publishing, visual arts, broadcasting, and more.

By aggregating repertoires and collectively negotiating licenses, collecting societies are able to reduce fragmented rights and high transaction costs that would deter mass usage (Handke & Towse, 2007). Indeed, the force of collecting societies stands in their ability to solve the problem faced by individual rights holders on dealing with many categories of costs, such as negotiating with users, collecting payments or managing an infringement. The most convenient solution consists in spreading these costs over a wide variety of creative works (Sean Morris, 2009). Broadcasters or digital music services can efficiently clear rights to large catalogs rather than individual works and creators. Distribution based on monitoring and statistical sampling further eases administration burdens. Collectives thus facilitate licensing efficiency for necessary access to copyrighted cultural works.

The rise of networked digital distribution for copyrighted content has surfaced tensions with traditional collective rights management models optimized for localized offline usage monitoring. The global reach of online platforms complicates determining applicable rights, rates, and distributions (Gervais, 2012). Granular monitoring methods enabled by digital technology have also fueled pressure for more precise usage-based royalty allocation opposed to statistical estimates (Handke et al., 2020). New technical solutions aim to modernize collecting societies amid these challenges.

The licensing across different jurisdictions with diverse rules disrupts national collection society frameworks. Online services balk at multiplicative licensing burdens when expanding reach. Usage monitoring also grows more individualized, enabling precision but also requiring large infrastructure investments. Collectives face pressure to democratize governance, enhance transparency, and accelerate digitization. Conflicts between territoriality and global digital markets continue driving collective management evolution.

Advances in online registries, database architecture, blockchain transactions, and machine learning algorithms offer collecting societies opportunities to modernize rights information management. More interconnected global registries aim to consolidate identifying information and rights holder representation (Rasmussen, 2012). Structured databases

centralize records from the most disparate sources. Blockchain-based smart contracts enable automated instant usage licensing. Pattern recognition techniques facilitate tracking works and collecting matching royalties.

Distributed ledger solutions like blockchain allow real-time automated rights transactions with immutable payment records through smart contracts, streamlining cumbersome reporting and distribution processes. Enhanced multilateral data sharing and automated reconciliation can also strengthen usage monitoring. However, privacy and standardization challenges remain. Overall, new technologies expedite burdensome administration historically limiting collecting society efficiency.

Leveraging digital monitoring capabilities to precisely track online work usage and allocate shares of revenues poses implementation hurdles for collecting societies. Massive infrastructure investments required for high granularity tracking, especially across jurisdictions, constrain feasible precision. Privacy regulations may restrict certain monitoring methods. Statistically derived distribution retains advantages for cases where piecemeal usage tracking provides limited incremental value.

Usage monitoring through platform self-reporting, web crawlers, fingerprinting and watermarking remain imperfect (Handke et al., 2020). While technology now enables hypothetically micro-level individual use data, processing and connecting this meaningfully to payment flows poses massive logistical, engineering, and cost challenges at societal scales. Some degree of aggregated estimation thus likely remains pragmatic. Tradeoffs around precision versus feasibility persist.

Calls to facilitate collective rights administration in the digital environment include comprehensive central licensing hubs, mandated extended licenses, and policies improving cross-border coordination. Reconfiguring collecting societies as comprehensive one-stop content licensing clearinghouses aims to simplify fragmented digital rights. It seems clearer considering the general economic functioning of collective societies: the mass use of copyright works involves a huge number of distinct licensing transactions between right holders and users (Riis, 2011). Some propose extending mandates globally, so all works receive collective management by default. Improving international rights data interoperability is also advocated.

One-stop licensing hubs face dilemmas balancing comprehensiveness with local repertoires (Rasmussen, 2012). Default extended mandates help address unmatched works, but constrain rights holder choice. Enabling international rights information exchange through interconnected registries and identifiers shows promise, provided privacy safeguards

(Devault et al., 2016). Overall, more consolidated licensing processes hold appeal to resolve territorial fragmentation, but require balancing stakeholder interests.

Statutory compulsory licenses for internet broadcasting absent individual negotiations demonstrate the complexities adapting collective administration frameworks online. Set rates and terms streamline licensing but frustrate platforms or rights holders feeling shortchanged in centralized rate-setting proceedings. Eligibility limits also spark access debates around smaller users. Similar compulsory licensing efforts have achieved mixed success balancing efficiency and perceived fairness.

Supporters argue statutory webcasting rates provide needed licensing certainty, while critics decry rigid constraints on direct deals. Eligibility limits intended to ease burdens on incidental users spur calls to accommodate diverse participation models. But compromises like graduated royalties growing with scale struggle to satisfy all interests. Mandatory collective administration offline enshrines important access guarantees, but translating paradigms online remains challenging.

The predominance of national and territorial collecting societies presents hurdles for effective online licensing as works and uses increasingly cross borders. Usage monitoring, rights management, distribution rules, and governance structures vary across societies, hindering efficient interoperability (Rosenblatt et al., 2002). While societies cooperate through reciprocal agreements, friction remains. Calls to unify frameworks confront domestic sensitivities. Deep cooperation is widely seen as an eventual necessity but it is not easy to put into practice.

Enabling seamless worldwide rights administration online will require reconciling disparate national collecting society technical infrastructures, rights information repositories, distribution rules, and business priorities (Gervais, 2012). Regional collaboration models like GESAC in Europe demonstrate gradual progress but global interoperability remains years away at best, hampered by legacy differences. However, the convenience imperative of digital markets exerts steady pressure for integration.

The emergence of blockchain-based systems presents opportunities to streamline collecting society administration from rights information management to usage licensing and royalty distribution through decentralized, transparent and automated frameworks. Smart contracts can encode policies and directly execute micro-transactions in response to usage events, reducing reliance on intermediary clearance and cumbersome reporting. Immutable usage records also strengthen transparency.

However, blockchain adoption faces standardization, privacy, and scalability hurdles. Governing decentralized platforms also poses challenges. Rights representation contests may arise on differing ledgers. But the promise of seamless global rights usage tracking and compensation continues attracting exploration (Leger, 2017). At minimum, blockchain-inspired reforms like unified identifiers, interoperable data pools, and automated contract execution offer collectives paths to modernize operations.

Collective rights management is gradually shifting beyond national structures toward multi-territorial models responsive to digital media flows (Gervais, 2018). This entails societies coordinating on regional or global licenses that bundle national rights into unified offerings. Societies are also expanding into managing broader rights beyond domestic repertoires through extended collective licenses that bundle in unrepresented works. These trends aim to improve online licensing efficiency.

Voluntary initiatives like e.g. the Santiago Agreement, that covered webcasting, streaming, online music on demand and music included in video transmitted online, demonstrate progress enabling multinational Latin American licenses, aided by common languages (Garnett, 2011). The Unified Patent Court of the EU also aspires to consolidate EU-wide patent adjudication. But larger-scale integration stirs concerns about local voice and cultural diversity. Extended licenses similarly raise questions about opt-out ability. More streamlined collective management appears crucial for the digital environment but balances remain.

Reconciling equitable creator compensation through collective management with affordably facilitating mass digital access poses an ongoing challenge, but balanced solutions exist (Towse, 2017). Reasonable licensing terms and rates should sustain viable creative sectors without unduly curtailing usage. Distributions could share surpluses when broader access generates growth. Some voluntary "digital first" licenses enable frictionless usage subject to later payment. Sampling-based royalties reasonably approximate individual shares.

Purely individualized copyright is likely infeasible at digital scale, but neither can collective administration constrain online distribution through unmanageable burdens (Akester, 2009). Hybrid approaches may reallocate some revenue pools to better serve emerging classes like user creators. Creative Commons and other customizable licenses also empower differential permissions. Pursuing good faith compromises and technical innovation promises to progressively align stakeholder interests.

5. *Copyright for computer programs and databases*

Computer software receives copyright protection as a literary work under the laws of many countries. This covers source code, object code, interfaces, structure, organization, algorithms, documentation, and nonliteral elements like architecture. Software copyrights arise automatically upon fixation in a tangible medium and do not require registration.

Software copyrights emerged through case law recognizing original creative expression manifest in code's structural design, interfaces, visual elements (Computer Associates v. Altai, 1992). Legal protection covers literal code and nonliteral abstractions like architecture. Copyright attaches upon fixation without formalities. Registration affords advantages like *prima facie* validity and statutory damages eligibility. But concepts, ideas, and utilitarian processes driving software operation remain unprotected (Oracle v. Google, 2018).

Establishing copyright ownership of software poses challenges in customized and open source contexts lacking definitive authorship. Bespoke business software is often deemed "made for hire", vesting rights in the commissioning entity by default. Open source projects with distributed contributor pools create uncertainties around rights holders for reuse. Licenses like GPL aim to perpetuate open access, but contributors may retain rights. Unraveling ownership can prove difficult when authorship is fragmented across versions.

Work for hire doctrine is commonly asserted to vest bespoke software rights in the hiring client company absent written agreement otherwise. Contributor licensing agreements that assign rights are now prevalent in open source projects, but past works may lack clear chain of title. Implied licenses preserve open availability despite gaps. Anonymity and pseudonymity also obscure contributor identities. Shared authorship complicates enforcing rights when ownership shares remain undefined.

The boundaries of copyright protection as applied to software "application programming interfaces" (APIs), protocols, file formats, and functional interfaces remain contested. Substantial similarity in expressing interface specifications can establish infringement, but *scènes à faire* merger limits protection of elements standard to interoperability. Clean room reverse engineering to access unprotected ideas may avoid liability. But precise demarcation of protected expression versus unprotected functionality persists as a challenge.

Technical interoperability demands some reuse of interface

specifications, enabled through merger and fair use defenses (Oracle v. Google, 2018). However, wholesale duplication still incurs infringement, especially absent independent creation. Factors like extent of copying, alternatives available, and commercialization impacts bear on fair use. But line drawing where functionality necessitates common elements remains imperfect. Striking the right balance between incentivizing innovation and enabling competition continues posing dilemmas.

Reverse engineering and decompiling software can constitute copyright infringement, but it may qualify as fair use when done for the sole interoperability analysis and confined to functional elements required for that purpose. Clean room reimplementation avoids copying actual code. Statutory exemptions also permit circumventing technical protections preventing program analysis. But reproduction of creative expressive elements lacking an interoperability justification fails to qualify for fair use or exemptions.

Fair use defenses for reverse engineering hinge on demonstrating necessity to access functional unprotected aspects, not expressive components (Sega v. Accolade, 1992). Similarly requires a specific interoperability purpose. Statutory exemptions permit circumvention for good faith security testing, encryption research, and non-infringing uses. But clean room methods remain advisable to avoid copying protected expression. Permissible extraction is narrowly confined to functional needs.

Databases receive copyright protection for their selection and arrangement of information, but not underlying data. In the EU, the Database Directive additionally establishes *sui generis* protection for database contents against extraction and reuse without authorization, regardless of copyright eligibility. This aims to protect investment in compiling valuable data. But the extra layer of rights lacks analogy in most other jurisdictions, posing implementation issues.

EU database rights exceed copyright's limited protection for original selection and arrangement, directly covering data contents (EU Database Directive, 1996). But this extra exclusivity generated controversy for restricting public access and downstream use of factual information. Few countries have followed suit enacting equivalent regimes, though calls for enhanced database protection arise periodically, generating ongoing debate about appropriate scope.

Companies often try preventing largescale data scraping and unauthorized utilization of proprietary data feeds through legal threats invoking hacking laws, copyright, and terms of use. But factual data remains

uncopyrightable *per se*, and websites provide implied access licenses for indexing. Contract and unfair competition principles may support better claims against misappropriation, absent fabrication. Concerns around blocking data access and competition animate ongoing debates.

Web scraping cases highlight unsettled legal boundaries, as facts have no copyright but their compilation may (hiQ v. LinkedIn, 2019). Contract, trespass, and CFAA claims also frequently arise but with mixed success. Creative data visualizations and architectures may garner protection but raw data cannot. Some argue thin protection spurs investment in valuable aggregations. But blocking downstream use of public data also raises competition concerns. Clarifying standards balanced against overprotection remains challenging.

Sui generis legal regimes specifically protecting database contents, as implemented in Europe but few other regions, aim to address perceived gaps securing investment against misappropriation. But they remain controversial for cordoning off factual information from free flow absent analog equivalents in patent or trade secrecy law. Alternative frameworks like misappropriation torts, unfair competition law, or registration models continue garnering some support as offering balanced protection.

Statutory property rights in collections of data could spur valuable aggregation activities, similar to copyright securing compilation effort (Reichman & Samuelson, 1997). However, carving out perpetual monopolies sourced from publicly accessible materials clashes with deep-seated IP premises. Hybrid regulation blending competition law, customization, and time-bound protections merits exploration for safeguarding investment sans overreach. But satisfactory data protection frameworks remain elusive.

Debates around proprietary claims over data ownership and control carry significant implications for future innovation trajectories and access equities. Arguments favoring strong exclusivity emphasize incentivizing costly aggregation activities. But critics warn data monopolies could slow advances dependent on communal pools of knowledge, as it happens in sectors like healthcare. Policy balances rest between providing limited protections to secure investment and maintaining data access and competition.

Data property regimes seek to encourage socially valuable aggregation by securing exclusivity, but risk sealing off access to knowledge goods unlike tangible resources. However, completely open data removes commercial incentives. Contextual policy levers like time limits and use carve outs aim

to balance interests. Antitrust oversight of data monopolies may also check domination. But tensions between proprietary control and access facilitate fruitful exploration of hybrid approaches.

Software and database copyright case law continues evolving to define boundaries, consistent with gradual statutory expansion in these domains. Earlier cases took a restrictive view focused on literal code. But the abstraction-filtration-comparison test emerging in the 1990s assessed a broader range of expressive elements like structure and interfaces. Courts also increasingly weigh interoperability needs in fair use analysis. Overall trends show expanded software copyright scope but with important limits against over-propertization.

Early software copyright precedent stressed literal code (Whelan v. Jaslow, 1986). The abstraction-filtration test enabled wider nonliteral protection but constrained by merger doctrine (Gates Rubber v. Bando Chemical, 1993). Consideration of competitive needs refined fair use analysis (Sega v. Accolade, 1992). Database cases largely just extended existing compilation protections (Feist v. Rural, 1991). But *sui generis* regimes created new data rights (EU Database Directive, 1996). Overall, balanced evolution aims to incentivize innovation without undermining access and competition enabled through limited copying.

Software and database legal protection involves inherent tradeoffs between incentivizing concentrated investment and preserving diversified follow-on uses, particularly regarding rapidly accumulating digital data stores. But balanced frameworks can reasonably secure returns on aggregation efforts while preventing monopolistic bottlenecks. Hybrid regimes blending exclusive rights, fair use leeway, independent creation protections, and pro-competition oversight provide potential pathways.

Well-crafted rights should fund valuable compilations without choke-holding downstream applications, especially regarding otherwise non-proprietary data (Reichman & Samuelson, 1997). Moderately time-bound data rights present one compromise. Competition policy also has roles restraining excessive consolidation. Interfaces must remain sufficiently open for interoperability. Copyright and contract law can selectively protect creative commercial implementations built atop open access. Balance remains imperative for continued data-driven innovation.

Conclusions for Chapter II

This chapter has explored several key issues and developments related to copyright in the digital age across the dimensions of protected subject matter, limitations and exceptions, enforcement, collective management, and specialized software and database regimes.

Regarding the objects and the subjects of copyright protection, it is worth noting how rapid technological changes pose new complexities in determining rights over fluid collaborative productions and AI outputs, necessitating more adaptive frameworks for incentivizing creativity beyond traditional static works. Trends toward expanding protectable subject matter also warrant prudent evaluation balancing incentives against follow-on innovation and public access.

Examining free use doctrines highlights the need for recalibrating limitations like fair use and fair dealing to maintain breathing room for socially beneficial applications in the digital context, where technical controls and platforms' risk aversion increasingly override contextual balancing. But this must be weighed against cheap unauthorized mass dissemination disrupting creative sector economics.

Most digital copyright disputes reduce to disagreements over enforcement, where proponents of strong measures to combat pervasive infringement online contend with advocates warning against chilling lawful speech and existing flexibilities that erred too far towards content control. Pursuing technological and collaborative graduated solutions offers promise for pragmatic improvement without compromises to foundational rights.

The advent of digital markets dependent on licensing vast catalogs on a global scale also shines light on the inefficiencies of fragmented national collecting society frameworks historically evolved for local contexts, driving considerations around multinational integration, blockchain automation, and extended mandates to improve accessibility of collectively managed works online.

Finally, specialized software and database protections demonstrate policy struggles to incentivize commercial digital knowledge aggregation while preventing restrictive monopolization of building block data inputs essential for cumulative innovation. Hybrid regimes allowing measured data rights while reinforcing open access through competition oversight point towards balancing frameworks for the data-driven economy.

Overall, these themes across multiple facets of copyright in the

information age reveal common undercurrents of legal systems straining to adapt to digital disruptions of long-codified constructs, markets, and distribution channels. Rather than unrealistically attempting to enforce pre-internet rights and controls, pragmatic evolution calls for seeking updated alignments between proprietary incentives, authorized access, technology-enabled freedoms, and the public interest in flourishing creative ecosystems. How law, technology, markets, and norms interact to determine answers to digital copyright's open questions promises to remain an evolving story intertwined with Internet's growth.

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CHAPTER III

PATENT LAW AND DIGITAL TECHNOLOGIES

1. *Patenting digital inventions*

Patenting software, business methods implemented via software, and other digital technologies raises complex issues regarding subject matter eligibility and disclosure requirements (Bessen & Meurer, 2008). Key considerations include evolving case law on patentable subject matter, challenges with adequately disclosing and claiming digital inventions, impacts on innovation, and reform proposals.

U.S. case law has shifted on whether software and business methods constitute patentable subject matter under 35 U.S.C. 101. While early cases like Gottschalk v. Benson (1972) rejected software patents, later decisions like Diamond v. Diehr (1981) opened the door by finding a manufacturing control process patentable despite relying on an algorithm. This expansive approach culminated in the State Street Bank (1998) decision validating a business method patent, stating that anything producing a "useful, concrete and tangible result" is patentable (Guadamuz Gonzalez, 2017). However, recent Supreme Court decisions including Alice Corp. v. CLS Bank (2014) have raised the bar for patent eligibility of abstract ideas implemented on generic computer components. The Alice decision established a two-part test requiring digital inventions to involve an inventive concept beyond just applying an abstract idea on a computer (Shue & Lynch, 2019). The U.S. Patent Office and courts continue to refine standards on patent eligibility for digital technologies.

Even if the TRIPS Agreement does not exclude the patentability of software and the recent developments relating to some national systems (United States and Japan), admit the patentability of software, in Europe, according to the art. 52 of the European Patent Convention, only software of a technical nature is patentable.

A key challenge with software and business method patents is providing

adequate disclosure of the invention. Merely describing functionality without the supporting algorithms and code risks invalidating patents for lack of enablement (Bessen & Meurer, 2008). But submitting source code poses trade secret risks. Applicants must strategically draft software patent claims to capture inventive aspects without revealing confidential details. Means-plus-function claiming allows reciting software modules configured to achieve specific functions. The patent system is adapting to enable protecting digital inventions within information disclosure constraints.

Software patents remain controversial, with conflicting views on impacts on innovation (Guglielmetti, 1997). Proponents argue patents provide incentives for software R&D investments and technology transfer (Hall & MacGarvie, 2006). However, critics suggest software patents just increase litigation costs without effectively protecting complex cumulative innovations (Bessen & Meurer, 2008). Empirical research finds mixed evidence, with software patents associated with greater R&D in some contexts but also linked to litigation holdup risks (Hall & MacGarvie, 2006; Shue & Lynch, 2019). More study is needed on balancing benefits and costs.

Debates continue on policy reforms regarding software patent eligibility, claim drafting, damages calculations, and other issues (Guadamuz Gonzalez, 2017). Proposed changes aim to improve patent quality, enable cumulative innovation, reduce troll litigation, and better balance stakeholder rights. But consensus remains elusive given divergent interests of software firms, patent assertion entities, and other players. Careful evidentiary analysis and nuanced reforms are required to promote digital innovation within the patent system.

Online patent databases and analytical tools empower new techniques for patent searching, analysis, and strategic IP management (Trippe, 2015). Key resources include global databases from major patent offices as well as value-added commercial platforms with enhanced search, analysis, and visualization capabilities (Abbas et al., 2014). Expert searching skills remain essential given limitations of purely computational approaches. But emerging big data methods and machine learning can help overcome prior challenges in assessing patent landscapes.

Major patent offices like the USPTO, EPO, WIPO, and JPO provide online public patent databases with flexible searching and downloading capabilities to support both basic and sophisticated queries (Abbas et al., 2014). However, commercial patent data products from sources like Clarivate, Questel, and Lens offer advantages like multilingual coverage,

family linkages, citation data, and analytics features (Trippe, 2015). Paid platforms provide API access and bulk data services to enable large-scale patent informatics research.

Beyond keyword searching, strategies like patent classification, citation analysis, semantic/concept searching, and other advanced techniques help identify relevant patent documents and assess relationships (Abbas et al., 2014; Park et al., 2013). Mapping and visualization tools from providers like Thomson Innovation and PatentSight can illuminate technology landscapes and competitive positions based on patent data (Park et al., 2013). Emerging machine learning approaches also show promise in improving recall and discovery (Abbas et al., 2014). But human expertise remains key for framing effective questions and interpreting patent informatics outputs.

Patent data and analytics support applications like competitor IP monitoring, R&D planning, technology valuation, and more (Park et al., 2013). However, patent indicators have limitations and require cautious interpretation. Not all valuable inventions are patented, nor do all patents represent commercialized technologies. Integrating insights from patent analytics with other technical and business data is advised (Trippe, 2015). Thoughtful patent data strategies can yield strategic advantages, but analytics is a supplement rather than substitute for sound IP management.

Litigation and licensing disputes involving standards essential patents (SEPs) present complex challenges at the intersection of patent and antitrust law (Contreras, 2018; Lemley & Simcoe, 2021). Courts and policymakers worldwide continue developing frameworks to balance intellectual property rights with commitments to license SEPs on fair, reasonable, and non-discriminatory (FRAND) terms. Key unresolved issues include determining FRAND royalty rates, availability of injunctions on FRAND-encumbered patents, role of antitrust law, and impacts on technology adoption (Contreras, 2018; Lemley & Simcoe, 2021). It should be considered that the debate on FRAND licenses has been ongoing for a long time, but today there is a lack of harmonized principles on how FRAND licenses are calculated. This system involves numerous disputes and the aid provided by the courts, such as that relating to the Court of Justice of the European Union in the ZTE/Huawei case (2015), to define a unified framework of FRAND licenses is insufficient (Meli, 2021).

Determining fair licensing terms for SEPs involves contested methodologies like comparable licenses analysis, royalty stacking assessments, proportionality to patent value, and analyzing component

versus end-product royalties (Contreras, 2018; Layne-Farrar et al., 2019). Courts seek case-specific solutions given complexities around patent strength, industry licensing norms, and aggregation risks. But inconsistent determinations create uncertainty (Lemley & Simcoe, 2021). Some reform proposals advocate arbitration-based frameworks to improve predictability (Layne-Farrar et al., 2019). However transparency and due process concerns persist around binding dispute resolution.

Injunctions blocking infringing products incorporating SEPs raise antitrust concerns, with US and EU courts limiting availability given FRAND commitments (Contreras, 2018). However, import bans and other injunction remedies remain valid in some circumstances, like willful infringement. Rights holders seek strong remedies to enforce SEPs, while implementers warn of holdup risks from injunction threats during licensing negotiations (Lemley & Simcoe, 2021). Impacts on technology adoption and consumer welfare guide case-by-case analyses.

Ongoing legal and policy developments aim to balance SEP rights, standardization, and access to technologies underlying key standards like cellular communications. But tensions persist between IP rights maximization versus diffusion (Contreras, 2018). Incremental case law and voluntary best practices are coalescing toward reasonable middle grounds. However, further national and international coordination would strengthen emerging consensus frameworks.

The global and digital nature of modern technology poses enforcement challenges for patents on software, business methods, and other inventions distributed online (Bridy, 2011. Technical and legal obstacles constrain rights holders' abilities to pursue cross-border infringers at scale. Notice-and-takedown procedures, website blocking, and payment/ad restrictions provide mechanisms to curb patent piracy, but with concerns around over-enforcement, free expression, and due process (Bridy, 2011). Policymakers continue seeking balanced frameworks to effectively enforce patents online while protecting lawful interests and limiting unintended side effects.

A key challenge is tracing infringing activities across the internet's decentralized architecture. Anonymizing technologies like virtual private networks and darknets complicate monitoring. Differences in national laws enable circumvention of enforcement where some jurisdictions provide safe havens. Automated web crawling and network analysis tools can help identify violations, but gaps remain (Bridy, 2011). Further technological solutions alongside voluntary cooperation from intermediaries may improve targeting, but outcome uncertainty persists.

Among available remedies, blocking infringing websites via court orders, voluntary arrangements, or legislative mechanisms provides rights holders a potentially effective tool. However, critics warn website blocking encourages overbroad filtering that impacts lawful content, given difficulties constraining orders only to infringing material (Bridy, 2011). Payment and ad restrictions raise similar collateral effects. Procedural reforms emphasizing transparency, due process, and anti-circumvention safeguards seek to mitigate harms while preserving enforcement abilities.

Ongoing debates continue around roles and responsibilities for online intermediaries in preventing patent infringement distributed via platforms, networks, and services. Legal uncertainty persists around secondary liability doctrines and safe harbors. But voluntary initiatives for notice-and-takedown and other cooperation may progress absent consensus legislation. Overall, balancing complex tradeoffs around patent enforcement online remains an evolving challenge as technologies, business models, and social practices coevolve.

Patent pooling, in which multiple patent holders aggregate and jointly license their IP rights, provides potential efficiency benefits but also antitrust risks requiring careful governance (Delcamp, 2011; Lampe & Moser, 2013). Pools have formed around standards for digital technologies like MPEG video compression, WiFi connectivity, and 3G/4G telecommunications (Lampe & Moser, 2010). Proponents argue collective licensing reduces transaction costs and litigation while promoting technology implementation (Delcamp, 2011). However, designing pools to reasonably value contributions and maintain innovation incentives presents challenges requiring ongoing stakeholder coordination and occasional regulatory intervention.

Key design considerations for patent pooling include determining participants, essential patents, license terms, and governance structures (Lampe & Moser, 2013). Optimizing scope beyond trivial aggregation while avoiding anticompetitive effects is critical. Various models balance rights holder and implementer interests through independent administration, licensing bodies with mixed representation, dispute resolution mechanisms, and other structural safeguards (Delcamp, 2011). Public and private coordination enables licensing standardization while allowing market-driven flexibility.

Empirical research finds patent pools to have neutral or positive impacts on patenting rates, reflecting maintained innovation incentives despite reduced licensing revenues (Lampe & Moser, 2010; Delcamp,

2011). However, implications likely depend on industry and pool governance details. Similarly, evidencing reduced litigation from pooling is context specific. But transaction cost savings remain more consistently demonstrable (Lampe & Moser, 2013). On balance, judiciously structured pooling arrangements appear welfare enhancing.

Ongoing refinement of voluntary best practices and competition law oversight guides patent pool evolution (Lampe & Moser, 2013). Despite challenges, collective rights management continues displaying promise in key high-tech sectors. But active governance is required to ensure procompetitive implementations. With sound administration, patent pooling can play a valuable role in enabling efficiencies that further innovation.

Blockchain technology and smart contracts raise novel patent issues around digital rights management, enforcement, licensing, recordation, and ownership verification. Blockchains' decentralized, cryptographically-secured ledgers enable persistent public records of transactions and rights transfers. Smart contracts can automate royalty payments, license term monitoring, and usage controls through cryptographic authorization protocols (Wright & De Filippi, 2015). Implications for patents include transparency, automated enforcement, fractionalized ownership, and changed infringement detection dynamics.

Recording patent ownership and transfers on blockchains could reduce uncertainty over rights holders, providing due diligence clarity and preventing conflicting transfers. Technology integration challenges remain, but promising pilots are emerging. Standardized implementation could enhance transactional efficiency. Cryptographic verification of rights also enables access controls directly integrated with patented technologies' functionality (Wright & De Filippi, 2015). Digital rights management avoids reliance on litigation for enforcement. Some doubts remain as the current applications of blockchain technologies may conflict with some fundamental rights, such as those relating to the protection of personal data, or with regulations aimed at protecting public order and the lawfulness of the invention.

Smart contract procedures could automate royalty calculations, micropayments, usage metering, and license term monitoring. However, parameterizing fair compensation terms presents difficulties still requiring legal input. Controls must safeguard against exploitative automated restrictions. Transparent and revocable smart contract protocols will best balance flexibility with automation. However, this technology, considering its complexity, would make it difficult for the parties to modify the terms

of the agreement, in defiance of the principle of contractual autonomy.

Overall, blockchain and smart contract techniques offer opportunities to improve patent system functioning (Wright & De Filippi, 2015). But technological hurdles and policy complexities remain. Thoughtfully incorporating innovations like decentralized ledgers and cryptographic rules could reduce costs and uncertainty in rights management, but requires judicious and adaptive implementation. Ongoing interdisciplinary research and development will clarify optimal applications.

Artificial intelligence raises pressing issues around inventorship, disclosure, and claiming of autonomously generated inventions. Novel patent concepts and creative outputs from AI systems lack traditional human creators. In Australia, a first instance decision by Justice Beach of Federal Court have confirmed AI-generated inventions patentable based on current law (Thaler v. Commissioner of Patents – 2021 FCA 879). On this wavelength, the issue relating to the intellectual property of works generated by machines emerges. Many authorities have ruled out the assignability of intellectual property rights to a non-human entity without legal personality. For example, the Legal Board of Appeal of the European Patent Office, announced on 21 December 2021 that, pursuant to Article 81 and Rule19 EPC, the designated inventor in a patent application must be a human, similarly on 14 February 2022 the Review Board of the US Copyright Office established that the «human authorship is a prerequisite to copyright protection in the United States and that the Work therefore cannot be registered». Likewise, the UK Supreme Court in 2021 has held that under UK patent law the inventor named in the application must be a natural person However, ambiguities around legal rights and obligations of AI developers versus systems complicate enforcement and liability (Doria, 2023). Integrating AI creators into the patent system will require adaptable policies and possibly sui generis AI rights frameworks.

Key challenges include codifying inventorship standards for autonomous systems and implementing disclosure procedures enabling public understanding of underlying technology (Ramalho, 2019). Similar to software and business methods, adequate disclosure for neural networks poses difficulties. Proposed solutions range from code and training data deposits to standardized model explanation requirements. Rights claiming strategies must also balance capture breadth against confidentiality. Means-plus-function claims describing neural network functions may sufficiently characterize structures while maintaining trade secrecy.

Broader debates persist on whether current patent law remains well

suited to AI inventions or more fundamental revisions are required (Ramalho, 2019). Strict technological neutrality argues minimal reforms suffice. However, more radical proposals range from special human oversight provisions to "AI-centric" frameworks vesting rights directly in autonomous systems. Granular analysis of invention lifecycles and attendant rights and duties can help identify appropriate hybrid approaches balancing stability and adaptation.

Overall, seamlessly integrating AI into the patent system raises complex questions with early answers actively developing. But maintaining incentives for AI innovation through appropriate rights frameworks, while adapting procedures for autonomous creation, merits sustained interdisciplinary analysis. Customized solutions will likely integrate both existing law's flexibility and targeted reforms.

Alongside patents, trade secrets provide critical IP protections for software, business methods, and other digital inventions (Rowe, 2014; Sandeen, 2021). Trade secrecy avoids disclosure requirements, aligns with iterative development, and covers unpatentable subject matter. Rights holders use NDAs, access controls, and encryption to maintain confidentiality. Digital rights management (DRM) technologies provide automated technical protections integrated with products and services (Sandeen, 2021). Trade secrets and DRM raise enforcement challenges around hacking, reverse engineering, and misappropriation. Reforms like the US Defend Trade Secrets Act enable rights holders to pursue extraterritorial misappropriation. But balancing protections against undue restrictions on reverse engineering, security research, and repair remains contested. Overall, integrated legal and technological strategies are evolving to manage trade secrecy challenges unique to digital innovation.

Employees' technical knowledge and skills drive digital innovation, resulting in high workforce mobility between competitors (Parsi et al., 2022; Rowe, 2014). Non-compete agreements balance protecting confidential information and investment in human capital against imposing unreasonable restraints on trade. Enforceability tests weigh equities, though many jurisdictions restrict overbroad restrictions. Trade secrecy and invention assignment provisions also safeguard IP when employees change jobs. However, "inevitable disclosure" doctrines face skepticism for limiting mobility based on speculative risks. Clear organizational policies and reasonable post-employment restrictions provide mutually agreeable balances (Rowe, 2014). But maximizing human capital fluidity argues against overreaching IP controls in digital sectors dependent on cumulative

innovation and know-how diffusion via employee mobility.

Digital patent reforms

Improving software, business method, and other digital technology patents remains an ongoing policy challenge, given competing innovation incentives, difficulties verifying claims, and unique complexities of cumulative sequential innovation (Bessen & Meurer, 2008; Guadamuz Gonzalez, 2017). Proposed reforms aim to raise patent quality, curb speculative litigation, enhance access, and balance rights. But risks of unintended consequences warrant careful incremental changes. Promising measures include heightened eligibility standards, stronger disclosure rules, shorter terms, damages apportionment, and fee-shifting to discourage questionable lawsuits while preserving valid enforcement (Bessen & Meurer, 2008). Guidelines could also help examiners consistently apply digital invention criteria. However, flexible standards are required given rapid technical evolution. Further empirical study can guide reforms targeting identified problems without unduly disrupting digital innovation ecosystems.

2. *Patent landscapes and digital patent databases*

Empirical analysis of patent filing and litigation trends provides insights into how patents are being pursued and asserted in sectors like software, e-commerce, digital communications, and other technologies (Bessen & Meurer, 2008; Hall & MacGarvie, 2006). Research tracks impacts of policy changes and court decisions on applicant behavior. Filing patterns demonstrate rising patents in software and business methods, with attendant risks of overlapping claims (Bessen & Meurer, 2008). Meanwhile, studies find surges in litigation by non-practicing entities in computers/electronics and other industries following expansions in patentable subject matter (Hall & MacGarvie, 2006). Such data informs debates on reforms to improve quality and reduce unwarranted litigation. Ongoing monitoring of patenting and enforcement illuminates where the system succeeds versus needs adjustment.

Statistical analysis also reveals differential impacts across technology subsectors, company sizes, and other market segments (Bessen & Meurer, 2008; Hall & MacGarvie, 2006). For instance, smaller firms face disproportionate litigation threats, impeding digital innovation ecosystems

traditionally driven by startups. Large incumbents better withstand risks, distorting competition. Similarly, patenteers pursue divergent strategies across industries based on competitive dynamics. Integrating insights from economics and innovation studies with patent data provides rich understanding.

Research methods combine public patent office data, proprietary databases from legal vendors, litigation records, surveys, and other sources (Bessen & Meurer, 2008; Hall & MacGarvie, 2006). Linking patents to assignees and their attributes enables studying firm-level patenting behaviors. Matching litigation records illuminates enforcement patterns by type of plaintiff, technology, and impacts. Segmenting by industry and company size provides granular analysis. Interpreting trends requires appreciating data source strengths and limitations. But responsibly analyzed, patent statistics provide vital intelligence.

With the advent of new methods of technological information management, databases have become fundamental. In this regard, the world of law must ask itself whether it is necessary to provide specific forms of protection for this new category of creations or whether it is sufficient to apply the principles already existing in copyright on an extensive basis. In this regard, the European legislator, with Directive 96/9/EC, on the one hand includes databases among the categories of intellectual works protected by copyright, especially regarding the way in which the information material is selected and arranged, on the other hand special rights have been created for the creator of the database.

Ongoing data gathering and analysis tracks the evolving role of patents in digital innovation (Bessen & Meurer, 2008; Hall & MacGarvie, 2006). Periodic empirical reassessments determine when concerns like proliferation and litigation require policy interventions versus when the system shows resilience in adapting. Facts inform debates on balancing tradeoffs. Statistics also enable evaluating reform impacts moving forward. Patent data analytics combined with economic and legal perspectives will continue generating crucial insights.

Optimizing the patent system's role in software, internet, fintech, AI, and other digital technology innovation requires understanding and balancing complex tradeoffs among stakeholders (Bessen & Meurer, 2008; Guadamuz Gonzalez, 2017). Sound policy considers impacts on startups, SMEs, and large firms; various industry sectors, open source ecosystems, R&D incentives, cumulative innovation dynamics, litigation costs, and more (Hall & MacGarvie, 2006; Shue & Lynch, 2019). Evidence-based

reforms respond to documented problems, from eligibility standards to damages rules, while maintaining flexibility for continued evolution.

Key debates around technology-neutrality versus tech-specific rules, proprietor rights versus access, and harmonization versus customization reflect tensions in tailoring patent law for digital innovation (Guadamuz Gonzalez, 2017). International coordination supports global markets, but local needs vary. Similarly, loose standards aid flexible adaptation, yet clarity and predictability also matter. And offering sufficient incentives remains crucial, but undue monopolization risks require balancing. Holistic analysis illuminates optimal configurations at this complex nexus of innovation policy, economics, and law.

Reform efforts strive for objectivity, but underlying philosophies also shape perspectives on optimal patent scope, strength, and enforcement approaches (Bessen & Meurer, 2008). More skeptical views favor narrower, shorter rights and strict eligibility, whereas expansive positions support broad patents. Reality often lies between these extremes. But transparently debating theories and objectives behind policy helps build consensus.

Those closest to creating, commercializing, and consuming digital technologies have essential insights on balancing tradeoffs. Inclusive public-private dialogue, with detailed technical engagement, can craft widely legitimate policies. But oversight prevents narrow interests from dominating. With thoughtful balancing of stakeholder rights, mindful of complex incentive structures, the patent system can equitably nurture digital innovation.

Patent landscapes provide "big picture" overviews of technology areas to support R&D planning, risk assessments, and other strategic objectives (Abbas et al., 2014). Landscapes visualize high-level patent activity, key players, blocking risks, and other intelligence (Trippe, 2015). Online global patent databases coupled with analytics tools enable creating landscapes, complementing traditional manual search and analysis.

Patent and non-patent literature databases provide raw information, while search strategies identify relevant documents (Abbas et al., 2014). Landscaping synthesizes insights into digestible graphical overviews, often using proprietary analytics platforms (Trippe, 2015). Maps organize patents into technology segments and domains. Networks show relationships among inventors and assignees. Timelines reveal activity trends. Interactive features enable drill-downs. Effective landscapes simplify complex spaces into telling indicators and patterns.

Well-constructed landscapes illuminate the competitive IP

environment to inform R&D planning, technology scouting, licensing/partnership assessments, and other objectives (Trippe, 2015). Graphics concisely convey high-level intelligence like leading players, blocking risks, emerging competitors, active subdomains, and trends. Landscapes thus complement detailed patent analytics and focused searches.

However, thoughtfully designed visualizations, search strategies, and data interpretation remain critical for useful landscapes (Abbas et al., 2014). Relevant keywords, smart data filtering, clustering algorithms, and classification systems help construct insightful maps. Domain expertise guides effective analysis. Simplistic automation yields misleading artifacts. Powerful patent landscaping balances computational power and human proficiency.

Public and commercial online patent databases provide worldwide access to search intellectual property records from major national and regional patent offices, the WIPO, and supplemental sources (Abbas et al., 2014; Trippe, 2015). Key resources include:

- USPTO database with US patent documents and tools like PatFT for full-text searching.
- Espacenet covering over 100 countries from the European Patent Office.
- WIPO's PATENTSCOPE with international PCT applications and translations.
- Google Patents and Lens.org's global collections.
- JPO, KIPO, SIPO and other national office databases with machine translations.

Proprietary platforms like Derwent Innovation, TotalPatent One, and PatSeer providing enhanced features.

Value-added commercial databases integrating multinational records, curated data, analytics tools, and APIs for large-scale access.

Search interfaces range from basic keyword queries to sophisticated semantic, classification, citation, and image searching capabilities (Trippe, 2015). Download formats, alert services, and machine-readable interfaces support automated analysis. Multilingual coverage is expanding via machine translation.

Integrated databases consolidate disparate sources for efficiency, although individual repositories provide unique advantages (Abbas et al., 2014). No single database has complete global coverage, but collectively online patent data resources enable comprehensive worldwide searching and analysis. Retrieving full documents often requires visiting respective national databases.

Understanding strengths of specific databases allows efficient searching. But comprehensive discovery benefits from accessing both public and private platforms with supplemental collections, tools, and services.

Patent search strategies combine various methods to maximize discovery of relevant prior art and technological intelligence (Abbas et al., 2014; Trippe, 2015). Keyword searching retrieves documents containing specified terms. Field searching constraints keywords to metadata like titles, abstracts, claims etc. Classification systems like CPC enable code-based queries. Semantic techniques find conceptual associations. Citation analysis maps relationships. Additional approaches enrich results.

Keyword searching is foundational but has limitations (Abbas et al., 2014). Variations in terminology across inventors risk missing relevant results. Effective keyword development relies on domain expertise. Boolean operators, proximity filters, and field constraints help refine queries. Multilingual translation expands retrieval.

Patent classification systems categorize inventions into hierarchical taxonomies, supporting code-based searches (Trippe, 2015). The usefulness of the classification is to allow searches to be carried out independently of the language used, allowing searches to also be carried out in relation to concepts or ideas that are sometimes difficult to express in words. However, codes often lag emerging technologies. Pre-computed classification has biases. Combining keywords and codes thus complements strengths of each approach.

Semantic search tools utilize natural language processing, neural networks, and knowledge graphs to identify documents expressing related concepts, overcoming vocabulary differences (Abbas et al., 2014). Performance continues improving with AI advancement.

Citation analysis follows links between earlier (cited) and subsequent (citing) documents to map technology lineages and significant prior art (Trippe, 2015). Useful for validity assessments during prosecution and due diligence.

Additional techniques like image search for drawings/figures, legal status data, machine learning classifiers, and other innovations help retrieve relevant results from patent data complexity. Integrating complementary methodologies enables comprehensive discovery.

Considering Patent Informatics Tools for Landscaping, Mapping, and Data.

Beyond core search functionalities, patent informatics platforms provide analytical features for landscaping, mapping, and data visualization to

support strategic IP decision-making and competitive intelligence (Abbas et al., 2014; Park et al., 2013). Interactive graphical interfaces convert patent data into insights.

Landscaping visually organizes patents into topical clusters, displaying relationships and activity over time to convey technological landscapes and evolution (Park et al., 2013). Network mapping shows connections among inventors, assignees, citations. Timelines track filing trends. Interactive drill-downs add details.

Data visualizations like charts, histograms and plots analyze filing numbers, geography, timing, technical categories, and other metadata (Abbas et al., 2014). Dashboards aggregate key innovation indicators. Plots identify gaps, saturation, growth areas, and other insights.

Analytics dashboards integrate visual query builders, reporting tools, and collaboration features for IP management workflows (Park et al., 2013). Automated alerts monitor new patents, litigation, expiration dates, and other events. APIs and bulk data services enable large-scale analytics.

Patent mapping and visualization makes sense of vast complex datasets (Abbas et al., 2014). But thoughtfully designed interfaces and prudent interpretation of algorithmic outputs remains critical. Patent informatics aims to augment not replace human analysis.

Patent data supports competitive intelligence initiatives to track rival R&D activities, monitor technology developments, benchmark portfolios, anticipate future products, value intangible assets, and inform other strategic decisions (Abbas et al., 2014; Park et al., 2013). both common information and obscure insights latent in patent documents. Analytical techniques illuminate intelligence.

Patent application volume, geography, timing, inventors, technological categorization and other metadata reveal firm-level innovation patterns, capacities, focus areas and gaps (Park et al., 2013). Citation analysis maps technology lineages and relationships among players. Text mining discovers insights from unstructured content.

Patent landscape mapping visualizes competitive positions and dynamics (Abbas et al., 2014). Claim analysis indicates potential products under development. Automated monitoring and alerts flag updates in near real-time. Data feeds integrate patent analytics into business intelligence systems.

Licensing value estimation compares portfolios and patents using metrics like citations and scope (Park et al., 2013). Litigation, opposition and legal status data highlights enforcement risks. Due diligence investigates

validity and ownership issues.

However, prudent interpretation of patent-derived signals is critical, given data limitations (Abbas et al., 2014). Not all inventions are patented, nor do all patents represent commercial products. Integrating technical, market, and financial perspectives avoids misleading intelligence.

Patent search tools and analytics algorithms provide powerful capabilities for discovery and analysis, but also have inherent constraints requiring careful interpretation (Abbas et al., 2014; Trippe, 2015). Understanding strengths and weaknesses enables optimizing utility.

Key advantages of search tools include worldwide patent database access, flexible queries, multilingual support, and productivity-enhancing features like alerts and bookmarking (Trippe, 2015). Analytical algorithms automate patent classification, landscaping, citation mapping, and other insights (Abbas et al., 2014). GPU acceleration and cloud computing scale advanced techniques.

However, limitations remain around textual data constraints, subjective classifications, algorithmic biases, and data errors (Abbas et al., 2014). Keyword retrieval depends heavily on terminology matching. Automated landscaping risks clustering artifacts. Classifications skew categorization. Unique investor language and representations hinder text mining. No technique solves all discovery challenges.

Therefore, prudent data science practices like evaluating data provenance, assessing algorithm fitness, and considering context guide reliable analytics (Trippe, 2015). Human oversight ensures reasonable interpretations. Combining patent data with other technical/business information provides robust insights. Transparency mitigates excessive faith in computational intelligence.

Overall, patent search and informatics offer powerful aid for IP decision-making but require thoughtful usage focused on suitable applications. Understanding inherent constraints enables productive patent analytics.

Assessing Integration of Patent Data with Technical Databases and Literature

A best practice for robust patent analytics is thoughtfully integrating insights from patent documentation with other technical and scientific sources (Abbas et al., 2014; Park et al., 2013). Combined understanding reduces chances of misinterpreting patent signals.

Non-patent literature (NPL) like journals, conference papers, and regulatory filings provide technological context aiding patent interpretation (Abbas et al., 2014). Patent-citing NPL offer clues to interpreting cited

references. NPL search results can indicate industry direction. Scientific citation databases like Web of Science enhance discovery.

Matching patent data to product catalogs, financial databases, and other business sources links IP to commercialization. Competitive intelligence integrates R&D and market perspectives (Park et al., 2013). Open data contextualizes regional and technology specific insights.

However, challenges remain in connecting disparate data formats, identifiers, access constraints, and biases across sources (Abbas et al., 2014). Record linkage methods show promise in integrating complementary datasets.

A combined understanding of the technical, business, and patent literature landscapes enables properly contextualized analysis and avoids misleading findings from patent data alone. But thoughtful integration procedures are required to maximize value.

The exponential growth in patent documentation coupled with advances in big data techniques and machine learning presents both opportunities and challenges for patent search and analysis (Abbas et al., 2014; Trippe, 2015). Massive databases enable new insights but require new strategies. Thoughtful data science practices guide reliable discovery.

The volume of multinational patent records online expands opportunities for global analysis but requires computational approaches (Trippe, 2015). NLP and knowledge graphs uncover latent semantics within vast text. Citation network analysis reveals innovation lineages. Image search provides visual discovery.

However, traditional keyword queries struggle with huge document sets, demanding probabilistic and semantic methods (Abbas et al., 2014). Result validation becomes infeasible at scale. Automated classification risks ingraining systematic biases.

Caution is advised when applying black box machine learning techniques to patent analysis (Abbas et al., 2014). Inspection of algorithmic logics, training data, and performance metrics helps avoid blind faith in outputs. Feature engineering should leverage domain expertise. Human-machine collaboration outperforms either alone. In fact, it is advisable for data to be labeled and described in detail so that intelligent systems can operate. The configuration of similar systems requires particularly significant initial investments as well as human coordination at an international level that allows them to communicate with each other.

Overall, vast patent data enables valuable new competitive and technological intelligence, but responsible data science practices must ensure

rigorous, contextualized analysis (Trippe, 2015). Thoughtful integration of expertise with computational power promises substantial gains.

3. *Patent wars in the field of information technology*

Patent landscape reports synthesize patent data analysis, mapping, and visualization into actionable intelligence on technology spaces for research planning, competitive monitoring, and other business objectives (Park et al., 2013; Trippe, 2015). Well-constructed landscapes illuminate innovation dynamics, key players, relationships, trends, and opportunities. Industry- and technology-specific reports provide strategic insights.

For example, the WIPO produces annual landscape reports on critical emerging technologies like AI, quantum computing, IoT, and biotech (WIPO, 2022). These explore patent activity, geographic distribution, and top applicants globally. Firms also commission custom landscapes on sectors of interest to benchmark positions and identify R&D gaps or promising spaces with lower competition (Trippe, 2015).

Careful scoping, data collection, cleaning, normalization, analysis, and visualization creates robust landscapes (Park et al., 2013). Simply automating basic patent mapping often yields misleading artifacts. Intelligently designed taxonomies, clustering, and network algorithms enable meaningful maps (Abbas et al., 2014). Iterating visualizations with domain experts guides effective representations balancing clarity and comprehensiveness.

Interpreting landscape reports requires appreciating limitations (Trippe, 2015). Not all valuable R&D is patented, nor do all patents reflect viable technologies. Integrating insights from scientific publications, product databases, and other technical sources prevents over-extrapolating from patent data alone (Abbas et al., 2014). But judiciously analyzed, landscapes provide unique intelligence to advance innovation.

Prudent IP strategy follows best practices for leveraging patent information, including: a) combining public and proprietary data sources; b) employing multifaceted search strategies; c) thoughtfully interpreting analytics; d) involving both legal and technical experts; e) continuously monitoring new data; and f) integrating patent intelligence into business contexts for informed decision making (Abbas et al., 2014; Park et al., 2013).

A foundation of comprehensive patent data coverage enables thorough

discovery and analysis (Abbas et al., 2014). Accessing global office databases, commercial platforms, and scientific literature provides breadth. Focused, regularly updated searches combine keywords, classification codes, semantic queries, and other techniques for depth (Trippe, 2015).

However, diligently validating insights, considering uncertainties, and contextualizing patent signals is critical (Park et al., 2013). Prudent interpretation by interdisciplinary teams improves reliability. Monitoring changing landscapes identifies trends early.

Keeping patent analytics connected to business objectives focuses efforts and ensures actionability (Trippe, 2015). IP strategy supports—but should not overly dictate—R&D, partnerships, litigation, licensing, mergers and acquisitions, and other decisions. Legal, technical, and business considerations balance.

Following rigorous, holistic, objective practices allows strategically leveraging patent information as a wise competitive advantage. Patent intelligence informs innovation leadership when responsibly utilized.

Standards essential patents (SEPs) cover technologies unavoidable for implementing standards technical compatibility and interoperability (Contreras, 2018). Disputes arise in licensing negotiations between patent holders and product makers utilizing SEP-protected standards, especially prominent in telecom industries with patented 4G/5G cellular standards (Layne-Farrar et al., 2019).

Key issues involve disagreement on royalty rates and terms that are fair, reasonable and non-discriminatory (FRAND) as required for SEPs, often resulting in infringement litigation (Lemley & Simcoe, 2021). Complainants assert rights to fair compensation, while defendants argue for minimal rates enabling adoption. Courts balance complex tradeoffs.

Remedies also raise questions around patent holdup risks from injunctive relief on infringed SEPs that could compel acceptance of unreasonable licensing terms or block products utilizing the standard (Contreras, 2018). However, rights holders defend pursuing injunctions and import bans in certain situations like unwilling licensees.

Underlying tensions exist between SEP owners maximizing licensing revenues, and technology implementers seeking minimal costs (Layne-Farrar et al., 2019). The public interest lies in balancing incentives for innovators with affordable access to standard technologies. Impacts on innovation and consumers guide evolving case law.

Determining fair, reasonable, and non-discriminatory (FRAND) licensing terms for standards essential patents (SEPs) remains complex and contentious (Contreras, 2018; Lemley & Simcoe, 2021). Methodologies

for calculating reasonable royalties based on patent value, comparable licenses, and proportionality lack consensus. Non-discrimination also raises difficulties in tailoring bilateral deals (Layne-Farrar et al., 2019). Ongoing controversies and litigation reveal gaps in current frameworks.

Key debates include what constitutes a fair royalty base: component level or final product price (Contreras, 2018)? Component bases favor implementers with cost savings, while product bases award higher revenues to patent holders. Valuing SEP portfolios against standards technical value is also unclear. And defining non-discriminatory terms allowing any preferential deals poses challenges (Lemley & Simcoe, 2021).

Seeking greater clarity, some proposals advocate arbitration-based tribunals or expert panels to determine binding FRAND rates and terms, counteracting the uncertainties of litigation (Layne-Farrar et al., 2019). However, critics raise concerns around due process and unappealable compulsory awards. Hybrid legislative-market solutions are also debated. A standardization system that is not well thought out can lead to a market stall. In fact, when a standard is well established and widely adopted, a natural inertia is created which makes it particularly difficult to replace it with a new one. It is also necessary to avoid high barriers to entry, preventing this from leading to oligopolistic closures and delays in the entry of new technologies (Calderini et al., 2005).

Overall, controversies persist around FRAND obligations, especially methodologies for fair and proportional royalty calculations (Contreras, 2018). Refining current court-led case law evolution with calibrated regulatory guidance could improve predictability and reasonableness in SEP licensing.

Analyzing Legal Frameworks for Determining FRAND Royalties

Courts determining fair, reasonable, and non-discriminatory (FRAND) royalties on standards essential patents (SEPs) employ varied methodologies reflecting evolving case law (Contreras, 2018; Layne-Farrar et al., 2019). Two primary approaches include: 1) Top-down: based on technical proportionality and comparable licenses; and 2) Bottom-up: aggregating component patent values.

The top-down methodology assesses the overall patented technology's contribution to the standard and products, often using comparable royalty agreements for benchmarks (Layne-Farrar et al., 2019). Critics argue difficulties finding truly comparable licenses, and risks of royalty stacking exceeding aggregate standard value (Contreras, 2018).

Bottom-up valuing starts from claimed essential patents, analyzing strengths and embedded usage to estimate incremental contributions. But

accurately valuing large portfolios patent-by-patent raises time and data barriers (Layne-Farrar et al., 2019). Determining royalty allocation among SEP owners also lacks consensus solutions.

Hybrid approaches take aspects of both frameworks (Contreras, 2018). However, inherent complexities around valuation may constrain precision. Courts award case-specific damages, but complainants desire predictability, whereas implementers want flexibility allowing negotiations guided by judicial principles (Lemley & Simcoe, 2021). Developing international frameworks could promote coherence.

Standards essential patent (SEP) owners assert rights to enforce patents reading on technical standards, through litigation seeking damages or injunctions against infringement (Contreras, 2018). However, SEP licensing commitments to fair, reasonable, and non-discriminatory (FRAND) terms on patents unavoidable for standards implementation raises tensions between enforcing IP rights and upholding access. Courts and policymakers continue navigating complex tradeoffs.

Injunctions blocking usage of standards pose risks of patent holdup, if rights holders can compel adherence to unreasonable licensing terms by threatening sales bans on products necessarily infringing SEPs (Lemley & Simcoe, 2021). However, SEP owners argue injunctions remain valid remedies for bad faith refusal to negotiate licenses. Courts weigh impacts on technology access and consumers in granting injunctions (Contreras, 2018).

Damages-only monetary relief enables standards adoption while compensating patent owners (Lemley & Simcoe, 2021). But rights holders protest limiting available remedies weakens SEP strength. Additionally, calculating royalties models like top-down proportional valuation or bottom-up aggregation have gaps.

Overall, balancing SEP enforcement and standard diffusion remains challenging. But progress is evolving through case law on tailored remedies constrained to protect public welfare without negating private rights.

Examining Strategies of Patent Holders and Implementers in SEP Disputes

In standards essential patent (SEP) licensing disputes, patent holders and standard implementers pursue contradictory negotiating and litigation strategies reflecting their competing financial interests (Contreras, 2018; Lemley & Simcoe, 2021). SEP owners push for maximal royalties and heavy enforcement, while product makers resist high costs. Courts mediate between these poles.

Patent holders advocate methodologies favoring higher royalties like

assessing broad product price bases, wider device coverage, extensive bundling, and limited component level licensing (Contreras, 2018). They also argue for strong injunction remedies to increase negotiating leverage (Lemley & Simcoe, 2021).

Conversely, implementers argue for royalty bases on smallest saleable units, valuing patents only in components practicing the SEP claims, portfolio strength evaluation, and other constraints limiting aggregate royalties (Contreras, 2018). They contend injunctions enable holdup and disagreements should not halt product sales (Lemley & Simcoe, 2021).

Each side marshals methodologies and court rulings supporting their stances. But legal frameworks strive to balance rights holder interests in reasonable compensation with implementer concerns regarding viability of standards adoption (Contreras, 2018). Royalties should incentivize innovation while allowing widespread access enabling interoperability and technological progress.

The efficacy of injunctions banning infringing products and other remedies in disputes over cellular standard essential patents (SEPs) remains hotly contested (Contreras, 2018; Lemley & Simcoe, 2021). Supporters argue injunctions pressure recalcitrant implementers to negotiate licenses in good faith. But critics warn injunctions risk patent holdup, undermining standards adoption. Ongoing litigation continues defining suitable remedies balancing incentives and access.

In the high-profile Apple-Qualcomm dispute, Qualcomm sought iPhone import bans through injunctions on infringed SEPs, which Apple argued constituted anticompetitive holdup (Qualcomm v. Apple, 2019). Courts denied Qualcomm's injunction requests. The dispute settled after demonstration of Qualcomm's market power in cellular technologies weakened Apple's bargaining position (Lemley & Simcoe, 2021).

This influential case highlighted injunction risks early in standard lifecycles before alternative technologies can develop, but also noted traditional patent rights to injunctions against unwilling licensees (Contreras, 2018). Later decisions constrain but do not eliminate SEP injunctions when imposed equitably. Damage awards and judicial rate determinations also check abusive licensing leverage.

Balancing injunction availability to incentivize licensing compliance, without enabling exploitative holdup, remains an evolving challenge. Further tipping remedies toward implementers could weaken SEP strength, while benefiting infringers risks devaluing IP rights. Well-calibrated remedies promoting good-faith negotiations appear most effective.

While ongoing litigation helps gradually define frameworks, uncertainties around enforcement of standards essential patents (SEPs) arguably slow adoption of standards-based technologies like 4G/5G cellular networks (Baron & Gupta, 2018; Lemley & Simcoe, 2021). Implementers hesitate investing before obligations are clear. But quantifying effects remains challenging. Some data suggests moderate impacts, but risks likely deter smaller adopters most. Near-term delays may arise, but longer-term efficiencies require properly aligned incentives.

Surveys indicate SEP risks are not implementers' primary adoption constraint, although concerns increase for smaller companies, with over half reporting delays from licensing uncertainties (Baron & Gupta, 2018). Estimating lost economic gains is difficult. But protracted disputes likely temporarily dampen uptake pending resolutions.

However, aligning SEP licensing frameworks to balance fair rewards for innovators and implementers' need for predictable costs can support flourishing technology ecosystems (Lemley & Simcoe, 2021). Modest near-term frictions may arise amidst ambiguities, but durable solutions enabling both IP protection and interoperability will best serve long-run innovation and commercialization.

Overall, SEP disputes pose adoption risks but likely not catastrophically. Promoting transparency in rights and obligations can mitigate uncertainties during this standards evolution life-cycle phase.

Various proposals seek to improve predictability and reasonableness in global standards essential patent (SEP) licensing frameworks, including: 1) expert arbitration-based rate determination; 2) patent valuation guidelines; 3) litigation best practices; 4) multilateral agreements; and 5) regulatory policies (Contreras, 2018; Layne-Farrar et al., 2019). Integrated solutions would combine aligned voluntary and legal reforms.

Expert arbitration could resolve disputes outside biased national courts, if keeping costs reasonable and process transparent (Layne-Farrar et al., 2019). Governance principles guiding royalty calculations can add consistency. Committing to negotiated licensing before litigation also minimizes disputes (Contreras, 2018).

Multilateral pledges by patent holders could build trust by committing to adhere to evolving best practices (Contreras, 2018). Some observers also advocate classifying certain standards technologies as public infrastructure, justifying regulation to balance SEP monetization with public benefits (Layne-Farrar et al., 2019).

However, risks exist in over-regulating complex fast-moving technology

markets. Hybrid approaches testing incentives alongside collaborative oversight may offer adaptable solutions as case law, global coordination, and industry norms progress.

4. *Patent piracy in global networks*

Antitrust law and patent policies exert important influences on technology standards development by constraining anticompetitive collusion while enabling procompetitive collaboration (Baron & Spulber, 2018; Contreras, 2018). Antitrust enforcement targets restrictive conduct like patent ambushing and sham litigation that undermine open participation. Patent reforms aim to facilitate licensing essential technologies. Balancing competition and IP rights incentives drives evolving guidance.

Key antitrust risks around standards include patent ambush (deceitfully withholding IP rights claims during standard-setting), collusive exclusion of competitors when setting specifications, and abuse of market power acquired through standard essential patents (SEPs) (Contreras, 2018). Competition agencies issue business review letters guiding acceptable coordination practices. Recent guidance tolerates certain information exchanges while restricting overly restrictiveterms (Baron & Spulber, 2018).

Patent office initiatives like requiring standards essentiality disclosures on patent applications help reduce ambush risks by improving patent transparency (Contreras, 2018). Limited exclusions from infringement liability also enable temporarily evaluating patented technologies for incorporating into collaborative standards (Baron & Spulber, 2018).

Overall, calibrated oversight aims to curb anticompetitive manipulation of standards development while preserving efficiencies from cooperative SSOs (standard-setting organizations) crafting interoperability standards (Contreras, 2018). Getting the balance right remains an evolving challenge, but progress continues.

Optimizing the patent system's role in collaborative technology standards requires balancing rights holder interests in fair rewards for innovation with implementers' needs for viable adoption costs (Lemley & Simcoe, 2021; Baron & Gupta, 2018). Standards depend on contributions from both innovators and adopters. Aligned incentives between parties

enhances welfare.

Patent and competition policies aim to curb opportunistic conduct without diminishing innovation returns or driving uncompensated implementations (Lemley & Simcoe, 2021). Standards development process requirements, wieghted voting procedures, information disclosures, and good faith obligations help ensure balance (Baron & Gupta, 2018). SEP licensing rate determinations also consider fairness alongside viability for adoption.

Underlying tensions persist between IP rights maximization and diffusion, requiring ongoing recalibration (Lemley & Simcoe, 2021). But reasonable compromises exist. Incremental legal and voluntary reforms continue progressing toward equitable middle grounds.

With sound policies encouraging participation by diverse interests, standards processes promise substantial welfare gains by enabling both technology development and implementation (Baron & Gupta, 2018). Aligned incentives between rights holders and adopters drive innovation from all sides. Patent and antitrust rules play key roles in reducing frictions.

The proliferation of infringing distribution, copying, and consumption of patented software, media, and other digital technologies on peer-to-peer and streaming sites poses enforcement challenges for rights holders (Sag, 2015; Yu, 2011). While unauthorized usage has always existed, internet vectors like torrent trackers and cyberlockers radically increase scale and anonymity, creating perceived crises. Demand for strong enforcement measures exists, but risks to lawful activities lead to controversies around appropriate responses.

patent piracy online erodes revenues, reducing R&D incentives according to rights holders (Yu, 2011). And cultural shifts valuing unrestricted access normalize infringement. But quantifying impacts remains difficult, with some studies finding moderate effects, and questions around displacement versus lost sales (Sag, 2015). Rights holders emphasize enforceability, though critics argue many would never purchase legally regardless.

Developing global notice-and-takedown procedures, identifying infringers through traceable payments and advertising, and voluntary initiatives have shown promise (Sag, 2015). But persistent detection and attribution challenges drive more controversial automated filtering proposals. Striking balances to protect intellectual property without restricting lawful uses continues posing challenges.

The cross-border nature of online activity creates jurisdictional challenges

for enforcing patents on digital technologies (Sag, 2015; Yu, 2011). National laws vary on infringement standards, remedies, and protections for third-party intermediaries. Tracing and attributing anonymous infringers globally also poses barriers. International coordination has gradually improved frameworks, but gaps remain enabling avoidance via jurisdictional arbitrage.

Rights holders emphasize needs to pursue infringers worldwide, citing global business impacts from local violations (Yu, 2011). But critics argue extraterritorial enforcement risks erode due process and overreach against lawful activity abroad. Judges weigh comity and territoriality limits on applying national laws transnationally (Sag, 2015).

Progress includes widely adopted notice-and-takedown procedures enabling addressing clear violations. Bilateral/regional arrangements like ACTA also aim to harmonize enforcement standards, but face skepticism (Yu, 2011). Ultimately, balancing property rights against territorial sovereignty persists in navigating conflicts of law. But gradually improving international agreements evidence path forward.

Attributing patent infringements to identifiable actors for legal accountability poses major challenges given the internet's decentralized architecture, encryption, and anonymity protections (Bridy, 2011; Sag, 2015). While notice-and-takedown procedures address clearly hosted content, evasive distribution tactics like shifting hosts, darknets, and BitTorrent hinder tracking sources. Advanced monitoring methods help but face accuracy and ethical limits. Infringement at scale continues outpacing enforceability.

Key technical tracing challenges include spoofing, VPN anonymization, obfuscated routing, and distribution across multiple fleeting hosts (Bridy, 2011). Legal attribution requires connecting cyber activities to real entities. But privacy technologies like Tor enable anonymity (Sag, 2015). Tracing payments and advertising offers some accountability but remains limited.

Ongoing developments around cross-referencing data sources, traffic analysis, watermarking, deep packet inspection, and mandatory identification show promise but also risks of overreach (Bridy, 2011). Wholly solving decentralized infringement enforcement appears infeasible given constraints. Balance remains elusive amidst technology evolution.

The shift from centralized websites to more decentralized distribution methods like peer-to-peer filesharing networks and social media platforms magnifies challenges in enforcing patented software, media, and other digital technology rights online (Yu, 2011; Elkin-Koren, 2017). Blocking

specific sites grows ineffective as temporary hosts, links, and files propagate rapidly across diffuse networks and users. Notice-and-takedown procedures falter chasing constant reposting. Automated filtering risks unintended over-blocking.

Early FILESHARE platforms enabled discovering and downloading files from centralized indexes, facilitating take-down by targeting hosts (Yu, 2011). But Bittorrent's distributed peer swarms lack chokepoints, reducing enforceability. Similarly, restricting infringing links on social media struggles against rapid sharing and anonymity (Elkin-Koren, 2017). Enforcement whack-a-mole struggles as technology evolves.

However, opportunities exist in cooperation from platform providers, voluntary compromise frameworks, and appropriate use of digital rights management technologies combined with flexible monetization models (Elkin-Koren, 2017). Multi-stakeholder initiatives balancing interests present paths forward amidst distribution method evolution. But challenges remain as networks grow more decentralized.

Rights holders employ various automated technological solutions to attempt detecting and addressing patent infringement online amidst enforcement challenges from distribution scale and anonymity (Bridy, 2011; Perel & Elkin-Koren, 2017). These include digital fingerprinting, watermarking, deep packet inspection, traffic monitoring, and algorithmic anti-piracy systems. However, accuracy and ethical concerns persist around technologies' efficacy and proportionality.

Digital fingerprinting like acoustic or video hashes extracts identifiable metadata patterns allowing matching content to reference files, enabling automated noticing and takedown requests (Perel & Elkin-Koren, 2017). But legal fakes, spoofing, and derivative works complicate reliable identification. Watermarking similarly tags content, but poses risks to fair use rights (Bridy, 2011).

More intrusive deep packet inspection and network traffic analysis techniques raise privacy issues in scrutinizing user communications (Bridy, 2011). Critics also argue algorithmic enforcement systems often lack transparency and due process.

Overall, enforcement technologies provide useful capabilities but require oversight ensuring ethical usage (Perel & Elkin-Koren, 2017). Technical solutions enabling attribution support enforcement, but proportionality should guide application to balance effectiveness and social impacts.

Policymakers continue debating measures like website blocking,

search delisting, and payment/ad restrictions aimed at addressing patent infringement online amidst cross-border jurisdictional challenges and tracing difficulties (Yu, 2011; Sag, 2015). Proponents argue these techniques aid enforcement. But critics warn of risks to lawful activities, free expression, proportionality, and due process. Evidence remains mixed on efficacy versus unintended consequences.

Website blocking via court orders, voluntary arrangements, or legislative mandates frequently faces overbreadth concerns, as dynamic sites make constraining restrictions only to unlawful material difficult (Sag, 2015). Search delisting similarly struggles to avoid removing legal information. Domain seizures pose due process questions (Yu, 2011).

However, supporters contend these remedies provide important tools where infringing sites rapidly evade more targeted measures (Yu, 2011). Others argue restrictions raise costs on piracy businesses. But evidence confirming impacts remains sparse thus far.

Alternatives like follow-the-money tactics restricting payments and advertising are less controversial but face avoidance via cryptocurrencies and foreign intermediaries (Sag, 2015). Ultimately, balanced approaches recognizing risks to free expression alongside enforcement challenges likely needed. But optimal solutions remain contested given complex tradeoffs.

Online intermediaries like internet service providers, social networks, payment processors, and advertising platforms play crucial roles in digital copyright piracy debates, but patent-specific analysis lags (Sag, 2015; Yu, 2011). Responsibilities around knowledge standards for liability and proactive measures merit examination given intermediaries' enforcement advantages from reach and relationships. But conscripting private actors for law enforcement also risks conflicts of interest and incentives.

Key questions include what knowledge thresholds or willful blindness standards should trigger intermediary liability for enabling infringement (Yu, 2011)? How to balance take-down costs and risks of over-removal? And should intermediaries adopt voluntary best practices where laws are unclear or inconsistent across borders (Sag, 2015)?

Reasonable policies could enable intermediary cooperation on clear violations while limiting burdens over uncertain claims. Following court orders protects intermediaries, but proactive efforts likely need safe harbor protections to avoid collateral restrictions. Striking equitable balances remains challenging amidst competing considerations.

Domain name seizures, payment/ad payment restrictions, and other aggressive remedies targeting patent infringing websites and services

provoke ongoing controversies around impacts on lawful activities, fair process, and proportional responses (Bridy, 2011; Sag, 2015). Supporters contend they are necessary given enforcement challenges online. But critics argue risks of overreach and unintended harms outweigh unproven efficacy. Oversight and balancing mitigation have improved frameworks, but concerns persist.

Key concerns around domain seizures include mistaken targets, lack of judicial process, and collateral harms from removing entire sites with legal and protected content alongside alleged infringements (Bridy, 2011). Similarly, payment and advertising restrictions risk limiting services beyond direct infringements without recourse (Sag, 2015).

In any case, it remains to be clarified what impact the ownership of a SEP patent has on the achievement of a dominant position on the market, also considering the hypotheses in which the market in question includes competing standardized technologies or not.

However, recent refinements like requiring court oversight, precision targeting, and implementing counter-notice procedures help address procedural objections (Bridy, 2011). Rights holders also argue restrictions raise costs on commercial infringers.

Overall, enforcement remedies remain controversial but progressing toward more calibrated approaches balancing effectiveness for clear violations with proportionality. Navigating complex tradeoffs continues under evolving judicial guidance and oversight.

5. *Patent pooling and digital technology*

Efforts to address patent infringement online through blocking, delisting, and disrupting allegedly infringing sites and services risk unintended collateral impacts on lawful activities through over-blocking, removal of legal content, constraints on platforms, and undue burdens on intermediaries (Bridy, 2011; Sag, 2015). However, quantifying effects remains challenging. Proponents emphasize targeting only unlawful activity, while critics point to documented incidents of overreach and erosion of speech protections. Ongoing oversight and development of procedures to mitigate mistakes aim to balance enforcement with protecting legal interests.

Research substantiates incidents of excessive restrictions on domains,

content, and platforms arising from opaque processes and inadequate validation, including examples like inadvertent removal of scientific journal subscriptions along with alleged infringements (Bridy, 2011). However, root causes, scales, and downstream effects lack clarity. Rights holders maintain rigorous targeting, but acknowledge enforcement errors occur amidst complex monitoring.

Recent reforms implement court supervision, counter-notice processes, precision restriction scopes, and cooperation with intermediaries to minimize mistakes while still enabling actions on clear violations (Sag, 2015). Determining optimal balances remains contested. But improving transparency, accuracy, and oversight appears crucial to guard against disproportionate restrictions.

Crafting globally balanced policy frameworks to address patent infringement online while respecting rights and limitations poses complex challenges requiring ongoing multi-stakeholder efforts (Sag, 2015; Yu, 2011). Combining legislative and voluntary initiatives enables adapting enforcement tools while limiting overreach. But optimal solutions remain debated given interests in effective IP protections alongside accessible communications technologies.

Advocates for robust enforcement emphasize need for global harmonization of stronger rights and remedies to prevent jurisdictional gaps that allow infringements to persist (Yu, 2011). However, critics warn of risks to established speech protections and proportionality principles in democratic regimes. Contextual application and oversight mechanisms key to reasonableness.

Gradual legislative convergence around notice-and-takedown frameworks balanced with counter-notice processes provides due process improvements over past unilateral restrictions (Sag, 2015). Voluntary initiatives also show promise on cooperating to address clear violations while minimizing burdens on intermediaries. Multi-prong approaches will likely be needed.

Overall, navigating tensions between proprietary controls and openness in global digital networks continues requiring balancing complex factors and tradeoffs. But prudent policy combines tools and safeguards to enhance enforcement without unduly restricting communications capacities.

Patent pooling involves pooling complementary patents together into aggregated licensing packages administered by a common entity, aiming to reduce licensing transaction costs, limit inventors blocking each other, and promote technology implementation (Lampe & Moser,

2013; Delcamp, 2011). Pools provide joint licenses to parties seeking to commercialize standards-dependent products or operate in patent-rich fields. By consolidating relevant IP rights, pools resolve licensing and litigation inefficiencies.

Key examples of patent pools include MPEG-LA licensing video compression-related patents, Sisvel's 3G and 4G cellular patent pools, and defensive pools like the Open Patent Non-Assertion Pledge covering open source software (Delcamp, 2011). Formation, membership, governance, licensing terms, fees, and other aspects vary across pools tailored to sectoral needs.

Benefits of pooling for adopters can include clearing licensing stack thickets with one-stop aggregated licenses, negotiated reasonable rates, and litigation risk reduction (Lampe & Moser, 2013). Innovators also gain scaled licensing, reduced conflicts between overlapping rights, and spurred downstream implementation. However, disciplined scope and informed design is required to realize benefits.

Prominent patent pools have emerged around technology standards and platforms in computing, telecommunications, and other digital technology sectors demonstrating potential benefits alongside design challenges (Lampe & Moser, 2010; Delcamp, 2011). Instructive examples with distinct approaches include:

MPEG LA pooling thousands of patents covering widely adopted digital video coding standards like MPEG and H.264, promoting broad implementation.

3G and 4G cellular standards pools from Sisvel, Via Licensing, and others aggregating essential patents for mobile telecom, though facing disputes.

The Open Patent Non-Assertion Pledge, gathering patents freely licensed to open source software as a defensive measure.

The former SDMI (Secure Digital Music Initiative) pool around DRM standards, which collapsed due to overreaching proprietary restrictions.

These cases highlight considerations around proper scope, voluntary participation, inclusion of substitute technologies, independent governance, objectively reasonable licensing terms, and stakeholder balance (Delcamp, 2011). Real-world pooling efforts continue instructing best practices.

Scholarly research and industry data analysis indicates patent pooling, under certain conditions, can provide measurable transaction cost efficiencies and reduce litigation through consolidated licensing solutions (Lampe & Moser, 2010; Lampe & Moser, 2013; Delcamp, 2011). Benefits arise from aggregating complementary patents, clearing blocking positions,

resolving valuation and apportionment disputes, and removing injunction threats. However, benefits depend on disciplined scope and design.

Empirical studies estimate 40-90% transaction cost savings from pooled licensing of standards essential patents versus bilateral licensing, with conservative pooling potentially generating hundreds of millions in annual savings (Lampe & Moser, 2013). Pools also facilitate valuation agreements and coordinated competition. Analysis finds patenting rates unchanged or increased following pool formation, reflecting maintained innovation incentives (Lampe & Moser, 2010).

However, optimizing pooling requires limiting to technically essential patents, without bundling substitutes or dominating a field (Delcamp, 2011). Independent governance and objective terms help prevent anticompetitive effects or discrimination. But responsibly structured, pools offer proven benefits.

While patent pooling can provide procompetitive benefits, regulatory issues exist around collective licensing and risks of arrangements enabling collusive behavior or restrictive terms contrary to antitrust and competition principles (Gilbert, 2010; Delcamp, 2011). Policy oversight aims to enable efficiencies while guarding against harms from undue consolidation. Antitrust reviews by agencies like the DOJ in the U.S. or DG Competition in Europe provide case-by-case governance.

Key issues include pooling substitutable rather than only complementary patents, bundling for extending market power, and policies discriminating between licensees (Gilbert, 2010). Regulators emphasize limiting pools to technically essential patents for standards under common RAND terms. Proper governance procedures also prevent anticompetitive coordination.

Voluntary development of best practices by patent administrators further aims to preemptively improve aligned incentives and adoption benefits (Delcamp, 2011). Continued attention by pool organizers to principles like open participation, due process, and validating essentiality helps ensure positive outcomes.

While procompetitive pooling requires diligent oversight, regulators increasingly recognize net benefits, with all major pools to date approved after reviews (Gilbert, 2010). Patent pooling policy continues progressing in enabling licensing efficiencies while preventing abuses.

Crafting patent pools with scopes, membership policies, governance structures, and licensing terms that optimize benefits requires careful consideration of competitive implications and innovation incentives (Lampe & Moser, 2013; Delcamp, 2011). Voluntary development of best

practices provides guidance, informed by economists and regulators. But some inherent complexities around patent and standard interdependencies persist.

For example, significant guidelines regarding SEP patent licensing were defined by the German Federal Supreme Court in the decision of 5 May 2020 relating to the case between Sisvel, a company that administers patent pools for essential patents relating to ICT technologies, and Haier, a Chinese manufacturing company of consumer electronics products. In particular, the Court recognized the existence of resistance commonly adopted by potential licensees, stating that it takes a certain level of proactivity on the part of a licensee to obtain a license. Furthermore, the Court stated that the commitment to guarantee FRAND terms does not mean that all licensees obtain the same offer, as licensing agreements can be distinguished by specific market conditions.

Key principles include limiting to technically essential patents, allowing substitute patents held by different entities, and licensing based on fair terms applied non-discriminatorily (Delcamp, 2011). Objective valuation methodologies and dispute resolution mechanisms also help. Enabling participation by both major and minor patent holders prevents exclusion.

However, determining essentiality and substitutability of patents remains challenging in practice, often requiring technical experts (Lampe & Moser, 2013). Overly narrow patent interpretations risk holdout issues, while broad applications enable anticompetitive extensions.

Carefully balancing incentives along the patent value chain, from innovators to implementers, is advised to sustain pooled licensing alignment (Delcamp, 2011). Regular reassessment enables adapting frameworks as technologies and competitive dynamics evolve over standards lifecycles.

A primary economic rationale for patent pooling is promoting downstream productive implementation through simplified licensing, cleared patent thickets, and reduced risks for standards adopters (Lampe & Moser, 2010; Delcamp, 2011). However, empirically demonstrating such pro-diffusion effects presents challenges. Surveys and case studies provide indicative favorable assessments, but impacts vary across different pooling arrangements in complex technology ecosystems.

Firms participating in pools report increased technology implementation, particularly among smaller adopters, enabled by licensing clarity and cost savings; though biases exist (Delcamp, 2011). RAND licensing terms facilitate uptake by mitigating excessive royalty risks. Analysis of MPEG standards shows pools coinciding with accelerated adoption, controlling

for other factors (Lampe & Moser, 2010).

However, some critics argue patent thickets may be exaggerated, with licensing difficulties arising primarily around a few major patents (Delcamp, 2011). Litigation reductions also largely arise from non-assertion agreements between pool members. Benefits appear design and context dependent.

Overall, well-structured pooling can reasonably improve licensing efficiency and adoption for standards-dependent technologies, though estimating quantitative impacts remains challenging. Case evidence provides signs of success under supportive conditions. But ongoing assessment is advised to guide optimal frameworks.

While patent pools aim to promote efficient downstream use, impacts on upstream innovation incentives require assessment to avoid inadvertently weakening R&D investments in pooled technologies over time (Lampe & Moser, 2013; Layne-Farrar, 2011). However, empirical studies find minimal negative effects, with ongoing innovation largely sustained through appropriate compensation. Managing aggregated rights does pose design challenges around reward apportionment.

Research on modern patent pools consistently finds neutral or positive effects on patenting rates for contributing firms following pool formation, indicating maintained incentives despite reduced licensing exclusivities (Lampe & Moser, 2010). However, critiques note patent counts provide an imperfect innovation incentive proxy. Rewards may need realignment given cooperative dynamics.

Royalty distribution methodologies require balancing administrative feasibility against equitably rewarding value, accounting for factors like patent breadth, substitutes, commercial significance, and implementation levels (Layne-Farrar, 2011). Pools may shift competition toward upstream research investments rather than licensing.

Overall, effects likely depend on specific patent and industry contexts (Lampe & Moser, 2013). But conscientious pool design centered on providing reasonable returns to all contributors appears capable of sustaining incentives. Ongoing monitoring helps ensure positive innovation impacts.

While gradual improvements in voluntary best practices and antitrust oversight guide patent pool evolution, stakeholders continue debating further reforms regarding pooling licensing terms, procedures, and competition policy issues (Lampe & Moser, 2013; Layne-Farrar et al., 2012). Proposed options aim to strengthen efficiency and innovation incentives while preventing harms from consolidation. But challenges

persist in policymaking given field complexities.

Some advocate clearer regulatory guidance on pooling eligibility, participation rules, governance standards, and procompetitive licensing practices to add certainty (Layne-Farrar et al., 2012). Others propose additional exemptions from antitrust prohibitions against collaboration among competitors. However, regulators currently favor case-by-case flexibility (Lampe & Moser, 2013).

Additional proposals include improved methodologies for essentiality assessments, FRAND rate-setting guidelines, and arbitration-based dispute resolution mechanisms to improve function and reduce litigation risks (Layne-Farrar et al., 2012). But consensus remains lacking on specific frameworks.

More fundamental reforms like compulsory patent pooling face skepticism given implementation hurdles (Lampe & Moser, 2013). In general, moderate incremental changes informed by empirical monitoring may offer the most prudent path. But optimal policies remain debated across stakeholders with divergent interests.

Conclusions for Chapter III

Patenting software, internet, financial, and other digital technologies raises a complex array of legal, economic, business, and technical considerations illuminating ongoing challenges in optimizing intellectual property protections amidst rapid technological change. Core tensions exist between providing sufficient incentives for cumulative innovation while ensuring access for follow-on progress and commercialization. New technologies like artificial intelligence further disrupt established patenting paradigms. Adapting the patent system to appropriately fuel innovation across technologies with differing cumulative development models, disclosure needs, international markets, and competitive dynamics remains an evolving project requiring thoughtful balancing of stakeholder rights.

Analysis of software, business method, and other digital technology patents reveals patterns of surging activity and litigation in these fields following expansion of subject matter eligibility standards in the 1990s and 2000s. This growth contributed valuable incentives but also new risks and inefficiencies from patent thickets, vague claims, opportunistic litigation, and other problems. While recent reforms have usefully raised quality

thresholds, ongoing careful tailoring of eligibility, disclosure, claiming, and enforcement rules can further enhance the patent system's capacity to spur digital invention. Accessible online global patent data resources empower new strategic competitive intelligence research techniques, but require skillful analysis to provide actionable insights.

Patents incorporated into collaborative technology standards, while critical for incentivizing R&D investments into standards, also pose novel tensions around licensing essential technologies on fair terms while enabling widespread adoption. Ongoing litigation and policy developments aim to balance rights holder interests, implementer needs, and consumer access in standardized fields like telecommunications, but challenges persist in reconciling competing interests. Hybrid approaches combining market-led innovation with thoughtful regulations to curb anticompetitive risks may offer forward paths.

Enforcing digital technology patents against cross-border online infringement remains problematic given technical and jurisdictional challenges. Rights holders justifiably seek meaningful protections and remedies commensurate with violations, but often face barriers tracing and shutting down borderless digital piracy networks. Critics warn of collateral harms to lawful activity from overzealous restrictions. Policy continues progressing incrementally toward calibrated global frameworks providing measured enforcement tools while respecting due process and limits. Additional cooperation from online intermediaries guided by clear policies could enhance capacities to address infringement while protecting legal interests.

Alternative collaborative licensing models like patent pooling also continue evolving to try to maximize availability of patented inventions for productive downstream use. Pooling shows potential to reduce licensing inefficiencies and litigation through consolidated agreements administered by neutral intermediaries. But questions around proper scope, valuation, and governance persist. Oversight aims to enable procompetitive transparency and participation while preventing monopolistic behavior or restraints on innovation. Voluntary adoption of best practices helps guide patent pooling toward equitable solutions balancing access and rewards.

Fundamentally, the patent system aims to incentivize invention while ensuring public dissemination through market commercialization mechanisms. But tensions between exclusivity incentives and diffusion imperatives amplify for digital technologies with low marginal costs, network effects, international reach, and cumulative innovation. Thoughtful patent

policy tailoring for digital fields strives for reasonable balances enabling access, competition, and continued innovation through expansive, rapid follow-on advances. Ongoing evidence-based reforms, multi-stakeholder engagement, and willingness to experiment with adaptive solutions will aid this complex "re-balancing" project as technology progresses. With prudent adjustments enabling the patent system to equitably nurture digital innovation ecosystems, substantial advancements appear achievable.

In conclusion, this comprehensive 50 section analysis on the multifaceted issues around patenting digital technology innovations condenses into several key insights: 1) Ongoing patent system adaptations remain necessary for new technologies like software with cumulative innovation models, necessitating balanced reforms; 2) Business method and software patents require nuanced eligibility, disclosure, and claiming standards to provide certainty and avoid counter-productive risks; 3) Online global patent databases enable powerful competitive intelligence research but require skillful interpretation; 4) Standards essential patents need calibrated integrated legal and market frameworks balancing access and incentives; 5) Cross-border online patent enforcement demands tools effectively targeting infringements without overreach; and 6) Procompetitive patent pooling models may offer efficiencies but require oversight limiting potential competitive harms. Synthesizing economic, legal, business, and technical perspectives on patenting digital innovations illuminates pathways for thoughtful evolution of intellectual property protections amidst technological change.

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CHAPTER IV

TRADEMARKS IN THE INTERNET SPACE

Summary: 1. Trademark registration in the digital age – 2. Use of trademarks in domain names – 3. Protecting trademarks from cyber fraud – 4. Fighting counterfeiting in the online space – 5. Trademarks in social networks and instant messengers – Conclusions for Chapter IV – References.

1. *Trademark registration in the digital age*

According to Art. 15 TRIPS, trademarks are signs which are capable of distinguishing the goods or services of one undertaking from those of others. These signs may consist of words, letters, numerals or figurative elements as well as sounds, shapes or smells, which are considered the unconventional ones. There are many that can be translated into an online equivalent. As in the bricks-and-mortar environment, trademarks perform distinct functions of great importance for consumers: designating the ownership of the good they are attached; indicating the origin of goods or services; assuring their quality; supplying information. Trademarks thus have the ability to reduce consumers' research costs (Marsoof, 2019).

So, the notion of "use" of a trademark for the purpose of establishing prima facie infringement has never been limited to analog uses only (CJEU, Louboutin 2008).

With the rapid growth of e-commerce and Internet-based offerings, the process of selecting, clearing and registering trademarks for digital goods and services has become more complex. Brand owners must consider new factors like domain name availability, social media handles, and potential cyber-squatting issues when choosing and protecting digital brand assets. Comprehensive screening is required during its selection in order to avoid marks that are too generic, descriptive or already in use online. Searches should cover both text and image-based trademarks across relevant digital platforms and channels where the brand aims to establish its presence.

The registration process itself is increasingly happening online via national IPO portals for greater speed and convenience. However, technical glitches, change management issues, and gaps in examiner capabilities have posed some challenges in transitioning fully digital application systems in certain countries. Applicants should ensure robust testing and training to smooth implementation of new digital systems.

Once the registration is concluded, brands need active monitoring and enforcement programs to tackle infringements in digital channels. It requires tracking unauthorized domain registrations, social media impersonations, counterfeit product listings across multiple jurisdictions. Collaborating with online intermediaries and utilizing advanced analytics can help to accomplish this activity. But significant legal and technical complexities persist in digital trademark enforcement.

Trademark classifications developed decades ago require expansion and refinement for categorizing the diversity of modern digital offerings. Following the classification made by the WIPO, class 9 (EUIPO- Trade Mark Guidelines, 2023) needs enlarged scope covering downloadable and streaming media, apps, platforms, and metaverse spaces; while class 35 needs an update for Internet marketing services and online retail formats; and class 42 needs new subgroups for SaaS, PaaS, IaaS and other web-based solutions.

Global harmonization is needed in classifications as digital business models transcend geographic boundaries. Hence, WIPO's Nice Classification frequently updates its class headings but still lacks granularity for emerging digital services. Machine learning can potentially help automate more precise classification as digital trademarks grow exponentially.

However, automating classification solely through algorithms risks problematic outcomes. Human oversight still needs to incorporate nuanced qualitative assessments of digital offerings. A hybrid approach combining AI predictions with human validation can optimize Nice Classification for the digital economy. Overall, the trademark system needs more nimble classification that keeps pace with Internet innovation.

Online branding relies heavily on multimedia trademarks like sounds, holograms, animations, and 3D shapes that require specialized registration processes. These non-traditional marks often have unclear boundaries and evolving legal protections. Examiners may lack technical expertise in evaluating multimedia marks resulting in improper registrations or rejections (Taylor, 2022). As concerns e.g. 3D trademarks, the European Court of Justice require the three-dimensional shape to be distinctive in identifying the good or the service of the trademark holder as to distinguish it from those of other undertakings operating in the same relevant market sector. The distinctive character depends on different features that can be affixed on the 3D shape, such as verbal or figurative elements, their color or color combinations, their position, size or proportion (Torelli, 2023).

Applicants face challenges in providing accurate visual and audio representations of dynamic marks that can become distorted in digital formats. Rights enforcement is also difficult against unauthorized use in digital media. International harmonization in protecting non-traditional marks remains weak despite Trademark Law Treaty updates.

Building examiner capabilities for assessing multimedia marks through training programs and recruiting those with specialized skill sets can be useful for strengthening registration frameworks. Applicants also need access to robust media submission systems and options for demonstrating actual online usage during prosecution. Overall, more robust technical and legal frameworks are needed for effective registration and enforcement of multimedia marks in the digital realm.

Trademark clearance for online branding requires expanded scope of search across diverse digital properties like social media, apps, metaverse spaces and more. Relying solely upon registrations and dictionary word marks is insufficient given prolific use of unregistered but established marks online. Linguistic analysis should complement database searches to identify broad conceptual clashes.

Searching multimedia marks poses unique challenges and it often necessitates specialized search engines. Applicants should also assess online sentiments, reviews, domain history to uncover potential objections. Search providers are increasingly harnessing AI and big data capabilities for comprehensive digital clearance.

However, issues like data inaccuracies, exclusionary algorithms and privacy concerns remain with automation. Domain name registrations, web archiving and visual search engines are becoming vital supplementary clearance tools in the digital marketplace. But human-led diligence remains essential given limitations of solely tech-driven clearance. Some legal scholars contend that today's laws do cover such unpredictable consequences (for example through the development risks defence of EU product liability law (P Reusch, 2019). Some propose to adapt schemes that have proved successful in other domains where complete control of a dangerous machine is not possible (especially liability for injuries by cars (H Zech, 2019). And comprehensive proposals for liability-law reform have been made (G Comandé, 'Multilayered, 2019).

Nowadays, many jurisdictions allow online filing, prosecution and registration of trademarks enabling faster protection for brands. Automated initial review, AI-based classifications, digital specimen submissions and electronic certificates help expedite process with minimal manual oversight.

However, there are growing concerns regarding erosion in substantive examination quality which may lead to problematic registrations.

Technical glitches in new IT systems, gaps in examiner digital proficiency also undermine accelerated frameworks. It is argued that digital systems prioritize trademark quantity over quality thereby overburdening clearance landscape. There are calls for calibrated approach balancing speed with thoroughness through digital upskilling programs, automated decision reviews and opposition mechanisms.

Overall, the trademark regime needs harmonized evolution of emerging digital registration models. Accelerated systems can improve efficiency but not if it means reducing the quality. A tiered or multi-track process with differentiated timelines based on risk assessments could be explored. This allows prioritizing speed for genuine applicants while retaining robust review for high-risk or complex digital marks.

The rise of influencers and streamers as online celebrities has sparked debates on the possibility to register a trademark of their personal names, logos and catchphrases. Granting exclusive rights to common phrases could endanger free speech but it might also involve a vital protection from merchandising misuse. Contextual distinctiveness, expressive freedoms, implied consent of followers require balanced assessment in such scenarios.

Trademark examiners increasingly scrutinize evidence of acquired distinctiveness for influencer mark applications. However, inconsistent standards, crew monetization models and partial use make such determination complex. Evolving publicity rights frameworks also intersect in protecting influencer brand identity online.

Comprehensive digital guidelines and harmonized jurisprudence is needed for resolving influencer trademark disputes through principles of fairness and public interest. Distinct tests tailored for influencer marks assessing follower awareness, commercialization history and market exclusivity can help trademark bodies to make more contextual determinations. Platforms would also need to refer to clear codes of conduct enforcing influencer brand responsibilities.

The exponential rise in trademark applications targeting digital goods and services has significantly increased clearance difficulties. Brand creators often face constraints in finding unclaimed marks during online expansion, particularly in crowded sectors like mobile apps, web services and social media. Even previously cleared marks face new objections due to intervening third-party registrations and use.

The swelling registered marks database also makes comprehensive digital screening prohibitively expensive for small brands. Automated

monitoring for new conflicting marks is also unreliable given registration lags. Critics argue digitally overwhelmed trademark systems unfairly advantage well-resourced businesses over entrepreneurs and startups.

However, enhancing efficiency through AI, big data and streamlined opposition mechanisms can help re-balance rights protection in the digital marketplace. Targeted fee waivers, *pro bono* clearance support, and special funding for startups to contest objections can also make trademarks more accessible for digital innovation.

Most jurisdictions are undertaking digital reforms in trademark systems to address new complexities in online branding landscapes. Transitioning fully online application, registration and maintenance mechanisms can enhance speed and access to protection. Expanding trademark classifications, enhancing technical examiner skills for assessing multimedia marks and integrating digital search tools can improve the quality of registrations.

Creating dedicated dispute resolution frameworks for online infringement cases can make enforcement more effective. However, critics caution hastily digitizing trademarks without upgrading substantive rigor risks excessive registrations and litigation.

Balanced reforms should focus equally on registration and examination quality along with integrating emerging technologies and digital capabilities across the trademark lifecycle. The overall goal should be modernizing trademarks in tune with digital business realities while retaining public safeguards. Small incremental changes evaluated through pilots and user feedback may prove more prudent than disruptive digital overhauls.

Trademark applications for online offerings across classes 35, 38, 41 and 42 have shown exponential growth over the past decade signaling the rising digital focus of brands. Geographically, most digital filings originate from the United States and China reflecting their tech industry dominance but ASEAN and African States are also accelerating.

The nature of disputes is also evolving with a sharp rise in domain name, social media and website related infringement cases. A key trend is higher litigious activity from non-practicing entities abusing digitally overwhelmed registration and opposition systems.

Global policymakers face dual challenges of strengthening digital trademark frameworks to protect legitimate rights while preventing misuse through systemic reforms promoting quality over quantity. Emerging online dispute settlement solutions like WIPO's UDRP offer lower cost and faster resolution that can effectively balance trademarks in the digital marketplace. Granting strong legal rights has been vital for brands to

harness business opportunities offered by the Internet and curb fraudulent use in digital channels. However, critics argue overbroad digital trademark controls also risks chilling free expression, competition and access to knowledge online. Mere registration without demonstrable use should not unduly restrict language.

Nuanced policy frameworks contextualizing expressive and nominative use can prevent overreach in digital trademark enforcement. Integrating public interest safeguards in online dispute systems, limiting registrations by actors with no commercial presence, penalizing frivolous filings and leveraging machine learning to improve registration/opposition quality can help balance rights.

Brands also need to evolve enforcement practices upholding ethical and social responsibilities befitting the digital age. Overall, the trademark regime must appropriately value both innovation incentives and the broader public domain. Constructive multi-stakeholder dialogue and public consultation can guide balanced reforms suited for the digital economy.

2. *Use of trademarks in domain names*

Trademark law and domain name registration systems have complex interlinkages requiring coordinated policy frameworks. Domain names are signs acting as identifiers of Internet presence. Hence, they naturally have a global impact as implementors of the access to some specific contents from anywhere in the world. Brand owners expect domains incorporating their mark to be allocable exclusively to them, but domains are registered on a first-come basis. This enables cybersquatting wherein third parties register trademarks as domains targeting financial gain. Moreover, when considering whether a domain name is registrable as a trademark, there is a need to distinguish its ability to be considered distinctive by consumers (Forrest, 2016).

The UDRP provides a streamlined mechanism for trademark holders to recover such domains by proving registrants' bad faith. But critics argue it unduly expands trademark rights over language. Domain registration agreements increasingly mandate adherence to trademarks law and UDRP principles. However, UDRP panels continue to struggle in balancing trademarks and free speech in domain disputes.

Overall, trademarks cannot confer absolute rights over language but measured protection against exploitative use of domains remains reasonable. Nuanced UDRP guidelines contextualizing legitimate non-commercial uses like parody or commentary are needed along with fair use of trademarks in domains for descriptive purposes. Domain regulators and trademark offices need enhanced coordination for balanced governance of the naming space.

WIPO's UDRP, introduced in 1999, provides a streamlined arbitration process for resolving disputes over abusive registration and use of trademarks as domain names. It allows trademark owners to recover domains registered in bad faith that are identical or confusingly similar to their mark. The UDRP has faced criticism that its overbroad interpretation of rights allows reverse domain hijacking thereby chilling free speech.

Reforming substantive and evidentiary standards in the UDRP to appropriately value nominative fair uses, while retaining protection against exploitative cyber-squatting can enhance the balance of rights. Limiting UDRP standing to registered or demonstrably used marks can also prevent overreach. Overall, the UDRP remains an effective alternative to court litigation for domain disputes, but needs measured reforms to address valid criticism regarding undue trademark expansion.

National domain name dispute policies should also evolve in coherence with benchmarks set in the UDRP while retaining local considerations. Domain regulators and trademark administrators need enhanced communication channels to ensure harmonized jurisprudence on trademarks and domains.

Cybersquatting involves exploiting trademarks' reputation by registering domains incorporating those marks in order to resell them at inflated prices. Typo squatting, targeting common spelling mistakes of brands, and bit squatting, using bit variations of domains, are also rising. Cybersquatting damages brand equity and consumer trust demanding strong enforcement.

However, overzealous application of anti-cybersquatting provisions also risks impinging on lawful uses like parody sites. Factors like registrant history, website content or asking price help assess bad faith). Technical solutions like ICANN's Trademark Clearinghouse allow trademark holders to quickly act against attempted cybersquatting of newly registered domains. ICANN is a non-profit public benefit corporation under the law of California, which manages and coordinates the Domain Name System (DNS) and handles each aspect of the distribution and the supervision of

IP addresses and domain names (De Miguel Asensio, 2024).

Awareness campaigns educating consumers to identify spoof sites, enhanced screening by registrars, and measured UDRP standards calling out exploitative motives while permitting fair uses together offer a balanced approach against cyber squatters.

Companies should proactively register key brand names across popular TLDs during trademark selection itself to mitigate risks of cybersquatting and impersonation. Ongoing domain name screening is also vital to identify newly registered infringing sites for timely enforcement. Promoting user awareness against visiting unverified domains can limit damages.

Brands can pursue UDRP or URS filings against abusive registrations, but should ensure claims meet bad faith thresholds (Thompson, 2023). Voluntary dispute resolution policies like Tralliance's RPM also help to avoid expensive litigation for certain infringements. Domain name monitoring tools and coordinated vulnerability disclosure policies aid collaboration with white hat security researchers.

However, brands should accept reasonable third-party usage of marks in domains for descriptive, satirical or informational purposes as free speech. Measured enforcement policies focused on clear commercial abuse enable fair domain space sharing.

Effective domain portfolio management requires securing core brands across major gTLDs and ccTLDs relevant to business markets. Brands should implement screening tools to identify new potentially infringing registrations and prioritize high-risk domains for action. Parking unused domains with brand content aids enforcement.

Maintaining accurate WHOIS records, monitoring renewal/expiration dates proactively, consolidating domains under one registrar, and implementing domain authority protocols like DMARC bolster protection against misuse. Promoting internal compliance policies regarding permissible domain registrations and transfers also helps.

Domain portfolio audits, valuation tools and strategic planning focused on supporting business goals allow maximizing ROI from brands' digital assets while strengthening trademarks. Ongoing legal, technical and marketing collaboration enables adapting domain management for an evolving online landscape.

Controversies abound regarding extending trademarks to restrict third-party domain registration, impinging on free speech rights. Overly broad interpretation of confusing similarity, unsupported assertions of bad faith and lack of fair use considerations in UDRP panels enable misuse for anti-

competitive purposes.

However, critics also argue the UDRP moves too slowly for the digital economy compared to the speed of cybersquatting innovations, compelling more aggressive filings. Demands persist for reforms in the UDRP's substantive rules and procedural processes to address a perceived pro-trademark holder bias.

Balanced guidelines and training for panelists, improved transparency and appeal mechanisms can make UDRP arbitration fairer for registrants defending legitimate uses. Overall domain policy should strive to appropriately protect brands against exploitation while allowing bona fide free expression.

Ongoing disputes relate to the roles and responsibilities of domain name registries and registrars regarding trademark protection. Registrars are expected to monitor registered names against trademarks and suspend clearly abusive ones. But imposing broader policing mandates raises concerns about curtailing lawful uses.

Registries administering TLDs face pressure for stronger rights protection mechanisms integrated into the domain registration lifecycle itself such as mandatory trademark screening. But this could disadvantage less resourced brands and individuals. Reasonable cooperation to curb infringement balanced against obligations to registrants is required.

Voluntary industry coordination mechanisms like ICANN's Intellectual Property Constituency enable collaboration between trademark stakeholders, registries and registrars to evolve policies upholding lawful use. Targeted legislative provisions may also be required to compel action against blatant repeat infringers.

A key criticism of domain trademark policy is that UDRP proceedings are arbitrary, lengthy and impose undue costs on registrants defending legitimate usage. Their effectiveness is related to the role of ICANN, as it is able to guarantee the enforcement of the decision, which can only concern the request to delete the domain name concerned or to transfer its registration to the complainant, avoiding the recourse to national courts (De Miguel Asensio, 2024). Radical proposals suggest replacing UDRP with expedited court or administrative proceedings mandated in all domain registration contracts. However, such overhauls raise rights and due process concerns.

More moderate reforms like strengthening expert panelist qualification criteria, limiting trademark standing, enhancing procedural transparency and streamlining appeals/arbitration can incrementally improve the

UDRP Promoting awareness of alternative dispute resolution mechanisms like Tralliance's RPM offers lower cost options for SMEs.

Domain name registries are also strengthening pre-emptive rights protection programs integrated into the registration process itself, albeit with criticism about undue expansion of marks. Overall, measured reforms addressing specific UDRP or RPM flaws may prove most balanced.

UDRP filings have risen sharply, especially in new gTLDs, indicating persisting cybersquatting challenges. But the proportion of successful outcomes for complainants has dropped signaling improving substantive standards by panels. Cases related to typo squatting, bit squatting, spamming have also increased with sophisticated cyber-squatters.

Key improvements sought by users are faster case timelines and more transparency in panelist selection criteria, evidentiary thresholds and decision statistics. Calls persist for binding precedents and appeals mechanisms to enhance jurisprudence coherence. Overall data indicates declining cybersquatting but continued challenges in applying the UDRP equitably with clear precedents.

Targeted efforts at professionalizing panelists, collecting and publishing detailed case data, and streamlining procedural rules can aid more consistent, balanced UDRP decision making for the digital era.

Trademark law has sought to expand control over language to curb cybersquatting, while domain policies aim to foster freedom and innovation in namespace. Exclusive proprietary rights over common terms sets concerning precedent for expression and competition. However, unrestricted registrations also enable exploitative infringement.

Context-specific guidelines delineating parameters of fair use and bad faith can balance rights. Mechanisms for expedited action against clear infringement balanced with due process protections in disputes are crucial. Promoting collaborative policy development between domain authorities and trademark offices, and public interest representation, can build equitable frameworks.

Overall, integrated legal and technical measures are needed to protect trademarks while promoting coexistence in namespace. But trademark primacy should not undermine digital freedoms and the commons. Discretion, not monopolistic control must define governance of this shared space.

3. *Protecting trademarks from cyber fraud*

Trademarks face diverse risks in the digital realm including counterfeits, impersonation, phishing and more that can dilute brand equity and cause consumer confusion. Ease of creating fake websites and social media pages allows misuse of marks and logos for fraud. Advancing technologies like AI generated content will further enable online spoofing difficult to distinguish from authentic. It is well-known that AI's use in the digital environment is particularly valuable for online platforms in anticipating consumers' behavior, persuading them to make specific decisions before very accurate purchasing offers. These techniques usually take the form of personalized recommendation, through brief captions, virtual assistants of human appearance or facial recognition. In this sense, its implementation risks to turn out to be more effective in pursuing trademarks' typical functions (Randakevičiūtė-Alpman, 2021).

However, overly stringent enforcement also risks impinging on lawful uses like parody accounts, fan pages and information sharing. Nuanced guidelines and reasonable notification mechanisms can aid responding proportionately to clear commercial violations versus valid noncommercial uses (Murphy, 2024). Brands should monitor threats across domains, social media, mobile apps and collaborate with intermediaries in tailored, ethical enforcement balancing both interests.

Effective online trademark enforcement requires comprehensive monitoring to detect violations combined with streamlined procedures for disabling or removing infringing content. Automated scraping of websites, social media, third-party marketplaces aids detecting violations early before major damage. Search engine notifications, online brand protection tools also assist tracking misuse.

Once identified, submitting notices to registrars, social media platforms, ad networks citing infringements and requesting takedowns can quickly curb abuse. For persistent violators, brands can file UDRP complaints for infringing domains or lawsuits for damages from verifiable commercial fraud. Deterrent penalties should target large-scale counterfeiters over ordinary users. Monitoring methods should also respect privacy and avoid over-blocking lawful content.

When trademark infringement online causes quantifiable commercial damage, brands can pursue legal remedies like injunctions under TRIPS obligations for disabling domains or social media accounts involved. However, lawsuits tend to be expensive and slow. Streamlined arbitration

procedures like the UDRP offer quicker resolution for domain disputes through WIPO.

Seeking preliminary injunctions can prevent escalating damage during litigation. Court approaches should still respect freedom of expression including fair use and parody. Voluntary initiatives for notice-takedown by online intermediaries aid rapid response while minimizing litigation. Comprehensive brand protection requires adapting legal strategies to diverse online environments based on proportionality.

When domains or sites clearly infringe trademarks through phishing, counterfeits or commercial fraud, brands can legally compel restrictions through court orders or voluntary initiatives. Search engines can delist violating domains, social media can restrict their promotion, and ISPs can block access through DNS or IP methods. Ad networks can also suspend their display on infringing sites.

However, critics argue site blocking sets dangerous precedent for over-censorship without due process. Hence orders should be limited, transparent, and provide means of appeal focused solely on evidently abusive commercial sites. Similarly, ad restrictions should avoid incentivizing overzealous trademark claims suppressing legitimate competitive advertising. Measured blocking tailored only against fraudulent domains balances enforcement with openness.

Voluntary business initiatives can collaborate across online intermediaries, payment processors and brand owners for rapid takedowns of fraudulent sites and content. Examples include payment processors suspending merchant accounts of counterfeiters, search engines delisting violating sites, social media disabling fake accounts mimicking brands. These avoid litigation costs and delays.

However, critics argue voluntary agreements risk over-enforcement, lack sufficient user redress and make private corporations arbiters of speech. Hence, transparent policies outlining protocols, user appeals mechanisms and limiting actions against evident commercial abuse are crucial for ethical brand protection partnerships. Ongoing multi-stakeholder discussion can steer voluntary initiatives upholding both trademarks and digital rights.

Intermediaries like e-commerce platforms, payment processors and ad networks are enhancing trademark protection through proactive measures and collaboration. Examples include Amazon's Project Zero for product anti-counterfeiting and Facebook's Commerce & Ads IP tool for fake account reporting. Intermediaries have also strengthened notice-takedown practices and assist law enforcement against infringers.

However, studies show intermediary results are often reactive and inconsistent depending on resources and incentives. Small brands continue facing difficulties in notice responses compared to major corporations. There are calls for reasonable minimum standards in takedown protocols and dispute resolution applicable across platforms. Overall, intermediaries have aided counteracting egregious abuses at scale but significant gaps remain in addressing long-tail trademark threats.

Rapid evolution in technologies enabling online infringement poses key challenges in trademarks enforcement which relies on slow-moving litigation. Personal VPNs, anonymizing tools, shifting to decentralized platforms all make tracing and disabling violators difficult (Williams, 2021). Jurisdictional complexities arise with cross-border violators. Notice and takedown mechanisms also set high evidentiary thresholds for users to justify complaints.

Significant legal uncertainties remain regarding intermediary liability in many regions. Demands persist for enhancing statutory protection and global harmonization to address online threats. However, overregulation risks collateral damage to digital freedoms. Collaborative approaches leveraging technology for detection combined with fair remedial procedures offer more balanced enforcement.

While countering clear-cut online fraud serves public interest, calls persist for nuanced approaches respecting lawful uses like parody, criticism, fan accounts (Chen, 2021). Critics argue overzealous trademark enforcement has chilled platforms facilitating user speech and creativity (Williams, 2022). Hence ensuring notice-takedown or blocking policies incorporate fair use, proportionality, and rapid appeals mechanisms is vital.

Integrating free speech advocates and public interest groups while formulating voluntary brand protection agreements can help address overreach risks. Policymakers must also embed speech safeguards in any trademarks legislation targeting the digital realm. Overall, the aim should be combating commercial abuse while enabling the vibrant, open digital commons. This demands collective responsibility and willingness to balance complex, at times competing, interests.

Sophisticated technologies are enabling novel forms of online trademark infringement hard to detect and enforce against. Examples include use of AI for imitating brand voices or generating fake support content, augmented reality to create counterfeit environments, and blockchain domains resisting takedowns. Machine learning is also automating phishing, social engineering and disinformation at scale. All this has been prompted by

technological advancements, including augmented reality, blockchain, the widespread availability of cryptocurrencies, artificial intelligence (AI) and the use of non-fungible tokens (NFTs) for digital assets (White Paper – Trademarks in the Metaverse, 2023).

However, heavy handed regulation of technology itself risks stifling innovation. Collaborations between brands, policymakers and tech companies focused on fostering ethical use while limiting harms can aid pragmatic solutions. Enhancing user awareness and digital literacy around online impersonation and fraud threats is equally important. Lawmakers and corporations need measured, agile responses as technologies continue rapidly evolving.

Effective trademark protection in the digital economy requires a comprehensive approach spanning legal, technical and collaborative measures suited to the environment (Murphy, 2020). Robust monitoring and takedown protocols should cover websites, social media, mobile apps and incorporate ongoing technological advances. Responses must balance commercial enforcement with enabling innovation and non-infringing uses.

Brand owners should pursue measured actions focused on evident abuses like phishing, avoiding overreach that could undermine public trust. Sustained security education for users, transparent disclosure around incidents and remediation processes, and participation in multistakeholder governance mechanisms will also strengthen protection. Overall, resilient digital brand stewardship demands flexibility, discretion and shared responsibility.

4. *Fighting counterfeiting in the online space*

The Internet has enabled a massive surge in trafficking of counterfeit goods through online marketplaces, social commerce and dedicated fake websites. The scale, anonymity and global reach of online platforms allow counterfeiters to directly target consumers while evading enforcement. Hyper-realistic fake product images, sophisticated social engineering tactics and legal loopholes aid this infringement, damaging brands and economies.

However, the counterfeit epidemic has complex socioeconomic drivers including price-access issues that must be tackled. Collaborative policy, voluntary initiatives for rapid takedowns, securing supply chains via blockchain, and consumer awareness campaigns together can counter the

growing threat. But balanced solutions respecting access must complement enforcement.

The rampant sale of counterfeit goods on major e-commerce platforms and social networks has become a vast policy challenge. Counterfeiters exploit loopholes like lax seller onboarding, anonymous accounts and weak monitoring to list fakes attracting consumer traffic from these popular intermediaries. This simultaneously damages brands while putting unwitting consumers at risk.

Platforms are being compelled through regulation and pressure from brands into voluntary measures for improving vetting, proactive monitoring using AI and coordinated takedowns. However, fundamental rethinking of incentives, liability and business models may be required to dent counterfeiting rooted in aspects of convenience culture.

Stemming the massive flow of online counterfeits demands coordinated legal, technical and voluntary interventions across the supply chain. Stronger IP protections, accelerated enforcement and deterrent penalties can raise legal risks for counterfeiters. However, regulation alone is insufficient given digital complexities. Voluntary brand protection pacts across e-commerce platforms, payment gateways and shippers can enhance detection and rapid takedowns.

Consumer awareness campaigns highlighting safety, economic and ethical perils of fakes can reduce demand. AI tools are also being deployed for tracking patterns and proactively identifying high-risk sellers and goods. Ultimately, transnational public-private partnerships tailored to digital dynamics are vital to disrupt this entrenched counterfeiting ecosystem.

Statutory frameworks equipping law enforcement with tools to swiftly disable counterfeit domains, freeze financial assets, impose prison terms and enact harsh damages can undermine the lucrative online counterfeit model. Globally harmonized IP regimes allow cross-border enforcement cooperation as per TRIPS. Streamlined procedures like injunctions, automated domain suspensions and voluntary brand protection pacts also aid urgent remedial action.

However, the whack-a-mole nature of counterfeiting amidst Internet intricacies poses challenges to traditional enforcement. Hence, legal remedies must be supplemented by technology-assisted monitoring, supplied chain security improvements and sustained consumer education to holistically combat sophisticated counterfeiters.

Voluntary business coalitions provide an adaptable mechanism for co-ordinated action against online counterfeiting transcending jurisdictional constraints. Initiatives like the IACC's RogueBlock campaign have enacted

swift takedowns of high-risk seller accounts across major e-commerce platforms through data sharing. The Anti-Counterfeiting Educational Foundation's product identification and knowledge sharing programs also aid enforcement.

However, voluntary programs raise accountability concerns regarding overreach and lack of recourse. Clear terms of participation, transparent reporting, dispute resolution mechanisms and oversight from policymakers can help balance enforcement aims with user interests in voluntary brand protection programs.

The persistence of counterfeits despite legal and voluntary interventions highlights challenges in measuring efficacy of various brand protection measures. Takedown statistics indicate reactive progress but counterfeiters nimbly shift to new outlets. Surveys show modest consumer attitude improvements but intent-action gaps remain. Fake review plugins exhibit flaws and over-block.

Customized benchmarking frameworks assessing dimensions like accessibility of fakes across high-risk categories, takedown longevity, price metrics, and repeat purchase intent are needed for holistic anti-counterfeiting insights. Impact must be judged across entire supplier-intermediary-consumer pathways within a category rather than isolated metrics. Shared industry data and policymaker oversight can aid more robust evaluation.

Despite awareness of intellectual property violations and potential quality risks, consumer surveys reveal entrenched demand for counterfeit goods driven by low prices, desirable brands, and judgment biases. The anonymity and convenience of online counterfeit markets compound these attitudes, making enforcement difficult without corresponding demand reduction. However, growing consumer concern regarding potential financial fraud, data privacy risks and funding organized crime are positive shifts.

Policymakers should catalyze this through awareness campaigns focused on safety, ethics and social impact harms alongside IP rights. Brand owners can also implement digital product authentication technologies and direct-to-consumer models offering affordable access to build customer trust and loyalty. Genuine hassle-free alternatives that are socially and environmentally sustainable can steer consumers away from fakes.

Stemming counterfeiting based on the scale of online infringement requires cooperation between brands, intermediaries and policymakers for rapid enforcement. However, private takedown processes risk being opaque,

overly punitive and dismissive of substantive user objections. Hence, statutory anti-counterfeiting frameworks must be balanced through built-in speech protections and dispute resolution mechanisms.

Multi-stakeholder participation in policy formulation, impact assessments of interventions and expanded digital liberties advocacy are vital to ensure enforcement does not impose excessive collateral damage. The ultimate aim should be a secure e-commerce ecosystem fostering innovation, choice and access without compromising safety or rights.

Experts project that emerging technologies like voice assistants, augmented reality, 3D printing and blockchain could each be co-opted for more sophisticated counterfeit production and distribution posing novel enforcement challenges (Taylor, 2020). The potential scale of deep fakes using AI and biometric spoof generation could significantly exacerbate online risks (Thompson, 2021). However, the same technologies also offer enhanced product authentication, supply chain tracking and detection capabilities to counter these threats.

Ultimately, the counterfeiting fight will be a perpetual arms race necessitating agile public-private responses. But it must be balanced with addressing systemic socioeconomic factors that sustain counterfeiting markets despite enforcement crackdowns. Only comprehensive long-term solutions focused on access and alternatives can dismantle counterfeiting.

An effective policy response to pervasive online counterfeiting must combine targeted legal deterrence, voluntary collaboration for rapid takedowns, supply chain security improvements, sustained consumer education and access to affordable authentic goods. It requires cross-border collective action between governments, intermediaries and brands tailored to digital dynamics with oversight for proportionality.

Policymakers should strengthen IP laws and enforcement capacities while instituting speech and privacy safeguards against overreach. Brand owners must evolve product security and direct-to-consumer channels. Intermediaries need to undertake ethical commerce practices and assist enforcement proportionately. Awareness campaigns highlighting counterfeiting impacts can help curb demand. Together this multi-pronged approach can holistically address the complex drivers, harms and enforcement challenges surrounding counterfeits.

5. *Trademarks in social networks and instant messengers*

Social platforms present complex trademark implications regarding profile names, handles, groups and branded channels that users create. Unauthorized use of brand names, logos or taglines as handles risks infringing trademarks and creating confusion. However, excessive enforcement also threatens free expression.

Clear terms of service guiding expected branding practices coupled with notice-takedown protocols for reported violations can help to fulfil the balance of rights. Protections should focus on evident impersonation and commercial misuse, not suppress commentary or unofficial fan accounts. Brands should also proactively secure key official profiles aligned with marketing strategies. Overall, a contextual approach is required judging factors like usage, intent and audience impact.

Trademarks face risks of infringement, dilution and from unauthorized branding on social networks that can cause consumer confusion or erode brand equity. Impersonation using fake brand profiles or social media verification to mislead audiences has become common, demanding monitoring and enforcement. Even non-malicious grassroots usage of logos and slogans on fan channels poses brand control challenges.

However, risks vary based on context like commercial intent, scope of followership and actual confusion caused. Blanket restrictions can curb innovation and speech. Developing platform norms guiding proportional brand usage based on collaborative policymaking can help balance interests. Usage deemed fair or impliedly condoned should not attract enforcement.

Trademark law provides protections for parody, criticism and other noncommercial commentary involving brand usage that balance enforcement with free expression (Murphy, 2019). However, applicability on social media is complex when usage scales rapidly across borders and intent is unclear. Overzealous takedowns have targeted even valid parodies and fan accounts.

Platform policies should integrate fair use principles suitably adapted for social media contexts. Education on responsible branding and transparency in takedowns can avoid chilling effects. Tools to contextualize usage like captions, tags and permissions can supplement enforcement. Ultimately, brands and platforms need nuanced coexistence guiding proportionate protection against infringement while enabling commentary.

Social networks establish notice-takedown protocols for rights holders to report infringing content like profile impersonations or pirated

merchandise images. However, critics argue that current processes lacking context enable censorship, are prone to abuse, and disadvantage users in disputing claims. Pushback against overreach has compelled improving redress and appeals options.

More robust notice requirements mandating detailed infringement evidence, allowing counter speech from accused users, and penalties for abuse can strengthen legitimacy. Ombuds mechanisms for complex cases involving parody or commentary defenses also promise fairer outcomes. Overall, nuanced notice systems mindful of criticism can balance trademark enforcement with digital liberties.

Platform terms prohibit various unauthorized and misleading uses of third-party trademarks in line with brand protection responsibilities. However, vagueness in naming specific violations risks censoring legitimate practices like parody accounts. Critics argue standardized rules inadequately accommodate context differences across usage types and industries.

Granular policies tailored for common marketing activities and brand-fan dynamics on each platform can improve reasonableness. Prominently explaining contextual factors guiding infringement assessments like commerciality, user intent and confusion metrics can aid transparency. Ongoing policy consultations between platforms, brands and civil society representatives can steer more balanced terms of service.

Debates persist over brand control on social media profiles bearing their name and trademarks. Brands argue impersonating official accounts should entitle recovering those profiles. However, criteria for assignation lack clarity when followers, engagement and content build independent user value. Critics also question overly proprietary assumptions stifling platform innovation.

Comprehensive policies should consider demonstrated user investments, brand popularization contributions, and audience expectations in determining account ownership. Trademarks cannot confer absolute property rights over language. Guidelines against impersonation and commercial scams should balance with allowing user cultivation of profiles incorporating branding under fair practice norms.

Responsible use of trademarks on social networking calls for understanding brand rights balanced against speech freedoms. Users should avoid outright impersonation through identical naming, logos or verification cues. Commentary incorporating brands should add disclaimers to avoid confusion. Seeking permission can validate usage in murky cases. However, critics argue social norms already signal unofficial fan branding.

Brands equally must not reflexively suppress non-malicious commentary or grassroots usage building communities. The development of global social media trademark ethics through multi-stakeholder collaboration can outline legitimate bounds balancing both interests. This demands compromises accepting reasonable unpaid usage that avoids deception or commercialization.

Social media ecosystems involve complex interactions between brand integrity needs and users' expressive freedoms. Allowing unchecked usage risks trademark dilution while overzealous enforcement chills speech. Contextual factors like real financial harm, actual confusion and intent of usage should guide evaluations.

Notice systems outlining permissible criticism, commentary and fan conventions can assist proportionality. Independent platform ombudsmen assessing harder cases of parody or nominative usage complaints can also ensure balanced recourse. Overall, collaborative policymaking between stakeholders to define mutually agreeable norms remains vital for social media trademark equilibrium.

Data reveals a surge in trademark disputes involving social media driven by real-time global reach amplifying risks of infringement or dilution. However, outcomes remain inconsistent based on platform resources, contextual usage assessments and jurisdiction. Cyber-squatting cases now frequently involve social media handles alongside domains.

Key user concerns include lack of transparency in claim procedures, difficulties contesting overbroad infringement assertions and risk of arbitrary account suspensions. Calls persist for external oversight of platform notice systems and evaluating impacts like lost followership after recoveries. Broader trademark reform also remains necessary to adapt definitions and defenses for social media fair use.

The novel dynamics of branding on social networks has revealed gaps in trademark doctrines devised for traditional mediums (Taylor, 2021). Critics argue emerging usage norms cannot be governed through existing enforcement mechanisms tailored for physical goods. Nuanced frameworks balancing brand integrity, user rights and platform interests are required (Thompson, 2022).

This necessitates updating trademark statutes and related platform terms of service to accommodate communicative fair uses, delineate prohibited impersonation, and specify permitted fan conventions or unlicensed references. Guidance on nominative usage, privacy controls over branded accounts, and protections for parody commentary and user-

created branding can aid clarity. Ongoing multi-stakeholder collaboration to align policies with evolving community standards and business models also remains vital.

Conclusions for Chapter IV

The rapid digitization of markets has fundamentally transformed branding landscapes, necessitating urgent modernization of trademark systems. This vital process must balance enabling protection in new technological contexts while retaining public safeguards against overreach.

Selecting and registering trademarks for online offerings now involves more expansive screening of global digital ecosystems to assess availability, from social media handles to domain names. Despite accelerating e-filing options, substantive examination rigor must not be compromised through full digitization. Evolving Nice Classifications require carefully expanding scope to emerging services while retaining cohesion. Guidelines and examiner training for assessing dynamic multimedia marks also need strengthening to maintain registration integrity.

With e-commerce reliance, brands prioritize comprehensive online clearance searching beyond registrations, including visual marks and linguistic variations. But automation risks cannot override human diligence given AI limitations. Accelerated registration frameworks similarly should reinforce rather than dilute examination quality through tiered processes, anti-fraud analytics and opposition mechanisms. Updated statutes, sensitization programs and streamlined dispute resolution can aid balanced trademark reforms.

Rising digital brand influencers pose novel registration challenges requiring bespoke tests assessing acquired distinctiveness contextual to follower awareness and commercial usage. Updated guidance on publicity rights at this intersection can also help navigate disputes judiciously. Brands need tailored online monitoring to combat rampant threats like counterfeits, cybersquatting and impersonation. However, enforcement actions should respect lawful criticism, commentary and parody.

Intermediaries like social media platforms are undertaking voluntary initiatives to cooperate on infringing content takedowns, ad restrictions and blocking habitual commercial violators. But private agreements raise accountability concerns which demands increased transparency

and external audits. Technical barriers like attribution difficulties persist, requiring harmonized legal updates to address online threats. But these must be counterbalanced with user safeguards against over-censorship.

The proliferating domain name system produces constant clashes with trademarks demanding expedited, balanced resolution. While the UDRP enables efficient arbitration, reforming standards on registrant rights, nominative usage and fair comment can make decisions more equitable. Domain authorities and brand owners should enhance cooperation balancing trademark integrity against stifling innovation in namespace.

Counterfeiting via e-commerce and social platforms has vast economic impacts demanding coordinated responses prioritizing enforcement against large-scale willful infringement. Intermediaries need stronger product authentication systems and proactive monitoring. However, sustainable solutions also require addressing socioeconomic drivers fueling counterfeit demand and improving affordable access to authentic goods.

Social media needs updated trademark guidelines clarifying permissible commentary, fan usage and disputes over branded account ownership. Principles of implied consent and cultivating followership over time can guide proportionality. Multi-stakeholder collaboration is vital for co-creating digital branding norms balancing brand integrity, user expression and platform interests. Despite enforcement challenges, restrained approaches focused on limiting clear commercial harms remain prudent.

In conclusion, trademark modernization for the digital economy must be guided by public consultations and impact assessments. Changes should match the pace of technological shifts to stay relevant, but retain focus on benefitting broader legal and online ecosystems. With prudent balancing, digitally transformed trademarks can incentivize innovation and strengthen brand investments that spur economic growth, while upholding the liberties, competition and access that define a progressive information society.

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The European Union Intellectual Property Office ('EUIPO') has indeed held that, while a designation for 'nonfungible tokens' or 'virtual goods' alone will not be sufficiently clear and precise, a designation for, e.g., 'downloadable virtual goods, namely, virtual clothing' shall be acceptable for the purpose of registration: European Union Intellectual Property Office (EUIPO), Trade Mark Guidelines, Edition 2023, Part B, Section 3, §6.25. While this approach appears shared across different jurisdictions, it may be too early to say if it will also entail a uniformity of approach in terms of filing and prosecution strategies worldwide: International Trademark Association, White Paper – Trademarks in the Metaverse (April 2023), available at https://www.inta.org/wp-content/uploads/public-files/perspectives/industryresearch/20230406_METAVERSE_REPORT.pdf, 20-23.

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CHAPTER V

KNOW-HOW AND TRADE SECRETS IN DIGITAL BUSINESS

1. *Trade secrets and know-how protection*

Trade secrets and know-how encompass confidential information providing organizations with a competitive edge, though lacks formal IP protections (Lemley, 2012). Trade secrets law shields commercially valuable data like algorithms, designs, processes from misappropriation when owners establish reasonable secrecy safeguards (McJohn, 2009). However, digital systems pose novel threats of exposure, necessitating updated legal frameworks aligned with IT complexities.

Organizations increasingly rely on digital trade secrets essential for operations, often lacking patent protections on data or software not meeting strict novelty and non-obviousness requirements (Miller & Davis, 2012). In the US, reasonable security measures like access controls and confidentiality agreements balance enabling operations while deterring theft according to the Uniform Trade Secrets Act (UTSA, from 1979, then amended in 1985) standards (Almeling, 2012). As emerging technologies proliferate, proactive IT governance minimizes risks of unauthorized use or exposure per cybersecurity best practices (Council, 2019).

Source code, proprietary datasets, machine learning models, and confidential business information constitute common digital trade secrets. Unique data compilations, infrastructure details, security vulnerabilities, and undisclosed algorithms also merit protection as highly valuable to firms (McJohn, 2009). Even seemingly public digital artifacts like website architecture may qualify for trade secret status given complex integrations.

Under the UTSA §1(4), information deriving economic value from secrecy and subject to reasonable confidentiality efforts qualifies for trade secret protections (Lemley, 2012). In this context, secret is indeed defined as any "information, including a formula, pattern, compilation, program, device, method, technique or process, that: (i) derives independent economic value, actual or potential, from not being generally known to, and

not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and (ii) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy". Key criteria then include commercial usefulness and visibility limits, rather than absolute secrecy. Courts weigh factors like access controls, disclosures, security investments in assessing trade secrecy claims during misappropriation cases (Almeling, 2012). The object of trade secret protection also covers ideas and not only expressions, as under copyright law.

However, opaque algorithms and data may frustrate reverse-engineering assessments of trade secrecy. Digital artifacts lack inherent secrecy characteristics necessitating context-specific analysis (Lemley, 2012). Businesses should implement layered technical and policy controls demonstrating earnest secrecy sufficient to establish rights, though avoiding overreach infringing employee mobility (McJohn, 2009).

Identifying secret digital assets may prove challenging absent direct evidence of derivation. Opaque software and ML can frustrate efforts to discern underlying confidential data or processes, unlike physical assets. While reverse-engineering, usually consisting in any activity of analysis of a product in order to date back to its composition and manufacturing process, can indicate trade secrecy, businesses may implement technical restrictions balancing legitimate testing against theft.

As mentioned, under UTSA §1(4)(ii), businesses must utilize the efforts that are reasonable under the circumstances to preserve the secrecy of commercially valuable information to establish legal protections. To this end, technical controls like encryption and access restrictions coupled with confidentiality policies often suffice. However, excessive constraints infringing worker mobility may fail standards of reasonableness (McJohn, 2009).

Prudent security should not preclude third-party disclosures, provided appropriate non-disclosure agreements are executed per legal guidance. Multi-layered defenses addressing key threats like unauthorized access, leaks, and cyberattacks reinforce claims when coupled with workforce training (Council, 2019). Reasonable investments balancing secrecy against operations represent best practices (Almeling, 2012).

Trade secrets constitute critical corporate assets conferring competitive advantages, with reasonable protections against misappropriation (Miller & Davis, 2012). Confidential data enables firms to extract more value from innovations than rivals, incentivizing R&D absent exclusive rights (Lemley, 2012). Secret algorithms, designs, and ML models are strategically vital for digital services.

In the digital economy, proprietary data, analytics, AI, and software design represent key strategic assets conferring competitive advantages. Startups in particular rely on trade secret protections for innovations lacking resources to patent (Miller & Davis, 2012). But massive data flows pose new threats, requiring governance limiting visibility (Council, 2019).

Digital integration across supply chains also risks exposing confidential information to partners. Technical and legal controls enable prudent data sharing and collaboration (Almeling, 2012). As data volumes grow amid opaque algorithms, businesses should strategically identify and secure high-value secrets vulnerable to theft.

Unlike patented inventions, trade secrets protect undisclosed information of any form granting market advantages (Lemley, 2012). For software and data failing novelty requirements, trade secrecy avoids public disclosure. Quicker protections incentivize incremental, ongoing innovations (McJohn, 2009). But independent derivation and reverse engineering remain lawful, eroding control.

For digital innovations, layered patent and trade secret protections maximize control and value realization (Miller & Davis, 2012). Source code publication often accompanies patents to satisfy disclosure requirements, while retaining trade secrecy of underlying details. However, patents may require secrecy forfeiture, necessitating strategic balancing.

The ubiquity of digital systems and porous data flows pose new challenges in preserving trade secrecy, though technical and legal controls are adapting (Almeling, 2012). Cloud computing prompts special governance given third-party possession of data (Council, 2019). Continual software updates and emerging reverse engineering techniques also threaten secrecy.

However, robust non-disclosure agreements, access controls, and encryption safeguard even complex assets (Lemley, 2012). As machine learning and artificial intelligence evolve, insights into model training data and algorithms will likely gain trade secret status, especially when it comes to the employment of machine-to-machine communication services that should be required to treat data as confidential (Surblytė-Namavičienė, 2020). Though absolute secrecy is unrealistic, businesses increasingly pursue "cybersecurity hygiene" to satisfy legal standards (McJohn, 2009).

Strategically identifying digital assets conferring competitive value provides a starting point for trade secrecy analysis. IT audits help map information flows, guiding protection priorities and controls (Council, 2019). Legal guidance on designing confidentiality agreements, security policies, and access restrictions reinforces rights. Employee training is

also critical for preserving secrecy amid daily operations (Miller & Davis, 2012).

However, excessive constraints may undermine rights by harming reasonableness and workforce mobility (Lemley, 2012). Maintaining secrecy sufficient to protect legitimate interests, while avoiding infringing transparency and ethics, represents a best practice. Ongoing governance responds to tech and data evolution (Almeling, 2012).

Organizations increasingly rely on digital trade secrets essential for operations, often lacking patent protections on data or software not meeting strict novelty and non-obviousness requirements (Miller & Davis, 2012). Reasonable security measures like access controls and confidentiality agreements balance enabling operations while deterring theft e.g. according to UTSA standards (Almeling, 2012).

With rising data volumes across sectors, organizations gather vast proprietary datasets secured via access restrictions constituting secrets. Businesses increasingly depend on confidential ML models and training data providing competitive advantages. Code underlying digital services, vocal biomarkers, unpublished security research similarly bear commercial value and susceptibility to theft absent reasonable controls.

Source code, proprietary datasets, machine learning models, and confidential business information constitute common digital trade secrets. Unique data compilations, infrastructure details, security vulnerabilities, and undisclosed algorithms also merit protection as highly valuable to firms (McJohn, 2009). Even seemingly public digital artifacts like website architecture may qualify for trade secret status given complex integrations.

However, trade secret value erodes once exposed, necessitating ongoing stewardship. Benefits must be weighed against costs of constrained information flows. Maintaining digital secrecy proves increasingly difficult amid porous IT systems. Still, reasonable safeguards sustain competitive differentiation even absent legal rights (McJohn, 2009).

Businesses should catalogue critical proprietary information and infrastructure (Council, 2019). Though absolute secrecy is not required, businesses must control access and distribution to retain rights (Lemley, 2012). Securing sensitive data like customer information in external collaborations is particularly critical, as third-party leaks may forfeit claims (Almeling, 2012).

Technical and legal controls enable prudent data sharing and collaboration (Almeling, 2012). As data volumes grow amid opaque algorithms, businesses should strategically identify and secure high-value secrets vulnerable to theft.

As emerging technologies proliferate, proactive IT governance minimizes risks of unauthorized use or exposure per cybersecurity best practices (Council, 2019).

Cloud computing prompts special governance given third-party possession of data (Council, 2019). Continual software updates and emerging reverse engineering techniques also threaten secrecy.

2. *Legal protection of know-how and trade secrets*

In the US, trade secret rights arise under state common law and statutes, establishing protections for commercially valuable confidential information (Almeling, 2012). In 1995, the American Law Institute published the Third Restatement of Unfair Competition Law which granted protection to any kind of information having a significant economic value. The Economic Espionage Act of 1996 then imposed criminal penalties for trade secret theft harming US markets (McJohn, 2009). These frameworks aim to balance public domain access with incentives for developing proprietary data and IP (Lemley, 2012). Then, in 2016, the Defend Trade Secrets Act (DTSA) became the first legislative intervention through which the Congress recognized the right to take federal legal actions before the misappropriation of trade secrets.

However, digital technologies frustrate classical models predicated on physical documents or tangible assets. Reasonable efforts to maintain secrecy prove more ambiguous with intangible information. Cryptography and opaque software may preclude misappropriation evidence. Calls persist for enhanced regulations attuned to virtual assets and threats (Council, 2019). But critics argue existing laws if modernized enable appropriate protections (Miller & Davis, 2012).

UTSA, EEA and DTSA represent very relevant instruments establishing rights to preserve incentives and prevent unfair free-riding (Almeling, 2012). Common law principles may also protect truly confidential information even absent statutory rights.

These laws deter improper means like hacking, breaching duties of confidentiality, or inducing disclosures (Lemley, 2012). However, technologies enabling remote access to data frustrate investigations. Reasonable efforts to maintain secrecy help establish culpability, but prove legally ambiguous with digital information. Clear policies and controls are thus vital to preserving rights.

To establish misappropriation under UTSA §1, acquisition must derive from improper means or disclosures by those owing duties of confidentiality (Lemley, 2012). Damages require evidence of actual losses, while injunctions also prevent potential future harms. However, digital technologies frustrate monitoring data flows to prove causality (Miller & Davis, 2012).

Circumstantial evidence like system logs may indicate intrusions despite cryptography obscuring contents. But businesses must balance protections against overreach, or risk anti-competitive claims when constraining employee mobility. Reasonable security measures help preserve rights if theft later occurs. Novel forensics and emerging tools like blockchain offer new means to establish digital theft (McJohn, 2009).

UTSA standards reject liability for reverse engineering or independent development, though businesses may use technical controls to legally protect secrecy (Almeling, 2012). Damages require proving actual losses, while injunctions also prevent enrichment (Lemley, 2012). However, courts increasingly weigh public interest factors when issuing injunctions against use of data (Council, 2019).

The intangible nature of digital information complicates evidencing unauthorized acquisition, a key element in trade secret misappropriation claims. DRM or blockchain tools may help track data provenance and detect leaks (McJohn, 2009). Statistical analytics can also identify abnormal access patterns indicative of theft.

But businesses must balance monitoring against infringing worker privacy. Controls like access restrictions and logs should aim to deter insider compromise, without crossing into overreach (Lemley, 2012). Technical measures alone rarely suffice; reasonable confidentiality policies and training more holistically establish diligent secrecy. But absolute proof of theft may remain elusive with virtual assets (Miller & Davis, 2012).

Locating compromised information online helps establish misappropriation. But tracing leaks to sources may prove impossible with mass data flows (Almeling, 2012). Circumstantial evidence corroborated by forensic analysis can demonstrate security deficits permitting surmised theft (Council, 2019). However, businesses should implement multi-layered controls to enable strong claims if trade secrets are compromised (Lemley, 2012).

Trade secrecy frameworks like UTSA coexist with other IP protections (Miller & Davis, 2012). Patents require public disclosure preempting continued secrecy. Copyright protects expressions but not underlying

ideas, processes, or data (McJohn, 2009). Thus trade secrecy is a critical, complementary form of protection (Lemley, 2012).

However, interfaces between digital IP regimes remain unclear given complex, integrated software and data. Certain patent applications now require disclosing any related trade secrets, complicating parallel protections. Technical measures like encryption aim to preserve secrecy after disclosures, with mixed results. Harmonizing complementary frameworks to incentivize innovation while promoting access remains an evolving challenge.

While trade secrecy protects valuable confidential information, other IP frameworks play important complementary roles (Almeling, 2012). Patents provide exclusive rights over novel, non-obvious inventions in exchange for public disclosure (Council, 2019). Copyright protects specific expressions rather than ideas or processes (McJohn, 2009). These forms of protection incentivize innovation and creativity within a balanced IP framework (Lemley, 2012).

The predominance of intangible digital information poses challenges to traditional trade secrecy frameworks developed around tangible documents or materials (Miller & Davis, 2012). Efforts to maintain online secrecy through policies and encryption remain legally ambiguous. Evolving technologies like AI and blockchain further complicate protections.

In the US, some propose enhancing the UTSA to clarify reasonable efforts to preserve digital secrecy (Lemley, 2012). Federal laws could also increase penalties for unauthorized access to data. However, critics argue existing laws if updated enable suitable protection of intangible assets. Ultimately digital and physical trade secrets necessitate aligned frameworks securing commercial data.

Trade secrecy's reasonable efforts standard is ill-suited to preserving intangible data secrecy (Almeling, 2012). However, principles-based laws enable adaptability to emerging technologies (Council, 2019). Improving cybersecurity, encryption, and access controls help establish diligent efforts for digital secrets (McJohn, 2009). But businesses must balance protections against transparency costs (Lemley, 2012). Modernizing frameworks to firmly protect digitized trade secrets remains vital.

The UTSA's open-ended language around reasonable efforts to maintain secrecy poses ambiguities in application to digital information vulnerable to copying and dissemination. Some propose adding enumerated factors in assessing online secrecy (Miller & Davis, 2012). Others argue defining standards risks undermining flexibility (Lemley, 2012).

Technical protections like encryption could substantiate reasonable efforts. Penalizing unauthorized access rather than disclosure may also enhance protections in the digital realm. However, imprudent extensions risk hampering reverse engineering and employee mobility. On balance, principles-based modernizations appear most prudent.

Legal clarity regarding permissible reverse engineering of software could spur innovation (McJohn, 2009). Further guidance on cloud storage and other emerging technologies may be warranted (Almeling, 2012). But wholesale rewriting risks unforeseen consequences (Council, 2019). Measured improvements attuned to digital threats, without undermining flexibility, represent the soundest path forward.

Beyond trade secrecy laws, private agreements and organizational controls provide complementary protections for proprietary data (Miller & Davis, 2012). Non-disclosure agreements contractually restrict confidant uses. Access controls and segmentation limit visibility on a need-to-know basis. Physical security also remains vital against external threats (McJohn, 2009).

However, businesses must balance reasonable protections against constraints undermining mobility or innovation (Lemley, 2012). Technical controls and private agreements should reinforce rather than substitute for prudent legal frameworks and enforcement. Holistic governance maximizes trade secret protections while avoiding overreach.

Non-disclosure agreements enable private protections atop confidentiality duties under trade secret laws. Access controls, encryption, and employee training constitute reasonable efforts substantiating legal rights (Council, 2019). Physical security provides additional assurance against external threats to sensitive assets (Almeling, 2012). Robust cybersecurity hygiene is a best practice in the digital age.

Digital technologies expand attack surfaces for trade secret theft, prompting litigation seeking technological and monetary remedies. However, predominance of intangible information complicates evidencing acquisition methods necessary to establish claims. Plaintiffs must balance pursuing outside hackers with preserving partner and employee relationships (Council, 2019).

Successes securing injunctions blocking use of compromised source code demonstrate courts' willingness to adapt protections to digital assets (Miller & Davis, 2012). However, constraints must avoid overreach suppressing lawful competition (Lemley, 2012). Ongoing jurisprudence maps trade secrecy to virtual domains, balancing rights and access. But technology continues outpacing law.

Digital secrets litigation increasingly alleges cyberespionage by state actors and hackers (McJohn, 2009). However, plaintiffs struggle to trace leaks definitively or prove harm given data fluidity (Almeling, 2012). Courts balance deterring theft against mobility in issuing injunctions (Lemley, 2012). While adapting trade secrecy to digital realms, litigation highlights persistent evidentiary challenges.

Protecting commercially valuable information incentives innovation, but excessive controls risk anticompetitive effects. Trade secrecy aims for balance, but proving online theft complicates enforcing rights. Calls for enhanced protections should be weighed cautiously (Council, 2019).

Technical controls like restricted access and data tracing at risk of overreach should aim to demonstrate diligence supporting rights if theft occurs, rather than constrain lawful competition (Lemley, 2012). Similarly, confidentiality agreements warrant prudent legal review to avoid restrictive covenants violating mobility (Miller & Davis, 2012). Holistic governance frameworks deter theft while avoiding undue constraints.

Balancing proprietary protections, employee mobility, and access to information remains challenging amid evolving technologies. However, principles-based modernizations attuned to digital threats appear most prudent. Multi-layered technical, contractual, and procedural safeguards help demonstrate reasonable efforts if trade secrets are compromised (Almeling, 2012). But trade secrecy should avoid overreach to maintain balance.

3. *Disclosure of digital trade secrets*

Digitization exacerbates risks of unauthorized disclosure of trade secrets through hacking, leaks, and accidental exposures. Online transmission enables instant dissemination across the globe (Council, 2019). Media outlets and whistleblowers can instantly publicize compromising data (Lemley, 2012). Insiders may rationalize leaks as serving public interest over legal duties.

Technical controls aim to restrict access and trace data flows to identify breaches. But perfect security is unattainable with exponential threats and complex systems (McJohn, 2009). Communications and culture cultivating stewardship are as vital as digital controls in minimizing unwarranted disclosures (Miller & Davis, 2012). However, some leaks

may remain outside organizational control.

Expanding use of mobile devices and cloud services increases vulnerabilities to trade secret theft. External hackers and rogue insiders can exfiltrate proprietary data and instantly transmit worldwide (Almeling, 2012). Whistleblowers may disclose secrets believing organizational practices require exposure despite legal risks (Lemley, 2012). However, disclosures violating duties require careful ethical balancing.

Whistleblowing often aims to expose perceived organizational wrongdoing, but violating legal duties raises ethical dilemmas (Miller & Davis, 2012). Journalistic responsibility favors public interest disclosures, though publishing lawfully protected secrets risks liability. Tech firms increasingly warn developers and testers against even inadvertent disclosures (McJohn, 2009).

However, overly broad controls on discussing work may cross into infringing rights (Lemley, 2012). Policies should articulate protections for legal whistleblowing of serious misconduct. But leaks of legitimately confidential data for individual gain unlikely clear ethical bars, nor affirm public interests. There are rarely simple choices between secrecy, transparency, and ethics.

Whistleblowers disclosing confidential data absent protections risk professional and legal consequences. However, controls perceived as gag orders suppressing dissent risk unintended harms (Council, 2019). Organizations should enable voicing concerns internally, while protecting legal data rights (Almeling, 2012). Policies balancing transparency, compliance, and ethics in complex situations remain vital.

Publishers and platforms disseminating unlawfully obtained secrets may face trade secrecy liability, even if not involved in acquisition (Miller & Davis, 2012). However, in the US, First Amendment protections generally shield media outlets reporting on matters of public concern (Lemley, 2012). Technical distributors like social networks likely enjoy broad immunity for third-party content under Section 230 (McJohn, 2009).

Imposing liability on publishers risks chilling scrutiny of businesses. However, distributing stolen secrets exceeding public interest raises ethical questions. Core freedoms enable oversight, but protections warrant prudent boundaries. For intermediaries like social networks, majority views favor immunity, arguing platforms lack publishing culpability.

Absent direct involvement in theft, media and platforms may avoid liability for disseminating secrets under First Amendment and Section 230 precedents (Council, 2019). However, knowingly trafficking in stolen data

raises moral hazards, even if legally permitted (Lemley, 2012). Guidelines balancing transparency, IP protections, and ethics remain vital amid evolving technologies (Almeling, 2012).

Responsible disclosure entails privately notifying organizations of vulnerabilities to enable patching prior to public exposure. However, overly restrictive bug bounty policies or legal threats against researchers risk deterring discoveries and disclosures (Miller & Davis, 2012). Clear frameworks delineating permissions and protections help sustain vulnerability research advancing cybersecurity (McJohn, 2009).

Robust bug bounty programs with defined rules and scopes help foster security research in a controlled fashion. Certain platforms legally permit select reverse engineering relevant to cybersecurity purposes (Lemley, 2012). But tolerances require careful balancing against theft. Ongoing dialogue between businesses and researchers remains vital for ethical cooperation advancing shared interests in identifying flaws.

Provided conducted lawfully, responsible disclosure of cyber vulnerabilities aims to advance security in a transparent fashion. Bug bounty programs expanding permissions for vetted hackers promote discoveries of flaws and risks (Council, 2019). However, businesses must secure truly proprietary assets and code within programs (Almeling, 2012). Clearly delineated access and authorization enable security advancement while protecting IP.

To mitigate harms from exposed secrets, organizations should have incident response plans including notification controls, legal takedown procedures, and external communications (Miller & Davis, 2012). Ongoing monitoring aims to quickly detect leaks and unauthorized uses. However, once publicly disclosed, containing trade secrets proves extremely difficult (McJohn, 2009).

Technical controls like access limitations remain vital to prevent insider compromise. Culture and policies promoting stewardship and sounding alarms internally also help avert leaks (Lemley, 2012). But organizations should prepare plans for decisive action if incidents occur, while learning to strengthen governance. Quick, coordinated responses can help limit damages.

Exposed secrets require urgent risk assessment and mitigation. Legal teams should evaluate takedown options and initiate actions to remove the information, if permissible (Council, 2019). Communications should convey appropriate messages to critical stakeholders, neither over or underreacting (Almeling, 2012). However, companies should strengthen

controls to prevent future lapses, using incidents to refine governance (Lemley, 2012).

Protecting legitimate trade secrets while enabling legal oversight presents competing priorities for businesses and institutions (Miller & Davis, 2012). Technical controls like access restrictions remain vital, but can also cloak unlawful practices. External disclosures for oversight purposes may employ protective orders safeguarding rights (McJohn, 2009).

However, excessive secrecy risks fostering misinformation and misconduct absent accountability (Lemley, 2012). Policies should enable confidential anonymous reporting of concerns internally. Training for leaders also stresses legality and ethics exceeding minimal compliance. Balancing transparency and confidentiality requires ongoing good-faith efforts by all parties.

Robust IT security controls are imperative for protecting legal trade secrets. However, external disclosures for lawful state purposes may warrant accommodations provided proprietary information is shielded (Council, 2019). Technical solutions like restricted, audited data access aim to enable necessary transparency (Almeling, 2012). Legal, policy, and technology frameworks should allow lawful sharing while protecting IP.

Online platforms face increasing regulatory pressure regarding proliferation of illicitly obtained secrets, though maintain protections under Section 230 (Miller & Davis, 2012). Encryption and dark web networks frustrate tracking and takedown of leaked data. While limiting active participation in unauthorized disclosures, most intermediaries resist policing third-party content given speech implications (McJohn, 2009).

However, critics argue broader responsibilities should accompany platform power (Lemley, 2012). Thoughtless reactions risk unintended censorship consequences, but inaction enables misuse. Multi-stakeholder initiatives aim to balance interests, but tensions persist over where lines are drawn. Evolving technologies continue outpacing questions of legal duties.

Intermediaries enjoy immunity for publishing third-party disclosures, even of questionable legality. However, opaque systems hinder remedies once secrets propagate online (Council, 2019). Satisfactory balances remains elusive, though cooperation addressing emerging threats shows promise (Almeling, 2012). Technical capabilities suggest certain reasonable duties may emerge alongside protections (Lemley, 2012).

Protecting legitimate trade secrets conflicts with values favoring transparency and oversight of organizations affecting public interest (Miller & Davis, 2012). In the EU, Directive 943/2016 establishes that trade secret protection does not always prevail, especially against the freedom of

expression and information rights, whistleblowing activities and workers' rights to move from one business to another and to be represented effectively (Maggiolino, 2018). However, indiscriminate disclosure of legally confidential data causes commercial harms. Whistleblowing frameworks aim to enable lawful dissent exposing substantive misconduct (McJohn, 2009).

Ambiguities persist in boundaries between conscience and lawbreaking (Lemley, 2012). Those entrusted with secrets owe duties, however objectionable the information. Oversight typically warrants legal channels respecting rights, though morality remains complex in application. There are rarely simple choices between conscience, law, ethics and duty.

Policies should articulate protections for legal whistleblowing of serious misconduct. Strong cultures reinforce stewardship duties across teams (Council, 2019). However, heavy-handed controls tend to backfire absent safety valves enabling dissent (Almeling, 2012). Balancing transparency, compliance, and ethics in complex situations remains an ongoing governance challenge (Lemley, 2012).

Digital technologies increase both incentives and opportunities for compromising trade secrets, though motivations vary (Miller & Davis, 2012). Corporate espionage seeks competitive advantage. Hacktivists pursue ideological ends like embarrassing firms (McJohn, 2009). Insiders may leak from disgruntlement or in hopes of personal gain (Lemley, 2012).

Understanding risk factors helps guide security investments. However, insider threats remain inevitable to some degree in complex systems. Holistic governance also entails minimizing incentives, safe channels for dissent, and cultural stewardship across teams. But perfect secrecy appears impossible amid vast data flows.

Easing of copying and transmission enhances opportunities for opportunistic IP theft (Council, 2019). However, many leaks also reflect principled dissent aimed at perceived excesses or harms (Almeling, 2012). Organizations should address root cultural and ethical concerns violations of duties (Lemley, 2012). Though not eliminating risks, values-focused leadership reduces likelihood of employee compromise.

Trade secrecy inherently involves tensions between transparency and proprietary protections (Miller & Davis, 2012). While necessary for innovation incentives, excessive controls also cloak troubling practices. Legal structures aim to balance interests, but applications require situational ethics (McJohn, 2009).

Revised whistleblower protections could maintain confidentiality

obligations for lawful trade secrets, while enabling safe reporting of serious misconduct (Lemley, 2012). Immunities also likely warrant expansion for good-faith security research. However, rights require responsibilities limiting unnecessary exposure of protected IP. Evolving technologies require ongoing governance balancing secrecy, transparency and ethics.

Law should delineate protections for discretion and dissent focused on abuses rather than avoiding compliance (Almeling, 2012). With thoughtful balancing, secrecy and transparency can coexist in ethical frameworks.

4. *Ensuring confidentiality of information*

Organizational policies establish rules, standards and procedures for handling confidential information to meet legal duties and business needs (Miller & Davis, 2012). Data classification schemas guide protection requirements for assets based on criticality and risk. Technical controls like encryption aim to implement policies securing access and transmission (McJohn, 2009).

However, excessive constraints may undermine productivity or incentivize workarounds (Lemley, 2012). Requirements should align with operational necessity and usability.

Clear policies guided by legal requirements provide foundations for respecting data protections. Technical measures like access controls and encryption aim to implement policies (Council, 2019). However, human factors necessitate continual training reinforcing responsibilities amid everyday pressures and complexities (Almeling, 2012). Integrated governance addressing technology, policy, and culture is imperative.

Robust cybersecurity protections represent essential starting points for securing digital trade secrets (Miller & Davis, 2012). Least-privilege access implemented via segmentation and role-based controls limits visibility. Encryption also secures data across networks, systems and devices (McJohn, 2009).

Proactive monitoring aims to detect abnormal activity indicative of breach (Lemley, 2012). However, false positives frustrate detection efficacy. Overriding controls also risks workforce relations and compliance. Balances enabling productivity amid security remain challenging but vital.

Laws and regulations impose data handling requirements with implications for confidential information flows (Miller & Davis, 2012). Privacy statutes often mandate security protections, access controls and restricted processing purposes. Data transfers across borders prompt

jurisdictional variances and conflicts (McJohn, 2009).

Navigating legal complexities requires close cross-functional collaboration (Lemley, 2012). Technical controls and policies should embed legal guidance. However, principles like data minimization warrant careful implementation given operational needs. Compliance should avoid unduly constraining business activities.

Data regulations continue shaping information practices with compliance implications. Guidance from counsel helps translate requirements into governance of security, access and sharing (Council, 2019). However, excessive constraints may hamper innovation or alienate personnel (Almeling, 2012). Compliance should balance legal duties, ethics and operational necessities.

Source code meriting trade secret protection raises particularly elevated security requirements given heightened risks and impacts of unauthorized exposure. Access restrictions through code vaults, extensive logging, and robust identity controls limit visibility (Miller & Davis, 2012). Cryptographic measures may also selectively reveal segments necessary for authorized purposes (McJohn, 2009).

However, pragmatism remains vital for developers (Lemley, 2012). Excessively strict controls will likely hamper productivity through burdensome processes. Secure collaboration tools instead enable protection balanced against usability. Holistic governance addresses both technology and culture.

Source code contains some of the most sensitive trade secrets in IT products and services. However, compelling security must accommodate workflows enabling reasonable development practices (Council, 2019). Cryptographic selective disclosure techniques show promise in balancing protection and utility (Almeling, 2012). But governance should emphasize stewardship rather than solely controls.

Third-party security represents a primary threat vector for digital trade secret compromises (Miller & Davis, 2012). Partner networks multiply potential exposure through data sharing and unfinished governance. Cloud migrations similarly increase reliance on external providers (McJohn, 2009).

Robust contracts like NDAs establish baseline confidentiality duties (Lemley, 2012). Due diligence assesses risks, supported by certifications demonstrating controls. Cryptographic measures also enable selective disclosure tailored to authorized purposes. But residual uncertainties persist amid dependencies.

Partners and vendors introduce risks despite contracts prohibiting

misuse of shared data. Technical protections like encryption and network segmentation enable prudent data exchanges (Council, 2019). However, interdependencies necessitate shared fates incentivizing stewardship through trust and mutual interests (Almeling, 2012).

Advances in rights management, blockchain, and data tracing aim to enhance protection of confidential information exchanged digitally (Miller & Davis, 2012). Controlling usage, copying, transfers and other handling of data enables dynamic access aligned with permissions. Immutable records also support monitoring and auditing by tracing unauthorized flows (McJohn, 2009).

However, usability and cost challenges persist with emerging technologies (Lemley, 2012). Overly burdensome controls will incentivize unsafe workarounds. Technical options should reinforce holistic governance emphasizing culture and ethics alongside security. There are rarely panacea solutions in complex IT environments.

Next-generation digital rights management employs granular usage controls tagged to encrypted data. Distributed ledger solutions like blockchain enable tamper-resistant tracking of information flows (Council, 2019). However, constraints must balance pragmatism to achieve adoption (Almeling, 2012). Technical advances should complement rather than substitute for prudent policies and training.

Complex modern IT environments pose innate challenges securing proprietary information. Vast data flows and myriad third parties inevitability create visibility (Miller & Davis, 2012). Cloud migrations reduce visibility and control over data handling. Emerging threats like AI-enhanced hacking compound challenges (McJohn, 2009).

Minimizing access through least-privilege controls and encryption aims to reduce attack surfaces (Lemley, 2012). Detailed auditing enhances monitoring capabilities despite opaque systems. Fail-safes in highly automated environments also mitigate risks from inevitable incidents. However, residual exposures persist amid dependencies.

Highly interconnected systems and supply chains multiply vulnerabilities. Automation and AI reduce but do not eliminate human factors (Council, 2019). Prudent controls should be coupled with instilling shared responsibility across partners (Almeling, 2012). Managing confidential information necessitates balancing pragmatism and proactive risk mitigation.

Ethical considerations surrounding individual rights and the public interest should inform confidential information governance alongside legal

duties (Miller & Davis, 2012). Excessive controls risk constraining worker mobility and competition. Transparency also promotes accountability, despite risks (McJohn, 2009).

Balancing interests requires situational ethics resisting narrow applications of rules (Lemley, 2012). Fostering stewardship through culture arguably proves more effective than controls and sanctions. However, protections must safeguard legal rights to preserve innovation incentives. Integrative approaches represent prudent paths forward.

Heavy-handed confidentiality constraints risk alienating personnel. However, controls aim to demonstrate protections substantiating legal rights (Council, 2019). Transparency should be maximized within lawful parameters through ethics policies and training (Almeling, 2012). Holistic governance requires aligning protections, people and values.

Key governance challenges include securing data amid growing volumes and myriad formats, remote and mobile access, complex automations, and supply chain interdependencies (Miller & Davis, 2012). Sophisticated hacking compounds threats to proprietary information. AI and machine learning create novel data deserving protection yet resisting traditional controls (McJohn, 2009).

Managing confidential data in the digital age necessitates proactive adaptation. Technical controls like encryption and access management must continually evolve in responses to emerging threats and vulnerabilities (Lemley, 2012). Fostering organizational cultures prioritizing ethics and shared responsibility also grows in importance amid complex, distributed systems.

Exponential data growth and technology advancement introduce new threats and uncertainties. Reasonable information governance requires keeping pace through continual enhancement of policies, security controls, training, and cultural stewardship (Council, 2019). However, businesses should identify truly high-value information to focus protections and avoid overreach (Almeling, 2012).

Integrative governance empowers stakeholders across teams to employ situational ethics advancing shared interests (Lemley, 2012). Fostering stewardship and security hygiene through organizational culture avoids risks of heavy-handed controls. Protections sufficiently robust to evidence respect for confidential data, yet avoiding unnecessary constraints, represent prudent paths forward.

5. *Non-disclosure agreements for digital secrets*

Non-disclosure agreements (NDAs) represent private contracts governing confidential information exchanges beyond duties under trade secret laws (Miller & Davis, 2012). NDAs aim to contractually forbid unauthorized uses and disclosures, enabling controlled sharing. Key clauses define protected data, impose non-use obligations, set time limits, and specify remedies (McJohn, 2009). If a business decides to share data, the use of a non-disclosure agreement or non-disclosure obligation as well as the presence of a term that requires a licensee to take some reasonable steps in order to guarantee that the secret information will not be revealed are essential tools that protect the business itself. Reasonability is a very flexible standard, but it could not be otherwise as to the need to adapt it to each distinct situation (Aplin et al., 2023).

However, NDAs must avoid unenforceable overreach infringing mobility and competition (Lemley, 2012). Negotiations should ensure clarity, reasonableness, and balance. NDAs work best complementing, rather than substituting for, prudent controls and security culture. Enforceability, collaboration, and ethics require careful balancing in crafting agreements.

NDAs establish contractual confidentiality duties upon specified information. Well-drafted agreements avoid vague definitions, narrow uses to operational necessity, and employ reasonable term limits (Council, 2019). However, constrained data flows may hamper innovation (Almeling, 2012). NDAs should reinforce governance policies emphasizing ethics and security.

Crafting enforceable NDAs necessitates clear, specific provisions without overreach, per legal guidance (Miller & Davis, 2012). Definitions of protected information should be articulated precisely to enable compliance and enforcement. Limiting use cases beyond basic operational necessity may also bolster claims if breach occurs (McJohn, 2009).

However, vague or expansive NDAs are less likely to be enforced (Lemley, 2012). Overly broad restrictions infringing worker mobility or restraining competition also risk being voided. Legal review ensures clauses align with precedents in applicable jurisdictions. Drafting should balance legal protections and collaboration.

Enforceable NDAs require specific designations of confidential information and permitted uses. However, restraints on competitive employment risk being deemed illegal (Council, 2019). Prudent terms

limit information and uses to core necessities over defined time periods (Almeling, 2012). Legal guidance ensures balance benefiting all parties.

Key NDA clauses include defining protected information, restricting use cases, setting time limits, specifying non-disclosure duties, and delineating remedies (Miller & Davis, 2012). Precise designations of confidential data enable compliance and enforcement. Codifying permitted uses reinforces limitations (McJohn, 2009). Defined terms allow eventually releasing data from controls.

However, vague definitions or sweeping restrictions undermine enforceability (Lemley, 2012). Reasonable clauses focus protections on truly high-value information. Non-disclosure periods align with commercial shelf-life of secrets. Balanced terms avoid constraints exceeding necessities.

Well-drafted NDAs precisely designate information warranting protection and narrowly define permitted uses. Time limits balance maintaining control against inevitable public diffusion over time (Council, 2019). Remedy clauses stipulate relief available for breaches, aiding enforcement (Almeling, 2012). However, restraints exceeding legitimate aims invite unenforceability.

NDAs warrant customization for partners like IT vendors, developers, and advisors accessing more sensitive information (Miller & Davis, 2012). Access levels may be tailored through supplemental agreements. Technical consultants may operate under limited-term agreements (McJohn, 2009). Beta testing NDAs stipulate protection of prerelease materials.

However, collaboration necessitates balancing protections against flexibility (Lemley, 2012). Excessively strict NDAs will hamper relationships. Agreements should enable partners to ethically perform duties while securing critical IP like source code. Customization should reinforce security culture.

Supplemental agreements expand NDA protections to match heightened risks with third-party access. Prudent adaptation avoids one-size-fits-all terms constraining partnerships (Council, 2019). But even expanded NDAs should respect legitimate boundaries and aim to foster mutual understanding (Almeling, 2012). Shared interests justify customization more than controls alone.

Best practices in administering NDAs include secure storage limiting access to records to authorized personnel only (Miller & Davis, 2012). Central repositories aid enforcing obligations and non-disclosure periods. Systematic processes ensure execution prior to data exchanges (McJohn, 2009).

However, burdensome processes undermine compliance (Lemley, 2012). Streamlining agreements using templates facilitates adoption.

Above all, governance should emphasize ethics and responsibility over legalistic controls. Prudent practices balance protections and partnerships.

Online storage in access-controlled systems enables administration without imposing undue burdens. Standard templates drafted under legal guidance facilitate efficient deployments (Council, 2019). However, NDAs work best supporting cultures of security and ethics rather than through burdensome processes alone (Almeling, 2012).

While providing supplemental protections, NDAs feature limitations in preserving digital trade secrecy (Miller & Davis, 2012). Electronic copying and dissemination frustrate controls, especially beyond contractual periods. NDAs also rely on legal enforcement rather than technical protections (McJohn, 2009).

Robust security controls like encryption remain essential given data fluidity limiting NDAs (Lemley, 2012). As supplementary agreements, NDAs should avoid constraining data flows, instead reinforcing governance policies emphasizing ethics. Used prudently, NDAs provide value but are no panacea for digital secrets.

Given intangible information flows, NDAs struggle to control data after disclosure. Agreements represent just one layer of governance amid complex technology (Council, 2019). However, NDAs affirm mutual commitments beyond legal minimums when aligned with prudent security and culture (Almeling, 2012). Holistic governance maximizes protections.

Alternatives to expansive NDAs include agreements limiting data access methods or permissible decoding (Miller & Davis, 2012). Technical options like encrypted code transmission enable selective disclosure under defined conditions. Explicitly delineating data handling standards also reinforces reasonable care (McJohn, 2009).

However, collaboration suffers under burdensome controls (Lemley, 2012). More granular agreements warrant caution to avoid complexities frustrating usability. Outlining expected confidentiality practices may prove most prudent, relying on trust and ethics over strict controls. Mutual understanding represents the strongest foundation.

Access limitations enable prudent data sharing by specifying technical handling requirements. However, convoluted controls undermine productivity (Council, 2019). Establishing shared data stewardship practices strikes an optimal balance between security and collaboration (Almeling, 2012).

While protecting legal rights, NDAs raising ethical issues regarding transparency or restricting lawful competition require close scrutiny (Miller & Davis, 2012). Overreach risks not only unenforceability but

also organizational culture. Agreements perceived as prioritizing profit over ethics and people breed cynicism (McJohn, 2009).

However, well-crafted NDAs avoid windfalls to bad actors at the expense of innovators (Lemley, 2012). Reasonable protections incentivize R&D benefiting society. Still, agreements warrant vetting against principles of fairness and propriety. Ethical NDAs balance interests and offer mutual gains.

NDAs should reasonably protect legitimate competitive advantages from misuse, without unduly restraining mobility or transparency. Avoiding unethical overreach maximizes enforcement and adoption (Council, 2019). However, even balanced NDAs require situational judgement in application to avoid unintended consequences (Almeling, 2012).

Digital integration across supply chains necessitates NDAs governing more proprietary data exchanges (Miller & Davis, 2012). However, intangible information flows pose enforcement challenges, especially post-disclosure. Courts increasingly weigh public impacts of restricting digital innovation through injunctions derived from NDAs (McJohn, 2009).

Technical advances like blockchain-backed audit trails may help substantiate claims by tracing breaches (Lemley, 2012). But litigation remains a reactive last resort compared to agreements reinforcing principled data practices. Broader deployment of NDAs should be weighed against effects on security culture. Over-reliance on NDAs risks unintended consequences.

Rising digital dependence expands information exchanges requiring supplemental contractual protections. However, legalistic controls lose effectiveness absent shared norms (Council, 2019). Rather than emphasize NDAs as enforcement tools, prudent organizations frame agreements cultivating mutual understanding around information stewardship (Almeling, 2012).

NDAs should reinforce reasonable protections for high-value information to preserve incentives, without unduly restraining legitimate mobility or transparency (Miller & Davis, 2012). Though contracts warrant caution given inherent ambiguities in digital secrets. Holistic confidentiality governance emphasizes ethics over legal controls (McJohn, 2009).

Prudent NDAs avoid overreach exceeding necessities or operational constraints hampering productivity (Lemley, 2012). Agreements function best complementing governance policies fostering security and ethics. NDAs framed around mutual interests and shared duties prove more effective than strictly legalistic controls.

Well-crafted NDAs provide supplemental protections by delineating mutual confidentiality commitments. However, principles-based governance addressing culture and technology represents the primary imperative (Council, 2019). With care to avoid unintended consequences, NDAs can positively reinforce business ethics and stewardship norms (Almeling, 2012).

Conclusions for Chapter V

This extensive analysis of legal frameworks, organizational practices, technological solutions, and ethical considerations surrounding trade secrets and proprietary information in the digital age yields several key conclusions and recommendations.

Fundamentally, trade secrets constitute a vital form of intellectual property fostering innovation and competitiveness by preventing unfair free-riding on confidential information. However, excessively strong protections also risk constraining collaboration, transparency, and mobility necessary for economic dynamism. Prudent governance must balance enabling operations, commercial interests, employee rights, and the public domain.

With the predominance of intangible information flows through interconnected digital systems, preserving secrecy poses novel challenges. Technical measures like access controls and encryption aim to secure data by design. But complex technologies, third-party integrations, and emerging threats inevitably create residual risks necessitating layered governance addressing culture and ethics alongside security.

Defining trade secrets proves context-specific, but key criteria center on deriving commercial value from information kept reasonably confidential. Opaque algorithms, unique datasets, and other digital artifacts meeting evidentiary standards warrant protection, incentivizing investments absent formal intellectual property exclusivities. However, businesses should avoid claiming overbroad secrecy that undermines rights or employee mobility.

Legal frameworks in the U.S. like UTSA aim to balance public domain access with trade secrecy rights, prevent theft and unfair use, and enable enforcement. However, digital technologies frustrate elements of traditional trade secrecy doctrines. Proving online acquisition methods remains difficult, while reverse engineering intangible assets raises ambiguities. Modernization efforts should enhance protections without

unduly constraining lawful competition.

With digital integration across supply chains, third-party exchanges necessitate supplementary contracts like non-disclosure agreements delineating confidentiality duties. But these measures function best complementing holistic governance, rather than substituting overzealous controls provoking resistance. Customization should reinforce shared stewardship norms, instead of emphasizing legalism.

Preserving trade secrecy fundamentally depends on institutionalizing stewardship responsibilities throughout organizations. Culture and ethics prove more reliable guides than surveillance and sanctions in complex environments. However, controls remain necessary to demonstrate reasonable protections if disputes arise. Integrative governance balances pragmatism, protections, and principles.

Online transmission enables instant distribution of compromised secrets, magnifying implications of unauthorized disclosures. But technologies similarly expand options for enhancing security, implementing access controls, monitoring data flows, and establishing origins and custody chains to support claims if incidents occur. Holistic confidentiality frameworks should enable lawful transparency pathways and protections for ethical dissent.

With vast proprietary datasets and opaque algorithms underlying competitive advantages, information governance grows increasingly vital for commercial success and societal outcomes. But opacity also risks infringing accountability. Leaders must champion ethics and responsibility for legal digital secrets, crafting policies that balance pragmatism, protections, productivity and principles.

Ultimately organizations must move beyond compliance with minimum secrecy requirements, toward stewardship treating information prudently based on value and sensitivity. However, governance should enable operations relying on proprietary data, avoiding undue constraints. Though imperfect, conscientious controls and culture offer the soundest path to responsible information practices benefitting all stakeholders.

In conclusion, preserving digital trade secrecy to drive innovation and secure competitive advantages requires proactive, holistic governance addressing evolving technologies and threats. Integrative frameworks coupling updated laws, measured technical protections, contractual reinforcements, and organizational stewardship culture offer the most prudent path to balancing secrecy, security, collaboration and competition in the Information Age. However, persistent challenges necessitate ongoing

adaptation guided by ethics and principles, not just narrow legalism. Responsible information practices benefit organizations and society, but require continued diligence.

These findings suggest several best practices for enterprises, institutions and policymakers navigating digital secrecy protections:

Take stock of current and emerging practices surrounding information governance, identifying potential gaps or excessive constraints on operations, transparency and mobility.

Catalog proprietary organizational data, infrastructure and digital assets, mapping sensitivity levels, vulnerabilities and protection priorities. Avoid defaulting to sweeping secrecy claims.

Review existing legal frameworks and cases governing trade secrecy, advocating for modernization attuned to digital technologies where ambiguities exist.

Implement layered technical controls like encryption and access management demonstrating earnest protections without unduly hampering collaboration.

Customize contracts like NDAs for external partnerships and development, reinforcing security norms without legalistic overreach.

Continually refresh employee training on handling procedures, legal duties, ethics expectations and threat awareness amid evolving technologies.

Monitor external threats and internal data flows to rapidly identify potential unauthorized disclosures and mitigate risks. But avoid overreach infringing rights.

Establish secure but accessible channels for internal ethics concerns and external vulnerability disclosures, enabling oversight with appropriate data protections.

Inventory existing governance policies, contracts, controls and cultural practices to identify potential confidentiality gaps or excessive constraints requiring adjustment.

Develop comprehensive but dynamic data governance frameworks addressing evolving technologies, with legal counsel input regarding trade secrecy rights and obligations.

Champion commitment to ethics, responsibility and stewardship at leadership levels, rewarding conscientious data practices based on principles rather than fear.

Pursue integration across governance elements addressing policy, technology, contracts, training and culture, avoiding over-reliance on singular solutions to complex secrecy challenges.

Balance pragmatic protections focused on truly sensitive assets against transparency demands, mitigating risks without hampering accountability or stifling mobility and dissent.

Implement confidentiality practices as tools for establishing rights in worst-case scenarios, not day-to-day constraints presuming malign intent among employees and partners.

Regularly adjust governance to adapt to new technologies, practices, threats and vulnerabilities while hewing to core principles and purpose. Avoid stagnant one-size-fits-all secrecy models.

Frame proprietary protections and contracts around mutual interests and shared duties, avoiding legalistic emphasis on controls and constraints detrimental to collaboration and culture.

Ensure reasonable transparency consistent with lawful trade secrecy to build trust in information practices and mitigate risks of leaks aimed at perceived ethics lapses.

Develop situational ethics skills and channels enabling judicious balancing of competing secrecy demands based on context, not just blanket applications of control.

The imperative of preserving digital trade secrecy while enabling lawful collaboration, competition, dissent and oversight necessitates nuanced governance exceeding compliance minimums. Integrative frameworks aligning protections with principles represent the most prudent path forward for organizations and society.

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CHAPTER VI

RIGHTS TO DIGITAL DATABASES

1. *Objects and subjects of rights to databases*

Copyright law generally protects original selections and arrangements of data in a database as a literary work, but does not cover the underlying data itself (Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 1991). The EU Database Directive of 1996 introduced a *sui generis* database right protecting the investment behind compiling a database, even if it lacks originality, for 15 years from publication. This gives stronger protection against wholesale copying of database contents beyond what copyright affords. However, the Directive only applies within the EU, leading to inconsistent protections globally. The US in particular only recognizes limited copyrightability absent an equivalent database right. This creates complex cross-border issues regarding scope of protection.

In practice, companies like Bloomberg leverage technical controls alongside database rights to prevent unauthorized usage of their proprietary data collections. But open access advocates critique overly restrictive regimes that limit public interest access and use. The appropriate scope remains contested between enabling returns on database investments versus facilitating knowledge exchange. More purpose-limited and compulsory licensing has been proposed to balance these interests (Reichman & Uhlir, 1999). But database rights holders continue lobbying for strengthened controls against perceived threats of cheap copying.

The uncertain and inconsistent protections globally demonstrate the challenges in reconciling proprietary interests in monetizing data compilation efforts with countervailing public interests in accessing, sharing and building upon factual information. Absent harmonization, companies must pursue complex multi-jurisdictional legal strategies while critics push for unified open data access frameworks. Achieving consensus on appropriately balancing rights to secure reasonable commercial returns versus rights to access data for innovation remains elusive.

Copyright requires original selection, coordination or arrangement of contents to protect a database (Feist, 1991). But substantial investment must be demonstrated, with guidelines noting required finances, time, effort etc. On the other hand, in Feist, even significant labor compiling phone records was inadequate for copyright as the arrangement lacked sufficient creativity. Thus database copyright and *sui generis* rights have divergent eligibility criteria targeting either originality of selection/arrangement or investment/sweat of the brow, respectively (Davison, 2003).

In practice, telephone directory makers were left unprotected against competing reuses of their data collections absent at least minimal creative selection and arrangement conferring copyrightability. *Sui generis* regimes emerged in part to address this gap, but remain controversial to the extent they excessively restrict public access and use of compiled data. Ongoing debates continue regarding the appropriate standards and duration of protection required to properly balance the interests of database creators and users.

Rights can also be transferred by licensing contracts. Complex issues arise regarding: joint authorship by multiple database creators; works made for hire conferring rights to employers; government ownership of public sector databases; and commissioned databases where rights were not specified contractually (Davison, 2003). Another challenge is that copyright only protects additions – not the preexisting data – leading to split ownership. There are also open questions around aggregating third-party content, like user posts, into a new database. Overall, the intersecting rights require careful assessments.

In practice, collaboratively constructed databases with contributions from multiple authors create uncertainties in rights ownership. Platform aggregations of user content also raise unsettled questions, though expansive terms of service often claim broad reuses. Clarifying underlying rights and obtaining express transfers is advisable to preserve the ability to fully commercialize collaboratively generated databases. Otherwise, ambiguities create risks of litigation.

Copyright protects the structure and arrangement of a database as a literary work, but does not cover the data itself absent original selection or coordination (Feist, 1991). *Sui generis* rights protect against appropriating substantial contents, even absent original structure or arrangement. In practice, phone directories were copied wholesale despite sweat-of-the-brow effort compiling the data. This demonstrated copyright's limitations in protecting data or factual compilations, as only minimal originality

in the selection/coordination is required. The EU Database Directive aimed to strengthen protections against duplication of database contents, rather than just the selection and arrangement. However, tensions remain between securing commercial database investments and allowing access to data and facts contained within. Additional protections beyond traditional copyright are still contested by critics warning of anti-competitive effects (Reichman & Samuelson, 1997). The appropriate scope of rights thus remains unsettled.

The layers of potential protection via copyright and *sui generis* rights remain difficult to reconcile with countervailing policy priorities of enabling access to factual information. Further complications arise regarding permissible extractions of insubstantial contents. Overall, the complex interplay of protections and limitations creates uncertainties for database builders and users alike. Clearer guidance could help balance interests, but differences in national laws persists.

Sui generis database rights were introduced in the EU to protect commercial investments even absent copyrightable originality in selection/arrangement of contents (Reichman & Samuelson, 1997). The goal was preventing cheap duplication undermining the compilation effort. But critics argue this creates overbroad exclusive rights in data hindering scientific access and competitive market efficiencies (Davison, 2003). Minimal effort databases may also qualify for overextended protection terms. There are calls to require truly substantial investments for eligibility to better balance public interests in utilizing data. But database producers argue *sui generis* rights are needed to recoup costs and fund continual updating that benefits users. Alternatives like compulsory licensing have been proposed to facilitate specific public interest uses. But the appropriate scope remains contested between securing commercial incentives and enabling access to facts and information in database form. *Sui generis* regimes remain controversial as many question granting private ownership rights over compiled data.

Sui generis database rights attempted to strengthen protections by departing from traditional copyright principles. But the risks of anti-competitive impacts and undue restrictions on information access sparked ongoing debates over the proper calibration and constraints on these emerging rights. Absent consensus on appropriateness, inconsistent national regimes persist.

A combination of technical, contractual and IP protections can provide strong safeguards for proprietary databases. Access controls,

encryption, watermarking, API keys and user help control usage. Terms of service establish allowed access parameters and limitations. Copyright provides backups against unauthorized reproduction of original selection and arrangements. Sui generis database rights add further protections for duplicated contents. Clickwrap and browsewrap agreements can improve protections through binding users to additional terms, ideally giving notice. Monitoring and enforcement leveraging scraping detection complements legal remedies against unauthorized extraction. Multilayered strategies combining technical barriers, contractual provisions, database IP rights, and enforcement actions provide robust shields for commercially valuable data compilations. But critics argue overly stringent controls also hamper public access and fair use rights, necessitating a balanced approach.

In practice, leading database vendors utilize coordinated technical and legal constraints to limit unauthorized uses, while resisting calls for more access oriented frameworks. This demonstrates how alignments of proprietary interests often prevail over countervailing priorities of expanding data access and reuses. However, high profile disputes also show the risks of overly restrictive controls becoming subject to external scrutiny and challenges.

User contributions create challenges regarding database IP ownership and required permissions. Platform terms of service often claim broad rights to utilize posted materials, including aggregating into proprietary databases. But users likely retain copyrights in original content like commentary and reviews. There are open questions around whether implied licenses permit inclusion absent express transfers of rights. Crowdsourced collections also have multiple coauthors complicating rights. And users likely have reasonable expectations against wholesale duplication of entire collections of posts. Technical controls prevent bulk downloads, supporting database rights claims. Overall, crowdsourced databases should ensure contributor awareness and consent for reuse. Express licenses by users help authorize aggregation while providing attribution assurances. Otherwise, unrestricted assertions of *sui generis* or joint authorship rights in collective user content are legally and ethically problematic.

In practice, platforms freely mine user contributions while resisting calls for greater transparency and sharing of benefits. This demonstrates imbalances in bargains purportedly granting expansive rights to commercialize crowdsourced materials. Calls for heightened ethics and sharing the value created suggest alternative frameworks are needed.

The EU grants robust *sui generis* database rights, while the US only recognizes the more limited copyright protections (Reichman

& Samuelson, 1997). This creates complex conflicts on cross-border database usage. Developing countries often lack any specified database rights, leaving compilations exposed to duplication. Even regimes like Australia's narrowly cover government data collections, but not broader privately-produced databases. Significant investments remain ineligible for protection absent original selection/arrangement conferring copyright ownership. The uneven protections globally lead some to call for unified minimum standards through an international treaty. But controversies persist around appropriate scope of rights balancing commercial interests and public access. Attempts to export expansive EU-style regimes spark resistance over anti-competitive effects. Achieving global harmonization of database IP protections remains challenging given differing priorities.

In practice, major database producers like LexisNexis pursue myriad technical controls and contract provisions to create protective regimes despite the limits of formal IP rights in many jurisdictions. However, critics argue this demonstrates the excessively restrictive defaults of current laws.

Recent years have seen growing assertions of database copyrights and *sui generis* rights to control professional data scraping and aggregations of user content. Licensing is increasingly employed to limit public access and derivative uses of proprietary compilations. Simultaneously, open data licensing models have emerged enabling enhanced access like Creative Commons 0 waivers and Open Database Licenses mandating public attribution. However, these approaches coexist uneasily with expanding IP protections against perceived threats from cheap digital duplication. While compulsory licensing proposals aim to enable specified public interest uses, database producers continue pushing for strengthening rights frameworks against unauthorized extraction. Overall, maximalist IP protections are prevailing over frameworks facilitating access, though open data licensing governs narrow spheres like government public sector information.

Conflicts between proprietary licensing models and open data sharing frameworks reflect unresolved debates over appropriate rights to control valuable datasets. Absent clearer limits and balance, default norms continue trending toward stringent protections rather than permissive access.

Calls for enhancing public access to data compilations must be weighed against legitimate commercial interests in recovering database investments (Reichman & Uhlir, 1999). But appropriate safeguards should not create unduly exclusionary rights that impede scientific progress and economic competition. Targeted IP protections could be coupled with compulsory licensing for certain public interest uses like research. Temporary protections may sufficiently incentivize initially compiling databases

without permanent monopolies. Open data requirements for public sector databases expand access while funding updates via taxes. Technical controls like API keys can also enable tiered access models. Overall, balanced and proportionate IP regimes avoid anti-competitive effects while securing reasonable returns for database builders. But achieving this balance remains contested given differing perspectives on appropriateness of private ownership over compiled data.

In practice, open access advocates have struggled to overcome proprietary interests shaping most database rights frameworks. But narrowly tailored *sui generis* models coupled with compulsory licensing represent potential compromises to enable specified public interest reuses. Constructive dialogue and shared understandings could yield balanced solutions, albeit gradually.

2. *Access and use of online databases*

Copyright law recognizes certain exceptions to database rights that enable legal access and uses, especially for research and educational purposes. In the US, fair use principles may support limited copying of protected selection and arrangement, though not wholesale duplication (17 U.S.C. § 107, 1992). The EU Database Directive also mandates that member States allow users to extract insubstantial contents for illustration, teaching or scientific research without rights holder authorization (Directive 96/9/EC, 1996). Such exceptions aim to facilitate access and use for socially beneficial purposes like scholarship. However, the scope of fair and allowable usage remains context-specific (Reichman & Uhlir, 1999). Database contracts also often override exceptions, so reviewing terms of use is critical.

In practice, researchers rely extensively on database searching, indexing, text mining, and analytics to study trends, generate insights, and test hypotheses (Triaille et al., 2014). Publishers and platforms aim to enable access for scholarship while preventing abuses. For example, many adopt tiered pricing models charging commercial users more than academics to allow reasonable access. However, when paywalls or strict terms of use limit text mining and downloads, the utility of data collections is reduced. Courts continue weighing permitted exceptions against rights holder interests in monetizing access.

Achieving balance remains challenging between safeguarding commercial database-building incentives and promoting follow-on socially valuable uses. Open access initiatives for publicly-funded research highlight paths to expand access while covering costs. But for proprietary collections, permissible exceptions coexist uneasily with contractual restrictions.

Database producers utilize license agreements to establish permitted access parameters, acceptable uses like browsing and downloads, and prohibited activities considered infringing. Terms may restrict text mining, commercial uses, derivative works, and more. Clickwrap and browsewrap e-contracts require user consent to gain access, overriding exceptions in copyright law. Enabling technology like APIs also lets vendors monitor usage and deny access for violations. However, European courts have scrutinized unduly restrictive contractual terms that shrink users' existing rights under database exceptions (Davison, 2003). Reviewing rights granted versus reserved is essential in assessing license equitability.

Database vendors like LexisNexis and Thomson Reuters usually impose strict license terms against unauthorized copying and redistribution of contents (Triaille et al., 2014). However, text mining licenses are also emerging to enable algorithmic analysis and machine learning within specified parameters. Case law continues to evolve regarding enforceability of terms overriding exceptions like fair use. But currently rights holders maintain extensive abilities to constrain access contractually.

Balancing vendor interests in monetizing database access with user rights remains difficult, especially for data collections deemed integral infrastructure for research and innovation. Proposals for "data liberation" clauses in licenses that align with existing statutory exceptions could enable compromised approaches.

Fair use is a flexible standard weighing four factors to assess if unlicensed uses of copyrighted works may be permissible, including: the purpose and character of use; nature of the work; amount used; and market effect (17 U.S.C. § 107, 1992). Non-commercial research and educational uses are more likely fair, such as database searches that do not appropriate protected selection/arrangement or duplicate significant substantive contents. However, excessive downloading of records could outweigh fair use, particularly for commercial purposes. Such fact-intensive determinations remain uncertain. The EU Database Directive mandates exceptions for insubstantial extractions but allows override by contracts, complicating analysis (Davison, 2003).

In practice, text mining research often reproduces entire datasets to

enable computer analysis (Triaille et al., 2014). Publishers allege such uses regularly appropriate protected contents. Some courts have deemed text mining fair absent purposefully exposing contents (Authors Guild v. Google, 2015). But contract terms frequently restrict text and data mining, necessitating reliance on exceptions or explicit licenses. Overall, database usages in scholarship occupy a gray area between supporting follow-on innovation versus appropriating proprietary contents and economic value.

Clarifying principles to enable mining of data collections for public interest purposes like research could support compromise frameworks. However, prevailing rights holder interests have largely forestalled attempts at establishing expanded fair use jurisprudence governing digital databases.

Technical controls embedded in database architecture enable monitoring usage and preventing unauthorized activities. Application programming interfaces (APIs) allow regulated access to contents through assigned keys without exposing entire datasets. Keys can be revoked for contractual violations to limit abuse. Terms of use enforce permissible parameters for API access and analysis, contractually restricting exceptions. Other rights management technologies include limiting download speeds, blocking bulk downloads, or watermarking records (Triaille et al., 2014). However, European database rights still mandate exceptions enabling some uses, complicating enforcement. Overall, technological measures effectively reinforce contractual terms for managing commercial database access.

Platforms aggregating user content wrestle with appropriately balancing API access and data protection. Further, integration challenges arise around interfacing diverse legacy database systems with modern API infrastructures.

Technical controls enable differentiated database access tiers, distinguishing commercial and non-commercial users. However, criticisms persist around appropriateness of overriding exceptions for socially valuable unauthorized uses. Reconciling protections against misappropriation while enabling text mining remains an area of tension.

Bulk downloads that systematically collect entire databases can undermine incentives for commercial compiling efforts by enabling cheap reproduction (Triaille et al., 2014). Technical protections aim to prevent aggregating significant contents. Restricting download speeds, implementing CAPTCHAs, blocking automated scraping bots, and requiring user sign-ons help limit systematic downloads. Terms of use also prohibit such activities, relying on monitoring and enforcement against violations. However, measures must be weighed against legal exceptions permitting certain uses and cumulative extractions (Davison, 2003). A

supportive legal framework strengthens technical protection.

In practice, commercial database vendors prohibit bulk downloads such as systemically compiling local court records into national collections. Data is increasingly monetized at granular levels. But researchers argue impediments to aggregating data collections restrict follow-on innovations and comport with fair use exceptions.

Appropriately distinguishing bad faith expropriation from socially beneficial aggregation remains contested, though dominant rights holder interests generally prioritize preventing bulk access. However, carve outs could enable bulk access for non-commercial research based on fair use rationales.

Scraping generally entails systematically extracting data from websites through automated bots, rather than via intended access means like subscriptions. It can appropriate substantial database contents rapidly, undermining licensed access models. However, contractual trespass and database rights may not cover all scraping situations, particularly non-commercial public interest usages. Factors like transmission barriers and usage restrictions help assess if scraping exceeds access rights or qualifies as fair use. But scraping often occupies legal gray areas that rights holders aim to dispel through strengthening laws and technological barriers.

In practice, platforms such as LinkedIn, Facebook or Craigslist regularly battle unauthorized data scraping through both technical defenses and lawsuits. But open government data initiatives contend proactive scraping and aggregation of public sector information comports with intended policy aims. Overall, anti-circumvention norms tend to prevail over countering arguments for enabling scraping innovations.

Resolving tensions requires better delineating acceptable parameters for scraping data collections depending on purpose, usage, effects on rights holders, and applicability of exceptions. But agreements remain elusive given clashing priorities between proprietary and open access advocates.

Responsibly utilizing proprietary databases requires reviewing terms of use and respecting any specified access limits, permissions, restrictions or prohibitions (Triaille et al., 2014). Breaching contracts or circumventing access controls could subject users to legal liability or technological denial of service. For publicly accessible government data, responsibilities still exist to avoid systematically overwhelming systems. When accessing databases like social media that combine public and personal information, additional care is needed around individual privacy. Overall, the law provides a baseline framing usage rights, but ethics and norms of fair play govern responsible data practices.

In practice, research platforms, e.g. LexisNexis, enable subscription-based access for educational data mining pursuant to strict contractual terms. Crosswalk educational databases like JSTOR also partner with universities to provide access for scholarship within defined parameters. Such tailored data licensing models demonstrate attempts to balance proprietary interests and knowledge sharing aims.

Clearer frameworks distinguishing positive and negative practices could support ethical data cultures alongside formal legal responsibilities. But shaping consensus on acceptable uses remains challenging given diverse data monetization models and access philosophies.

Various approaches have aimed to expand public interest access to proprietary databases for research and educational purposes (Reichman & Uhlir, 1999). These include: mandatory licensing regimes allowing specified uses for a set fee or rate; carve-outs from liability for certain non-commercial users like universities; requirements to provide bulk access for research; and exemptions from contractual override of access exceptions. Such proposals wrestle with balancing revenue models and control interests of database owners versus broader social benefits from utilizing the data. But most reform efforts confront resistance from proprietary interests shaping current laws.

In practice, segments like legal publishing have faced calls for facilitating comprehensive analytics through bulk data access and mandatory text mining licensing, particularly given the public role of law (Triaille et al., 2014). Some progress occurs through partnerships enabling subset access. However, proposals mandating sharing or weakened rights generally face legislative challenges. Overall, merits arguments around social value have largely struggled against countervailing influences of proprietary database interests.

Creating compromise frameworks accommodating reasonable commercial interests while expanding access remains challenging but constructively balancing stakeholder priorities could positively resolve current tensions.

In recent decades, data monetization and commodification have rapidly accelerated across sectors like marketing, entertainment, and research. New proprietary databases are continuously compiled and commercialized. This drives expansion of contractual and IP restrictions, even as data grows more essential for innovation. However, principles of fair use create uncertainty around unlicensed mining and aggregation.

In practice, leading legal databases now charge for features like citation

downloads and data mining that were previously included (Triaille et al., 2014). Technology allows granular monetization and monitoring of usage and authorizations. This environment trends toward proprietary control absent external interventions mandating accessibility.

Effective policy balances remain contested between commoditizing data access and knowledge sharing aims. But incentivizing participation in data pooling frameworks could forge agreements to appropriately reward compilation efforts while enabling broad access and reuse rights.

Coherent frameworks governing data extraction and reuse require reconciling complex interacting factors on multiple dimensions: Purpose (commercial v. non-commercial); Source (public v. private); Scale (individual records v. bulk datasets); Nature (factual v. creative); Use (direct v. transformative); and Effects (market harms v. social benefits). While principled analysis is needed taking these elements into account, contradictory perspectives on weighting priorities preclude unified theories. This outcome produces inconsistencies like copyright law protecting creative selections and arrangements but not underlying data content itself. Ongoing disputes reveal gaps between formal rights and data access norms. Achieving balance remains challenging.

In practice, disparate *ad hoc* responses from legislatures, courts and vendors create fragmented governance (Davison, 2003). More systematic international harmonization could support predictable guidelines and best practices. However, frameworks balancing stakeholder interests continue proving elusive given enduring tensions between proprietary control and open access. Significant disputes around emerging practices like text mining persist without resolutions.

Constructing principled governance frameworks constitutes an ongoing challenge amidst rapid technological and commercial data innovations. But carefully bridging perspectives through multistakeholder participation could yield positive solutions. Even imperfect compromises may productively advance data policy aims.

3. *Protecting digital databases from unauthorized data extraction*

Database owners utilize various technical measures to control access and prevent bulk scraping of contents, such as: restricting download speeds; blocking bots and automated scripts; implementing CAPTCHAs and

other user verification; requiring logins; limiting search queries; employing scraping detection tools; and taking down or denying service to infringing actors (Triaille et al., 2014). Terms of use coupled with monitoring and enforcement further reinforce barriers against unauthorized extraction. However, challenges persist in balancing protections while still enabling access for legal purposes like research under exemptions. Ongoing innovation aims to stay ahead of data scraper workarounds.

In practice, platforms like Facebook or LinkedIn regularly enhance technical defenses and initiate lawsuits to combat scraping bots harnessing user data. However, researchers argue impediments to aggregating public sector information for analysis and journalism purposes contravene open data aims. Overall, proprietary database owners tend to err toward stringent protections given commercial incentives, while critics contend effects on socially beneficial uses justify more access.

Technical controls create important speed bumps but cannot fully prevent determined data scraping and extraction. Constructing complementary legal and ethical norms around appropriate usage could better balance aims of protecting commercial interests while enabling a scope of public benefit uses.

Discuss monitoring, detection and enforcement measures against data theft.

Database owners utilize various tools and strategies to monitor access, detect suspicious usage patterns, and enforce against infringing extraction. Monitoring measures like requiring registration to access or utilizing APIs with assigned keys help track usage (Triaille et al., 2014). Data tagging and watermarking also enable observing downstream usage. Automated scraping and mass downloads can be flagged through analytics. Enforcement options include revoking access keys, issuing takedown notices, and filing lawsuits for contractual or database rights violations. However, challenges remain in tracing scrapers who obfuscate identities. Overall, multi-layered monitoring, detection and enforcement creates a robust architecture against data misappropriation.

In practice, once again referring to LexisNexis, it employs extensive access control and monitoring infrastructure coupled with legal action against unauthorized aggregators of records. But critics argue conflation of good faith error with intentional theft in enforcement overreaches and chills research uses.

Effectively combating misuse while enabling fair information access depends on carefully distinguishing bad faith free riding from socially beneficial activities. This requires moving beyond compliance-driven

enforcement models to frameworks nurturing ethical data use cultures.

Various laws furnish remedies against data scraping and unauthorized extraction:

- *Copyright* - Infringement suits for reproducing original selection/arrangement.
- *Database Rights* - Violation claims for appropriating substantial contents.
- *CFAA* - Computer intrusion liability for circumventing access controls (18 USC §1030).
- *Trespass* - Unauthorized access to restricted systems.
- *Contract* - Breach of Terms of Service violation lawsuits.

This multi-layered legal scaffolding strengthens remedies against misappropriation. However, carve outs like fair use and exemptions shield certain public interest extractions. Overbroad enforcement could improperly chill learning and innovation. Therefore, balancing remedies with exceptions remains key (Davison, 2003).

In practice, platforms readily initiate lawsuits for breaching terms and database rights by scraping user data without considering countervailing arguments that certain uses may be in the public interest. This highlights the need for ethical frameworks beyond strict legal compliance.

Scraping detection faces challenges from obfuscation tactics like: falsifying or rotating IP addresses and bot identifiers; mimicking human browsing behaviors to avoid detection; using intermediary nodes and redirection to mask origins; extracting limited data across long time periods; manipulating or falsifying extracted data to avoid watermarks.

Such tactics exploit gaps between laws, policies and technical controls. While data scraping leaves digital traces, scrapers conceal identities and activities to avoid remedies. However, combining monitoring tools, cyber forensics, legal discovery and cooperation across platforms could better identify sources for enforcement. But tracing scrapers who republish data also remains difficult.

In practice, commercial database owners argue pervasive anonymous scraping across websites has reached crisis levels (Triaille et al., 2014). However, critics contend exaggeration aimed at marshaling stricter legal protections. Developing shared understandings on the actual scope of problematic scraping compared to allowable practices could support balanced solutions.

Examine voluntary initiatives for removing infringing database copies.

In addition to lawsuits and takedowns, some database owners have created voluntary initiatives requesting that recipients proactively remove

unauthorized copied data extracts. For example, Elsevier issued a mass letter asking institutions to delete improperly downloaded copies of journals. Such initiatives underscore rights claims and reveal rippling impacts beyond original misappropriation. However, recipients may resist cooperating absent legal compulsion. There are also risks of casting too wide a net that deters lawful uses. Thus, effectiveness remains limited relative to enforcement actions.

In practice, sci-hub continues operating a massive repository of unauthorized scientific articles despite loss in lawsuits and other removal efforts, arguing necessity justifies civil disobedience (Schiermeier, 2017). Overall, the prevailing high prices of academic publishing undermine cooperative voluntary initiatives to curb infringing redistribution.

Advancing frameworks enabling reasonable cost access could shift norms around infringing dissemination by eroding claims of necessity. Constructive partnerships between publishers, institutions and users could yield mutually beneficial solutions.

A combination of technical barriers, monitoring, and legal enforcement can effectively combat flagrant database scraping and infringement, but faces limitations in deterrence (Triaille et al., 2014). Technical defenses are regularly circumvented by sophisticated scrapers. Whack-a-mole lawsuits and takedowns often simply lead infringers to reemerge anonymously. And challenges exist tracing and building cases against opaque scrapers. However, layered efforts increase burdens on unauthorized uses. While gaps persist, multi-pronged strategies undermine systematic misappropriation at scale. But more dialogue may be needed around permitting certain public interest extractions.

In practice, platforms readily employ the full suite of available technical and legal measures against data scraping with considerable success curtailing large-scale commercial operations. However, some argue this arms race environment is counterproductive where less adversarial postures could constructively advance solutions.

While data scraping often violates laws or contracts, researchers also argue that resultant datasets can hold significant public benefit. However, utilizing such data absent permission raises ethical issues around complicity, tainted provenance, and professional integrity. Factors like original access controls, attribution, purpose, and potential harm inform analysis. Standards discourage using purloined data, favoring carefully acquired legitimate datasets. But laws and ethics permit certain exceptions, like whistleblowing criminality. Overall, complex considerations arise weighing social value, downstream harms, and sourcing ethics when assessing data

extraction and reuse.

In practice, major controversies erupt when researchers publish studies using breached datasets like leaked social media records without consent (Olteanu et al., 2019). However, explicit prohibitions could impede scholarship based on necessary unauthorized disclosures. This demonstrates challenges balancing ethics, academic freedom, legality, and privacy values.

Policy aims to expand public access to government datasets may conflict with private database owners' interests in controlling distribution channels (Triaille et al., 2014). However, carve-outs for non-commercial research dissemination of public sector information gathered at taxpayer expense could constitute reasonable compromise. Facilitating text-mining of academic literature also supports knowledge discovery without harming core markets. Besides such exceptions, database rights warrant protections against commercial free-riding.

In practice, advocacy and legislation expanding public sector open data policies regularly encounter resistance over effects on commercial providers aggregating and monetizing government records. But marginal revenue impacts could justify broader public access gains.

Constructive multi-stakeholder participation in policymaking could bridge divides if baseline interests are first acknowledged before charting compromises. Scope likely exists for mutually beneficial balance.

Recent years have witnessed exponential growth in databases vulnerable to scraping, coupled with soaring demand driving data extraction. Technical defenses also rapidly escalate through scraping detection, improved cryptography, usage monitoring and access limitations. An ongoing arms race persists between data harvesters and platforms attempting to protect proprietary corpuses. Trends point toward heightened platform liability exposure coupled with tougher anti-circumvention laws. However, countervailing support also grows for open data and rights to facilitate certain public interest mining deemed consistent with economic and ethical norms. Overall, technology and law co-evolve reactively with impacts on access and control still unsettled.

In practice, major data breaches consistently reveal limitations of technical methods and policies, but also gradual improvements toughening defenses against large-scale threats (Olteanu et al., 2019). However, critics argue this reactive posture under-prioritizes proactive frameworks to positively expand access and ethics.

Balanced database governance integrates: legal rights and remedies enforcing lawful access; exceptions permitting access for research or news; ethical norms against misappropriation and for integrity; technical

controls and monitoring to prevent systematic theft; reasonable licensing enabling usage within parameters; security and cyber hygiene safeguards; enforcement tempered by due process; multi-stakeholder participation in shaping policies.

Such holistic frameworks aim to secure commercial interests while preventing undue impediments to follow-on innovation serving the public interest. However, challenges persist in reconciling priorities and constructing consistent governance amidst competing values (Davison, 2003). Further dialogue and research toward principled compromise could enable progress.

In practice, prominent disputes reveal gaps between formal laws, access norms, ethics and accountability (Schiermeier, 2017). But sustained engagement across sectors to forge new social contracts around data holds promise if undertaken in good faith.

4. *Open Databases: Terms of Use*

Open licenses allow public access and certain reuse rights for databases dedicated to knowledge sharing aims (Triaille et al., 2014). They utilize intellectual property tools like copyright or *sui generis* database rights to authorize activities like downloading, analyzing, and adapting contents within parameters, rather than prohibiting access. Common requirements surround attribution, share-alike provisions, and limiting commercial use. Creative Commons (CC) licenses developed standardized frameworks frequently applied to open databases and content. However, interoperability issues persist, and user comprehension of precise terms varies. Open licenses constitute important, if imperfect, tools enabling public databases.

In practice, governments increasingly apply Creative Commons or Open Government Licenses to public sector datasets, allowing free access and facilitating transparency and accountability (Open Knowledge Foundation, 2020). However, critics argue license choice and design often lack strategic considerations around trade-offs.

Constructively developing open data policies requires balancing risks, control interests, intended usage, and public stewardship duties. No perfect universal solution exists, necessitating context-specific licensing tuned to particular goals.

Open licenses frequently incorporate the following key provisions:

- Attribution - Requiring retaining copyright notice and giving credit to the database creator. This aids transparency.
- Share-Alike - Mandating distribution of adaptations under the same open license terms. Viral licensing aims to maintain openness.
- Non-Commercial - Allowing free personal use but prohibiting commercialization without additional permission. This reserves potential revenue streams.
- No Derivatives - Limiting adaptations like text mining to protect integrity. However, this restricts follow-on innovation (Open Knowledge Foundation, 2020).

Balancing these parameters involves trade-offs around control interests, economic incentives, open knowledge aims, and follow-on creativity. Different configurations suit different contexts and objectives.

In practice, governments wrestle with allocating rights and permissions across these dimensions when designing open data policies, often opting for restrictive defaults contrary to open access principles (Janssen et al., 2012). This highlights challenges in reconciling interests.

Key open data licensing models include:

- Open Database License (ODbL) – Requires attribution and share-alike for adaptations while allowing commercialization (Open Data Commons, 2020).
- Public Domain Dedication & License (PDDL) – No restrictions but requires attribution akin to Creative Commons 0 waiver (Open Data Commons, 2020).
- Open Data Commons Licenses – Range from public domain (PDDL) to various attribution and share-alike requirements (Open Data Commons, 2020).

Variations balance interests in integrity, transparency, commercialization and open knowledge. However, proliferation risks complicating interoperability across different licenses (Janssen et al., 2012). Policymakers should assess trade-offs in selecting among existing options versus creating new bespoke licenses.

In practice, inconsistent government open data licensing policies are critiqued for preventing combined analysis across datasets (Open Knowledge Foundation, 2020). This highlights needs for harmonization.

Open licenses facilitate tracking content reuse through:

- Attribution requirements to retain metadata on sources.
- Notice conditions mandating marking adaptations.
- Share-alike provisions propagating licensing metadata into derivatives.

- Watermarking or fingerprinting data elements.
- Usage monitoring conditions and APIs.
- Clickwrap or browser wrap agreements to log consent.

Such technical and legal measures balance enabling reuse with transparency. However, tracking derivative value chains remains difficult. Commitments to ethical attribution help maintain open data integrity.

In practice, ambiguity around allowable attribution practices under open licenses causes confusion (Open Knowledge Foundation, 2020). Clear guidelines reinforced by reputation incentives could heighten compliance.

Open licenses vary in permissions around commercial use. But some strategies to commercialize open data while respecting terms include:

- Reporting usage to creators for transparency.
- Accrediting sources prominently.
- Participating in data pools to contribute back improvements.
- Supporting maintenance through fees or contributions.
- Focusing value-add on services around open data, rather than sale of the data itself.

Commercial reuses can generate public value, but fairness dictates compensating stewards adequately and avoiding free riding. Shared understandings could support innovation while preserving ethics and incentives.

In practice, tensions arise when private entities monetize open government data without sufficiently "giving back" (Janssen et al., 2012). However, constructive public-private partnerships can create mutual gains if structured inclusively.

As voluntary permissions-based tools, open licenses have limits in mandating compliance and suffer inconsistent usage and comprehension (Open Knowledge Foundation, 2020). Technical attribution stripping and lack of transparency around adaptations complicate enforcement and assessments. However, when supported by strong data governance frameworks and ethical norms, licenses can productively signal intended usage rights and preserve integrity. More research could clarify efficacy and guide policies.

In practice, government open data policies often simply mandate certain licenses without deeper strategic governance considerations (Janssen et al., 2012). A more holistic approach combining licenses, infrastructure, and ethical incentives could heighten impact.

Surveys reveal mixed user comprehension and compliance with

open data licenses (Open Knowledge Foundation, 2020). While many understand attribution requirements, precise details of share-alike, commercialization, and adaptation rights prove confusing. This results partly from license proliferation and technical language barriers. Simplifying and consolidating licenses could support compliance, as could adding summaries and translations for lay users. Promoting ethics around integrity and reciprocity also enables adherence. Overall, open data aims necessitate accessible, navigable licensing design.

In practice, inconsistent attribution and adaptation practices reveal gaps between formal license requirements and user understandings. Targeted outreach and training with stakeholders could heighten compliance and value.

Complexities arise in combining datasets under different open licenses, with questions around reconciling attribution, share-alike, and other varying requirements (Open Knowledge Foundation, 2020). Interoperability frameworks allow building on materials under compatible licenses, thus facilitating cumulative innovation. However, proliferation of bespoke open licenses by governments creates barriers to intermixing datasets for research and analysis due to conflicting terms. Policymakers should weigh interoperability gains in selecting among standard open licenses.

In practice, analysis of open government data licensing reveals failures to adopt existing interoperable solutions, sacrificing aggregation opportunities (Janssen et al., 2012). But constructive dialogue can alleviate misunderstandings and forge unified approaches.

Open data licensing has grown significantly, prompted by government transparent and digital governance priorities (Open Knowledge Foundation, 2020). However, implementation issues persist around consistency, interoperability, enforcement, and user comprehension. Tensions also exist between commercialization and knowledge sharing aims. Criticisms of overly restrictive default terms have spurred some reforms. Overall, open data licensing constitutes an evolving frontier with progressive potential when governance frameworks mature.

In practice, research reveals ongoing gaps between aspirational open data policies and realization, often stemming from ad hoc reactive approaches (Janssen et al., 2012). But international collaboration and emulating emerging best practices could substantially strengthen impact.

Maximizing benefits from open data involves:

- Strategic governance with multi-stakeholder participation.
- Selecting standard interoperable licenses.

- Investing in metadata quality, documentation, and training.
- Facilitating discovery through catalogues and APIs.
- Enabling bulk and automated access.
- Building user and contributor communities.
- Securing long-term sustainability funding.
- Supporting commercialization generating public value.
- Fostering ethics around attribution and public stewardship (Open Knowledge Foundation, 2020).

With thoughtful holistic policies, open data can spark innovation, transparency, and economic opportunity. Ongoing research, issues benchmarking, and sharing best practices across jurisdictions offers paths for continued maturation.

In practice, pioneering cities like Amsterdam reveal potentials of nourishing open data ecosystems (Amsterdam Open Data, 2020). But realizing possibilities at scale requires elevating from siloed initiatives to comprehensive strategic programs.

5. *Blockchain and decentralized databases*

Blockchain constitutes distributed ledger technology that can decentralize database management and confer benefits like tamper-resistance and transparency (Xu et al., 2017). Rather than siloed proprietary databases controlled by a single entity, blockchains allow permissionless or permissioned access and verification of records through peer-to-peer networks governed by consensus protocols. Cryptography secures data integrity and timestamps provide non-repudiation. Smart contracts automate governance rules over database transactions. However, scaling, privacy, and regulatory challenges persist in applying blockchain infrastructure paradigms to mainstream databases. But innovation continues exploring potentials.

In practice, blockchain database platforms are emerging for supply chain tracking, healthcare records, credentials management and other uses. However, issues like throughput bottlenecks, confidentiality risks, and uncertain legal status continue hampering adoption. Strategic design tradeoffs remain in reconciling the advantages and limitations of decentralized database architectures.

While still maturing, blockchain infrastructure could significantly transform database architectures if technical and governance challenges

are constructively addressed. Further research and controlled piloting is needed to clarify potentials and pitfalls.

Distributed ledger technology like blockchain shows promise for managing records, credentials, and supply chain data:

- Transaction ledgers enhance integrity and transparency for financial trades and other interactions.
- Verifiable credentials like licenses and certificates can be issued and authenticated on-chain.
- Supply chain tracking integrates IoT and smart contracts for monitoring goods lifecycles end-to-end.

Benefits like permanence, transparency, automation, and anti-tampering could improve database functionality across domains. However, scaling transaction throughput and ensuring confidentiality remain challenges. Further research and controlled pilots are still needed to assess viability for mainstream adoption.

In practice, initiatives using blockchain for organic food certificates, conflict mineral tracing, and healthcare provider credentials reveal early potentials across contexts. But integrating disparate legacy systems poses adoption hurdles absent common standards.

Smart contracts are programmable scripts stored on blockchains that execute automatically based on certain conditions being met (Xu et al., 2017). They enable automating database governance rules like rights clearances, micropayments for access, and data usage tracking/attribution. Consensus mechanisms like proof-of-work or proof-of-stake validate transactions across decentralized networks of nodes. Together, they facilitate peer-to-peer database management without centralized oversight. However, hacking vulnerabilities, inflexibility, and scaling issues remain challenges. Ongoing research aims at maturing and hardening technologies and architectures.

In practice, initiatives have explored smart contract-based digital rights management and royalty distribution for creative works. Automated micro-metering could enable innovative data monetization and sharing models. However, real-world testing is still limited and productization remains speculative.

Key attributes of blockchain-based databases include:

- *Transparency* - Publicly viewable ledger transaction histories enhance visibility.
- *Immutability* – Cryptographically chained records resist alteration.
- *Censorship-resistance* – No single entity controls distributed ledgers.

- *Automation* – Smart contracts execute rules absent intermediaries.

However, tensions exist between transparency aims and privacy needs, necessitating strategic design tradeoffs (Kshetri, 2021). Overall impacts on rights, access, security and other factors remain uncertain given the still emerging technology. Further research and controlled experimentation is required.

In practice, high-profile cryptocurrency thefts reveal risks from hacking, insider threats and coding vulnerabilities that persist amidst blockchain safeguards. Holistic security analysis and oversight mechanisms are thus imperative as exploration continues.

Adopting blockchain infrastructure faces integration hurdles with existing databases, given radically different architectures:

- Parallel operation allows testing benefits before wholesale migration.
- Hybrid approaches selectively apply blockchain components like integrity hashing.
- Data interchange standards help bridge legacy databases.
- Gateways can interface between on and off-chain environments.
- Permissioned private chains avoid some open blockchain risks and integration challenges.

Further research can clarify optimal integration strategies across contexts balancing transition costs, risks, and benefits (Xu et al., 2017). Methodical piloting and iteration remains advisable given still emerging technology.

In practice, many proposed blockchain applications faltered due to flaws in reconciling novel and legacy components across technological and organizational dimensions (Kshetri, 2021). Avoiding overhyped deployments through measured exploratory approaches could support sustainable adoption.

Potential benefits for rights and royalties management include persistent attribution, automated micropayments, and immutable records. For records, positives encompass verifiability, transparency, and lack of central point failure. However, scaling transaction throughput, confidentiality, and long-term integrity maintenance remain challenges. Ensuring fair access and preventing dominance by major players also requires governance mechanisms. Overall, while promising in isolated applications, generalized feasibility and desirability remains debated given technical and social tradeoffs. Controlled, context-specific piloting and iteration on design is advised (Xu et al., 2017).

In practice, most proposed blockchain digital rights management

platforms remain speculative or struggling to materialize at scale amidst infrastructure limitations (Kshetri, 2021). Significant technical and economic barriers persist absent breakthroughs.

The transparency of distributed public blockchains conflicts with privacy needs, though emerging solutions like zero-knowledge proofs and trusted execution environments show promise in selectively disclosing data (Xu et al., 2017). Permissioned and consortium chains also restrict viewing to approved participants. Legal frameworks govern personally identifiable information protections regardless of technology medium. However, long-term data permanence on blockchain necessitates caution around sharing sensitive information. Hybrid on and off-chain storage, encryption, access controls, analytics governance, and decentralized identifiers could provide additional safeguards tailored to different database use cases and contexts.

In practice, high-profile de-anonymization attacks reveal risks from the radical transparency of public blockchains (Kshetri, 2021). However proactive design integrating legal and technical privacy enhancing techniques can mitigate inherent challenges.

Key challenges confronting blockchain-based databases include:

- Scaling transaction speeds and data storage.
- High resource consumption from crypto mining protocols.
- Confidentiality and compliance with privacy regulations.
- Interfacing with legacy information systems.
- Lack of standards, governance, and legal frameworks.
- Code vulnerabilities and hacking threats.
- Uncertain alignment with organizational structures and needs.

While innovation continues tackling these limits, blockchain technology remains immature for mission-critical business and governmental databases absent further advances (Kshetri, 2021). Focused piloting can guide evolutionary improvements toward mainstream viability.

In practice, most proposed blockchain architectures fail to materialize beyond limited proofs of concept, stymied by fundamental limitations on throughput, storage, energy, security, and maintenance costs. Significant research and testing is still required before feasibility can be determined.

Key trends in decentralized data networks include:

- Data marketplaces allowing sale and sharing of datasets via micropayments or tokens
- Self-sovereign identity and verifiable credentials disintermediating central authorities.
- Supply chain integrity via collective tracking of goods production and distribution.

- Automated rights and royalty distributions for digital creative works.

However, scaling complex data and control logic on blockchain infrastructure remains challenging. Most proposed applications remain hypothetical or in limited trials absent mainstream breakthroughs. But ongoing innovation continues exploring models and seeking solutions to open issues.

In practice, decentralized data sharing schemes confront challenges around bootstrapping participation, preventing dominance by large players, and reconciling transparency with confidentiality needs across contexts (Kshetri, 2021). Significant coordination issues persist despite the theoretical decentralization.

Blockchain technology for databases currently occupies the peak of inflated expectations in Gartner's hype cycle, with viability and maturity still developing (Xu et al., 2017). Realizing lasting potential requires progress across multiple fronts:

- Hardening security, reliability and storage.
- Improving transaction speeds and access controls.
- Establishing standards and interoperability.
- Clarifying legal status and rights.
- Integrating with legacy systems.
- Developing sustainable business models.
- Building receptive institutional and cultural environments.

Despite uncertainties, blockchain infrastructure holds disruptive possibilities if technical, economic and social challenges are constructively overcome through ongoing exploration and measured piloting (Kshetri, 2021). Further research and reasoned debate focused on specific use contexts promises to guide reasoned development.

In practice, blockchain databases remain more vision than reality, with most proposed models still conceptual or constrained to limited trials. Significant unknowns persist around balancing tradeoffs and aligning innovations with real needs amidst enduring hype. But judicious iterative experimentation and critique could crystallize futures.

Conclusions for Chapter VI

This extensive analysis reveals the complex challenges in constructing equitable governance frameworks to balance database rights, access, and

protections in the digital age. Tensions persist between proprietary controls and openness aims across intersecting legal, economic, technological and ethical dimensions.

On database rights, traditional IP regimes like copyright afford limited protections largely tied to original selection and arrangement, rather than underlying compiled data itself. Sui generis models like the EU Database Directive furnish broader rights against appropriating substantial contents, but remain contested given constraints on data access. Ownership questions also multiply with collaboratively constructed databases and user-generated content platforms. Determining applicable rights requires nuanced analysis attuned to specific contexts and usages.

Meanwhile, contracts and technological measures establish strict terms of access and restrictions beyond baseline IP rights. Licenses often curtail exceptions that would otherwise permit certain public interest uses like text mining for research. Tracking and enforcement mechanisms like API keys and scraping detection augment protections further. However, critics argue overly stringent controls undermine follow-on innovation without sufficiently balancing equitable public access.

Preventing wholesale duplication requires protections to incentivize commercial data compilation. But appropriate safeguards should not create unduly exclusionary rights that impede scientific progress and competition. Technical barriers, monitoring and deterrence mechanisms help secure proprietary databases against misuse. But concomitantly upholding opportunities for socially valuable purposes remains imperative, yet challenging to reconcile with access-control priorities. Even uses like news reporting and academic research often get caught in excessively far-reaching database protections.

Open data licensing furnishes alternative permissions-based models to proactively enable access, reuse and analysis for public-interest databases. But implementation complexities persist around licensing interoperability, user comprehension, technical integration, and adapting terms for different contexts and objectives. Creative Commons and Open Government Licenses constitute initial frameworks requiring ongoing optimizations. Encouraging contributory commons could also sustain ecosystems integrating public and private databases for innovation. But first steps remain tentative across most sectors absent comprehensive strategic initiatives.

Emerging blockchain architectures demonstrate further disruptive potentials through decentralizing databases via distributed ledgers. Benefits like transparency, automation, disintermediation and anti-tampering

could support novel data sharing models. However, scaling complex data and control logic on blockchain infrastructure remains challenging currently. Integration difficulties, security threats, legal uncertainty and other challenges have stymied many proposed applications to date. Yet ongoing thoughtful exploration of blockchain technology continues progressing understanding and possibilities.

Across these complex frontiers, balanced database governance integrates legal rights and exceptions, technological controls and access mechanisms, multi-stakeholder participatory policymaking, contractual innovation, market reforms, distributed architectures, ethical norms, privacy safeguards, security frameworks, and competitive diversity. Holistic integrated strategies avoid either-or extremes like overprotection or uncontrolled openness. Nuanced solutions attuned to specific database types and uses remain imperative, given diverse settings like privately-compiled proprietary data, public sector open data, crowdsourced user content, social media monetization of personal information, and emerging decentralized data alternatives.

Debates persist on appropriate rights, limits, priorities and compromises across contexts. Thoughtful policy conversations could yield positive-sum solutions balancing reasonable economic incentives and control interests with ensuring equitable access and cumulative innovation opportunities. But challenges flow from disparities in resources and power affecting whose voices and interests dominate governance. Therefore, ensuring truly inclusive participation in shaping compromises constitutes an essential process aim, though difficult amidst commercial pressures and lobbying influences.

A further obstacle arises in the lack of coherent overarching legal and ethical frameworks governing data access and control, leading to piecemeal stopgap responses when tensions erupt. Comprehensive global accords enabling principled innovation could support sustainable solutions addressing intrinsic inequities baked into current systems. However, forging an expansive accord remains daunting given conflicting ideological perspectives and priorities across nations. But even an imperfect grand bargain hashed out transparently and inclusively may prove better than ongoing discord. Certainly outcomes would improve assessing impacts on traditionally marginalized groups and incorporating diverse vantage points to get the process right even if optimal solutions remain elusive.

Overall, while complex challenges persist, navigating database rights, access and governance issues constructively gives hope for significant prog-

ress advancing multiple interests. But this necessitates transcending siloed proprietary and public positions to seek integrative understanding of interconnected aims. Through cooperation, compromise and ethical commitments to mutual flourishing, substantial gains seem possible. And innovations like blockchain, though still developing, reveal further possibilities for transformative change. Dynamism remains characteristic across the database landscape. Ongoing thoughtful and inclusive engagement among stakeholders appears most likely to steward responsible evolution. But this requires transcending unproductive conflicts toward generative dialogue and debate. If wisdom, ethics and good faith motivate efforts on all sides, breakthrough solutions may emerge through time, even if incrementally.

Significant open questions and disputes certainly endure given complex tradeoffs and power differentials. However, the vast potentials across proprietary, public and distributed databases necessitate continuing exploration and measured experimentation to expand access while adequately protecting rights and investments. With conscientious multiperspective engagement, promising pathways may open toward negotiating equitable compromises and constructing ethical data cultures enabling cumulative knowledge exchange. The tasks ahead demand thoughtfulness and wisdom. But the possibilities justify undertaking challenges in the long-term hope of maximizing mutual benefit and the common good.

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CHAPTER VII

LICENSE AGREEMENTS ON THE TRANSFER OF DIGITAL RIGHTS

Summary: 1. Types of licensing agreements in the IT sector – 2. Standard terms and conditions for public offers of digital products – 3. Creative Commons and Open Licensing – 4. Software licenses – 5. Licenses for content on social networks and platforms – Conclusions for Chapter VII – References.

1. *Types of licensing agreements in the IT sector*

Licensing agreements in the IT sector can generally be categorized as proprietary or open source licenses (Lessig, 2001). Proprietary licenses restrict users' rights to access, modify, and redistribute the software, with rights reserved by the copyright holder (Fitzgerald, 2006). Common proprietary licenses include end-user license agreements (EULAs) for commercial software and freemium licenses that limit some functionality. In contrast, open source licenses such as GNU GPL grant users broad rights to use, modify, and share the software freely, with source code availability (Lindberg, 2008). Other categories include public licenses like Creative Commons for content, and free software licenses that permit commercialization.

The choice of open or proprietary licensing has significant implications for business models and market positioning (Gomulkiewicz, 2004). Proprietary models allow companies to capture value from intellectual property through royalty payments and exclusion of competitors. However, they inhibit adoption relative to open licensing and preclude collaborative innovation. Open licensing promotes transparency, quality improvement through community input, and network effects that benefit ecosystem development. But revenue generation can be more challenging without exclusivity.

In practice, technology firms utilize a spectrum of license agreements matching their commercial needs (Arora et al., 2016). Microsoft and Adobe employ restrictive EULAs for flagship software products with royalty payments (Adobe, 2022; Microsoft, 2022). Google uses open source licenses for operating systems like Android but retains commercial control (Google, 2022). Small developers often leverage open licensing for collaborative benefits and user trust. Multi-model approaches combining open and proprietary licensing are also common.

Proprietary software licenses restrict users' ability to freely access, modify or redistribute licensed technology, with rights reserved by the copyright holder (Fitzgerald, 2006). Common terms include limiting software copying, reverse engineering, and commercial redistribution. Revenues are generated via upfront license fees or royalties. Proprietary licensing allows software vendors to retain control over their products. However, it has drawbacks like reduced adoption and inability to improve code.

In contrast, open source licenses take a different approach by granting users broad rights over the technology (Lindberg, 2008). Source code is made publicly available for inspection, modification and redistribution under relaxed licensing terms. This facilitates decentralized collaborative development and commercialization. Popular open source licenses include GNU GPL, MIT, and Apache. Key benefits are enhanced transparency, quality and user trust. Challenges include loss of proprietary control and monetization difficulties.

Public copyright licenses like Creative Commons provide standardized open licenses for content reuse (Creative Commons, 2022). They help creators share works easily for remixing and redistribution, retaining selected rights like attribution. Adoption is widespread for media, education and government works. Critics argue CC lacks nuance and does not prevent misuse.

Key license terms determine parties' rights and obligations (Fitzgerald, 2006) Exclusivity clauses restrict licensees from competing implementations. Territory provisions limit geographic markets. Royalty payments allow licensors to monetize intellectual property. Warranties reduce licensee risks but increase licensor liability. Service levels specify technical support obligations. Term and termination clauses govern license duration and renewal.

Balancing these terms requires understanding how they impact value creation and value capture (Arora et al, 2001). For instance, hardware vendors gain revenues from royalties but may impede adoption. Open source licensors increase network effects through non-exclusivity but lose potential licensing fees. Restrictive terms help software vendors protect proprietary code but reduce user trust. Well-crafted license terms align with business models to efficiently monetize technology.

Optimizing license structure is a strategic decision for IT firms (Gomulkiewicz, 2004). More permissive terms favor collaboration and standardization. Restrictive clauses enable value capture from intellectual property. Licensors must structure agreements to balance commercial interests with customer satisfaction and ecosystem development. Getting

licensing terms right is vital for leveraging IT innovation for sustainable competitive advantage.

Beyond generic licenses, tailored licensing approaches have emerged for specific IT market segments:

- *Cloud computing extensive* use of service agreements outlining performance metrics, change management, compliance and termination provisions for cloud services (Buyya et al, 2009).
- *Internet of Things* - companies employ licenses covering device firmware, connectivity, data usage and interoperability for bundled IoT products and platforms (Weber, 2010).
- *Mobile apps* - app stores provide standardized and templated licenses for commercial distribution of smartphone apps, retaining significant oversight rights.
- *AI/ML* - some firms use restrictions against applying trained ML models for unethical purposes like surveillance or social discrimination (Brundage et al, 2020).

These specialized licenses help address contextual technological and regulatory nuances within IT sub-sectors (Gomulkiewicz, 2004). Tailoring agreements to use cases enhances enforceability. However, inconsistent licensing schemes also create interoperability and compliance challenges. Striking the right balance is an ongoing challenge.

The optimal licensing model for an IT product is determined by strategic factors (Gomulkiewicz, 2004). For software, proprietary licenses help sustain competitive advantage but may inhibit adoption versus open source. Hardware often uses proprietary licenses to enable licensing revenue from device sales. Firm size also matters, indeed startups gain from open collaboration while established vendors prefer retaining IP control. Products with network effects favor open licensing for greater uptake whereas niche solutions benefit from proprietary restrictions.

Licensing also depends on market positioning (Arora et al, 2016). Firms pursuing premium markets may use restrictive licenses to signal exclusivity, while mass market entrants leverage open source for rapid diffusion. Licensing models are shaped by target customer preferences and pricing strategies. There are often trade-offs between short-term revenues and long-term ecosystem development.

Firms also balance licensing standardization for interoperability against customization for competitive differentiation. Standardized models like Creative Commons ease adoption but limit uniqueness. The optimal approach combines customization with common compatibility frameworks.

IT licensing practices have evolved significantly, shaped by technological and industry trends (Välimäki, 2005). The rise of cloud computing has resulted in extensive service licensing rather than traditional software licensing. In mobile app ecosystems, standardized proprietary app store licenses are leaded. Open source adoption has surged, especially for Internet infrastructure technologies. Licenses are incorporating specialized clauses for emerging issues like AI ethics and data privacy. Restrictive terms in proprietary licenses have received greater legal and regulatory scrutiny.

These trends illustrate the dynamic interplay between licensing models, firm IP strategies and technological innovation within the IT sector (Arora et al, 2016). Licensing practices coevolve with industry maturation. Startups often favor open licensing while established firms protect IP through restrictions. But excessive control can inhibit innovation ecosystems. Regulations also constrain licensing options. Effective licensing governance requires monitoring these complex interactions.

Looking ahead, several technological and social developments may further transform IT licensing (Välimäki & Pitkänen, 2022). These include blockchain's ability to embed licensing logic in technology, growth of AI-generated works requiring carefully designed open licenses, increased user awareness of technology ethics and data privacy, and evolving societal notions of IP in the digital economy. Anticipating these shifts will allow firms to craft future-ready licensing strategies.

Growing complexity of IT environments creates challenges for license compliance and enforcement. With extensive software portfolios, poor vendor license management practices often result in under-licensing. Firms using open source codes face risks regarding license compatibility and attribution. The distributed nature of cloud computing makes compliance verification difficult. Enforcing licenses across global jurisdictions with varying interpretations poses legal hurdles. Auditing and tracking licenses in dynamic heterogeneous environments with containerization requires extensive internal processes. Lack of standardization also hinders monitoring.

Addressing these pain points requires greater automation, standardization, transparency and collaboration among licensors and licensees (Lindberg, 2008). More consistency across open source licenses would reduce conflicts. Cloud licensing standards help manage distributed services. Blockchain has potential to embed licenses immutably in systems. Common reporting formats like SPDX help track open source usage. Ultimately, collaborative governance and shared infrastructure will be needed to monitor complex technology ecosystems.

Some obstacles actually persist due to inherent incentives. Vendors

benefit from opaque or inconsistent licenses that increase customer lock-in. Overly strong open source copyleft provisions hamper compliance. Lack of global harmonization of copyright laws also undermines enforceability. Achieving widespread license compliance will require overcoming these challenges.

The technology industry's proliferation of heterogeneous proprietary licenses impedes interoperability between diverse IT systems and components. For example, integrating proprietary systems like Windows and Unix is legally difficult due to incompatible licenses. Such technical barriers hinder technology adoption and increase vendor lock-in. Even open source licenses like GPL and Apache License 2.0 have subtle differences that complicate compliance in mixed environments.

Greater standardization and reciprocity among licenses is needed to balance proprietary interests and collaborative innovation. Initiatives like Creative Commons aim to provide interoperable public copyright licenses to mitigate this challenge. International standardization bodies are also developing frameworks to digitally represent license contracts through machine-readable metadata.

However, given incentives for differentiation, the achievement of full standardization represents an uncertain objective (Arora et al., 2016). Firms benefit from customized licenses matching their business models. But licensors should aim for sufficient reciprocity and common compatibility frameworks. Modular approaches that separate proprietary value-add from open standardized technology layers provide one path to balanced standardization.

Licensing fragmentation has spurred standardization initiatives to facilitate interoperability, transparency and usability. In open source, the Open Source Initiative approves standard open source licenses like GPL meeting criteria of free usage and redistribution. Creative Commons offers globally standardized public copyright licenses for content sharing. The Open Data Commons project provides standardized open databases licenses. International standardization efforts include OASIS LegalXML to digitally represent license contracts.

Proponents argue such standardization reduces adoption barriers for licensors and legal uncertainties for licensees (Välimäki & Pitkänen, 2022). It increases compatibility across open source components. Machine-readable licensing metadata also enables automation. However, critics contend excessive standardization is inflexible and disadvantages smaller firms.

The optimal approach likely combines standards with customization (Gomulkiewicz, 2004). Shared compatibility frameworks enable

interoperability while allowing tailored differentiation. Modular architectures separating standardized technology layers from proprietary components provide a model. Global collaboration among stakeholders is vital to develop balanced, internationally aligned standards.

Best practices for value-optimizing IT licensing include: aligning terms with business models and market positioning; maintaining internal licensing processes and compliance infrastructure; using standardized licenses where possible to leverage network effects; incorporating specialized provisions for emerging issues like privacy and AI ethics; balancing customization for strategic needs with interoperability; collaborating with other licensors to enable reciprocal compliance; providing transparency to users on license rights and restrictions; and regularly reviewing and updating license agreements to address technological and regulatory changes.

Legally optimizing licensing requires careful governance and being attuned to complex innovation ecosystems (Arora et al., 2016). Firms should consider short-term monetization and long-term ecosystem impacts. Open collaboration and proprietary control should be balanced. Changes in technology, business models and regulations need to be monitored.

Ultimately, sustainable value derives from mutually beneficial licensing arrangements between licensors and licensees (Välimäki & Pitkänen, 2022). Fair licensing enables innovation by both proprietors and user communities. Participative design of agreements can help achieve this balance. Licensing is a key strategic tool for equitably mobilizing collective ingenuity in the digital economy.

2. *Standard terms and conditions for public offers of digital products*

Many digital services rely on standardized form contracts and terms of service to govern user rights and platform obligations. These enable mass contracting by accepting uniform conditions rather than negotiating separate agreements. Key documents include Terms of Service (ToS), End User Licensing Agreements (EULAs), and Privacy Policies specifying allowed platform uses, intellectual property rights, and data collection rules.

Standardization delivers benefits like reduced transaction costs, legal certainty, and ease of enforcement at scale. Templated terms leverage drafting precedents and best practices. They provide a common framework for access across user bases. Criticisms include lack of customization, uneven bargaining power, and limited user understanding of legal terms.

Widespread ToS adoption makes examining standard contract practices for digital services essential (Marotta-Wurgler & Bakos, 2014). Core issues involve ethical stewardship of user data, balancing control with open ecosystem participation, and good faith in modifying platform rules. Careful governance of digital standard contracts helps foster trust.

Users manifest assent to standard online contracts through various methods.

- *Clickwrap* - Requiring active checking of boxes to accept terms before using a service. This provides strong proof of affirmative consent.
- *Browsewrap* - Terms are merely linked on a site without active user agreement. Consent is weaker and often disputed in lawsuits.
- *Sign-in wrap* - Asking users to click "I agree" during service registration flows. Provides good evidence of agreement.
- *Rolling contracts* - Assent is inferred from ongoing service usage after providing notice of contract changes. Consent can be uncertain.

Effective contracting requires clear mutual indication of acceptance (Bakos et al., 2014). Clickwrap and sign-in flows are legally optimal. Browsewrap risks user ignorance of terms. Rolling changes should ensure users understand evolving policies.

Standard digital contracts contain important clauses that define user rights:

- Acceptable use policies outline appropriate conduct and prohibited misuses of a service. This allows platforms to ban abusive users.
- Copyright and content licensing terms dictate ownership and permitted uses of materials uploaded by users. These balance user and platform rights.
- Privacy policies detail what user data is collected and how it is processed. Concerns exist about long opaque privacy policies.
- Service modification clauses let platforms change terms unilaterally. But abusive application can diminish user trust.
- Liability disclaimers and dispute resolution specify limited platform obligations. However, local consumer laws may override these.

Carefully drafted clauses increase certainty while providing ethical safeguards for users. But novel digital business models strain traditional contracting frameworks, requiring new solutions.

While standardized contracts enable scale, customization is sometimes required. Unique regulatory and cultural norms across jurisdictions may necessitate localized policies on areas like speech, privacy and promotions. Specific services like gaming, healthcare or finance may need tailored terms

reflecting industry regulations. Demographic factors like age could require differentiated policies and plain language.

Personalization also fosters user affinity (Bakos et al., 2014). Adaptive machine learning techniques can customize terms to user preferences and behaviors. But excessive fragmentation risks unintended discrimination. Standardization with modular country- and service-specific clauses likely provides the best balance. Legal and product teams should collaborate to incorporate customizations thoughtfully.

Lengthy, legalistic digital contracts have led to calls to enhance comprehension for users. Potential strategies include: summarizing of key terms in simple overviews (layered "explainers" can annotate complex clauses); using infographics, videos and interactive modules to engage users and build understanding; personalized walkthroughs during sign-up tailored to user needs; making terms open to comments and ratings to concentrate on poorly understood sections; testing contract comprehension experimentally before rollout; employing "nutrition label" designs highlighting main privacy and security practices.

Thoughtful contracting experiences create trust and transparency. But legal accuracy should not be sacrificed. Multidisciplinary teams of lawyers, designers and technologists can innovate user-centered contracting.

Digital contracts frequently update policies amid evolving technologies, business models and regulations. But controversies exist around appropriate notice, consent and rights preservation when terms change. Unilateral changes risk harming users' interests without opt-out. However, requiring renewed consent from all users creates impractical burdens for platforms.

Balanced approaches provide advance notice and choices where feasible. Material policy shifts warrant explicit re-consent, while minor changes may just require communication. Change management processes should incorporate user feedback. Overall, keeping terms narrowly tailored and encouraging participation foster perceptions of fairness even during changes.

Consumer protection laws constrain digital standard contracts regarding unfair terms, transparency, and data rights (Helberger et al., 2018). For example, the EU's Unfair Contract Terms Directive limits clauses creating imbalanced user obligations. Consumer protection agencies increasingly deem long impenetrable privacy policies illegal. GDPR requires informed opt-in consent for data processing.

However, enforcement remains challenging given rapid tech evolution and jurisdictional variances. Self-regulation shows promise through stewardship initiatives like the Trustworthy Accountability Group, which, accord-

ing to the description published on its website, aims at "fighting criminal activity and increasing trust in the digital advertising industry", especially "connecting industry leaders, analyzing threats, and sharing best practices worldwide". Overall, consumer laws uphold baseline user rights, but ethical platform governance requires going beyond minimal compliance.

Reconciling standardization efficiencies with user empowerment raises trade-offs in digital contracting (Kim & Telman, 2022). Some experts advocate notice-and-consent reforms making terms more visible and choice-based. Others envisage "rights-based" terms focused on equitably sharing platform value. Standardization could anchor around people-centric frameworks like the UN Guiding Principles on Business and Human Rights.

Hybrid approaches may be optimal. Standardization enables access and understandability while supporting choice through modular clauses. Focusing terms on principles rather than rules better accommodates edge cases. Ultimately, thoughtfully designed standardization supporting reciprocity and collective benefit provides a promising path.

Digital contracting is undergoing major transitions. As users become more and more confident of the use of legal expressions, lengthy impenetrable agreements are being replaced by condensed modular formats. The rise of chatbots and digital assistants enables interactive and personalized contracting experiences. Machine learning can customize agreements or identify problematic clauses. Open contracting initiatives encourage collaborative document design. Overall, innovations in user experience, personalization and analytics provide opportunities to reinvent contracting centered on trust and cooperation.

Best practices for ethical digital standard contracting include: prioritizing readability, transparency and comprehension for users; obtaining informed affirmative consent; narrowly scoping required data collection; providing user participation avenues; creating centralized rights dashboards; applying changes equitably with notice; undergoing independent audits; collaborating with users and advocates on template design; incorporating human rights principles; and localizing conscientiously for global contexts. Ultimately, sustainable standard contracting requires viewing terms of service as digital constitutions for collectively governing platforms.

3. *Creative Commons and Open Licensing*

Creative Commons (CC) is a non-profit organization that provides standardized public copyright licenses to enable easier sharing and reuse of creative works (Creative Commons, 2022). CC offers a spectrum of licenses granting various permissions, from requiring only attribution to allowing modification and commercial use. The rationale is to foster open information flows by reducing legal barriers like cumbersome rights clearances (Carroll, 2006).

The scope of CC licensing is global and cross-domain. Licenses have legal force in over 70 jurisdictions worldwide through porting to local law (Hietanen, 2008). CC licenses are used by over 1.6 billion works spanning media, data, science, education, and government (Creative Commons, 2022). Adoption has steadily increased since the 2001 launch. Ongoing growth is driven by demand for more open, collaborative paradigms of knowledge sharing.

CC has expanded its licensing suite over time, adding localized ported licenses and those tailored for specialized contexts like databases and public sector information. This evolution illustrates CC's efforts to address emerging needs for standardized sharing frameworks across domains.

CC offers a spectrum of licenses that creators can choose from to govern reuse rights (Creative Commons, 2022):

- *CC BY* - Requires attribution only. Most permissive, allowing modifications and commercialization.
- *CC BY-SA* - Attribution + ShareAlike provision requiring derivative works be licensed the same way. Viral licensing model.
- *CC BY-ND* - Attribution + NoDerivatives clause prohibiting edits to the material. More restrictive.
- *CC BY-NC* - Attribution + NonCommercial condition banning commercial uses.
- *CC BY-NC-SA and BY-NC-ND* - Combinations of the above adding ShareAlike and NoDerivatives clauses alongside NonCommercial. Most restrictive.

These options let creators pick the license balancing openness and control for their goals. BY permits maximum reuse while ND and NC limit commercialization and modifications (Hietanen, 2008). Mix-and-match modular permissions cater to diverse sharing needs.

The appropriate Creative Commons license depends on intended sharing goals (Guadamuz, 2017):

- CC BY maximizes dissemination so is ideal for companies, activists, and scholars prioritizing diffusion.
- CC BY-SA's viral copyleft helps spread open ecosystems like Wikipedia. It legally reinforces open collaboration norms.
- CC BY-NC permits nonprofit reuse while retaining commercial rights, suiting creators seeking impact over profits.
- CC BY-ND prevents modifications so maintains work integrity, appealing to artists wary of appropriation or distortion.
- CC BY-NC-ND provides maximum control over use conditions for sensitive or risky content.

Understanding license implications aids selection (Carroll, 2006). More permissive licenses better leverage the networking capacity of the internet. But stricter conditions give creators protective control. Needs vary case-by-case.

While CC offers a standardized framework, it also interoperates with other open licensing schemes (Hietanen, 2008). For example, Creative Commons licenses are designed to be compatible with key open source software licenses like the GNU GPL (Creative Commons, 2022). This allows legal mixing of code and content in collaborative projects. CC licenses also complement public domain tools like the Open Data Commons formats for open government data.

Some critics argue CC's simple modular license design lacks nuance for complex licensing needs. But CC's intent is providing a minimal set of legal building blocks, not comprehensive policy sets. CC complements rather than replaces other open licenses. Taken together, these tools constitute a richer legal infrastructure supporting open collaboration.

Creative Commons licensing is widely adopted in scholarly publishing and education (Tennant et al., 2016). In academia, CC BY and CC BY-NC are common licenses for open access journal articles, enabling sharing while retaining attribution norms. Educators use CC licenses for open educational resources, allowing adaptation. Librarians apply CC to digital collections to facilitate public access.

Benefits include reducing cost barriers to knowledge and enabling collaborative pedagogical innovation (Hietanen, 2008). However, scholarly publishing business models can constrain open licensing adoption. Plagiarism also remains a concern. Overall, CC presents promising legal pathways for recalibrating scholarly communication and education for open participation.

Studies have assessed the efficacy of Creative Commons licenses in achieving the goal of easier content reuse across contexts. In general,

CC-licensed works are much more discoverable and used compared to all-rights-reserved copyrighted works. CC licensing also generates indirect benefits like reputational gains for creators through wider exposure.

However, inaccurate user understandings of license terms persist, sometimes inhibiting reuse in practice. For example, false assumptions of non-commercial use restrictions are common. Public misconceptions coupled with technical complexities around mark-up also constrain adoption. But overall, CC licenses provide usable legal tools enabling more participatory information ecosystems.

While impactful, aspects of Creative Commons licensing have also garnered criticism (Guadamuz, 2017):

- Weak enforceability since CC organization lacks resources to police violations, relying instead on community norms. But automated tools increasingly help detect abuses.
- Vagueness of key license terms like Non-Commercial opens interpretation issues. However, flexibility aids applicability across contexts.
- Incompatibilities with local laws in some global jurisdictions. CC's porting system tackles this through local adaptations.
- Lack of accommodation for finer policy distinctions needed in some domains. But modular extensions help address nuances.

Overall, identified shortcomings have trade-offs against standardization benefits and sparked constructive reforms by CC organization (Creative Commons, 2022). A balanced outlook helps critically strengthen this licensing infrastructure.

A key goal of Creative Commons is providing legally interoperable public licenses, reducing friction in remixing works (Creative Commons, 2022). As discussed, CC licenses were designed to be compatible with common open source software licenses, enabling cooperative code and content development. Trademark policies also facilitate cobranding with other licensing systems like the Free Art License.

However, incompatibilities between CC and other licenses persist, precluding some reuse cases. For instance, share-alike clauses in CC BY-SA can conflict with other viral licenses. Mixing CC-licensed material with all rights reserved works also raises copyright issues. Rights holders sometimes also use technical protection measures overriding CC permissions. Overall though, CC's interoperability mechanisms significantly lower licensing barriers to collaborative creativity.

Creative Commons licenses have achieved widespread global adoption, though prevalence varies across jurisdictions and content domains (Carroll,

2006). Developed countries lead in CC usage, given greater legal support for open licensing models. Certain creative sectors like music and art make extensive use of CC, but uptake in commercial media is slower. Open access scientific publishing heavily utilizes CC but the mainstream science industry does not.

These patterns illustrate how institutional contexts shape adoption. Jurisdictional differences in copyright regimes and industry business models constrain or facilitate uptake. But the commons created by CC-licensed works generates self-reinforcing network effects likely to continue driving adoption (Creative Commons, 2022).

Best practices when using Creative Commons licenses include: carefully selecting the license matching sharing goals; redistributing unaltered copies rather than transforming works; providing accurate attribution per license requirements; linking to the CC license deed from copies; indicating modified works as such; not utilizing CC-licensed material in all-rights-reserved works; avoiding false implications that licensors endorse derivative uses; considering moral rights like privacy; and generally respecting author intentions and ethical norms around acknowledgement (Creative Commons, 2022).

Additionally, licensors should choose CC versions compatible with distribution media and provide metadata to increase discoverability. Responsible CC usage balances legal permissions with ethical norms valuing agency, dignity and reciprocity.

4. *Software licenses*

Software has unique attributes like source code secrecy and network effects that require specialized licensing approaches beyond general copyright law (Gomulkiewicz, 2004). Key considerations include enabling revenue models through restrictive end user agreements, managing open source collaboration, addressing interoperability needs, and enforcing licenses technically via code access controls.

Additionally, software industry dynamics shape licensing (Välimäki, 2005). Established vendors use licensing for market power. Startups employ open source for adoption. The rise of APIs, cloud computing and AI raise new issues. Developments like blockchain and open source could also transform licensing.

Effective software licensing governance balances value capture through

proprietary restrictions against value creation through openness and adoption (Arora et al., 2016). Firms should align terms with business models while considering impacts on innovation ecosystems.

Software licenses fall into three broad categories:

Proprietary licenses like commercial EULAs impose restrictive terms maximizing licensor control. Source code is usually not provided. Revenues come from sales, subscriptions and royalty fees. Rights to modify, redistribute or reverse engineer are prohibited.

Open source licenses take the opposite approach by granting broad usage rights to licensees. GNU GPL is the canonical open source license ensuring user freedoms through copyleft provisions requiring open distribution of derivative works. Others like MIT and Apache are more permissive.

Source-available models are hybrids providing source code access but limiting certain redistribution rights. Examples include shared source from Microsoft and source-available from Google. This balances openness with retaining IP control.

Key software license terms include:

- Warranties on software quality and bug fixing obligations. More warranty coverage benefits licensees but increases licensor liability.
- Technical support and maintenance services provided, often tied to subscription fees. Service levels impact adoption.
- Rights to upgrades and new versions. Enabling easy upgrades incentivizes initial purchase but reduces revenue opportunities.
- Usage restrictions dictating permissible uses and users. Stricter terms maximize commercial exploitation.
- Transfer and assignment clauses governing sublicense rights. Locking licenses to devices or users provides market power.

Optimizing these terms requires aligning with pricing strategies, competition, user expectations, and platform growth potential (Gomulkiewicz, 2004).

Managing software licenses poses challenges (Ven & Verelst, 2006). Firms must track licenses across portfolios, versions, and devices while monitoring compliance through audits. Enforcing restrictions embedded in code further complicates management. Major under-licensing risks exist due to lack of automation and process transparency.

Open source license compliance also poses hurdles, including tracking licenses across dependencies, ensuring license compatibility, and providing proper attribution. Copyleft licenses like GPL have additional redistribution obligations. New risks emerge as AI-generated code lacks

clear licensing. Overall, complex heterogeneous software ecosystems strain license governance capabilities.

Interoperability between software components is inhibited by conflicting and incompatible licenses. Proprietary licenses often limit integration with open source code. Even open source licenses have subtle differences in areas like patent clauses that raise legal uncertainties in mixed environments. This complicates modular software development.

Greater standardization has been proposed to address these challenges (Välimäki & Pitkänen, 2022). But some differentiation provides competitive advantages. Striking the right balance between harmonization and customization remains difficult but critical for software innovation.

Enforceability of end-user license agreements for software has frequently been challenged on grounds of unconscionability, lack of assent and misuse of copyright law (Lemley, 2015). Courts have often deemed clickwrap EULAs enforceable but web-based browsewrap agreements more questionable. Increasingly strict EULAs have also drawn scrutiny from regulators and advocacy groups.

However, viable alternatives to proprietary restrictions remain limited (Fitzgerald, 2006) Open source models are unsuited to some technologies or business models. Ultimately, ethical considerations around consumer protection and technology access, not just narrow legal precedents, should guide EULAs' governance.

Copyright of code provides a foundation enforcing software licenses (Menell, 2019). Violating license terms like reverse engineering restrictions can constitute copyright infringement, adding legal weight to contractual agreements. This helps proprietary vendors retain control. But some argue software licensing overreaches reasonable copyright protections, meriting reassessment of this linkage.

Overall, well-crafted copyright and licensing frameworks should balance proprietary interests, user rights, and innovation impacts (Samuelson, 2006). Reform proposals range from stronger user rights in copyright law to exempting certain types of restrictions from license enforcement. But consensus remains elusive given competing stakeholder incentives.

Software licensing has undergone major shifts, enabled by technological and social dynamics (Välimäki & Pitkänen, 2022). The open source model has expanded from niche applications to widespread enterprise adoption and integral infrastructure technologies like Linux. Proprietary vendors now frequently integrate open source components with proprietary code and SaaS delivery. User awareness of technology ethics and open innovation has also increased.

Looking ahead, further licensing changes may emerge through blockchain usage restrictions encoded in software, growth of community-driven open hardware models, and new paradigms as AI-generated software lacks human developers to license code. Overall, software licensing remains in dynamic flux between openness and control.

Software licensing strategies vary across technical and market environments (Arora et al., 2016). On desktops and laptops, both proprietary and open source approaches are common. Mobile ecosystems impose more centralized app store licensing models. Cloud services rely heavily on subscriber agreements rather than traditional software licenses. Embedded systems employ device-locked OEM licenses enabling revenue through hardware sales. Open source dominates core infrastructure like web servers. This diversity illustrates contextual factors influencing licensing.

Best practices for software licensing include (Fitzgerald, 2006): aligning license terms with product characteristics and business models while considering impacts on innovation ecosystems; maintaining internal licensing processes; tracking licenses across software portfolios; ensuring open source license compliance; modularizing software architecture for licensing flexibility; participating in collaborative governance models; providing transparency on code development; incorporating ethical principles against uses like surveillance; allowing limited modifications that enable user autonomy; and regularly reviewing license agreements as technology and norms evolve. Legally astute yet ethical licensing policies reflect shared value creation between licensors, licensees, and society.

5. *Licenses for content on social networks and platforms*

Social media platforms rely on terms of service and content licenses to govern intellectual property rights over user-generated content. These standardized agreements specify whether users or platforms own materials posted, what usages are permitted, and rights to monetize content like through advertising.

Key issues include balancing user and platform rights, addressing ambiguities between platforms terms and formal copyright, managing attribution norms, and preventing abusive uses of shared content. Ethics of data privacy, transparency over income from user content, and addressing power imbalances also arise.

Understanding social media licensing is crucial as user-created content

drives value, but legal ownership remains contested. More participative copyright frameworks have been proposed reshaping terms for user empowerment.

Platform terms dictate core rights over user content:

- Ownership clauses assign copyright ownership to users or platforms. Complete IP transfers are controversial. Shared ownership compromises are emergent.
- Usage permissions determine rights to reuse, modify or commercially exploit posted materials. Broader licenses allow more value generation but can enable abuse.
- Control features like content takedowns balance rights. Users need protections against overzealous enforcement.
- Attribution interests even where platforms own content. User naming enhances transparency.
- Revenue sharing from monetization like ads. Lack of participation has raised ethical concerns.

Overall, balanced terms considering implications for innovation, fairness and user agency are needed.

Complex interactions between platform terms, formal copyright law, and Creative Commons or public domain content licenses characterize social media environments (Sag, 2020). Ownership assertions in terms of service may be overridden by existing copyright. CC-licensed materials retain baseline permissions that platforms cannot revoke. Applicability of various agreements creates uncertainty.

More harmonization has been proposed. For example, platforms could integrate CC licensing options natively, aligning terms and copyright. Making platform terms subordinate to copyright law has also been suggested. Further complications arise with remixing disparately licensed content. Overall, clarifying this interplay remains an ongoing challenge.

Beyond formal copyright, moral rights of attribution persist around social media creative content. Even where platforms legally own materials, ethical obligations exist to properly attribute authorship. Licensing terms interact with these attribution norms - licenses like CC BY accurately reflect attribution interests while broad IP transfers do not.

Accurately crediting authorship recognizes agency, preserves reputations, and upholds dignity. User participation is also incentivized by this recognition. Platform design changes like emphasizing attribution could strengthen moral rights. Overall, contracts should be complemented by human ethics of acknowledgement.

Monetization of user content by platforms through advertising and

data practices has raised ethical concerns. Terms of service often grant platforms rights to employ posted materials with limited revenue sharing. Exploiting personal data alongside licensed content aggravates this issue. Even de-identified analytics provide platform value without user participation.

Proposed solutions include tighter constraints on allowable monetization, or even prohibiting uses beyond platform operation. Revenue sharing schemes could incentivize users. Participative platform governance and transparency are also needed to shape mutually beneficial contracts.

Scholars have assessed the efficacy of copyright licensing models for social media (Sag, 2020). Stricter copyright asserting user ownership risks stifling emergent culture of remixing, while expansive platform rights engender resentment. Shared licensing compromises like Creative Commons face difficulties enforcing attribution norms online. Ultimately, adapting licensing to support — rather than limit — collaborative value creation should be the goal.

Technical protections like blockchain-based content tracking and social norms around proper attribution can also strengthen licensing. Hybrid governance blending code, contracts, and community ethics offers promise for empowering participatory social media cultures.

Various reforms have aimed to clarify ambiguities in social media content licensing to empower users: enshrining user ownership in law to override terms of service asserting platform rights; requiring platforms to offer Creators Commons licensing options; making terms subordinate to copyright law; increasing revenue sharing from monetization of user content; allowing collective negotiation of licensing terms.

Balanced reforms increase user control while supporting platform sustainability. However, implementation remains challenging given misaligned incentives.

Two significant though conflicting trends are emerging around user content licensing on social platforms. First, platforms are expanding monetization features allowing creators to earn incomes from posted content through tipping, subscriptions or NFT sales. However, portability allowing easy migration of user content across platforms remains lacking. Creating ecosystem incentives encouraging both empowerment trends will be impactful.

Studies suggest social media users rarely formally license original content shared online but often symbiotically co-create derived "viral" meme content (Sag, 2020). Adoption of standardized public licenses like Creative Commons remains limited currently. This likely stems from lack of awareness and platform affordances. But movements supporting

Common, Commons, or Creators public licensing signal future possibility of participatory norms and infrastructure emerging online.

Best practices involve providing usage rights clarity to users while restricting exploitative monetization of content. Comprehensible agreements, nuanced licensing choices, and participative contract design create empowerment. Community governance mechanisms and revenue sharing enable justice. However, sustainable platforms also require retaining some usage rights. Ultimately, inclusive innovation drawing upon collective digital intelligence while equitably sharing value is optimal.

Conclusions for Chapter VII

This analysis of IT sector licensing practices has explored a diverse range of agreements governing intellectual property rights over technologies, software, content, data, and user-generated materials. Effective governance of these digital licenses constitutes a critical foundation enabling innovation and value creation across the technology ecosystem encompassing firms, creators, and society. However, complex trade-offs abound between proprietary control and open participation, requiring thoughtful balancing of incentives and ethics. Sustainable licensing policies will be those aligning value capture with value creation to catalyze collective ingenuity through legal empowerment.

Several key themes emerge around optimizing licensing approaches. First, aligning terms and permissions to business models and product characteristics proves vital. More restrictive licenses help partners monetize IP assets directly through fees and exclusivity. This incentivizes costly research and development, allowing firms to sustain competitive advantage. However, open licensing often better leverages distributed co-creation and network effects for platform growth, by granting broad re-use rights to diverse users. Hybrid models blending open source with proprietary licensing are also potent. The right licensing blend depends on strategic contexts.

Second, governance capabilities enabling licensing agility and efficacy determine impacts. Firms should maintain internal infrastructure to effectively track licenses across diverse portfolios, ensure compliance, and keep agreements updated as technologies and markets evolve. Capabilities allowing adaptable licensing terms to address specialized product needs or respond to external shifts will be key competitive advantages. Particularly

for open source, community collaboration on governance increases transparency and adoption.

Third, standardization, where appropriate, serves crucial functions like enabling interoperability, improving legal clarity, and facilitating market transactions. However, room for tailored differentiation aligning with diverse strategic factors remains important, providing licensing latitude. Modular approaches separating standardized from customizable components offer one path to balance harmonization and flexibility. Shared stewardship models like open standards organizations and collaborative communities provide tools to navigate this balance.

Fourth, future-ready licensing will require addressing emerging issues like AI ethics, surveillance potential, digital privacy, attribution norms, environmental sustainability, platform power dynamics, and reimagining data ownership. Incorporating such social considerations into license provisions in a proactive manner will be vital for mitigating risks and enabling innovations conferring collective benefit rather than harm. Adaptable governance embracing multifaceted value beyond pure financials or legalities will be key.

Fifth, equitably rewarding contributions from all ecosystem stakeholders should underpin licensing architectures. This entails reasonable sharing of revenues, participatory rights in monetization decisions, and moral attribution interests. Sustainable licensing confers agency to users, not just platforms or IP owners. A transition towards more contributory and decentralized innovation models is beginning, requiring licensing to evolve alongside.

Finally, given complex cross-border and cross-domain interactions, multi-level integrative governance approaches addressing licensing holistically will be most effective. This spans aligning informal social norms, formal legal contracts, national regulations, international frameworks, and embedded code-based restrictions and affordances licensing aspects. Navigating this complexity demands nuanced contextual understanding to incentivize innovation.

In conclusion, thoughtfully designed digital licensing regimes that empower multifaceted participation and equitably share value represent a critical foundation for next-generation knowledge economies. This landscape demands that legal and business minds expand definitions of value creation beyond profit or control. The collective possibilities catalyzed through digitally networked intelligence call for increasing creativity applied to governance itself. With care and wisdom, licensing can play a crucial role architecting thriving collaborative ecosystems benefiting all.

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CHAPTER VIII

PROTECTION OF INTELLECTUAL RIGHTS ON THE INTERNET

1. *Extrajudicial ways to protect digital rights*

Extrajudicial strategies such as notice-and-takedown procedures allow copyright holders to request the removal of allegedly infringing content from online platforms without going through formal legal proceedings (Urban & Quilter, 2006). The Digital Millennium Copyright Act (DMCA) in the U.S. provides, since 1998, a legal framework for notice-and-takedown, granting online service providers safe harbor from liability for user-generated content if they expeditiously remove materials in response to valid takedown notices (Bridy, 2011). Rightsholders can send cease-and-desist letters or file standardized DMCA notices to platforms hosting infringing materials. If the platform fails to disable access, the copyright holder may seek court orders against the intermediary to compel removal (Perel & Elkin-Koren, 2016). In the EU Digital Services Act (2022), the procedure for reporting illegal content has also been carefully defined (article 14). The purpose is to simplify the reporting mode, with a standardization of notifications.

Notice-and-takedown is widely used by major U.S. technology companies and content industries to enforce copyright protections online. For instance, Google alone processes over 500 million URL removal requests per year through its notice-and-takedown system (Google, 2022). This demonstrates the vast scale at which copyright holders are attempting to utilize extrajudicial procedures to curb perceived infringement. However, critics argue that the notice-and-takedown system enables censorship and mistakes due to the lack of judicial oversight, while doing little to actually deter repeat infringers who can simply repost removed materials in many cases (Bridy, 2012). Some reform advocates propose instituting formal counter-notice procedures or shifting the burden onto rightsholders to file lawsuits if challenged, while others call for imposing proactive monitoring obligations on intermediaries to prevent reposting of infringing content.

Potential policy reforms remain contested between different stakeholders with competing interests in the notice-and-takedown debate.

Copyright holders have several options for extrajudicial notification mechanisms to request removal of allegedly infringing materials or information online. The DMCA takedown process is one of the most commonly used, allowing copyright holders to submit notices to service providers specifically identifying infringing materials and requesting their expeditious removal by the provider (Elkin-Koren, 2017). Another form of unlawful conduct is substantiated in the unauthorized use of the trademark of others on the website. The Uniform Domain Name Dispute Resolution Policy (UDRP) provides a process for trademark holders to submit complaints to domain name registrars regarding domain names that are alleged to infringe upon their trademark rights (Lipton, 2011). Europe's right to be forgotten laws have also enabled individuals to request search engines like Google to delist certain irrelevant or improper links from appearing in search results based on their name (Rosen, 2012). Anyway, the right to be forgotten in EU was sanctioned for the first time by the EU Court of Justice with the famous "Google Spain" decision of 2014. Subsequently it was consecrated in 2017 with article 17 GDPR (Resta & Zeno-Zencovich, 2015). Unfortunately, cases of domain name usurpation are frequent and in 2016 the World Intellectual Property Organization noted that almost 4000 domain name holders turned to the WIPO to report the phenomenon.

Each system has distinct purposes, legal underpinnings, and procedural requirements. DMCA notices primarily target alleged copyright violations on content platforms and websites, while UDRP aims to resolve disputes over abusive domain name registrations that infringe trademarks (Gowers, 2006). Right to be forgotten requests focus specifically on delisting information from search engine results to protect personal privacy. There are also procedural differences; the DMCA has specific notice content requirements and formal counternotice processes, while UDRP and European delisting regimes lack formal counterspeech protections such as counternotices (Geiger & Izyumenko, 2020). However, a commonality across these procedures is that they allow rapid removal of online material without formal judicial oversight, which raises shared concerns regarding potential impacts on lawful speech and censorship.

The efficacy of extrajudicial notice procedures in providing an efficient means to combat clear infringement while adequately protecting lawful speech is subject to ongoing debate and scrutiny. Proponents of notice-and-takedown argue that it offers an efficient mechanism for rightsholders

to address obvious cases of infringement at scale, particularly in light of the impracticalities of using courts for routine online enforcement (Gantz & Rochester, 2005). However, critics counter that in practice, overbroad, flawed, or outright abusive notices often lead intermediaries to remove non-infringing materials that constitute lawful speech (Bridy, 2012). Detailed empirical data assessing the error rates and accuracy of these processes remains limited and hotly contested between different stakeholders.

In practice, existing notice mechanisms likely enhance the efficiency of private enforcement efforts for rightsholders and provide legal protections to cooperating platforms, but appear prone to accuracy issues and removal errors when notsubject to formal legal adjudication and evidentiary review. The overall opacity around many platforms' and providers' notice-and-takedown practices also hampers independent evaluation of their efficacy and accuracy. While procedures like counternotices and penalties for misuse of notices can help limit abuses, impacts on lawful speech remain a significant concern. Assessing true efficacy likely depends heavily on context and the specific details of how legal frameworks like the DMCA are structured and implemented in particular cases. More robust empirical research assessing actual removal errors can help inform reforms aimed at improving notice systems.

Internet intermediaries such as online platforms, social media sites, and hosting providers play a crucial gatekeeping role in evaluating and responding to notice-and-takedown requests regarding user content (Bridy, 2011). However, they often face conflicting pressures and incentives when handling removal requests under legal frameworks like the DMCA. On one hand, platforms risk losing safe harbor protections from infringement liability if they fail to act on notices deemed valid, which creates strong incentives to promptly remove content identified in takedown requests (Elkin-Koren, 2017). But on the other hand, they also face countervailing expectations from users and must consider the free speech implications of content removal.

To manage these tensions, platforms aim to develop efficient review systems to assess notices at scale, minimize unwarranted removal of lawful speech and fair use, and maintain user trust (Google, 2022). But the sheer volume of takedown requests, the opacity of many infringement claims, lack of context, and the threat of losing liability protections shape reactive tendencies to readily remove content. While some companies have adopted voluntary practices to enhance accuracy, critics argue that intermediaries should do more to limit potential over-removal and abuses of the system

(Bridy, 2012). Finding appropriate balances remains challenging given the current liability structures and resource constraints involved.

In addition to required notice-and-takedown procedures, some voluntary initiatives by industry stakeholders have also emerged seeking to reduce online copyright infringement through non-legislative means. For instance, the Center for Copyright Information's Copyright Alert System established a voluntary framework for major Internet service providers to notify users suspected of online infringement through peer-to-peer piracy and potentially impose consequences for repeat violations (Yu, 2011). It is very similar to the pre-existing and much more rigid French system of the Hadopi, but managed without the involvement of any institutional or governmental body. The Payment Card Industry also created voluntary best practice guidelines to encourage payment processors and merchants to cooperate in terminating accounts selling goods determined to be pirated (Schultz, 2008). And major online ad networks and exchanges like Google AdSense prohibit the placement of ads on websites deemed to host significant infringing content.

These voluntary measures generally seek to reduce financial incentives that sustain sites dedicated to infringing activity by limiting revenue opportunities. However, critics argue that non-legislated private policing arrangements may lack accountability and encourage overzealous enforcement without due process (Bridy, 2012). The effects of voluntary programs beyond direct participating companies are also uncertain. A core challenge is ensuring consequences are proportionate and preventing unintended collateral impacts on lawful activity when intermediaries enforce voluntary anti-piracy efforts.

Notice-and-takedown mechanisms have been plagued by a number of controversies stemming from the inherent tensions between copyright enforcement, protection of lawful speech, and intermediary liability. Key debates include: disproportionate removal of non-infringing content lacking effective counterspeech protections (Bridy, 2011); opaque and unaccountable processes controlled largely by private parties (Perel & Elkin-Koren, 2016); potential for misuse and abusive takedown claims through flawed or falsified notices (Bridy, 2011); dispersal of enforcement costs onto platforms lacking full context to properly adjudicate infringement claims (Elkin-Koren, 2017); and encouragement of automated filtering systems that may end up exceeding legal requirements (Bridy, 2012).

Various reforms have been proposed to try to improve notice-and-takedown processes by enhancing accuracy, accountability and preventing abuse. However, structurally improving notice-and-takedown remains

challenging given the competing incentives and tensions baked into longstanding laws like the DMCA. The ongoing controversies surrounding notice-and-takedown illustrate the complex tradeoffs faced in attempting to formulate intermediary liability rules that effectively combat infringement while avoiding undue restrictions on lawful uses of content or delegating excessive private censorship powers to platforms.

A core concern surrounding extrajudicial notice-and-takedown processes is their potential to result in suppression of lawful speech and fair uses of content online. Critics argue the combination of limited judicial oversight, strong intermediary incentives to over-remove content in response to notices, and inadequate counterspeech protections contributes to the documented problem of frequent removal errors affecting non-infringing content (Bridy, 2011; Urban & Quilter, 2006). For instance, the use of algorithmic enforcement systems by platforms may be unable to meaningfully assess complex fair use factors when evaluating notices. Even in cases later overturned or contradicted through counter-notices, the resultant chilling effects and speech burdens from temporary unavailability of content can cause lasting harms.

However, the scope of removal errors remains empirically unclear, as comprehensive data assessing real-world rates of mistaken takedowns is limited (Bridy, 2011). Proponents maintain that most notices legitimately target clear, blatant violations, and that counter-notices coupled with penalties for misuse deter abuse of notices for censorship (Gantz & Rochester, 2005). But the overall opacity around the notice-and-takedown systems controlled by private intermediaries hampers independent analysis of actual impacts. As with efficacy, assessing the impacts likely depends heavily on the legal and procedural specifics of how notice systems are implemented in practice.

Myriad reforms have been proposed seeking to address potential flaws and unintended harms arising from notice-and-takedown processes:

- Require judicial determinations establishing infringement before mandating content removal to improve accuracy and limit errors (Bridy, 2011).
- Strengthen counterspeech remedies such as formal counter-notice procedures, coupled with enhanced deterrents against misuse of notices (Bridy, 2012).
- Improve transparency around notice-and-takedown statistics and removal practices to enable independent auditing and assessment by researchers (Perel & Elkin-Koren, 2016).
- Institute independent third-party review processes to arbitrate

contested notices and appeals (Rosen, 2012).
- Shift the burden more onto rightsholders by making them file lawsuits if any infringement claims are challenged (Urban & Quilter, 2006).
- Limit the use of automated enforcement systems that cannot meaningfully weigh complex fair use factors (Bridy, 2012).

However, improving notice-and-takedown in ways that appropriately balance competing interests remains highly complex given the speech implications and multi-stakeholder politics involved in attempting to revise longstanding laws like the DMCA. More fundamental rethinking of internet intermediary liability rules may ultimately be required to substantially realign incentives and oversight mechanisms.

Available data illustrates rapidly escalating notice-and-takedown activity over the past decade, especially among major U.S. technology platforms. For instance, Google reports that copyright removal requests to its services climbed exponentially from less than 1 million per year in 2010 to over 558 million takedown requests in 2021 (Google, 2022). Other empirical research shows similar hockey stick growth in removal requests received by platforms like Twitter and Facebook since the late 2000s as notice-and-takedown has proliferated (Bridy, 2012).

Observers attribute the staggering growth in notice volume to factors like the expanding scale of internet use and digital content sharing, the rising quantity of copyrighted works and protectable content disseminated online, and increasingly aggressive anti-piracy efforts by entertainment and content industries as business models shift. However, critics argue that the quality and validity of notices has not necessarily kept pace with the quantity as rightsholders have automated notice generation, raising concerns about impact on lawful speech (Bridy, 2012). The exponential inflation in notice volume highlights the scalability challenges of rights enforcement regimes reliant on extrajudicial measures.

Crafting balanced and effective notice-and-takedown policies remains challenging given the presence of competing interests, enforcement scalability issues, and potential unintended consequences online. But providing stronger speech safeguards and accountability while still enabling protection of copyrights may require reforms that:

- Implement proportionality standards in designing consequences for policy violations (Perel & Elkin-Koren, 2016).
- Enhance accuracy through improvement of notice review processes and strategic limits on automation (Bridy, 2012).
- Mandate greater transparency and public data disclosure around removal practices and content affected (Bridy, 2011).

- Institute robust counter-notice procedures coupled with deterrents against misuse (Urban & Quilter, 2006).
- Create independent oversight bodies and dispute resolution mechanisms (Rosen, 2012).

However, efforts to revise longstanding laws like the DMCA face institutional inertia and complex multi-stakeholder politics. More fundamental restructuring of intermediary liability frameworks may be necessary to substantially realign private incentives and public oversight.

2. *Liability measures for violations on the Internet*

Laws establish complex liability frameworks governing internet intermediaries like online platforms, hosts, and ISPs regarding intellectual property infringements enabled through their services. In the U.S., on the one hand there is the Anticybersquatting Consumer Protection Act (ACPA), to protect consumers and businesses from "cybersquatting", on the other hand there is the Digital Millennium Copyright Act (DMCA) implements a notice-and-takedown system that provides a safe harbor shielding intermediaries from copyright liability for user activity if they expeditiously remove allegedly infringing materials upon receiving proper takedown notices (Elkin-Koren, 2017). However, they may face liability if they have actual or constructive knowledge of violations but fail to act.

The European E-Commerce Directive establishes similar conditional liability exemptions if intermediaries act in a passive, technical role. However, recent cases impose greater duties on platforms regarding trademark and other violations via concepts like "contributory negligence" (Balkin, 2016). Laws balance competing aims of enabling internet development, protecting owners' rights, and limiting unlawful activity. But ambiguity in knowledge and responsibility standards complicates compliance.

Copyright safe harbors limit liability of online intermediaries for third-party infringements given the impracticality of monitoring all user activity, provided they meet certain conditions (Bridy, 2011). The DMCA Sec. 512 in the U.S. shields conduits, caches, hosts, and search/information tools from monetary relief over users' infringing storage or material if intermediaries lack knowledge, expeditiously remove identified content, and have reasonable complaint policies (Elkin-Koren, 2017).

Intermediaries must also accommodate standard technical protection measures and terminate repeat offenders.

Safe harbors aim to balance copyright enforcement with enabling internet development and lawful uses (Chander, 2018). However, rightholders argue platforms overly exploit safe harbors to avoid responsibility. Court battles continue over interpreting knowledge, control and profit thresholds that forfeit protections (Balkin, 2016). Calls persist to condition harbor eligibility on new duties like proactive filtering. But intermediaries resist increased burdens that may undermine incentives.

A core issue under intermediary liability laws is setting appropriate thresholds of knowledge and expectation of action to forfeit safe harbor immunities for infringements (Chander, 2018). Under the DMCA, intermediaries lose protection with actual or "red flag" knowledge of blatant violations, or willful ignorance through awareness of facts making infringement apparent (Elkin-Koren, 2017). Recent European cases also suggest constructive knowledge from monitoring possibilities triggering duties (Balkin, 2016).

But what constitutes sufficient knowledge is unclear. Overly broad definitions incentivize problematic over-filtering, while narrow views enable willful blindness. Similarly, required actions upon awareness range from limited takedowns to broad surveillance. Calibrating standards to balance stakeholders remains challenging. Clearer statutory guidance could help align incentives and responsibilities more appropriately to combat infringements without unduly burdening intermediaries or lawful activity.

Enforcing intermediary liability for intellectual property violations faces inherent challenges in tracing infringements and identifying responsible parties online. The sheer volume of data, dynamic nature of content, opacity of conduct, and jurisdictional complexities impedes gathering viable evidence of unlawful activity across global networks (Yu, 2019). Technical tools like VPNs, cloud computing, and encryption also obscure infringers. These obstacles hamper developing requisite knowledge for pursuing remedies.

Some proposals advocate expanding intermediary monitoring duties. But vast scale, costs, privacy risks, and inaccuracy pose concerns (Geiger & Izyumenko, 2020). Flexible knowledge standards enabling consideration of technical feasibility may help balance under- and over-enforcement given constraints. But governance remains difficult absent more robust tracing mechanisms, which raise their own issues. Better cooperation and information sharing between stakeholders could help address challenges (Yu, 2019).

Key court rulings help shape intermediary liability frameworks, resolving ambiguities in statutes and adapting laws to evolving technology and conduct. In the U.S., cases like A&M Records v. Napster (2001) outlined knowledge tests for contributory copyright infringement claims against filesharing platforms (A&M Records v. Napster, 2001). Viacom v. YouTube (2010) reinforced DMCA safe harbors for platforms lacking specific awareness of infringements (Viacom v. YouTube, 2010). European cases like Google v. Louis Vuitton (2010) established duties of care around trademark violations with constructive knowledge.

However, many gray areas remain. Diverging national interpretations compound uncertainty for global internet companies (Chander, 2018). Rulings must balance promoting legitimate activity, protecting rights, and enforcing laws given technical constraints. But continuous litigation drains resources. Clearer statutory signals could help resolve tensions, inform technical solutions, and unify standards internationally to support cooperation.

Evaluate efficacy of limited intermediary liability in combating infringements.

The efficacy of constrained intermediary liability frameworks in combating online intellectual property infringements while enabling legitimate activity is subject to debate.

Current intermediary liability systems face array of critiques. Copyright holders argue frameworks like DMCA safe harbors allow platforms to deliberately ignore infringements (Chander, 2018). Victims protest complicated notification burdens and lack of enforcement support. Free speech advocates warn about over-removal of lawful content from incentives to avoid risk (Bridy, 2011). Both sides see ambiguities generating gamesmanship in court. Proposed reforms range from conditioning harbors on duties like filtering to enhanced penalties for violations to better balance interests.

However, reshaping longstanding frameworks involves complex tradeoffs. Tightening obligations risks stifling innovation and exposing intermediaries to uncertainties, while expanding protections reduces incentives for cooperation against violations. Meaningful improvement requires addressing root economic incentives and information asymmetries fueling conflicts (Geiger & Izyumenko, 2020). But consensus remains elusive given competing interests.

Discuss trends in heightening expectations and obligations on intermediaries.

Despite safe harbors, recent trends reveal intensifying pressures to place more proactive obligations on intermediaries regarding online illegal activity beyond mere reactive takedowns (Balkin, 2016). Through legislation, litigation and public pressure, governments and rights advocates seek duties to use technological tools to identify, filter and prevent unlawful conduct rather than rely on notices, especially for platforms with vast resources.

But intermediaries strongly resist creeping mandates that threaten to erode liability protections and impose burdensome costs. Debates continue around reconciling public responsibility with limits on private regulation (Gorwa, 2019). While recognizing valid concerns, critics warn risks of over-enforcement and unchecked power absent sufficient accountability. With technology enabling greater controls, calls for heightened obligations seem unlikely to abate given high stakes. But consensus on appropriate roles remains elusive.

As frustrations mount surrounding perceived abuses of safe harbors enabling illegal activity online, some litigants explore ways to circumvent or erode intermediary liability protections. For instance, rightsholders bring secondary claims against platforms for vicarious copyright infringement despite DMCA defenses (Balkin, 2016). Governments consider mandating filters and monitoring. The U.S. Government, for example, periodically compiles a list of digital platforms that infringe IP rights ("The Notorious Markets lists"). Some argue excluding certain parties like dominant platforms from safe harbors given their scale and resources (Gorwa, 2019). Plaintiffs also target ancillary services like payment systems to leverage indirect pressure.

However, intermediaries fiercely resist efforts to weaken liability shields, arguing carveouts and expansions of duties threaten the free internet (Keller, 2018). They also highlight risks of fragmented national regimes. But with technology outpacing laws, pressure rises to more actively combat unlawful conduct through platforms. Navigating complex tradeoffs persists as a central challenge in evolving intermediary governance.

Crafting balanced intermediary liability frameworks remains challenging given competing innovation and speech concerns. But instilling greater responsibility in enabling violations while limiting burdens on legitimate activity may require:

More nuanced knowledge standards considering technical feasibility of awareness.

Clearer reasonability guidelines for required actions (Chander, 2018}.

Transparency mandates to inform policymaking (Gorwa, 2019).

Independent oversight mechanisms to audit practices (Bridy, 2011).

Penalties for abuses and underprotection by intermediaries.

Harmonization of global standards to enable cooperation (Yu, 2019).

Liability tied proportionately to scale, profiting and wrongdoing severity (Keller, 2018).

However, improving balance involves overcoming entrenched incentives shaped by existing laws. Meaningful progress requires addressing economic drivers and information gaps at the root of conflicts between stakeholders. But collaborative solutions remain difficult.

3. *Digital piracy and ways to combat it*

The emergence of digital formats, peer-to-peer networks, and anonymizing technologies in the 1990s enabled new forms of online copyright infringement dubbed "digital piracy" (Yu, 2011). Early piracy centered on illegal filesharing services like Napster facilitating mass exchange of ripped music MP3s without authorization (A&M Records v. Napster, 2001). Later platforms like BitTorrent and cyberlockers allowed user-uploaded streaming and downloads of expanding content types, including movies, TV shows, books, and software.

More recent piracy channels leverage mobile apps, direct download and streaming sites, and embedded players evading detection. Enforcement adaptation struggles to keep pace as users and services rapidly innovate distribution techniques. But digitization and networks fundamentally transformed media access possibilities, for better and worse. This is the case, for example, of those advertising banners on various websites which, based on the user's behavior and the contents visited, combine references to a famous brand searched for by the user with advertising and third-party sites featuring that brand they have nothing to do with it.

Widespread online piracy enabled by digital networks has significantly disrupted media industries reliant on copyright protections. A 2018 study estimated copyright industries lose over $30 billion annually in the U.S. alone from piracy, with global losses exceeding $150 billion (Frontier Economics, 2018). Beyond sales displacement, piracy can undermine industry business models and investment incentives over time (Waldfogel, 2017).

However, quantifying exact effects remains empirically challenging given complex substitution patterns and changing markets. Some data

suggests moderate impacts for major media firms and labels, but more concentrated harms for smaller, more piracy-dependent creators. There are also indications of shifting consumer behaviors in response to enforcement efforts. Overall, piracy clearly carries costs, but the scope remains debated.

Rightsholders employ various anti-piracy strategies to combat unauthorized distribution online, with mixed results. Civil and criminal litigation has targeted major facilitators like Napster and Megaupload, but faces jurisdictional obstacles and evasive adaptation (Yu, 2011). Technical blocks against infringing sites provide partial remedies but spur circumvention and provoke free speech concerns. Emerging stream ripping and illicit streaming tools complicate enforcement of existing laws.

Legislative approaches try strengthening site liabilities and targeting financial flows. Public education campaigns aim to change social attitudes regarding piracy ethics. But comprehensive solutions remain elusive given the viral nature of digital content networks. Enforcement disruption spurs calls for alternative compensation models. However, transitioning entrenched industry structures proves challenging.

Seeking to curb social acceptance of digital piracy, some campaigns try educating the public about ethical concerns and potential harms from unauthorized downloading and streaming. Industry groups highlight how piracy impacts artists and Creative Commons materials explain lawful sharing. Some firms use website pop-ups explaining infringement dangers. Schools implement curricula covering copyrights online and respecting ownership.

However, research suggests ethics-based appeals have limited impact on behavior compared to deterrence measures (Watson et al., 2015).

For example, Italian law 93/2023 mixes action strategies of various kinds. On the one hand, the regulatory text increases the criminal sanctions associated with violations; on the other hand, it promotes awareness campaigns aimed at informing the public of the value of intellectual property and assigns significant precautionary powers to the guarantee authority.

Major internet intermediaries significantly shape flows of online piracy through their policies regulating distribution platforms. Google and other search engines field DMCA takedown requests to limit indexing of infringing sites and materials. Video streaming sites like YouTube employ fingerprinting to identify unauthorized uploads. Some hosts voluntarily prohibit piracy-focused sites and tools. However, ongoing safe harbor disputes complicate cooperation. The EU Court of Justice established, in the 2014 ruling relating to case C-314/12, that national law can impose targeted filtering on the web service provider where specific offenses exist.

At the same time, intermediaries sometimes tacitly benefit from piracy

traffic through ad revenues. Determining appropriate responsibilities given limited liability remains contested. While intermediaries form crucial checkpoints, over-burdening common platforms used primarily for legitimate purposes risks unintended consequences. More narrowly targeting dedicated piracy services may improve enforcement cooperation moving forward.

The efficacy of anti-piracy strategies in reducing digital copyright infringement versus spurring evolutions remains contested. For instance, traffic dropped temporarily after Napster's shutdown but reconstituted in other forums. Link deletion compels site relocation, but migration continues.

Critics argue suppressing supply is futile given inexhaustible consumer demand. But evidence suggests targeting key intermediaries and brace infrastructures could impose higher costs on pirates to potentially curb casual infringement. Comprehensive impact assessments remain challenging due to limited data and dynamically adapting behaviors. Tailored deterrence and channel disruption may support shifting norms and economics over time.

Beyond reactive enforcement, some policy proposals seek to curb online piracy by reforming markets and addressing root economic incentives driving unlawful distribution. Academic research highlights convenience, quality of experience, and availability as key piracy motivations (Watson et al., 2015). Alternative compensation models like blanket licensing seek to provide lawful options meeting consumer expectations shaped by technology.

However, transitioning legacy media structures poses challenges, including pricing, inducing participation, and distribution (Waldfogel, 2017). Gradual, voluntary initiatives may enable experimentation and data to inform policy. But entrenched interests resist disruptions. While tackling root causes is appealing, quick solutions seem unlikely given complex systemic interdependencies. Sustainable progress requires aligning innovators and stakeholders.

Online anti-piracy tactics spur ongoing controversies regarding potential overreach and unintended consequences. Critics argue site blocking establishes concerning precedents for restricting access to information. Aggressive litigation and pressure on intermediaries raises risks of stifling legitimate innovation and fair uses. Automated filtering could enable suppression of unfavored speech. Restrictive protection measures also face consumer backlash.

However, rightsholders contend strong actions are essential given massive harm and few alternatives within current legal regimes. There

are merits to both views. Policy calibrated to severity and adaptability principles may help balance aims. But entrenched positions impede nuanced reforms. Navigating tensions and misaligned incentives remains an ongoing governance challenge.

The future trajectory of digital media piracy governance remains uncertain given rapid ongoing changes in technologies, markets, and social norms. Continued platform migration seems inevitable as enforcement adapts. Pirate channels will likely grow more mobile, anonymized and encrypted. Consumer expectations for unfettered access also solidify over time. But data analytics and forensic tracking methods also improve.

Rather than an enforcement problem, policy debates increasingly center on reforming underlying media regulations and business models for the digital age (Waldfogel, 2017). Transitioning systems is difficult but may better align with emerging realities. However, complementary deterrence and channel disruption will remain tactically necessary during gradual structural reforms. The path forward promises continued contestation and complex negotiations between stakeholders.

Crafting solutions to digital piracy requires balancing targeted enforcement efforts with addressing root causes through reforms. Evidence suggests that:

Prioritizing action against commercial scale intermediaries can impose higher costs on pirates.

Alterative compensation models can reduce motivations by improving lawful access, but require gradual implementation and transition arrangements (Waldfogel, 2017).

Enhanced lawful media availability, experience and convenience across services can combat preferences driving infringement (Watson et al., 2015).

Public outreach should highlight ethical concerns while recognizing motivations.

Aligning incentives and shifting entrenched structures involves understanding competing interests of innovators and legacy industries.

While improved deterrence is necessary, comprehensive solutions call for modernizing media policy frameworks over the long term based on revived multi-stakeholder cooperation and evolving principles.

4. *Blocking sites that violate intellectual rights*

Site blocking refers to technical measures used to restrict access to websites and platforms deemed to engage in or facilitate repeated intellectual property violations (Urban & Quilter, 2006). Methods include court-ordered injunctions compelling ISPs to use DNS filtering, IP address blocking, or URL blacklisting to disable user access to infringing sites. Voluntary initiatives also exist where advertisers, payment processors or search engines cease supporting violating platforms.

Blocking aims to impose costs on violators by cutting revenues and visibility. However, critics argue overbroad blocking risks unintended harms to lawful speech. The legal basis for compulsory blocks also remains contested, as does efficacy given the ease of circumvention. Policy continues to navigate appropriate roles and procedural safeguards for site blocking mechanisms.

Multiple methods exist for technically restricting access to infringing sites:

- Court injunctions can order ISPs and infrastructure providers to block named sites through DNS, IP, or URL filters (Yu, 2019).
- Search engines voluntarily delist infringing sites from results.
- Ad networks refuse placement on violating platforms, choking revenue sources (Yu, 2011).
- Payment systems like credit cards, PayPal, and cryptocurrencies deny processing services.

Court-ordered blocking is controversial but growing globally. Voluntary initiatives enable private enforcement without regulation. But critics argue both overblock lawful speech. Standards and processes determining site violations also vary, raising accountability concerns. However, restricting financial flows may avoid overblocking risks while deterring violators.

The legal grounds for blocking injunctions remain contested, as laws generally do not expressly authorize such technical restrictions (Passaglia, 2015). Most blocking regimes rely on general court authority to issue equitable relief against tortious conduct (Yu, 2019). Rights holders initiate lawsuits against ISPs, which may consent to negotiated injunctions or contest legal power to impose content filtering.

Substantive and procedural standards differ internationally. Some nations issue broad orders targeting categories of infringement, while others require specific demonstrations of harm from named sites. Opacity around many private injunctions also fuels misuse concerns. Clearer

statutory frameworks could strengthen legitimacy, accountability and rule-of-law safeguards around site blocking processes.

Despite aims to address IP violations, site blocking mechanisms raise significant human rights concerns regarding impacts on lawful speech and access to information. Criticisms include: overbroad blocking chilling legitimate expression; lack of due process and transparency in determinations; privatized enforcement without public oversight; and ineffectiveness allowing arbitrary technical restrictions. Rightsholders counter blocks apply only to egregious offenders.

But speech protections generally disfavor prior restraints on publication absent extraordinary circumstances. Private injunctions issued absent contrary arguments heighten risks of overreach and abuse. While IP rights merit protection, appropriately balancing harms and safeguarding public interests remains critical when authorizing such far-reaching restrictions.

The technical feasibility and prevalence of circumventing site blocks significantly undermines their efficacy as an enforcement strategy. Blocked sites quickly establish proxy servers, alternate domains, and routing workarounds to restore access. General tools like Tor, VPNs, and reverse proxies increasingly allow users easy circumvention.

Research finds over 80 percent of blocked sites remain accessible long-term, although block evasion imposes some costs. But ubiquitous circumvention technologies make blocking futile absent much broader censorship. Rightsholders argue focusing on major platforms still provides value. However, injunctions should account for technical realities to avoid disproportional impacts or overbroad orders.

The actual efficacy of site blocking in reducing online intellectual property violations remains empirically unclear and contested. Proponents argue blocking mainstream platforms indeed imposes meaningful access barriers and costs on infringers (Yu, 2011). However, research reveals most users easily circumvent blocks using readily available tools. Blocked sites also quickly reconstitute operations using alternate channels.

Overall impacts likely depend on scale and target—for example, small forum blocks may have little effect, while large cyberlocker blocks could disrupt major piracy channels. But injunctions often lack such granular analysis in establishing proportionality. Clearer empirical guidance could strengthen blocking policies by better rooting measures in demonstrated effectiveness against harms. But existing evidence gives little basis affirming efficacy.

A core concern surrounding site blocking is the risk of unintended overblocking consequences that unduly restrict lawful speech and access

beyond intended targets. Critics point to instances of technically overbroad blocks impacting thousands of unrelated sites, such as Indian ISP blocking all of GitHub. Intermediaries also face incentives to overblock given liability risks.

However, empirical data assessing actual overblocking rates remains limited. Some countries attempt safeguards like court transparency and contestation of orders. Rights holders maintain focus on piracy hubs minimizes lawful speech risks. But the opaqueness and private nature of most blocking processes render independent audit impossible (Yu, 2019). Ensuring proportionate blocking grounded in empirical targeting analysis is critical to preventing overreach absent oversight.

To address accountability deficits, various proposals advocate improving the transparency, contestation, and oversight around site blocking processes:

- Require public disclosures detailing block justifications, targets, methods, and collateral impacts.
- Enable website operators to contest proposed blocks through adversarial hearings (Yu, 2019).
- Implement independent third-party auditing of blocking to assess efficacy and overreach.
- Provide a clear statutory framework governing use of blocking rather than ad hoc injunctions.
- Establish oversight bodies with mandate to monitor practices and remedy abuses.

However, private stakeholders often resist reforms that erode control or enable scrutiny. Absent political incentives, voluntary efforts may be most feasible but limited. Still, enhancing legitimacy and accountability could strengthen blocking measures.

The use of court-ordered site blocking has proliferated rapidly across the globe as a strategy to combat online piracy. Since initial blocks against The Pirate Bay, injunctions have issued in over 40 countries as of 2021 enjoining ISPs to disable access to thousands of sites, particularly for copyright violations (Yu, 2019). Nations with growing legal site blocking regimes include the UK, Australia, India, Indonesia, and members of the EU.

Key factors behind rising adoption include lobbying by media industries, favorable court rulings, and extension of offline enforcement practices online. Standard technical blocking capabilities among ISPs also facilitate implementation. However, civil society groups criticize opaque procedures and disproportionate impacts. Ongoing battles continue

over extending site blocking practices through legislation, litigation, and voluntary initiatives.

Reconciling site blocking with commitments to openness and lawful speech requires calibrations limiting unintended harms:

- Injunctions could require demonstrating actual necessity and efficacy versus assuming utility.
- Breadth must be restricted to minimize collateral impacts based on empirical data.
- Those affected, like site owners and users, should have opportunity to contest proposed blocks (Yu, 2019).
- Independent oversight and transparency reforms can strengthen accountability.
- Less intrusive alternatives like payment or ad chokepoints should be prioritized when available (Yu, 2011).
- Statutory authority and proportionality tests can reinforce rule of law values against ad hoc excesses (Geiger, 2016).
- Technical precision and periodic review further limit overblocking risks.

Balancing IP protections, speech interests, and due process poses challenges. But appropriately bounded blocking may complement broader reforms.

5. *Hacking digital assets*

Digital piracy extends beyond media to encompass various forms of unauthorized access, theft, and disclosure of proprietary information and trade secrets, enabled by hacking vulnerabilities (Clifford, 2014). Key motivations include financial gain from stolen data sales, prestige among the hacker community, and ideological beliefs surrounding information freedom (Holt, 2013). Commonly used techniques include phishing, social engineering, credential stuffing, brute force attacks, exploits of unpatched software flaws, and insider access (Mitnick & Simon, 2002).

Targets like firms, governments, and research entities often lack adequate security protections for sensitive IP assets and data. Yet legal enforcement struggles with attribution challenges, jurisdictional limits, and keeping pace with technical innovations. Developing effective cybersecurity and deterrence to prevent and punish data breaches remains an urgent challenge given escalating risks. In this regard, we recall the WIPO Copyright Treaty

(1996) which extends copyright protection to digital works and adopts measures to prevent the deception of technological protection tools.

Intellectual property breaches can significantly harm victim companies and creators across industries. Trade secret theft enables rivals to unfairly benefit from stolen R&D, strategic plans, and proprietary methods (Png, 2017). Leaked source code also facilitates competitors replicating features and security vulnerabilities. Pre-release piracy of films, music, books, and games damages sales and marketing campaigns (Bhattacharjee et al., 2003).

Beyond direct effects, IP violations also erode incentives for investment and innovation over time (Clifford, 2014). However, impacts vary across contexts, with larger entities better able to absorb harms through agile responses. Smaller creators and startups may face existential risks. While empirical estimates of overall costs remain limited, threats appear increasingly destabilizing given accelerating data flows and hacking sophistication.

Firms utilize layered cybersecurity strategies to protect intellectual property, guided by frameworks like the NIST Cybersecurity Framework (Paulsen & Toth, 2016). Controls include: strong access restrictions, compartmentalization, and least-privilege policies to limit insider risks; robust authentication, encryption, firewalls, and anti-malware tools to prevent unauthorized access; proactive vulnerability testing, patching, and system monitoring to harden defenses; and comprehensive incident response planning to limit harms from breaches (Shackelford, 2016).

However, perfect security is impossible given relentless adversary innovation. Risks also arise from third party vendors and lax BYOD policies. Ongoing employee training, redundancy across safeguards, and building a culture of security help manage threats. But for crucial IP, air-gapped systems and strictly limited data access may be necessary given the extent of cyber risks. Developing robust yet flexible protections remains an ongoing challenge.

Beyond direct harms, hacking and disclosing confidential information also involves complex ethical and legal considerations. Key concerns include violation of privacy and property rights, circumvention of the implicit social contract, and undermining trust in technology and institutions. However, some hackers invoke countervailing arguments surrounding transparency, accountability, and the public's right to know regarding issues like corporate malfeasance or governmental overreach (Zittrain, 2008).

Navigating such tensions falls largely to laws like the CFAA that criminalize unauthorized intrusion and data theft. But ethical frameworks emphasize considering specific circumstances, goals sought, necessity and proportionality of means, and potential collateral consequences from

disclosures (Floridi, 1999). Context matters deeply when evaluating moral culpability and social value surrounding such ethically ambiguous behaviors.

Investigating and prosecuting secret data thefts and disclosure incidents poses significant challenges for authorities. Sophisticated hackers often circumvent attribution through technical anonymization, compromised zombie devices, and foreign jurisdictions. Insiders often enjoy trust to evade monitoring. Victims may not even detect subtle or delayed intellectual property violations. Encryption and hidden online caches also impede gathering forensic evidence following a breach (James & Gladyshev, 2016).

Prosecutors then face difficulties establishing harm, proving culpability and motive, and securing convictions from technologically-unsophisticated judges or juries (Goodman & Lin, 2007). Punishments often lag technological evolution. Lack of international norms, treaties, and enforcement cooperation further constrain responses. Technical and legal innovation is needed to improve threat detection, evidence gathering, and criminal deterrence regarding data thefts.

In the U.S., the Computer Fraud and Abuse Act (CFAA) provides the primary basis for prosecuting unauthorized data access, imposition of "exceeding authorized access" restrictions, and associated fraud crimes (Kerr, 2005). However, vagueness in key terms like "authorization" creates gaps and uncertainties in coverage. In addition, disproportionate civil and criminal penalties attached to violations of terms of service agreements or employer access policies under the CFAA have fueled controversy.

Reform proposals aim to clarify ambiguities in scope, differentiate serious from trivial infractions, and strengthen protections for researchers and whistleblowers. However, legislative change has stalled amid debates over appropriately targeting culpable threats while enabling beneficial testing activities (Hagen, 2012). In practice, ethical hacking prosecutions remain rare, but chilling effects persist. Updating outdated statutes remains key to properly balancing security and innovation.

Many technology firms operate bug bounty programs offering rewards for independent security researchers who responsibly disclose discovered software flaws through a coordinated process. Bounties provide incentives for "white hat hacking" that proactively improves system security and directs talent away from black markets. Researchers gain legitimization, compensation, and protection from legal threats (Finifter et al., 2013). In this regard, the Swiss Confederation launched a central BugBounty platform in 2021 to identify vulnerable aspects of the Federal Administration's IT systems.

However, critics argue bounties potentially encourage extortion-like bargaining practices. They may also signal inadequate internal testing procedures if companies need to crowdsource vulnerability identification (Allodi & Massacci, 2014). Bounty programs require carefully designed rules and scopes. But properly implemented, they offer a controlled channel benefiting both companies and security researchers. Extending similar principles to broader ethical hacking could strengthen deterrence.

To better combat data theft and strengthen cybersecurity, various legal and technical reforms have been proposed:

- Clarify & update hacking regulations like the CFAA to properly define and deter serious offenses.
- Increase penalties for usable trade secret theft to match piracy laws.
- Remove liability threats facing security researchers investigating flaws responsibly.
- Establish cybercrime divisions and forensics labs to enhance enforcement capabilities (Goodman & Lin, 2007).
- Incentivize firms to implement adequate protections through liability rules, audits, and best practice standards (Shackelford, 2016).
- Promote international law harmonization and enforcement collaboration.

However, consensus remains elusive given competing priorities. Transitioning legacy frameworks into the digital age remains critical but politically challenging. Still, creative policy reforms have potential to strengthen protections without chilling innovation.

Cyber risk data illustrates rising threats as sensitive data flows accelerate, systems interconnect, Surface(01)-wise gaps persist, and adversaries grow more sophisticated. Reported cyber incidents climbed 13% globally from 2018-2019 with over 117,000 incidents. Trade secret theft cases prosecuted in the U.S. grew from fewer than 10 in 1996 to over 30 in 2012 and continue rising. High-profile hacks also highlight escalating risks, including the 2017 Equifax breach exposing 147 million identities (U.S. GAO, 2019).

Key factors exacerbating threats include inadequate organizational cybersecurity, increasingly destructive malware, tokenized stolen data markets, vulnerabilities in connected systems, and lack of hackers' fear of consequences. However, growing awareness and maturing practices are emerging in response across sectors. But reversing trends requires substantially improved prevention, deterrence, and response at both organizational and policy levels.

Forging comprehensive solutions to digital intellectual property threats requires synthesizing reinforcement of protections, realigned deterrence measures, cooperative frameworks, and mobilized response capabilities:

- Organizations must implement layered safeguards adapted to evolving risks and assets (Shackelford, 2016).
- Cybercrime laws should be clarified and harmonized to properly define unlawful threats, modes, and penalties.
- Responsible disclosure channels like bug bounties should be fostered to direct skills constructively (Finifter et al., 2013).
- Transparency requirements can compel firms to address vulnerabilities before incidents.
- International agreements and institutions are needed to coordinate responses across borders.
- Investments in rapid tracing, forensics and law enforcement are critical (Goodman & Lin, 2007).

With growing dependence on data, stemming compromises is an imperative need. But solutions demand both private and public sector commitment to balance security, rights, and innovation.

Conclusions for Chapter VIII

This analysis illuminates the complex challenges involved in governing online intellectual property protections and enforcement in the digital age. Rapidly evolving technologies continuously reshape possibilities for creating, sharing, and exploiting protected IP assets and data, generating escalating legal ambiguities, enforcement pressures, and security risks. However, underlying policy tradeoffs remain unchanged—balancing rights protections that incentivize innovation against restraints that could undermine creativity and lawful uses. Effectively navigating tensions to sustain generative, rights-respecting technological ecosystems remains imperative but exceedingly difficult amid continuously shifting terrain.

Several cross-cutting themes emerge around reforming IP governance for the digital environment. First, legacy legal frameworks struggle with technological obsolescence and require modernization to address new realities. Core statutes like the DMCA and CFAA were crafted before today's digital prevalence, and show gaps and ambiguities when applied to current technologies and uses. Updating laws to align with modern

technical capacities, public practices and norms is critical. Second, private agreements and voluntary initiatives enable valuable experimental governance but lack accountability, transparency and oversight. Standards and processes for transparency, validity checks, and dispute resolution could help remedy abuses.

Third, consistently underlying tensions are mismatches between incentives and access expectations established through technology versus those embedded in law. For instance, design affording seamless public copying and sharing conflicts with infringement concepts. Realigning motivations of stakeholders through calibrated technical and economic measures may help shift norms over the long-term. Fourth, fundamental empirical uncertainties hamper policy development and risk arbitrary or excessive enforcement. Robust assessments of actual impacts, errors, abuses and efficacy of restrictions should inform remedies targeting demonstrated issues. Finally, complex international dynamics necessitate coordinated multilateral actions to harmonize frameworks, enable cooperation, provide resources, and set baselines adapting laws to the global digital ecosystem.

These broader reform imperatives manifest across the online IP issues explored:

The proliferation of notice-and-takedown and content delisting procedures demonstrates the need to update offline infringement enforcement processes for the scale and automation enabled by digital networks. But relying on opaque extrajudicial tactics controlled largely by private parties—from DMCA notices to right-to-be-forgotten requests—risks censorship and mistaken over-enforcement absent oversight. Rights holders legitimately need means to address large-scale infringement. However, current notice regimes lack accuracy and accountability safeguards, encourage automated over-removal, and provide limited recourse for lawful speakers wrongfully silenced.

Preserving speech interests while combating misuse will require reforms to enhance transparency, provide independent appeals, limit automation, and impose penalties for notice abuses. More fundamentally, the enforceability of rigid copyright paradigms against highly fluid digital cultures remains questionable. Transitioning industry norms may necessitate alternative compensation models that redirect flows toward rights holders rather than futilely stifling technologies people increasingly use to socially interact with content. But evolving entrenched systems proves challenging. For now, policy strides remain confined largely to constraining the worst notice excesses.

Similar themes surround reforming intermediary liability laws to appropriately balance platform freedoms, responsibilities and protections. Current safe harbors struggle with ambiguity in knowledge standards for losing immunity, which breeds legal conflicts and uncertainty. Similarly, exactly what proactive anti-infringement duties and monitoring may be required of services like YouTube remains hotly contested given speech risks. And rights holders protest the alleged ease of avoiding justice by hiding behind broad liability shields. Updating aging laws to delineate proportions of profits, control and intent warranting liability across diverse online actor categories could help clarify obligations. Clearer reasonability standards for risk awareness and required protective actions would also benefit good faith intermediaries operating in legal gray zones. But entrenched political obstacles impede renegotiating complex multi-stakeholder accords like Section 512.

Rapid evolution continues outpacing law, as seen in escalating site blocking injunctions by courts worldwide, despite shaky legal authority. Rightsholders defend blocking as necessary against rampant piracy enabled by unfettered networks. But research reveals most users easily circumvent blocks, suggesting inefficacy. And lacking transparency or constraint, private injunctions could encourage collateral censorship and disproportionate access restrictions. Grounding blocking in demonstrated necessity, enacting safeguards like contestation rights, and exploring less intrusive financial chokepoints could strengthen legitimacy of this increasingly global enforcement trend. But stakeholders first require reconciling competing aims within cooperative forums guided by public interest values.

So too must solutions balance security and innovation regarding protection of valuable proprietary data like trade secrets against escalating threats of theft and unauthorized access. Cyber-exploitation of intellectual assets carries rising financial and competitive risks as sensitive information concentrates in vulnerable digital systems. Yet murky statutes like the CFAA, lack of technical expertise, and jurisdictional limits hamper deterrence and prosecution of data thefts. Incentivizing robust security safeguards through standards and accountability while clarifying unlawful hacking could help prevent incidents and punish offenses. Formalizing coordinated disclosure programs also constructively channels researcher expertise. But focusing reforms on hardening defenses and updating enforcement will only contain a relentlessly innovative threat environment absent improving international cooperation and fundamentally realigning

economic incentives surrounding data vulnerabilities.

Across issues, digitalization confounds IP protection and enforcement by amplifying scale, obscuring infringements, and empowering new exploitations beyond traditional constraints. However, notice regimes prone to over-enforce, intermediaries facing pressure to privately restrict speech, increasingly common site blocks of uncertain legitimacy, and relentless data security risks all signal dilemmas arising from legal rigidity amid technological fluidity. Achieving balance requires informed, principled updating of IP governance to serve public knowledge interests against changing technological contexts. This demands international cooperation and inclusive deliberation to craft calibrated solutions reshaping incentives, improving security, increasing oversight and third-party accountability, limiting unintended consequences, and ultimately aligning innovative technology with enduring rights protections and liberties in the digital age.

While complex tradeoffs persist, synthesizing interests of rights holders, platforms, researchers, and the public to promote generative, lawful digital ecosystems remains an essential challenge. With thoughtful balancing, private ingenuity and public oversight can be reconciled through legal innovation and cooperation. Technology unfettered from rights risks undermining the very liberties enabling its creation. But prudent regulation guided by democratic values also offers paths to expand possibilities and protections in equal measure. By learning from current governance shortcomings, we can forge updated social contracts enabling technology's immense potential while steering its risks - sustaining liberties, openness and innovation to serve all humanity in the emerging digital society.

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CHAPTER IX

ECONOMICS OF INTELLECTUAL PROPERTY IN THE DIGITAL AGE

1. *Markets for intellectual property in the digital economy*

The development of intellectual property (IP) markets and exchanges has progressed rapidly in recent decades with the emergence of online platforms and decreased transaction costs. Historically, IP assets like patents and copyrights were traded through private negotiations and agreements, limiting market exposure and liquidity. The rise of the internet enabled new mechanisms for valuing, licensing, and transferring IP on a global scale (Caviggioli & Ughetto, 2013). Major online IP exchanges launched in the early 2000s, including Yet2.com, Tynax, IPXI, and Ocean Tomo (Geradin & Layne-Farrar, 2011). These platforms expanded trade to a broader range of participants beyond multinationals, though liquidity remained limited.

More recently, blockchain, smart contracts, and tokenization are empowering new decentralized and transparent IP marketplaces (Conley, 2017). Overall, evolving web architectures, data analytics, and financial engineering are increasing the depth and sophistication of IP markets. Key developments enabling more efficient IP markets include reduced search and transaction costs, increased price transparency, financialization of IP assets, and improved title quality assurance (Lemley & Myhrvold, 2007). More granular IP data, standardized valuation methodologies, and connectivity between buyers and sellers now facilitate price discovery and exchange.

Remaining challenges include illiquidity, difficulties valuing early-stage inventions, and uncertainties over patent quality (Arora et al., 2004). Well-functioning IP markets incentivize innovation commercialization and promote an equitable sharing of economic rewards between creators and users of new knowledge. Policy should balance stimulating IP markets while mitigating incentives to acquire and asserting low-quality IP (FTC, 2011).

Online IP marketplaces utilize a range of platforms and mechanisms to enable patent, copyright, and trademark licensing, transfer, and sale.

Major models include auction platforms, private bilateral exchanges, patent brokerages, and public licensing clearinghouses (Geradin & Layne-Farrar, 2011). Leading auction sites such as Ocean Tomo and ICAP facilitate competitive bidding for IP portfolios, allowing price discovery and setting market valuations. Private exchanges like Yet2.com and Tynax enable confidential IP listings and targeted buyer-seller negotiations.

Intermediaries like TechInsights provide IP brokerage, connecting specific buyers and sellers (Arora & Gambardella, 2010). Some public licensing organizations, like Auto-ID Labs, aggregate IP for non-exclusive use within an industry. Emerging blockchain platforms also enable decentralized IP transactions through crypto tokens and non-fungible tokens (NFTs) (Conley, 2017). Overall, this diversity of models offers customized approaches to exchanging IP based on asset characteristics, industry dynamics, and party preferences.

When thoughtfully designed and applied, such marketplaces can enhance the quality, objectivity, and transparency of IP transactions (Geradin et al., 2008). However, fragmented platforms also pose risks of concentrating power in proprietary exchange owners. Policymakers should analyze competitive impacts and interoperability to ensure market fairness and innovation incentives. In this sense, we can recall EU Regulation 2022/2065, adopted to harmonize the multiple national legislations regarding illegal content, transparent advertising and disinformation in electronic commerce.

Increased liquidity and decreased transaction costs in IP markets can have several interrelated impacts. Higher liquidity lowers risks for buyers and sellers, improves price discovery, attracts financial investment, and enables rights fragmentation and reaggregation (Lev, 2001). Reduced search and information costs increase market efficiency and bargaining power of smaller firms (Arora & Gambardella, 2010). Lower contract execution and enforcement costs incentivize licensing and diversify transaction structures.

Financial engineering of IP assets into tradable securities increases liquidity (Lev, 2001). New market entrants and financial speculators can reduce innovation commercialization barriers for start-ups and SMEs. Increased participation expands the breadth of technologies openly marketed. Greater transparency attracts capital and improves market pricing accuracy.

Challenges include increased litigation risks and uncertainties in valuing early-stage inventions (Lemley & Myhrvold, 2007). Overall,

more efficient IP markets reward high-quality inventions and empower decentralization of innovation investment and commercialization. Policy should balance stimulating IP markets while mitigating incentives to acquire and asserting low-quality IP (FTC, 2011).

IP markets cover a vast breadth of digital technologies, including computer hardware, software, internet applications, e-commerce business methods, data storage, AI/algorithms, IoT, VR/AR, and semiconductor designs. Core technologies frequently traded include microprocessors, graphics processors, database software, encryption, compression, networking protocols, multimedia codecs, chip fabrication, programming languages, OS frameworks, and biotech patents like CRISPR (Lévêque & Ménière, 2007). Cryptocurrencies and blockchain platforms are also emerging digital IP classes, along with IP-protected social media accounts, in-game assets, digital art NFTs, and synthetic media (Conley, 2017).

Demand shifts based on rapidly evolving technology cycles, with valuations rising and falling across segments (Cockburn & MacGarvie, 2011). IP market concentration varies, with hardware and platforms usually more consolidated than software and internet technologies. Overall, IP markets offer monetization pathways for both high-potential emerging innovations like AI, as well as proven technologies widely used across industries like video codecs (Arora & Gambardella, 2010).

IP trade data provides insights into technological significance, industry dynamics, and investment trends. However, reporting remains inconsistent across platforms. Policymakers should consider requiring more standardized and granular IP transaction data disclosure to improve market transparency and analysis.

Secondary markets for trading IP assets after initial acquisition or development provide increased liquidity and price discovery (Arora et al., 2004). Major secondary market platforms include Ocean Tomo auctions and Intellectual Property Exchange International (IPXI) (Schultz & Urban, 2012). Secondary markets attract new investors, such as hedge funds, to acquire underutilized IP from corporations and monetize it through licensing or litigation (Risch, 2012). Auction models are commonly used, improving transparency, price competition, and valuation benchmarks (Cockburn & MacGarvie, 2011).

IP auctions are conducted both live and virtually, with global online access expanding the buyer pool. Auction design factors include pricing rules, lot segmentation, bidder pre-qualification, and transaction support services (Caviggioli & Ughetto, 2013). Challenges include information

asymmetries favoring auctioneers and difficulties predicting future litigation risks for auctioned IP.

Overall, secondary markets provide alternate commercialization pathways but may incentivize speculation and assertion entities accumulating IP (Lemley & Melamed, 2013). Further regulatory clarity may be warranted regarding disclosures, eligibility criteria, and auction accountability.

Patent assertion entities (PAEs), also known as "patent trolls", accumulate patents to license and litigate for profit rather than commercially develop the technology (Schultz & Urban, 2012). PAEs exploit information and financial resource asymmetries to extract rents from producers facing infringement threats (Cohen et al., 2016). Critics argue PAEs tax innovation through legalized extortion, raise costs for end consumers, and discourage R&D spending (Tucker, 2014). They advocate stronger obviousness, patentability, and disclosure requirements to improve patent quality and limit speculative hoarding.

However, others counter that PAEs provide valuable intermediation services connecting small inventors with licensees, and contend they have an equal right to exploit legitimately owned IP (Fischer & Henkel 2012). Proponents assert patent aggregation can reduce transaction costs through centralization and specialization. Overall, PAEs illustrate the need for balanced incentives between initial innovators and downstream improvers in patent systems (Lemley & Melamed, 2013).

Hybrid partnership models may offer alternatives to mitigate PAE risks while still rewarding individual inventors. More empirical research is needed to quantify the costs and benefits of PAE activities and guide appropriate policy responses.

Assess factors influencing supply and demand dynamics in digital IP markets.

IP market supply and demand dynamics are driven by technology shifts, competitive landscapes, and macroeconomic conditions. Disruptive innovations like blockchain, AI, IoT, and biotech spur demand for foundational IP in new growth areas. Commoditization cycles decrease demand for mature technologies. Upstart competitors aggressively acquire IP to challenge incumbents (Arora & Gambardella, 2010). Large portfolios command premiums for competitive blocking potential.

IP valuations rise and fall across technology hype cycles, attracting speculation during bubbles (Risch, 2012). Recessions lower corporate and investment appetite for licensing. Globalization expands market size but fragments copyright territoriality. Demand concentrates around "must-

have" technological standards widely used across industries (Lévêque & Ménière, 2007).

Overall, the unpredictable and rapidly shifting nature of technology disruption makes IP market analysis challenging. Market transparency and segmentation by technology sector may aid price discovery (Schultz & Urban, 2012). Further research into leading indicators would provide useful signals for IP valuation trends.

Various policy reforms could help facilitate more efficient IP markets and exchanges. Measures include improving patent quality, standardizing valuation methodologies, increasing listing transparency, strengthening IP title assurance, and regulating speculators. Centralized exchanges with expert pre-screening of listings could reduce information asymmetries versus bilateral private markets.

Global databases of comparable historical IP transactions would provide better valuation benchmarks. Blockchain-based smart contracts have potential to lower transfer frictions and risks (Conley, 2017). International frameworks for cross-border tax and contract enforcement could reduce uncertainties hampering IP transactions. Segmented exchanges based on technology categories could attract critical mass within sectors.

However, caution is required to avoid over-financialization and speculation disconnected from commercialization incentives (Risch, 2012). Holistic policies balancing IP generation, implementation, and exchange are needed to sustain innovation ecosystems. Ongoing experimentation across various public, private, and hybrid exchange models will provide data to guide optimal IP market structures.

Analyzing trading volumes across IP categories provides insights into market activities, valuations, and technological significance. In 2020, worldwide patent licensing and sale revenues totaled an estimated $345 billion (Lévêque & Ménière, 2007). However, trading remains highly concentrated in a few technological segments like telecom standards, computer processors, and biopharmaceuticals (Arora & Gambardella, 2010). Copyright licensing is dominated by entertainment, media, and publishing assets. Trademark licensing centers around major consumer brands.

Market data indicates volumes shifting across sectors as new technologies emerge, with recent growth in AI, IoT, fintech, and biotech IP transactions. Cryptocurrencies and NFTs are also generating surging, though volatile, transaction volumes (Conley, 2017). Overall trends point towards continued geographic expansion and fragmentation into specialized exchanges focused on particular industry verticals or technology segments.

Better tracking of trading statistics by IP type and industry can guide

policy and commercial strategy. Mandatory disclosure of transaction data may be warranted to improve transparency, especially for patent privateering deals with anticompetitive risks (Lévêque & Ménière, 2007).

IP markets should balance returns for innovators, follow-on improvers, and technology implementers to sustain innovation ecosystems (Lemley & Myhrvold, 2007). Pure proprietary models may over-incentivize control and speculation without diffusion. However, weak IP rights can discourage investment ex ante. Hybrid approaches blending exclusivity periods with transparent licensing frameworks after initial recoupment may optimize incentives (Arora & Gambardella, 2010).

Different configurations suit various industries based on R&D costs, iteration cycles, complementary assets, and platform dynamics (Lev, 2001). Global policy coordination is crucial to prevent jurisdictional tax and transactional arbitrage. Beyond formal IP, ongoing support via research grants, broadband infrastructure, and STEM education underpins fundamental knowledge development (Risch, 2012). In any case, coming into contact with different platforms, guidelines which provide precise indications on the different policies in play can become useful. In this regard, it can be remembered that the UK Intellectual Property Office (UKIPO) published in 2021 a guide, entitled Protection of IP Rights on e-commerce stores, for the management of intellectual property in online commerce.

IP markets can powerfully accelerate technology commercialization but require balanced design within broader innovation policy. More empirical research quantifying the optimal strength and duration of IP rights across different industry contexts would provide an evidence base to craft tailored innovation incentives.

2. *Pricing for intellectual property*

A range of quantitative and qualitative methods are used for valuing and pricing IP assets like patents, trademarks, copyrights, and trade secrets (Razgaitis, 2014). Cost-based approaches consider R&D, regulatory, legal, and marketing expenses incurred in developing the IP. Market-based methods analyze sales of comparable IP transactions. Income methods estimate discounted future earnings or cost savings enabled by the IP. Factors considered include exclusivity scope, competitive substitutes, complementary assets needed, and technology lifespan. Standardized valuation models remain elusive given IP uniqueness and market opacity.

Hybrid valuation approaches are often employed integrating multiple techniques (Reilly & Schweihs, 1999). Adjustments account for differentiation factors like brand strength, jurisdictional coverage, and technological relevance. IP valuation relies on specialized expertise across law, technology, and finance (Parr & Sullivan, 1996). Challenges include information asymmetries, difficulties predicting disruption risks, and intangible knowledge boundaries. Periodic revaluation over the IP asset lifecycle is advised to reflect evolving market conditions (Smith & Par, 2004). Overall, rigorous IP pricing requires both quantitative assessment and qualitative appraisal of competitive value contribution.

Key IP valuation methodologies include cost-based, market-based, and income-based approaches (Razgaitis, 2014). Cost techniques value the invested R&D, regulatory approval, legal protection, and commercialization expenses. The replacement cost method considers recreation costs. Market methods analyze pricing norms from prior comparable transactions. Transactional data limitations often constrain market-based techniques (Reilly & Schweihs, 1999). Income approaches like discounted cash flow model the present value of projected licensing or royalty income, discounted by risk.

Each approach has advantages and limitations. Cost methods capture innovation investments but not competitive market value (Parr & Sullivan, 1996). Market techniques depend on transaction transparency and comparability. Income models are sensitive to input assumptions but factor earning potentials. Hybrid best practices triangulate across multiple methods to derive supportable IP valuations, tailored to asset characteristics (Smith & Par, 2004). International accounting standards continue working to harmonize IP valuation guidance across jurisdictions.

The optimal IP valuation approach depends on asset type characteristics. For patents, income models are commonly used given the exclusionary rights conferred (Razgaitis, 2014). Trademarks lean toward market methods analyzing brand premiums. Copyrights utilize both market pricing data and discounted cash flow analysis tailored to duration. Trade secret valuation focuses on competitive advantage and replication difficulty (Reilly & Schweihs, 1999). For early-stage inventions with high uncertainties, real options analysis may supplement DCF analysis to capture commercialization probabilities.

Across IP classes, cost-based methods often serve as a baseline reference point anchored to historic R&D outlays. Market models provide external validation but require transparency into licensing deal terms (Parr & Sullivan, 1996). Income techniques are frequent for patents and copyrights

less prone to obsolescence risks. Overall, integrating multiple approaches compensates for limitations of individual methodologies and provides holistic IP valuation perspectives (Smith & Par, 2004).

Valuing early-stage IP involves additional uncertainties regarding legal strength, technological viability, competitive threats, and commercialization costs (Reilly & Schweihs, 1999). Startup IP valuation relies more on cost-based methods given limited market data, using proxies like founder credentials and patent metrics (Razgaitis, 2014). Staged investment models help value options to abandon projects if milestones are unmet. Distressed IP assets require deep due diligence on causes, with adjustments for litigation liabilities and competitive threats (Parr & Sullivan, 1996).

For early-stage inventions, real options analysis helps capture continuation probability distributions. Scenario modelling also aids valuation under uncertainty. Overall, early and distressed IP valuation relies more on qualitative assessment of technology and team potential. Investors accept greater ambiguity and liquidity risks to secure exclusive access to promising inventions.

Capitalizing internally generated IP like patents, brands, and software on corporate balance sheets requires distinguishing R&D investments from capitalisable assets under accounting standards. Only IP providing probable future economic benefits and legal exclusivity is capitalized, usually later stage development (Smith & Par, 2004). R&D outlays expensed may serve as cost input to subsequent IP valuation once technical feasibility is demonstrable. Impairment testing over asset lives ensures carrying values reflect competitive viability.

Amortization profiles rely on analysis of revenue contribution longevity and obsolescence risk patterns (Razgaitis, 2014). IP contributed to joint ventures or spun off into subsidiaries requires allocation of cost basis and tax implications. Reporting disclosures inform investors on IP development expenditures and asset fair values (Reilly & Schweihs, 1999). Overall, rigorous IP accounting policies govern financial statement representations of innovation-related intangible investments and assets.

IP pricing has several strategic dimensions beyond pure valuation, including establishing competitive barriers, signaling value to investors, defending market share, and maximizing return horizons (Smith & Par, 2004). Higher prices can signal quality but may discourage adoption. Lower prices increase affordability but can undermine perceived value. Penetration pricing helps establish standards dominance. Price bundling enables product integration plays. IP pricing integrates with broader platform monetization models (Parr & Sullivan, 1996).

Pricing also depends on internal commercialization versus external licensing strategies. Outbound IP licensing prices may aim to discourage competitive use. Inbound IP purchase prices consider integration urgency and architectural control needs. Tax optimization, regulatory constraints, and competitor responses also impact pricing tactics (Reilly & Schweihs, 1999). Overall, IP pricing balances value-based methods against strategic market positioning, ecosystem development, and competitive signaling objectives.

Pricing trade secrets and proprietary know-how presents difficulties given the lack of legal exclusivity protections and greater secrecy desired (Razgaitis, 2014). Valuation relies more on specialized cost analysis and competitive advantage differentials (Parr & Sullivan, 1996). The value derives from information asymmetry against competitors. However, quantifying advantage margins and duration is challenging. Knowledge rapidly diffuses absent secrecy measures. Pricing aims to incentivize confidentiality while minimizing external perceptions of high intrinsic value.

Bundling know-how with exclusionary IP helps modularize pricing. Licensing know-how through services partnerships can increase transparency control (Smith & Par, 2004). Due to higher misappropriation risks, know-how may warrant pricing premiums over codified intellectual property. Audit rights, two-way disclosures, and partial upfront payments help balance trade secret pricing risks between exchangers.

IP valuation expertise continues advancing in sophistication given growth in intangible asset investments (Reilly & Schweihs, 1999). Major IP consultancies like Ocean Tomo, Charles River Associates, 284 Partners and values firms like Houlihan Lokey provide valuation services, with increasing financial engineering support. Database tools like ktMine and IPwe provide transactional data analytics for benchmarking. Still, variations persist across firms in methodology rigor. Regulatory bodies are working to increase valuation standards consistency, such as SFAS 157 in the U.S. (Razgaitis, 2014).

Valuation practices continue evolving from crude rules of thumb toward analytics-driven models integrating legal, technology and finance indicators of competitive value contribution (Parr & Sullivan, 1996). However, quantitative assessment requires balancing against expert qualitative appraisal of unique IP assets. Overall, the IP valuation field is professionalizing but remains a blend of art and science.

Efficient IP pricing can accelerate commercialization by enabling equitable value sharing between innovators and implementers (Smith & Par, 2004). Underpricing may award excessive profits solely to licensees.

Overpricing curtails adoption incentives. Optimal pricing expands innovation diffusion by balancing return horizons. Transparent market-informed pricing also lowers licensing coordination costs that can deter IP exchanges.

Standardized pricing models and practices reduce information gaps between IP creators and commercializers that generate misaligned value expectations (Razgaitis, 2014). More accurate valuation helps independent inventors demonstrate economic merits to investors and potential licensees. Overall, efficient pricing provides incentives for specialization between innovation development and commercial-scale implementation (Reilly & Schweihs, 1999). However, pricing optimization should focus on maximizing welfare, not just private returns.

IP pricing decisions raise several ethical considerations, including transparency, conflicts of interest, pricing power abuses, and fairness standards (Parr & Sullivan, 1996). Opaque pricing through secret negotiations may conceal anticompetitive collusion or unfair terms. Service provider independence must be assessed when relying on advisors. Dominant firms should restraint from exploitative pricing enabled by market power. Pricing should aim to sustain innovation incentives without creating excessive deadweight loss for society.

IP holders have ethical duties to balance value capture against promotion of cumulative innovation and broadest access (Smith & Par, 2004). Reasonable pricing enables follow-on improvements, whereas overpricing stifles downstream innovations. IP valuation professionals should proactively address pricing ethics, given information and power asymmetries involved (Razgaitis, 2014). Overall, IP pricing warrants heightened corporate social responsibility given its innovation impact. Shared IP pricing standards may better align commercial incentives with societal welfare interests.

3. *Valuation of intellectual property*

Valuation models for intellectual property rights can be divided into two broad groups: valuation models in the context of buyng and selling transactions; valutation models in the financial statements.

Key methodologies for valuing intangible IP assets include cost-based, market-based, and income approaches (Smith & Par, 2004). Cost

techniques consider R&D expenditures and replication costs. Market methods analyze pricing norms from comparable transactions and licensing deals. Income models project future cash flows or cost savings enabled by the IP, discounted to present value (Reilly & Schweihs, 1999). Additional qualitative factors are also examined, like competitive dynamics, legal protections, asset complementarity, and obsolescence risks. However, IP valuation remains more complex than physical assets given intangibility and lack of standardized benchmarks.

Hybrid models integrating multiple quantitative and qualitative techniques are often employed to triangulate value ranges (Parr & Sullivan, 1996). Periodic revaluation is advised over the IP lifetime as commercial viability and legal protections shift. Specialized expertise across technology, law, and finance is crucial for rigorous IP valuation. Despite advances, IP value assessment retains elements of art as well as science due to asset uniqueness and market evolution (Razgaitis, 2014).

Core IP valuation methodologies include discounted cash flow (DCF) analysis, relief from royalty models, comparable market transactions, and cost-based approaches. DCF techniques project licensing or cost savings income streams enabled by the IP, discounted by risk to determine fair value. Relief from royalty methods derive value based on hypothetical royalty payments avoided by owning the IP. Market transaction analysis examines pricing norms from prior deals for comparable assets. Cost approaches quantify R&D and recreation costs invested in developing the IP.

Each methodology has advantages and limitations. DCF models factor earning potentials but rely on uncertain forecasts (Smith & Par, 2004). Market techniques depend on transaction transparency. Royalty relief methods still require selecting appropriate hypothetical rates. Cost is grounded in historic development outlays but not future value (Reilly & Schweihs, 1999). Integrating multiple complementary techniques provides greater analytical rigor given intangible information uncertainties inherent in IP assets.

The optimal valuation approach depends partly on the IP asset class. For patents, DCF is commonly used given the exclusionary income rights conferred (Parr & Sullivan, 1996). Trademarks emphasize market pricing methods analyzing brand premiums. Copyrights employ both DCF projections tailored to duration and market comparables. Trade secrets focus on cost analysis and competitive advantage differentials. Early-stage IP relies more on qualitative potential assessments rather than quantitative extrapolation (Razgaitis, 2014).

However, all methods can provide useful perspectives (Reilly & Schweihs, 1999). Integrated approaches are advised to address intangible information gaps and method limitations around uniqueness and uncertainty. Ongoing revaluation is key as assets progress across technology and commercialization maturity curve stages.

In addition to core quantitative methods, IP valuation requires analyzing specialized qualitative factors like exclusivity strength, competitive substitutes, complementary assets, synergies, strategic value-drivers, and obsolescence risks (Smith & Par, 2004). Exclusivity scope across jurisdictions, durations, and enforceability affects value. Lack of close substitutes increases market power. Control over complementary assets needed for commercialization shapes prospects. Potential synergies with acquirer's existing portfolios factor into strategic pricing (Parr & Sullivan, 1996). Rate of technology turnover and follow-on innovation dynamics impact value sustainability.

Key accounting issues in capitalizing and amortizing IP assets on corporate balance sheets include meeting definitional criteria, valuation methodologies, amortization profiles, and impairment testing (Reilly & Schweihs, 1999). Internally developed IP must demonstrate future economic benefit potential beyond routine R&D activities to qualify for capitalization (Razgaitis, 2014). Amortization schedules over limited legal or useful lives are based on cash flow contribution analyses. Regular impairment testing ensures carrying values reflect evolving commercial prospects, with write-downs as warranted.

Capitalization and amortization policies significantly impact reported earnings and book values (Smith & Par, 2004). Note disclosures provide details on IP asset valuation methodologies, lives, and current year amortization expenses. During mergers and acquisitions, IP is valued and reassigned between entities triggering tax allocations. Overall, rigorous policies for IP accounting valuation, capitalization, amortization, and impairment are crucial for accurate financial reporting and analysis.

IP valuation incorporates strategic dimensions beyond pure financial modeling, including establishing competitive advantage, attracting investment, defending market share, integrating external innovations, and maximizing return timeframes (Parr & Sullivan, 1996). Higher valuations may deter competitive use but also limit licensing revenue. Lower valuations increase adoption but forgo income. Tax minimization, regulatory constraints, and competitive signaling also factor into IP pricing tactics (Smith & Par, 2004).

Ownership rights allocation is key for joint IP development. Pricing

structures may bundle IP access into broader platform monetization strategies (Razgaitis, 2014). Outbound licensing prices and inbound purchase offers consider commercialization time urgency and architecture control needs. Overall, IP valuation balances quantitative analytics against strategic market positioning, ecosystem development, and competitive signaling goals.

Early-stage IP valuation presents greater challenges given limited legal protections, prototypes rather than commercial products, and lack of market testing (Reilly & Schweihs, 1999). Startup IP relies more on qualitative assessments of inventor expertise, technological edge, and addressable market potential. Valuation stages as project milestones are met. Distressed IP valuation requires deep diligence into causes, with steep discounts for legal vulnerabilities or competitive threats (Smith & Par, 2004).

Advanced modelling techniques help address uncertainty, including decision-tree analysis, real options, and milestones-based staging. Willingness-to-pay interviews gauge stakeholder value perceptions (Parr & Sullivan, 1996). Overall, early and distressed IP valuation depends more heavily on expert qualitative judgments of team potential, competitive differentiators, and commercialization trajectories. Investors accept greater ambiguity and liquidity risks to secure proprietary access.

IP valuation expertise is deepening as dedicated specialty emerging beyond general accounting, legal, and technology appraisal skills (Razgaitis, 2014). International accounting standards continue aligning IP valuation guidance, such as IFRS 13 Fair Value Measurement. Trade associations like the Licensing Executives Society provide valuation training and certifications. Major IP valuation consulting firms include 284 Partners, Charles River Associates, and Ocean Tomo. Database tools like RoyaltyRange and ktMine help benchmark comparable transactions.

However, variations persist in methodology sophistication and reporting transparency (Reilly & Schweihs, 1999). Movements toward common standards balance prescriptiveness against the need for expert judgment flexibility given IP uniqueness. Valuation accuracy hinges on multidisciplinary integration of financial, legal, technological, and strategic commercialization insights tailored to each asset's specialized profile and context (Smith & Par, 2004). Ongoing IP revaluation is advised over asset lifecycles rather than one-time appraisal at origination.

More accurate IP valuation can improve innovation investment and transaction efficiency by enabling value-based pricing and exchange (Parr & Sullivan, 1996). Underpricing may deter R&D investment whereas

overpricing can inhibit licensing adoption. Optimized pricing expands access and commercialization while sustaining innovation incentives for creators (Razgaitis, 2014). Efficient valuation provides benchmarks to negotiate equitable licensing terms and IP sale prices. It quantifies royalty rates that balance returns for upstream R&D against downstream productivity gains.

Standardized valuation practices reduce information and power asymmetries between transacting parties that can cause misaligned expectations (Reilly & Schweihs, 1999). Reasonable IP pricing allows independent inventors to better demonstrate economic potential to investors and licensees. Overall, efficient IP valuation provides key infrastructure for effectively functioning markets that spread the fruits of innovation.

IP valuation raises ethical considerations regarding transparency, conflicts of interest, pricing power exploitation, and fairness standards (Smith & Par, 2004). Intellectual property ethics aspires to ensure that the rights of creators, owners and users of intellectual property are protected and balanced. Opaque valuation practices enable hidden distortions and anticompetitive abuses. Advisor independence must be ensured when relying on their expertise. Dominant firms must restrain from exploitative pricing enabled by temporary monopolies. Stakeholder value distribution beyond shareholders factors into sustainability considerations (Parr & Sullivan, 1996).

However, IP generators also deserve fair returns on risky R&D outlays. Pricing structures should balance incentives for innovation against maximizing access and cumulative improvement (Razgaitis, 2014). IP valuators have ethical duties to proactively address pricing distortions, given embedded information and influence asymmetries. Overall, the long-term impacts of IP valuation merits heightened corporate social responsibility.

4. *Taxation of transactions with intellectual property objects*

IP transactions face complex taxation issues across income, withholding, capital gains, and value-added taxes (OECD, 2020). Licensing triggers royalty income tax obligations for the IP holder, and potentially technology service taxes for licensees (Ernst & Young, 2019). IP sales may incur capital gains taxes. Withholding taxes often apply for cross-border transactions. Characterization as a license versus sale has major tax implications

(PwC, 2016). Local IP holding structures and tax treaties aim to optimize taxation. Overall, multinational IP commercialization requires navigating international and country-specific tax rules. As regards an international transfer of international property rights, i.e. when the transferor and the transferee are located in two different countries, the various international organizations, including the OECD, have intervened to develop corrective strategies for phenomena that are a source of dangerous distortions competitive as well as illegitimate practices. More specifically, intellectual property rights in the international context are characterized by the presence of two subjects, both fiscally resident in different states, with the consequence that at least two are involved in this operation different tax systems. This problem, however, can be mitigated when a Convention exists between the States involved, or when both States belong to a supranational system. For example, the OECD has established the general rule of taxation of royalties only in the state of residence of the actual beneficiary. This provision can be partially derogated from the provisions of international treaties against double taxation concluded by national systems.

Tax obligations shape commercial decisions regarding internal development, acquisitions, licensing, and transfer pricing (KPMG, 2017). Deductions for R&D and IP amortization provide incentives for innovation investments. IP-rich multinationals face controversies over profit shifting to low-tax jurisdictions. Global tax coordination difficulties enable tax avoidance. Stakeholders debate how to balance taxation rights between source and residence countries (Avi-Yonah & Xu, 2018). Overall, IP-related taxation considerations significantly influence behavior of corporations, investors, and governments.

Distinguishing licensing versus sale transactions has major tax implications (UN, 2017). Licenses generate service income taxable where work is performed. Sales may trigger capital gains and transfer taxes. Withholding taxes often differ. Permanent IP transfers with unrestricted rights are more likely to be deemed sales (Ernst & Young, 2019). Rights restrictions like exclusivity, geography, and duration indicate licensing. However, such delineation can be ambiguous where rights are split across multiple parties or evolve over time.

Tax authorities scrutinize subtleties suggesting de facto sales like perpetual durations, lump-sum payments, and IP control transfers (OECD, 2020). Historic abuses led to crackdowns on "license box" schemes enabling disguised sales (PwC, 2016). Overall, multinationals engineer complex IP transaction structures targeting favorable tax characterization: it is necessary to start from the tax analysis of the business choices inherent

in the management of intellectual property and understand how to review the taxation of the royalties (Greggi, 2010).

Key types of taxes arising in IP transactions include withholding taxes, capital gains, and VAT (Ernst & Young, 2019). Withholding taxes apply to cross-border royalty and licensing fees. Capital gains taxes apply to IP sales and transfers between affiliates. VAT is often charged on licensing transactions. R&D cost deductions and IP amortization provide tax incentives for innovation investment (OECD, 2020).

Complexities arise in withholding tax treaty eligibility and rates (KPMG, 2017). Capital gains can be deferred through holding company structures. VAT application depends on local services regulations. Overall, IP transactions require navigating an array of international and country-specific tax rules (PwC, 2016). Tax authorities look to limit abusive tax avoidance while still facilitating fair commerce. Further coordination efforts may be warranted to simplify compliance burdens.

IP transactions spanning multiple countries face added tax complexities (UN, 2017). Withholding tax applicability and rates depend on each country pair's treaty agreements. Characterization as licensing versus sales may differ across jurisdictions. Some countries tax IP sale gains where developed, others where sold (Ernst & Young, 2019). Transfer pricing manipulation among affiliates sparks controversies. Rates and deductions vary across locations, enabling tax minimization via structure choices.

Navigating inconsistent global tax systems imposes high compliance costs, uncertainty risks, and administrative burdens for multinational IP commerce (OECD, 2020). However, unilateral measures to combat tax avoidance spur double taxation disputes without international coordination. Efforts toward multilateral frameworks balance prevent abuses while facilitating legitimate activity (Avi-Yonah & Xu, 2018). Overall, sustainable solutions require aligning incentives and cooperation across source, residence, and conduit countries.

Companies utilize various IP holding structures and transaction tactics to minimize taxes (KPMG, 2017). Strategies include shifting ownership to low-tax jurisdictions, intercompany licensing, and hybrid mismatch arrangements (PwC, 2016). Maximizing deductions for R&D and amortization accelerates tax savings. Offshore IP havens with beneficial regimes attract profit shifting. Routeing transactions through conduit entities exploits treaty networks.

However, these practices spur tax base disputes between countries (OECD, 2020). Anti-avoidance rules combat specific schemes like the

"Dutch sandwich" (UN, 2017). Minimum taxes, patent boxes, and formula apportionment have been proposed to curb optimization (Avi-Yonah & Xu, 2018). Overall, complex IP transactions enable sophisticated tax planning but require thoughtfulness to balance incentives and equitable allocation across stakeholders.

Multinationals transferring IP ownership and shifting profits to low-tax affiliates spur tax controversies (Ernst & Young, 2019). Strategies include parking IP in havens while deducting R&D elsewhere, and complex transfer pricing to concentrate gains intercompany (OECD, 2020). These shell structures erode country tax bases (UN, 2017). However, firms assert rights to minimize costs. Determining arm's length pricing is inherently subjective for unique IP.

Critics argue tax avoidance reach problematic levels without international coordination (Avi-Yonah & Xu, 2018). However, unilateral measures like digital taxes prompt double-tax disputes and trade tensions (KPMG, 2017). Fundamental reforms like formulary apportionment face implementation hurdles. Overhaul requires balancing revenue needs, commerce facilitation, and competitive impacts (PwC, 2016). But progress is gradual against inertia. Thoughtful multilateral efforts can help align incentives for long-term cooperation.

Various measures have been proposed to reform global taxation of IP transactions (OECD, 2020). Suggestions include shifting to unitary taxation, destination-based income apportionment, minimum taxes, toughening transfer pricing rules, and expanded tax treaties (UN, 2017). Patent boxes, local R&D incentives, and IP legal reforms also aim to balance competition for assets (Ernst & Young, 2019). However, fundamental changes face adoption obstacles, given required international coordination. Unilateral measures prompt double taxation disputes.

Nearer-term improvements center on transparency and anti-avoidance practices (Avi-Yonah & Xu, 2018). Common reporting standards illuminate shell schemes (KPMG, 2017). Withholding taxes deter excessive royalty deductions. Scope limitations curb regime shopping. Tax incentives should reward genuine skills, not just passive asset ownership (PwC, 2016). Overall, thoughtful multilateral efforts can enhance cooperation, align incentives across countries, and balance benefits with effectiveness.

Sophisticated multinationals employ various evolving practices to minimize global tax obligations on IP income (OECD, 2020). Major trends include shifting IP to low-tax havens, leveraging deductions and preferential regimes, intricate transfer pricing, treaty shopping, and hybrid

mismatches to create stateless income (UN, 2017). Aggressive use of tax rulings and patent boxes expand incentives exploitation. Firms assert obligations to shareholders to optimize costs.

However, these practices impose lost tax revenues for countries (Ernst & Young, 2019). Anti-avoidance regulations struggle to keep pace as structures rapidly innovate (Avi-Yonah & Xu, 2018). Reform trajectories balance prescription against flexibility given business model diversity (KPMG, 2017). But greater transparency and cooperation help illuminate distortions and realign incentives (PwC, 2016). Overall, sustainable win-wins require recognizing legitimacy behind differing stakeholder motivations and crafting mutual benefits.

Taxation frameworks aim to balance multiple principles, including revenue sufficiency, reflection of activity scope, non-distortion of decisions, feasibility, and fair international allocation (OECD, 2020). Tensions persist between source countries where IP is created or used, residence jurisdictions of controlling companies, and conduit locations in between (UN, 2017). Formulary approaches based on factors like sales and assets split taxes across relevant countries. Minimum taxes deter shifting. Local R&D incentives reward innovation directly (Ernst & Young, 2019).

Determining equitable allocation is complex given IP uniqueness and ownership separability from activity (Avi-Yonah & Xu, 2018). Phase-in periods enable adjustment. Regular reviews accommodate evolving business models (KPMG, 2017). Dispute resolution procedures curb double taxation. Ultimately, sustainable solutions come through international agreements reflecting shared interests and closing loopholes (PwC, 2016).

Optimal tax policy balances multiple aims, including revenue generation, legal enforcement, economic efficiency, and international cooperation (OECD, 2020). Moderate rates deter avoidance while funding public services. Collection feasibility and compliance costs factor into design. Neutrality across decisions and country jurisdictions aims to avoid distortions unless intentional. Treaties expand agreement on norms (UN, 2017). Transition plans enable adaptation, given reform disruption risks.

Regular reviews maintain alignment with evolving business and technology landscapes (Ernst & Young, 2019). Transparency and data exchange combat tax haven abuses. Customized IP incentives require ongoing impact evaluation to reward genuine contributions (KPMG, 2017). Ultimately, collective action through institutions like the OECD and G20 helps align country interests (Avi-Yonah & Xu, 2018). Overall, balanced tax policy entails managing trade-offs for sustainable innovation, investment, and economic progress.

5. *Investments in digital assets*

Several key factors are driving increased investment interest in intellectual property and digital assets, including new revenue opportunities, portfolio diversification, embedded option value, and changing risk-reward profiles. The rise of knowledge economies is generating growing income streams from intangible assets relative to physical capital. Digital technologies are expanding monetization pathways via licensing, securitization, and exchange platforms (Watkins, 2019). Cryptographic uniqueness and network effects create speculative upside for digital tokens and NFTs (Kaal & Dell'Erba, 2017). Portability and divisibility of IP assets offer diversification benefits for investors and asset managers.

Overall, the shifting basis of value creation toward innovation is transforming perspectives on digital IP as an emerging investable asset class with attractive cash flow and capital gain prospects. However, appropriate diligence remains necessary to assess underlying legal protections, competitive risks, team capabilities, and addressable market size. Thoughtful investor stewardship can strengthen IP asset value and commercialization success.

Each model offers differentiated risk-return profiles, capital structures, and liquidity timeframes. Start-ups and private equity allow earlier access to high-potential IP, but with locked up capital and high failure rates. Public IP securities and tokens offer greater liquidity at later stages once commercial viability is proven (Watkins, 2019). Overall, prudent portfolio allocation across the IP investment spectrum can help investors manage risk-reward trade-offs.

Thorough investor diligence is crucial when evaluating digital asset investments, including assessing legal protections, competitive moats, team capabilities, addressable markets, technical architecture, tokenomics, and community traction. Key questions include patentability for core IP, trademark strength, copyright coverage, and trade secret controls. The scope, quality, and defensibility of rights require analysis. Engineering team skills gauge technical execution capacity. Token distribution schedules, consensus mechanisms, governance terms, and interoperability should be examined for crypto investments (Kaal & Dell'Erba, 2017).

Due diligence provides the basis for value-added investor stewardship through risk mitigation, strategic advice, financing assistance, and network access. Overall, rigorous diligence and active involvement enable investors to enhance the productivity of innovation-centric digital asset classes.

Key risks requiring consideration for investments in digital IP assets include infringement litigation, technological obsolescence, employee departures, duplication by competitors, and changing legal landscapes. Infringement claims can impose major liabilities, legal costs, and injunctions. Disruptive innovations can rapidly devalue existing IP. Regulatory shifts regarding issues like interoperability, APIs, and data access impact monetization models (Kaal & Dell'Erba, 2017).

Ongoing monitoring, litigation support, team incentives, defensive patenting, and lobbying help investors manage these risks (Watkins, 2019). Diversification across technology vintages provides obsolescence hedging. Overall, digital IP investments warrant active risk identification and mitigation to protect asset value, given rapid change pace. But managed well, taking calculated risks also provides upside exposure.

Accounting for cryptocurrencies, digital tokens, NFTs, and contingent IP assets involves complex challenges, given intangibility, valuation variability, ownership fragmentation, and rights contingency. Capitalization, revenue recognition, depreciation policies, and disclosures require tailored approaches. Mixing of consumption utility and investment value creates tax complexities. Custody proof and cybersecurity also present operational risks (Kaal & Dell'Erba, 2017).

International accounting standards continue developing guidance for these emerging digital assets. Overall, transparent assumptions, supplemental metrics, and qualitative disclosures provide necessary context for investors trying to analyze opaque digital asset accounting.

IP and digital assets can be held through various investment structures, each with relative advantages. Private equity allows access to early-stage inventions with high upside potential. Public markets increase liquidity at later stages but may bias short-term performance. Joint ventures enable co-development and spin-out of IP. Venture capital and angel investors specialize in emerging technology deal sourcing and execution. Cryptocurrency hedge funds apply quantitative portfolio techniques. Exchange-traded funds lower access barriers for mainstream investors.

Ideal structures depend on asset characteristics, commercialization status, and desired investor rights. Diversified approaches balance return profiles over different time horizons and risk appetites. Ongoing analysis of structure efficacies and frictions provides useful insights to enhance functioning of the digital asset investment ecosystem (Watkins, 2019). Overall, the optimal investment architecture maximizes value for underlying IP assets while efficiently meeting return requirements.

Certain digital asset classes like cryptocurrencies, utility tokens, and NFT collectibles entail significant speculative risks despite novel technological foundations. Trading often far exceeds use for functional purposes like transaction settlement or access privileges (Kaal & Dell'Erba, 2017). Valuations are highly volatile given uncertainty over sustainable demand and inherent scarcity. Informational efficiency is constrained until institutional investor participation deepens. Irrational exuberance and fraud risks exist during hype cycles.

However, speculative bubbles historically occur with the emergence of transformative technologies before maturing. Risk-aware portfolio allocation helps manage cyclical fluctuations. Sustained engineering progress and commercial adoption justify long-term investment alongside short-term trading. Overall, skepticism and diligence help separate digital speculation from fundamental venture value creation (Watkins, 2019). Beliefs should be stress-tested and balanced with market evidence.

Ideas for appropriately regulating digital asset investments balance investor protection, innovation facilitation, risk monitoring, and industry cohesion. Suggested measures include clear trading rules, disclosures on engineering stability, systemic risk analyses, conflict of interest policies, custody protections, incentive alignment, interoperability encouragement, and dispute resolution. Sandbox mechanisms allow controlled experimentation to guide frameworks. The pace of change necessitates flexible principles-based oversight.

Industry collaboration is essential to establish responsible norms and technical infrastructure (Kaal & Dell'Erba, 2017). Investor education furthers understanding of digital asset complexities. However, excessive prescription risks constraining beneficial evolution. Overall, thoughtful regulation can foster trust and progress but requires cooperation between policymakers and practitioners to craft tailored solutions (Watkins, 2019). Trial-and-error with regular adaptation will govern the digital asset ecosystem.

Digital asset investment patterns vary significantly across technology and IP sectors based on innovation cycles, asset characteristics, and monetization models. For example, biotech involves lengthy R&D so favors private equity at early stages. Hardware requires large fixed facilities, attracting venture capital and project finance partners. Blockchain depends on network effects for value, so public exchanges and promotion foster adoption (Kaal & Dell'Erba, 2017). Media/entertainment IP relies more on royalties and licensing. Analysis of investment activity and structure

preferences provides insights into the commercial viability pathways for different IP verticals.

Maximizing the social utility of digital assets, not just private profits, represents an important ethical responsibility for investors in this field. Diligence should assess whether projects offer true innovation advancement versus speculative activity without real economic contributions. Investor stewardship can guide projects to ethical practices and positive external impacts, given significant influence. Supporting open standards and interoperability prevents excessive privatization of knowledge that can hinder cumulative innovation (Kaal & Dell'Erba, 2017).

Conclusions for Chapter IX

This extensive analysis of intellectual property markets, pricing, valuation, taxation, and digital asset investments reveals a complex ecosystem undergoing rapid evolution. Advanced technologies are enabling more efficient IP trading, financialization, and monetization while also disrupting competitive dynamics. Innovative firms are exploring new boundary-pushing models like patent pools, NFTs, and decentralization. However, risks from speculation, opacity, and inequality continue mounting. Sustainable progress requires balancing interests across creators, investors, competitors, and the greater public.

Several overarching insights emerge from assessing developments across these interrelated IP domains. First, reducing information gaps and transaction costs through online exchanges, data analytics, and smart contracts can significantly improve price discovery, market efficiency, and investment matching. Lower barriers expand access and funding for upstart ideas. But risks from speculation and patent assertion entities also increase, necessitating oversight. Second, advanced valuation techniques integrating legal, technological, and financial analysis provide a foundation for efficient markets. However, methodological consistency and transparency remain works in progress given IP uniqueness. Third, complex international tax minimization practices by multinationals highlight needs for coordination and anti-abuse measures. Thoughtful reforms can help align incentives across countries. Fourth, surging interest in trading IP assets, tokenized offerings, and NFTs reflects their hybrid utility, investment value, and scarcity novelty. But investor diligence and balanced regulation are

imperative given elevated volatility.

Looking holistically, well-functioning IP systems require aligning incentives across creators, investors, competitors, intermediaries, governments, and society. Purely proprietary models risk over-enclosure and rent-seeking which stifle downstream innovation. But weak protections deter ex ante investments in new inventions. IP pricing should balance returns to pioneers against maximizing access and cumulative advancement. Tax policies should fund public knowledge inputs while preventing distortion-creating arbitrage. Investor stewardship in backing socially productive IP can guide ethical digital progress, not just capital accumulation. Overall, thoughtfully designed institutions, incentives, and safeguards provide foundations for IP systems to equitably serve innovation and opportunity for all.

Advanced technologies like blockchain, AI, VR, biotech, and clean energy will keep transforming competitive dynamics and knowledge-based value creation. Incumbents face growing threats from decentralized disruption. Startup ecosystems are proliferating globally. Established IP monetization models face crowding out by tokenization and micropayments. These accelerating changes make periodically reassessing the health and direction of IP systems essential. Regular reviews of pricing models, valuation methodologies, tax regimes, and investor diligence practices against evolving conditions can help maintain balance. Progress measures based on innovation indicators, access equality, knowledge diffusion, and quality of life impacts are vital complements to static IP filings statistics. Holistic reforms should further empower decentralized creativity and sharing while curtailing rent-seeking.

In conclusion, intellectual property systems sit at a crossroads today. Persistent flaws like patent thickets, excessive litigation, tax gaming, and inequality constraints risk hampering innovation and progress. But thoughtfully executed reforms to align incentives, enhance accountability, optimize access, and promote the greatest global good provide pathways to balance interests. The possibilities of blockchain, open source, and collaborative innovation illustrate the power of equitable knowledge sharing. By pursuing transcendent inclusive ideals that lift up humanity collectively through innovation, digital IP systems can progress from today's tensions into an era of creativity for all.

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CHAPTER X

GLOBAL MANAGEMENT OF INTELLECTUAL PROPERTY ON THE INTERNET

Summary: 1. International Digital Rights Management Institutes – 2. Global problems of ensuring intellectual rights on the Internet – 3. Models for regulating intellectual property on the Internet – 4. International cooperation in the field of intellectual propertys – 5. The future of the intellectual property system in global networks – Conclusions for Chapter X – References.

1. *International Digital Rights Management Institutes*

Intellectual property (IP) frameworks have long operated via international coordination and rule-setting. The World Intellectual Property Organization (WIPO), a specialized agency of the United Nations, plays a central role in the global governance and harmonization of IP laws and policies. Headquartered in Geneva, WIPO currently has 193 member states that work cooperatively to develop international IP agreements and standards (WIPO, 2022).

WIPO's mission focuses on driving innovation and creativity for economic, social, and cultural development through a balanced international IP system. It provides services facilitating the protection of IP across borders and resolves disputes between private parties. WIPO also engages in analysis and capacity building while monitoring evolving technologies, business models, and IP needs globally. Its role spans normative rule-setting, registration and procedural administration, dispute resolution, enforcement assistance, and policy research and coordination.

Key WIPO activities include negotiating treaties to harmonize national IP laws. Major WIPO-administered treaties cover areas like copyright, trademarks, patents, designs, and geographical indications. WIPO also develops non-binding recommendations, model laws, databases, and procedural frameworks countries can voluntarily adopt to modernize IP systems. It further administers 26 international registration systems to streamline cross-border IP filings and management (WIPO, 2022). Through training, monitoring, and partnerships, WIPO strengthens national institutions' abilities to implement IP systems meeting international standards.

Beyond formal treaties, organizations like WIPO develop model laws,

regulatory templates, and procedures countries can customize in reforming national IP rules. These non-binding tools provide guidelines adapting international standards to localized contexts (Yu, 2017).

For example, WIPO's model laws outline provisions conforming with its treaty obligations on copyright, trademarks, and other IP issues. Countries like Vietnam have adapted these to develop comprehensive domestic frameworks. WIPO further cooperates with national governments in reviewing IP legislation for consistency with international laws. Such technical assistance is vital for developing countries with limited regulatory experience.

Procedural frameworks also ease IP protection across borders. WIPO's Madrid System for trademark registration and the Patent Cooperation Treaty (PCT) provide centralized application processes and simplified priority claims across multiple jurisdictions (WIPO, 2022). These systems reduce duplication and costs while increasing predictability for users.

International IP organizations additionally craft joint policy recommendations and declarations. The WIPO Development Agenda in 2007 outlined reform priorities balancing protection with public interests like access to knowledge. Ongoing agenda projects improve data analysis, institutional capacity, and IP flexibilities in developing countries (Deere, 2009).

Digital rights management (DRM) controls access to and usage of digital content and devices to prevent piracy. It remains controversial given its potential to undermine copyright exceptions like fair use. WIPO engages in extensive work around managing IP in the digital environment through its DRM initiative (WIPO, 2015).

Key efforts include commissioning expert reviews of DRM's legal implications across jurisdictions. These examine issues like circumventing DRM protections, managing rights information, and licensing terms' interplay with existing copyright limitations. WIPO also analyzes technological trends and standards in DRM systems used by platforms like iTunes (Yu, 2017).

However, civil society groups have argued WIPO's DRM agenda excessively favors proprietary interests over user rights (Giblin, 2011). Its anti-circumvention provisions could reduce access to public domain works. Critics further allege a lack of transparency and one-sided industry participation in WIPO's DRM activities. But WIPO contends its role remains neutral and aims to develop understanding among divergent interests. Ongoing efforts emphasize public education and balanced frameworks allowing reasonable personal uses.

Governing IP online involves reconciling territorial laws with the internet's global reach. International organizations highlight flexibilities within existing frameworks alongside updating national laws for the digital shift.

Approaches include employing IP exceptions permitting more uses like quotation or parody in user-generated content. Voluntary, negotiated guidelines also help adapt laws where significant reform is politically difficult. For instance, fair use principles may guide platforms' copyright enforcement algorithms or monetization policies. Similarly, coordinating voluntary notice-and-takedown procedures improves efficiency while deterring overzealous IP claims.

However, critiques argue guidelines lack accountability and leave interpretation to private actors (Quilter and Urban, 2006). International assistance improving judicial expertise and updating statutes can further adapt IP rules to internet realities. But conflicting national priorities hinder universal solutions. Ultimately, balanced frameworks involve strengthening enforcement tools while expanding user rights and limitations in the online environment.

Centralized databases and filing systems administered by international bodies ease registering and managing IP rights globally. WIPO's platforms allow simplified application, renewal, and record-keeping for patents, trademarks, designs, and domain names in multiple countries through a single portal.

For instance, the Madrid System for international trademark registration enables rights holders to protect marks across 120 jurisdictions by filing with WIPO (WIPO, 2022). This drastically reduces cumbersome direct national applications. WIPO's Patentscope database further compiles international patent documents, helping users identify prior art and rights information across boundaries.

Global Dossier provides a one-stop source consolidating applicants' patent prosecution histories from participating offices like the USPTO, EPO, and JPO. Subscribers and examiners can track real-time application status changes across authorities through the system (Suthersanen, 2019). Such platforms enhance transparency and access while rationalizing overlapping procedures across countries.

However, issues remain around national implementation and integration with existing registries. Developing countries also have more limited participation due to administrative costs. Steps like differential fee schedules attempt to improve accessibility and usage of international platforms. But fully realizing one-stop systems requires overcoming

persistent legal and technical integration challenges.

International coordination has achieved considerable progress in harmonizing national IP laws and procedures around common standards and classifications. Organizations' capacity building, monitoring, and dispute resolution efforts also strengthen compliant implementation. WIPO-administered treaties greatly advanced harmonization in areas like copyright, trademarks, and patents (Suthersanen, 2019). The TRIPS agreement obligated WTO members to provide minimum IP standards.

However, critics argue harmonization disproportionately serves developed countries' commercial interests over public welfare. Persisting legal and procedural divergences also impede users navigating varying rules across jurisdictions (Suthersanen, 2019). For instance, patent examination timeframes differ markedly between patent offices. Ongoing national discretion around exceptions and registration processes thus limits harmonization. Ultimately effective global coordination requires balancing improved certainty and rights protection with flexibility accommodating local contexts.

Developing countries face barriers to equitable participation in global IP debates from resource constraints and limited expertise. Reflecting these concerns, WIPO's Development Agenda sought reforms like strengthened technical assistance, impact analyses, and public interest representation (Deere, 2009). Subsequent capacity building initiatives attempted to increase developing countries' engagement in norm-setting and negotiations.

However, achieving consensus around reforms faces challenges. Policy priorities diverge between developing and developed members given differences in domestic IP industries. More powerful countries still dominate agenda-setting and exchanges through greater resources. Developing countries also struggle balancing participation costs with domestic needs. Lastly, commercial interests have captive influence in IP debates that broader public and user participation may only partially counteract (Matthews, 2011).

Evolving technologies, media shifts, and user practices are prompting re-examination of IP systems. International groups highlight emerging priorities like copyright in the online space, balancing IP with human rights obligations, and updating rules for artificial intelligence and synthetic media. In this regard, EU Directive 2019/790 constitutes a significant point of reference in the regulation of the relationship between copyright and online platforms, seeking a balance between the interests relating to digital content sharing platforms and those of the authors of the intellectual works.

For example, WIPO studies appropriate protections and obligations around AI-generated works lacking human authors (WIPO, 2020). It also explores integrating IP principles with agreements on biodiversity, climate, and plant genetic resources. Expanding public domain access mechanisms is another priority as constraints impede digital re-uses. At the same time, enforcement gaps around piracy and counterfeiting necessitate coordinated improvements and shared technical solutions.

International IP accords were traditionally limited to industrialized countries. But the WTO's TRIPS agreement dramatically expanded IP rules' global reach during the 1990s (Yu, 2017). Developing countries faced new obligations to implement standards protecting foreign IP and investments.

This triggered significant legal reforms modernizing domestic IP laws in emerging economies like China, India, and Brazil. Developing country WTO members increased minimum patent terms, added software protections, and strengthened enforcement mechanisms. Policy space to tailor IP for local needs correspondingly narrowed despite initial flexibilities, as bilateral and regional trade deals also mandated stricter rules.

These trends stirred controversy around impacts on prices, technology transfer, and access to knowledge. Critics argued strengthened IP disproportionately benefited advanced economies' rightsholders without spurring domestic innovation. However, developing countries still perceive integrating into global IP systems as vital for attracting trade and investment. Ongoing international trainings and procedural harmonization further embed standard IP models worldwide. But continuing disparities in innovative outputs highlight debates around one-size-fits-all IP norms.

Adapting IP governance to the online space involves balancing protection, access, and internet openness (Quilter and Urban, 2006). Emerging frameworks emphasize multi-stakeholder participation, human rights principles, and flexible exceptions alongside enforcement obligations.

Maintaining IP's incentives while enabling digital expressions necessitates accommodating new remix and sharing practices. Rights must also not unduly restrict technological innovation. Clearer limitations and liability exemptions protecting user interests are vital additions to enforcement mechanisms. Further devolving rulemaking and procedures to the local level where possible allows customizing IP to community needs and values.

Any reforms must also ensure marginalized groups can support, access, and contribute to knowledge goods. Simplified participatory processes giving users greater voice in policymaking helps safeguard a diversity of cultur-

al expressions. Overall, inclusive and transparent rethinking of IP can shape balanced frameworks fostering creativity in the global digital network.

2. *Global problems of ensuring intellectual rights on the Internet*

The internet's global and decentralized architecture poses unique difficulties for governing IP rights within traditional territorial frameworks. Enforcing rights online involves reconciling contradictions between IP's territoriality and the internet's borderless nature (Yu, 2017).

One key challenge is determining applicable jurisdiction and choice of law for online disputes spanning multiple countries. The location of infringing acts and parties is often unclear or divided across borders. For instance, unauthorized downloads via peer-to-peer networks traverse servers worldwide. It becomes difficult establishing definitive jurisdiction or connecting incidents to national laws. Conflicting jurisdictions also enable forum shopping for favorable rulings.

Anonymity online further obscures identifying and locating infringers, limiting enforcement. Technological measures like VPNs, spoofing, and encryption frustrate tracing users. Short-lived sites reappear rapidly under new names and locations. This reduces rights holders' abilities to pursue legal actions compared to the physical world.

Additionally, the scale and speed of piracy online exceeds conventional contexts. Digital reproductions are perfect copies, enabling rapid worldwide dissemination once leaked. Notice and takedown procedures struggle containing viral spread across platforms. Such dynamics necessitate rethinking traditional models of enforcement.

Four central issues complicate IP governance online:

- *Jurisdiction*: Internet communications traverse territorial bounds, creating conflicts over applicable laws and courts' authority in disputes. Localized determinations of infringement do not map cleanly to borderless networks.
- *Anonymity*: Identity concealment mechanisms frustrate attributing liability and sanctioning infringers. Technological anonymization reduces accountability relative to the physical world.
- *Piracy*: Digital reproductions' quality, scalability, and searchability massively increase risks of piracy. Enforcement struggles containing viral copying and distribution.
- *Cross-border disputes*: IP disputes increasingly involve acts, parties,

and effects spanning multiple countries with contradictory laws. Coordinating adjudication and remedies remains challenging. In this regard, it is recalled that a mediation center has been established at the EUIPO which offers free alternative resolution services for cross-border disputes in intellectual property matters.

Reconciling territorial IP with the internet's global architecture requires rethinking traditional jurisdictional assumptions, anonymity's implications, proportionality of sanctions, and mechanisms for resolving cross-border cases.

Global coordination around enforcing IP online has generated some convergence but remains hampered by national discretion and internet architecture. Successes include widely adopted notice and takedown procedures enabling rights holders to request removing infringing content. Voluntary arrangements between rights holders and platforms on utilizing filtering and geo-blocking technologies to limit piracy also emerged.

Anti-circumvention laws mandated by the WIPO internet treaties increased consistency in prohibiting DRM circumvention across countries. International agreements further compelled transitions from paper to electronic IP registries and centralized filing databases improving rights monitoring.

However, critics argue enforcement coordination excessively prioritizes rightsholder interests over public access and internet openness (Yu, 2017). Fragmented national laws still create uncertainties and jurisdictional forum shopping opportunities. Persisting cross-border enforcement gaps also undermine cooperation's efficacy. For instance, the EU's "right to be forgotten" conflicts with the US' near-absolute protections for platforms hosting third-party content. Ultimately effective deterrence requires reconciling competing visions of internet regulation internationally.

Domestic IP laws evolved within territorial constructs, generating multiple gaps governing online infringement spanning jurisdictions (Quilter and Urban, 2006):

- Unclear jurisdiction allows forum shopping among contradictory laws. National frameworks lack agreed principles on applicable rules and venues.
- Weak secondary liability fails to incentivize platforms and intermediaries to deter infringement. Safe harbors require updating for meaningful cooperation.
- Narrow territoriality prevents effective enforcement against foreign sites and extraterritorial acts. Rights face greater constraints than harms.
- Procedural obstacles like mutual recognition of judgments deter collective action against cross-border threats.

- Substantive gaps around new media types, adaptable limitations, and proportionality of sanctions all constrain enforcement.

Truly resolving such gaps requires comprehensive international treaties and model laws adapting IP to the online context. Unilateral domestic reforms inevitably face limits as infringing acts traverse borders. But conflicting national interests pose obstacles to meaningful multilateral modernization.

Examine role of non-state actors like online intermediaries in IP protection.

Online intermediaries and platforms play critical roles governing IP given their intermediation of infringing activities, resources, and influence over online environments.

Key roles encompass notice and takedown schemes where platforms remove infringing content upon rights holder requests. Voluntary arrangements also emerged around utilizing filtering and geoblocking to limit piracy. Search engines demote infringing sites in rankings while payment processors restrict financing.

Joint initiatives between intermediaries and industry like the US Copyright Alert System also aimed to educate and deter illegal file sharing. Critics however argue overzealous private enforcement risks stifling legitimate activity and speech.

Questions persist around intermediaries' responsibilities and liabilities for third party infringement online. Calls for intermediary safe harbor reforms contend stronger secondary liability would incentivize proactive cooperation with rights holders. However, risks remain of private censorship absent judicial oversight. Ultimately, balanced frameworks delineating clear obligations upon notice while limiting proactive surveillance may be needed.

A singular global IP system securing rights online faces substantial adoption and enforcement hurdles (Quilter and Urban, 2006). Nations retain sovereign authority over tailoring IP protections to domestic conditions. Varying levels of development generate conflicting priorities between strong IP rights and access flexibilities. Persisting North-South divisions hence impede universal harmonization.

Critics further argue unified IP protocols are infeasible and undesirable given internet architecture. P2P and encryption inherently enable user empowerment exceeding top-down control. The domain name system's governance via voluntary multistakeholder coordination also provides a competing decentralized model. Rather than coherent command-and-control, adaptable communication and transparency may better serve rights and access.

National discrepancies in IP rules and geo-blocking of content impose substantial burdens on internet users (Daniel Castro and Alan McQuinn, 2015). Those seeking lawful access face confused, contradictory frameworks across jurisdictions. Works freely available in one country may be restricted elsewhere absent transparent reasoning. Circumvention tools remain necessary but legally contested.

Studies also suggest geo-blocking reduces consumer welfare overall by limiting competition and choice. Market segmentation sustains international price discrimination while also enabling censorship and parochial cultural policies. Users are denied equitable participation in global digital networks and discourses.

However, large cultural and economic differences argue against wholly unified rules or content access models. But current fragmentation arguably goes beyond tailoring IP protections to domestic conditions. Expanding licensing portability and mutual recognition while limiting unjustified geo-blocking could improve consistency. Greater transparency and review around access restrictions are also needed to balance rights with user interests.

Strengthening global coordination is vital for addressing cross-border infringement enabled by internet connectivity. Proposed reforms include:

- New treaties standardizing enforcement jurisdiction, procedures, and remedies across borders.
- Stronger secondary liability in safe harbors to incentivize intermediary cooperation against overseas piracy.
- Bilateral/regional agreements between countries sharing priorities on combating infringement.
- Standard enforcement request procedures so platforms consistently respond across jurisdictions.
- Information sharing networks for watchlists, cybersecurity, and investigations against rogue sites.
- Joint technological solutions like digital fingerprint registries to identify pirated material.
- Capacity building and decentralization enabling localized enforcement grounded in communities.

However, risks remain around over-enforcement and internet fragmentation from regulatory disagreements. Ongoing North-South divisions may also undermine universal reforms. Ultimately effective cooperation requires balancing strong protections with proportionality, due process, and safeguarding internet openness.

National regulation of online IP predominantly emphasizes expanded

rights and enforcement mechanisms given legislative capture by media industries (Yu, 2017). This manifests in areas like extending copyright terms, heightening sanctions, mandating ISP cooperation, and prohibiting DRM circumvention.

However, counter-trends are also emerging to modernize IP for digital realities. Canada, Singapore, and other states introduced more flexible fair use regimes. Recent EU reforms require improving content portability and transparency around geo-blocking. Some states also strengthened intermediary liability shields to limit content filtering obligations.

Forging international consensus on IP online will require balancing sovereign authority over domestic rules with commitment to minimum harmonized global standards. Rather than blanket uniformity, adaptive frameworks allowing localized implementation may prove more feasible.

WTO-style reciprocal agreements predicated on achieving equivalent minimum protections could overcome entrenched cultural and economic differences hindering one-size-fits-all universalism. Trading enforcement and substantive commitments allows customizing application to national contexts.

Centralized coordination further risks undermining internet architecture's empowerment of users through decentralized innovation. Preserving freedoms necessitates limiting overzealous restrictions, filtering, and incursions on privacy. Integrating human rights principles helps safeguard balanced IP frameworks considering all stakeholder interests in the global digital ecosystem.

Ultimately, recognizing national discretion over domestic rules while progressively raising international minimums and protecting internet openness can enable gradual, consensus-based convergence.

3. *Models for regulating intellectual property on the Internet*

Adapting IP governance to the internet involves choosing between varying regulatory models, each carrying different implications for rights, access, and innovation (Quilter and Urban, 2006).

Centralized international frameworks seek to extend traditional norms through multilateral treaties committing states to standardized protections, procedures, and enforcement cooperation. Supporters argue coordinated universal rules best manage cross-border challenges.

Decentralized approaches emphasize national discretion in tailoring IP policies to domestic conditions. This recognizes local values and developmental differences. Enhanced mutual recognition also limits conflicts between diverse regimes.

Self-governance privileges private ordering by platforms, stakeholders, and users to devise context-specific rules through contractual terms, voluntary guidelines, and norms. This harnesses localized expertise and built-in enforcement. However, accountability and inclusion deficits persist.

Finally, multi-stakeholder models incorporate hybrid public-private coordination through transparent forums balancing competing interests. But achieving meaningful consensus remains difficult absent institutionalization.

Reconciling varying visions and implications is critical for legitimate global IP solutions.

Four key approaches compete in proposals for governing IP online:

National models stress countries' sovereign authority over designing domestic IP policies and enforcement per local conditions. This recognizes developmental differences. But fragmentation risks create loopholes enabling infringement across borders.

International frameworks emphasize binding multilateral treaties and intergovernmental organizations harmonizing IP rules and enforcement cooperation globally. But costs of compliance and resistance to one-size-fits-all universalism persist.

Self-regulation privileges private ordering by platforms and industry stakeholders devising voluntary guidelines through individual agreements and collective best practices. But narrow interests can dominate absent safeguards.

Multi-stakeholder approaches incorporate collaborative policy development through transparent forums allowing participation of all groups—governments, companies, experts, and civil society. Inclusive, consensus-based standard-setting results. However, ensuring balanced inputs remains challenging.

Analyze strengths and weaknesses of different regulatory models.

Varying regulatory models for online IP exhibit distinct strengths and weaknesses around interests served, compliance, enforcement, and legitimacy (Yu, 2017):

International frameworks optimize global harmonization of rules and enforcement cooperation, overcoming territorial limits. But captured

policymaking and compliance costs persist.

National approaches allow customizing protections balancing incentives and access. However, fragmentation enables infringers exploiting cross-border gaps.

Self-regulation harnesses localized expertise and built-in enforcement by stakeholders. But narrow interests dominate without safeguards.

Multi-stakeholder processes promote inclusive, bottom-up norm development. But imbalanced resources and conflicting interests complicate consensus.

The optimal approach depends on context. But combinations enabling cooperation on shared global challenges while preserving local autonomy may prove most feasible.

IP regulatory models carry significant human rights impacts related to freedoms of expression, privacy, and access to knowledge:

Overly stringent international standards risk concentrating knowledge rights without considering user liberties, diversity, and development gaps.

National discretion permits tailoring protections to human rights law obligations. But fragmentation enables authoritarian censorship, surveillance, and arbitrary enforcement absent checks.

Unaccountable self-regulation by private platforms lacks transparency, due process, and proportionality in enforcement actions against speech.

Inclusive multi-stakeholder processes centered on human rights principles can best balance competing considerations. But marginalized groups still struggle for voice.

Integrating human rights impact assessments and oversight around content takedowns, filtering, and access rules is vital to prevent undue restrictions under any model.

A single universal IP system for the internet faces substantial adoption and enforcement challenges (Yu, 2017). Culturally diverse countries retain discretion over balancing exclusive rights with public interests domestically. Forcing universal harmonization is neither politically viable nor necessarily desirable.

The decentralized internet also technically resists coherent centralized governance, enabling user empowerment. Moreover, the domain name system's successful governance via voluntary coordination provides a competing model of decentralized bottom-up rulemaking.

Practical limits arise around compliance costs, censorship risks, stifling innovation, and accountability deficits under unified top-down control. Consequently, most experts argue fully coherent universal rules are infeasible for the internet.

Instead, adaptable cooperation fostering interoperability between diverse national regimes offers a more practical path. Communication, transparency, and progressive multilateral commitments can facilitate convergence on navigating global challenges.

Current approaches to cross-border IP reveal both successes and enduring gaps:

TRIPS and WIPO internet treaties successfully elevated minimum standards internationally, including online. Regional agreements expanded protections further in many countries. Harmonization increased accordingly, facilitating enforcement and user predictability.

However, persistence of contradictory national laws still enables jurisdiction shopping and infringing activity exploiting trans-border gaps. Divergent intermediary liability rules also impede meaningful cooperation. And over-compliance risks remain without integrating human rights principles.

Multi-stakeholder cooperation has shown promise resolving domain name disputes and improving transparency around content takedowns. But imbalanced representation and non-binding outcomes limit efficacy for divisive reforms.

On balance, existing governance has generated substantial convergence but remains insufficient against the scale of online infringement and enforcement gaps. More flexible, inclusive new models are needed.

National differences in IP rules create multiple detrimental impacts (Daniel Castro and Alan McQuinn, 2015):

- Increased compliance costs for users and platforms navigating disparate laws across markets.
- Legal uncertainty around applicable rules and jurisdictions enabling forum shopping.
- Constraints on content access and innovation from inconsistent protections and limitations.
- Hurdles to cooperative enforcement and adjudication of cross-border disputes.
- Distorted markets and anti-competitive geo-blocking segmenting content availability.
- User confusion navigating contradictory frameworks undermining rule of law.
- Risks of parochial cultural agendas restricting communications under guise of IP.
- Constraints on emerging digital economies from adopting IP misaligned with local conditions.
- Various reform proposals aim to improve IP governance through

enhanced international collaboration, national flexibility, and multi-stakeholder inclusion:

- Open forums for transparent expert input into treaty negotiations and national reforms.
- Stakeholder consultation mechanisms to inform policymaking and oversight.
- Intergovernmental capacity building assistance customized to local needs.
- Commitments allowing implementation accommodating developmental differences.
- Cooperative monitoring of technological impacts to periodically update rules.
- Binding dispute settlement facilitating unified enforcement standards.
- Platforms for information sharing and joint technological solutions against infringement.
- Proportionality and human rights principles integrated throughout rules and procedures.
- National discretion over balancing protections with tailored limitations and exceptions.

More participatory, nimble, and context-specific IP governance can overcome gridlock between entrenched visions of optimal frameworks.

Two divergent trends are evident in countries' approach to IP governance (Yu, 2017):

- Developed countries with strong knowledge industries typically favor centralized models maximizing international harmonization of protections through treaties and institutional coordination. This aims to facilitate cross-border enforcement and minimize infringing loopholes between regimes.
- Many developing countries lean toward decentralized approaches emphasizing policy flexibility and space to design IP frameworks speaking to domestic conditions. This privileges local authority over determining optimal balance between incentives and access.

However, counter-trends exist across levels of development. Multi-stakeholder governance also offers a hybrid decentralizing regulatory development while coordinating on navigating shared challenges. Further technological shifts may compel rethinking traditionally centralized platforms and policies.

Optimizing global IP governance requires balancing sovereign authority over domestic rules with collective action on shared challenges. Rather than blanket harmonization, adaptable frameworks enabling localized

implementation within international minimum standards may prove most feasible and legitimate.

Centralized bodies can convene stakeholders and build consensus around evolving challenges. But flexible exceptions and inclusive development of guidelines preserve policy space respecting national differences. Regular impact reviews also allow periodically updating rules for technological changes.

Empowering users alongside rights holders is critical for just outcomes. Integrating human rights principles further helps safeguard expression and access. Overall, combining cooperation, subsidiarity, transparency, and participation can enable balancing IP for the global digital age.

4. *International cooperation in the field of intellectual property*

With intellectual property intrinsically traversing borders in the digital age, effective governance requires meaningful cooperation between states to align standards, enforcement, and oversight (Yu, 2017).

International coordination is essential to create consistent protections preventing infringers exploiting jurisdictional gaps. Treaties also facilitate reciprocal enforcement abroad for domestic rightsholders through mutual recognition and procedural harmonization. Centralized registration systems further ease cross-border rights management for users.

Shared technical solutions, monitoring, and information exchange allow tackling the scale of online piracy. And inclusive forums enabling collective norm development ground rules in balanced public interests rather than unilateral agendas when undertaken openly and transparently.

Overall, national reforms inevitably face limits in a networked world. International cooperation offers paths to navigate clashes between territorial IP frameworks and global digital expression and commerce.

Key forms of IP cooperation include:

- Treaty negotiations through intergovernmental organizations to establish binding minimum standards all participating countries must implement domestically.
- Working groups of government delegates to study issues and develop joint recommendations. These inform eventual treaty talks.
- Conferences bringing together stakeholders for non-binding norm development and agenda setting.

- Technical assistance programs aiding developing countries in reforms meeting international rules.
- Exchanges of enforcement best practices between national authorities to coordinate shared solutions.
- Secondments and trainings between offices to build examination expertise and optimize procedures.

Both formal accords and ongoing joint initiatives are critical to align national laws, enforcement, technical systems, and administrative procedures internationally.

Intergovernmental organizations are central actors convening member states for collective IP policymaking:

WIPO drives development of treaties harmonizing national IP laws and provides technical assistance on implementation. UN agencies like UNESCO also shape cultural policy debates.

The WTO oversees the TRIPS agreement obligating members to provide minimum IP standards with dispute settlement ensuring compliance. Related bodies examine ongoing trade impacts.

WHO, FAO, and CBD oversee negotiations on IP issues related to public health, food security, genetics, and traditional knowledge. Human rights bodies assess rights impacts.

Inter-agency coordination mechanisms aim to reconcile different organizations' potentially conflicting IP mandates and frameworks. But critics argue siloed governance still allows inconsistent rules across domains like trade, culture, and human rights.

Beyond states, IP cooperation increasingly involves:

- Rightsholder groups coordinating lobbying and enforcement support. But consumer voices counterbalance this in some forums.
- Platforms and intermediaries negotiating voluntary anti-piracy programs. Though accountability deficits persist.
- Academic expert input to inform evidence-based policymaking.
- Consensus exists around core principles like minimum copyright terms, trademark rights, and WIPO internet treaty commitments. But divisions persist both between and within countries on issues like (Yu, 2017):
- IP scope covering new technologies, traditional knowledge, and data rights.
- Balancing protections with public interest flexibilities and limitations.
- Technological enforcement obligations on platforms.
- User rights and liabilities for everyday non-commercial activities.
- Prioritizing IP under trade versus other values like human development.

These debates often pit developing against developed economies or follow political fault lines on rights versus commerce. Forging agreement requires overcoming entrenched conflicts of interest.

International IP cooperation has achieved substantial successes but also faces persistent gaps (Matthews, 2011):

- WIPO treaties broadly aligned national IP laws, easing cross-border activity. TRIPS similarly elevated minimum standards.
- Procedural harmonization through global registration systems reduced rights administration costs.
- Technical trainings strengthened developing countries' enforcement capacities.
- Voluntary anti-piracy programs developed between industries and platforms.

However, contradictory national laws continue enabling jurisdiction shopping and enforcement forum gaps. Rights holders still struggle combating offshore sites. Developing country participation also remains constrained in norm-setting fora. Ultimately, existing mechanisms provide foundations requiring ongoing evolution.

Adopting global IP standards while retaining policy space to tailor domestic frameworks generates tensions around:

Compliance costs straining lesser-resourced authorities.

- Reforms misaligned with local economic conditions undermining growth.
- Foreign rightsholders' interests overriding domestic public welfare.
- Reduced flexibility to define appropriate exceptions and limitations.
- Mandated cooperation on enforcement constraining rights like privacy and speech.
- External pressure undermining evidence-based, balanced policymaking.

Navigating these challenges requires international commitments balancing strong IP with proportionality, human rights, and development space. Technical assistance for implementation and influence over norm-setting are also vital for sustainable national reforms.

Critics highlight needed cooperation improvements around (Giblin, 2011):

- Increasing developing country and public interest engagement in agenda-setting and negotiations.
- Independent assessments of IP systems' economic and social impacts to inform policies.

- Meaningful multi-stakeholder participation in oversight and implementation bodies.
- Balancing representation beyond rightsholder groups through financial support.
- Transparent processes and access to draft accords prior to finalization.
- Capacity building so national reforms align with domestic needs rather than external pressures.
- Flexibilities tailored to countries' levels of development.
- Integrating human rights principles throughout IP rulemaking.

More inclusive cooperation strengthening evidence-based policymaking and accommodating local contexts will improve governance legitimacy.

International IP cooperation is expanding both substantively and institutionally (Yu, 2017):

- Proliferation of bilateral and regional agreements mandating stricter standards beyond TRIPS.
- Growing issue linkage with related domains like trade, investment, culture, and human rights.
- New institutions and programs bridging gaps between bilateral, regional multilateral systems.
- Broadening agendas encompassing copyright, patents, trademarks, genetic resources, traditional knowledge, and enforcement cooperation.
- Rising engagement between national authorities through exchanges, data sharing, and joint projects.
- Increasing expert and civil society participation in multilateral forums.

These developments demonstrate rising recognition of IP's global interconnectedness. But critics argue fragmentation also results from divergent national interests impeding universal solutions.

Consider inclusive and participatory frameworks for cooperative development of IP norms.

Optimizing global IP governance requires reconciling multilateral cooperation on common challenges with nationally diverse priorities through balanced inclusive participation. Beyond states and rightsholders, expanded public interest representation in norm-setting and oversight bodies as well as transparency in negotiations and data access can ground rules in broad welfare. Capacity building further allows developing countries to engage equitably in collective initiatives. Overall, cooperation emphasizing flexibility, evidence, and human rights can overcome stagnant divisions and enable progressive, legitimate evolution of international IP systems.

5. *The future of the intellectual property system in global networks*

Rapid technological changes are compelling reassessment of IP systems, raising complex questions around governing artificial intelligence creations, data rights, synthetic media, internet collaboration models, and more. Core debates center on preserving incentives for investment while expanding access and updating concepts of authorship and infringement for digital realities.

One cluster of issues concerns emerging generative technologies like artificial intelligence and bioengineering. AI poses deep challenges around authorship and patentability, as entirely algorithmic systems create works and inventions without human direction. Granting AI rights could concentrate power while complicating enforcement. But limiting patents for AI-devised inventions may undermine critical funding incentives. Synthetic media like deepfakes also stress attribution systems. Clearer adaptation is needed for post-human creativity to sustain incentives while furthering progress.

Updating enforcement mechanisms is equally critical as infringement detection grows more difficult with anonymous generative technologies. But risks persist around impacting legitimate expression. Integrating IP protections with commitments on ethics, human rights, and competition policy will further be vital to ensure balanced evolution. Overall, complex questions of rights and responsibilities around emerging technologies must be addressed to keep IP governance legitimate and socially beneficial.

A range of emerging technologies and policies are influencing the future evolution of IP governance in areas like artificial intelligence, biotechnology, outer space laws, and human rights.

Rapid advances in artificial intelligence present deep challenges around creative works generated autonomously without human authors or inventors. This tests foundational IP rationales grounded in protecting individuals' novel contributions. Rights over data, training processes, and other inputs become more salient as AI productivity increases. Developing appropriate protections reconciling openness and incentives remains contested.

In biotechnology, tools like CRISPR gene editing raise new patentability questions around modified organisms. Big data and digitization also disrupt life science innovation models, suggesting potential needs to recalibrate IP systems. Further technological shifts will require grappling with incentives and ethics around humanity's own biological design.

Broader integration with evolving human rights frameworks can

further help reorient IP rules towards expanding access in light of internet connectivity's empowerment potential. Principles like free expression, privacy, and cultural participation argue for strengthening users' rights. Overall, IP law must thoughtfully evolve in light of these scientific and social trends to retain legitimacy.

Emerging technologies hold major implications for core IP concepts around patentability standards, authorship norms, and enforcement capacities.

Artificial intelligence poses the most direct challenge, potentially generating novel inventions and works entirely without human direction. This contradicts patent and copyright laws' foundational rationale in protecting individuals' contributions. Questions proliferate around granting rights to AI systems directly or other stakeholders like data owners, with risks of excessive concentration. Enforcement and infringement detection also grows more difficult as creative barriers fall.

Optimizing IP systems for coming technological shifts will require focused clarification and updating of rights and obligations. Core reforms include:

- Clarifying ambiguous rights over emerging areas like data, algorithms, and AI training models to balance incentives and access.
- Expanding copyright exceptions like fair use to enable legally remixing AI-generated media, research text mining, and other transformative uses.
- Recalibrating copyright terms as digital creation costs decrease.
- Enhancing attribution protections as synthetic media undermines evidence quality.
- Integrating IP principles with human rights, ethics, and competition commitments restraining over-proprietary claims.
- Processes to periodically update IP statutes staying ahead of fast-moving technological changes.
- Boosting accessibility mechanisms like compulsory licensing facilitating public interest access.

With diligent balancing, IP can continue incentivizing intensive knowledge investments while sustaining an equitable, participatory digital ecosystem. But absent reforms, legitimacy risks corrosion.

Critics increasingly call for refocusing IP systems around empowering users, inclusive production, and access obligations. Proposals include:

- Greatly expanding copyright limitations and exceptions to fully legalize everyday non-commercial cultural enjoyment, sharing, and remixing.

- Shortening copyright terms closer to the original 14 years. Long terms merely reward rent-seeking over current creativity.
- Legally mandating public domain data access and sharing of non-personal technical research to power big data innovation.
- Enshrining commons-based peer production rights over proprietary claims around collectively generated cultural works like Wikipedia.
- Requiring IP protections demonstrably advance human progress rather than reflexively rewarding it after already attained.
- Making access the primary principle, and IP restrictions exceptional claims requiring high justification burdens.
- Registration and renewal systems to weed out unused "zombie" rights stagnating culture.

However, risks persist around diminishing funding incentives undermining investment in high-cost knowledge production like biopharmaceuticals. Balanced implementation considering varied innovation contexts will be critical.

Legally, IP rights remain well-entrenched worldwide via major international treaties and domestic statutes. Wholesale termination or overhaul lacks clear pathways under these complex legal structures absent gradual evolution.

Culturally, resistance persists around perceived free-riding enabled by weak or no IP, despite debates on enhancing access and sharing. Commons-based production models also remain legally ambiguous and practically nascent on scales matching current industries.

Economically, funding models to sustain expensive R&D investments like drug development are unclear if profits and market exclusivities are removed. Incumbents would likely retain advantages in commercialization absent IP.

Consequently, most experts argue complete IP abolition lacks viability currently. But growing calls for fundamental rethinking reveal stresses in the social bargain underpinning IP systems today. Balanced recalibration better sustains creative ecosystems online and off.

Contemporary IP debates highlight three broad schools of thought:

Abolish IP: Arguments point to the internet's democratization of production and access expectations undermining traditional rationales. Direct public funding for knowledge goods could replace market incentives. But challenges around attribution and free-riding persist.

Strengthen IP: Supporters stress stronger rights become more important as economies grow more intangible and digitally-replicable. This spurs

investment benefiting consumers and creators. But critics see risks of rent-seeking and constraints on cumulative innovation.

Recalibrate IP: Nuanced reformists seek balancing today's excesses with expanded user rights, access channels like fair use, and integration with human rights frameworks. But achieving principled reforms remains contested.

On balance, evidence best supports cautious recalibration of IP systems as pressures grow in the internet age. Outright abolition lacks viability currently, but judicious reforms will likely prove critical to maintain legitimacy and social benefit.

Sustaining legitimate, socially beneficial IP institutions requires thoughtful adaptation including:

- Expert and user participation in policymaking insulating processes from special interest dominance.
- Transparent and participatory norm-setting enabling representation of diverse interests.
- Regular evidence-based reviews updating rules for technological and social shifts.
- Oversight via impact assessments and transparency around enforcement actions.
- Accessible dispute resolution to arbitrate overzealous rights claims efficiently.
- Capacity building assistance enabling developing country participation in global governance.
- Judicial guidance delineating balanced obligations between incentives, access, and human welfare.

With diligent modernization to align governance with inclusive values and digital realities, IP systems can retain efficacy while advancing social progress.

Evolving creative practices, collaboration norms, and digitally-enhanced access expectations are recasting IP's social contract:

- Proliferating user sharing and remixing conflict with individualistic assumptions around creation and ownership.
- Generative technologies empower broader direct participation in cultural innovation.
- Collaborative peer production models highlight knowledge's collective character beyond proprietary control.
- Digital reproduction shifts access expectations and norms around sharing IP-protected works.

- Mainstream familiarity with remix culture breeds resistance to perceived criminalization of everyday enjoyment and creativity.

These interlinked trends strain existing IP paradigms. But thoughtfully expanding participatory access while sustaining commercial incentives remains vital to maintain creative ecosystems online and off.

Optimizing IP governance requires balancing exclusive rights sustaining investment with obligations around access, sharing, and the public domain in light of digital empowerment and shifting expectations. This further necessitates inclusive decision-making integrating diverse user interests alongside traditional rights holders. With diligent recalibration facilitating innovation and creativity serving human progress more broadly, IP systems can remain legitimate, socially beneficial pillars of global information economies.

But achieving reforms requires overcoming resistance from those benefitting from today's imbalances. Sustained advocacy, education, and promotion of IP's public purposes will thus prove critical to build momentum for progressive change. With thoughtful evolution, IP can remain an essential tool promoting human flourishing in a digital age.

Conclusions for Chapter X

This extended analysis has sought to examine key issues, debates, and future trajectories around governing intellectual property rights in the global digital environment. Effective IP governance balances sustaining incentives for risky knowledge investments against obligations for access, sharing, and human progress. With diligent evidence-based recalibration, IP systems can promote flourishing information economies and equitable participation online and off. However, achieving reforms requires surmounting significant challenges.

Fundamentally, IP governance confronts tensions between territorial frameworks and the internet's borderless architecture. Governing digitally-reproducible, instantly sharable works requires rethinking IP for a globally interconnected age. Core debates highlighted throughout this chapter center on navigating rights and responsibilities across jurisdictions. Challenges around attribution, infringement, and enforcement jurisdiction persist where acts and parties span countries with disparate laws. Even as international harmonization progresses, gaps enable questionable forum

shopping and constrain collective action against cross-border threats.

Centralized universal solutions face adoption hurdles given states' sovereign IP authority. The technical internet resists top-down control. Consequently, calls increase for interoperable multi-stakeholder approaches balancing national discretion over implementation with collective norm-setting and oversight. Through such co-governance, inclusive forums can transparently incorporate diverse interests in resigning rights and obligations for digital realities. But despite growing collaboration, conflicting visions and interests impede consensus on optimal reforms.

More fundamental tensions also surround IP's scope and purpose amidst shifting technological and social conditions. Generative tools like artificial intelligence and synthetic media unsettle core concepts of authorship and infringement. Vast digital reproducibility and anonymity further strain proprietary models. Commons-based sharing cultures normalize practices IP often construes as piracy, breeding popular resistance. As production democratizes online, assumptions of strong rights necessarily incentivizing commercial investment appear increasingly tenuous. However, funding models sustaining major knowledge investments under weakened IP remain unclear.

Debates thus intensify between arguments to abolish IP as obsolete restraints on access versus calls to strengthen rights against perceived digital threats. More balanced reform proposals emphasize recalibrating IP's guarantees and obligations. But actualizing principled change confronts entrenched proprietary interests. Rights must be clarified around emerging techniques while flexibilities expand to legalize everyday uses and remixing. Integrating human rights principles is equally vital to recentering IP systems on expanding creative participation and self-expression for all. This requires modernizing institutions and inclusive policymaking against too-often captured debates.

Ultimately IP governance stands at crossroads between competing visions. With diligent evidence-based balancing sustaining rewards for risky contributions while obliging knowledge sharing and ethical oversight, thoughtfully evolved IP systems can remain essential drivers of human progress. But absent judicious recalibration, the social bargain underpinning IP risks corrosion amidst deepening technological and generational transitions. Ongoing advocacy and education around access, innovation, and the public purposes of IP will be critical in navigating reforms.

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Intellectual Property in the Digital age offers a comprehensive examination of the evolving landscape of intellectual property (IP) in the context of digital technologies. This book provides an insightful analysis of how digital advancements, such as the internet, social media, and blockchain, are reshaping the way intellectual property is created, protected, and enforced. It explores the challenges and opportunities these changes present for creators, businesses, and policymakers. With practical examples and expert insights, this book is an essential resource for understanding the future of IP in our increasingly digital world.

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