ISSN 2226-6771

VOLUME 5 July 2016 NUMBER 1

GRADUATE INSTITUTE OF INTELLECTUAL PROPERTY,
NATIONAL TAIPEI UNIVERSITY OF TECHNOLOGY

NTUT Journal of Intellectual Property Law and Management

The NTUT Journal of Intellectual Property Law and Management is published twice a year by the National Taipei University of Technology ("Taipei Tech."), a national university located in Taipei City, Taiwan. The Journal is run by the Graduate Institute of Intellectual Property, an educational organization of Taipei Tech. The address of Taipei Tech. is No. 1, Sec. 3, Chung-hsiao E. Rd., Taipei City 10608, Taiwan.

EDITORIAL TEAM

NTUT Journal of Intellectual Property Law and Management is published twice a year by the National Taipei University of Technology ("Taipei Tech."), a national university located in Taipei City, Taiwan. The Journal is run by the Graduate Institute of Intellectual Property, an educational organization of Taipei Tech. The address of Taipei Tech. is No. 1, Sec. 3, Chung-hsiao E. Rd., Taipei City 10608, Taiwan.

CALL FOR PAPERS

The NTUT Intellectual Property Law and Management is a multidisciplinary journal which concerned with legal, economic and social aspects of IP issues. This journal is included in the SCOPUS, WESTLAW, WESTLAW HK, LAWDATA, AIRITI LIBRARY citation databases, and it welcomes contributions to address IP topics at national, regional and international level.

Submission:

1. A manuscript has to follow the citation format of The Bluebook: A Uniform System of Citation. If the citation format for a particular reference is not provided, please give a citation in a form: [Author], [*article title*], [volume number] [JOURNAL TITLE] [first page] (publication year), for instance, Zvi Griliches, *Patent Statistics as Economic Indicators: A Survey*, 8 JOURNAL OF ECONOMIC LIRERURURE 1661, 1661-707 (1990).

If your article relates to management or business, pin-point citation is not required. For all manuscripts, a list of references is not required.

2. A manuscript is normally limited to at most 5,000 words, including the main text and footnotes. Potential authors are encouraged to contact NTUT IIP for a manuscript template.

3. A manuscript has to include an abstract of at most 300 words and at most five keywords.

4. The authors are responsible for the factual or legal accuracy of their papers. No payment is for contribution. Two copies of the journal will be supplied to the authors free of charge.

Manuscripts must be typewritten in English. Electronic submissions are

preferred. Please provide Microsoft Word files and email to iipjournal@ntut.edu.tw.

Review:

All submissions will be subject to a peer-review process or at least editor-review process.

Copyrights:

By submitting manuscripts, all authors shall grant to the National Taipei University of Technology to disseminate their papers through the instruments of the National Taipei University of Technology or other entities.

Publication Ethics and Malpractice Statement:

The journal is committed to ethics and quality of publication. Authors, editors, reviewers, and staff are required to follow general standards of ethical behavior. Authors should submit their original works without infringing intellectual property rights of others. Editors and reviewers should evaluate manuscripts according to their academic value. Reviewers should not take advantage of the original ideas drawn from the reviewed manuscripts. Reviewers should keep confidential the content of each reviewed manuscript until it is published.

TABLE OF CONTENTS

Regular Articles

Global Perspective

Section 337 Investigations at the U.S. International Trade Commission

Robert K. Rogers*

The ITC is a quasi-judicial independent agency, based in Washington, D.C., and has nationwide jurisdiction and subpoena power. The ITC is responsible for, among other things, administering Section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), which is commonly and herein referred to as "section 337." Subject matter jurisdiction is vested in the ITC by 19 U.S.C. § 1337(a)(1), which allows the owner of a federally registered patent, trademark, or copyright, among others, to file a complaint with the Commission, against one or more respondents who are importing, selling for importation, and/or selling after importation into the United States, goods that infringe upon the owner's trademark, copyright, or patent claims. Proof of importation is a necessary element in all Section 337 cases, and relief will not be granted by the Commission in the absence of such proof.[1]

Section 337 also prohibits other types of unfair acts and unfair competition in the importation of articles into the United States, the threat or effect of which is to destroy or substantially injure an industry in the United States, prevent the establishment of an industry, or restrain or monopolize trade or commerce in the United States. 19 U.S.C. §1337(a)(1)(A). This part of section 337 provides jurisdiction for the ITC to treat trade secret misappropriations.

I. Jurisdiction at the ITC

A. Subject Matter Jurisdiction

Subject matter jurisdiction in the ITC is established, for example, by a verified allegation in a complaint of an unfair act in the importation of articles that infringe one or more claims of a United States patent that is valid and enforceable. Jurisdiction exists regardless of the geographic location of the misappropriation and is based upon the importation of the articles.

---

* Mr. Rogers is Senior Counsel at Steptoe & Johnson LLP. Prior to joining Steptoe, Mr. Rogers was an Administrative Law Judge for 19 years and served at the USITC from 2008 to 2013.

1 "[S]ection 337 requires an 'importation' or a 'sale for importation' before the ITC may exercise jurisdiction over any accused goods." *Enercon GmbH v. Int'l Trade Comm'n*, 151 F.3d 1376, 1380 (Fed. Cir. 1998).

B. *In Rem* Jurisdiction

In rem jurisdiction is jurisdiction of the goods alleged to be imported into the United States in violation of section 337. This jurisdiction provides the authority for any exclusion order that may issue as a result of the ITC investigation.

The importation requirement is modest. In *Certain Trolley Wheel Assemblies*, Inv. No. 337-TA-161, USITC Pub. No. 1065, 0084 WL 951859, Comm'n Determination at *7-8 (Nov. 1984), the Commission found the importation requirement satisfied by the importation of a single product of no commercial value. Similarly, an unreviewed Initial Determination ("ID") in *Certain Purple Protective Gloves*, Inv. No. 337-TA-500, USITC Order No. 17, 2004 WL 2330140, at *3 (Sept. 23, 2004), found "[a] complainant need only prove importation of a single accused product to satisfy the importation element."

C. *In Personam* Jurisdiction

In personam jurisdiction is usually established by the personal appearance of a party or its counsel and/or the personal service of the complaint and notice of investigation upon a party named in the investigation. It provides the authority for issuance of a cease and desist order by the Commission. *See*, *e.g.*, *Certain Miniature Hacksaws*, Inv. No. 337-TA-237, Initial Determination (hereinafter, "Init. Det."), 1986 WL 379287 (Oct. 15, 1986).

II. Remedies at the ITC

A. Exclusion Orders

(a) Limited Exclusion Order -

A limited exclusion order instructs the U.S. Customs and Border Protection ("CBP") to exclude from entry all articles that are covered by the patent at issue and that originate from a named respondent in the investigation. *Kyocera Wireless Corp. v. Int'l Trade Comm'n,* 545 F.3d 1340, 1345, 1355-1359 (Fed. Cir. 2008)(ITC has no statutory authority to issue an LEO against downstream products of non-respondents) This is the remedy most often ordered by the Commission.

(b) General Exclusion Order –

A general exclusion order instructs the CBP to exclude from entry all articles that are covered by the patent at issue, without regard to source, and it is permitted only in certain limited situations. Specifically, the statute provides

that the Commission may issue a general exclusion order only if it determines that:

(A) a general exclusion from entry of articles is necessary to prevent circumvention of an exclusion order limited to products of named persons; or

(B) there is a pattern of violation of this section and it is difficult to identify the source of infringing products.

19 U.S.C. § 1337(d)(2); *see also Certain Hydraulic Excavators*, Inv. No. 337-TA-582, Commission Opinion (Feb. 3, 2009) (describing the standard for general exclusion orders). The Federal Circuit has explained that a complainant must meet "the heightened requirements of 1337(d)(2)(A) or (B)" before the Commission will issue a general exclusion order. *Kyocera*, 545 F.3d at 1358.

The standard for a finding that a GEO is necessary to prevent circumvention of an exclusion order is difficult to meet. In one example, the Commission upheld a finding that this standard was met and issued a General Exclusion Order, based upon findings that, among other things, foreign manufacturers package their products in unmarked, generic or reseller branded packaging that lacks any markings or labels to identify their origin, and many manufacturers and distributors create multiple websites and corporate identities with ease, allowing them to sell infringing products while concealing their true identities. *Certain Inkjet Ink Cartridges with Printheads and Components Thereof,* Inv. No. 337-TA-723, Commission Opinion (February, 2013).

To demonstrate a pattern of violation the complainant must show that "there is a pattern of violation of this section and it is difficult to identify the source of infringing products." The pattern of violation must be separate from the accused infringement alleged in this investigation. *See Certain Self-Cleaning Litter Boxes & Components Thereof*, Inv. No. 337-TA-625, Commission Opinion at 56 (Apr. 28, 2009) (explaining that a "pattern of violation of this section" must include acts of importation unrelated to one of the named respondents)(Reversed on other Grounds

B. Cease and Desist Orders

In addition to or in lieu of an exclusion order, a complainant may also be granted a cease-and-desist order directed against specific respondents. Because *in personam* jurisdiction in the constitutional sense is not required for the Commission to remedy unfair acts or methods of competition, cease-and-desist orders have been issued against both domestic and foreign respondents. To issue such relief, the Commission typically, but not always,[2] requires a complainant to

[2] *See, e.g., Certain Digital Models, Digital Data, and Treatment Plans for Use, in Making Incremental Dental Positioning Adjustment Appliances Made Therefrom, and Methods of*

show that there exist within the United States "commercially significant" inventories of the infringing articles.[3] The Commission itself enforces cease-and-desist orders, while Customs enforces exclusion orders.

Section 1337(f)(2) provides that "[a]ny person who violates an order issued by the Commission under paragraph (1) after it has become final shall forfeit and pay to the United States a civil penalty for each day on which an importation of articles, or their sale, occurs in violation of the order of not more than the greater of $100,000 or twice the domestic value of the articles entered or sold on such day in violation of the order."[4] In the four prior cases in which the Commission levied civil penalties, the Commission utilized a six-factor test to determine the appropriate penalty, balancing: "(1) the good or bad faith of respondent; (2) the injury to the public; (3) respondent's ability to pay; (4) the extent to which respondent has benefited from its violations; (5) the need to vindicate the authority of the Commission; and (6) the public interest."[5] In one case that penalty against an offending company was $13,675,000.[6]

III. Procedures at the ITC

The procedures at the ITC are generally the same regardless of whether a case is based upon alleged infringement of patents, registered trademarks, copyrights, or upon other unfair trade practices, such as alleged trade secret misappropriation.

A. Assignment To An Administrative Law Judge

Once the Commission votes to institute an investigation, the matter is referred to the Office of Administrative Law Judges ("ALJ"), and the Chief ALJ issues an Order assigning the investigation to one of the office's six ALJs. Cases are generally assigned to the ALJs on a rotational basis as they are received from the Commission; however, relative workloads, related cases and other factors are considered, so the rotation cannot always be predicted.

At the ITC, the ALJs preside over and conduct hearings and formal proceedings that involve issues related to unfair trade practices and intellectual property rights (including patents, trademarks, and trade secrets), as

---

Making the Same ("Digital Data"), Inv. No. 337-TA-833, Comm'n Op. at *147-148.

[3] *See EPROM, EEPROM Flash Memory and Flash Microcontroller*, Inv. No. 337-TA-395, USITC Pub. No. 3392 at 80 (Feb. 2001) (Comm'n Op.).

[4] 19 U.S.C. §1337(f)(2).

[5] *Certain Lens-Fitted Film Packages*, Inv. No. 337-TA-406, 2003 ITC LEXIS 807, Comm'n Op., at *25 (June 23, 2003).

[6] *Jazz Photo Corp., v. Int'l Trade Comm'n,* 264 F.3d 1094 (Fed. Cir. 2001).

well as economic and business issues. ALJs rule on motions, control discovery, regulate the course of evidentiary hearings and receive relevant evidence. They hold conferences regarding myriad issues, and dispose of procedural requests or similar matters, and issue written decisions.

B. The Speedy Investigative Process

Once a section 337 investigation begins, it is an extremely fast moving process.

Normally the ALJ will first issue a Protective Order, which covers the submission (via discovery or formal filing) and handling of confidential information during the course of the proceeding. Next, the ALJ will typically issue an order notifying the parties of the Ground Rules to be followed during the investigation, in addition to the Commission's rules. The ALJ also sets a procedural schedule which includes a target date for completion of the investigation; the target date is normally no longer than 16 months (a target date of longer than 16 months is permitted; but the ALJ must adopt such a date by issuing an Initial Determination, which is subject to review by the Commission). The quick target date is driven by the statute's requirement that section 337 investigations be completed at the earliest practicable time.

Timing at the ITC is critical, because of the goal to conclude a case within 16 months of institution. The Final Initial Determination ("ID") is due not less than 4 months prior to the target date (*i.e.,* about 12 months after institution). Trial is usually set to begin 8-10 months into the calendar, and discovery usually concludes 6-7 months into the calendar. Speed is essential and creates an unforgiving environment for parties and counsel who do not meet deadlines.

The ALJ presides over an evidentiary hearing that is conducted in accordance with the federal Administrative Procedure Act. Typically, hearings last one to two weeks, during which time fact and expert witnesses testify and are subject to cross-examination. During the hearing, exhibits are introduced and entered into evidence. In administrative hearings, admissible evidence is limited to that which is relevant, material and reliable. The formal Federal Rules of Evidence do not control; but the ALJs generally use the Federal Rules as guidelines to help in the process.

After a thorough review of all of the evidence admitted into the record of the hearing, and the briefs filed by all parties, the ALJ will issue an ID. The ID is a detailed discussion of the evidence and the arguments of the parties, culminating in the ALJ's findings regarding what the evidence showed, the ALJ's conclusions of law and the bases for those conclusions.

C. Discovery

Discovery is a concept that is frequently misunderstood outside of "common law" countries, such as the United States. It is, however, quite important that those who are involved in litigation in the United States, understand and give great importance to the discovery process and its rules. Failure to do so can cause disastrous results for the foreign party in the U.S. courts and at the ITC. While discovery in the courts can sometimes take years, it is usually concluded at the ITC within about 6 months.

Prehearing discovery in cases generally in the United States and at the ITC is a means of insuring that all parties have a fair and equal opportunity to know what evidence is likely to be used by opposing parties to prove their respective case(s). Such knowledge can encourage settlement prior to a hearing, and can encourage a narrowing of issues to be heard at the hearing (*e.g.*, stipulations based on evidence, or requests for admissions); and can serve to focus the parties' attention on issues that are material to a decision at hearing. This ultimately serves to conserve resources of the parties and the government, and the knowledge gained through discovery can lead to settlement of the case.

While discovery in section 337 cases is in theory very similar to discovery in state and federal court cases, there are some differences in practice. The main differences are the following: discovery occurs earlier and under much tighter time pressures at the ITC; the Commission's nationwide jurisdiction cuts out some procedural hurdles that can exist in other fora; because the ITC ALJs are charged with developing a full record, they are generally less receptive to motions to limit discovery; a foreign respondent that chooses to participate in an ITC investigation will find it difficult to shield itself from discovery.

D. The Hearing

All hearings in section 337 investigations occur at the ITC building in Washington, D.C. Hearings are held before an ALJ and usually last one to two weeks. Currently the ALJs require direct testimony (both for the case in chief and rebuttal testimony) to be presented in the form of a written witness statement, subscribed and sworn by the witness. The witness statement is in question and answer form, and the answers are to be those of the witness. Usually objections to testimony in the witness statement are made and ruled upon prior to the beginning of the hearing, because the witness statements must be produced to all parties and the ALJ at a date set by the ALJ that occurs prior to the hearing. This approach to direct testimony serves to speed the hearing process and reduce costs to the parties, while assuring that the needed direct testimony will be presented at the hearing. Live testimony in those hearings is

devoted to cross-examination of the witness and any redirect examination that may be needed by the party presenting the witness.

Because matters at the ITC almost always involve CBI, it is common for parties, their in-house counsel, and others not signed on to the protective order, to be excluded from the hearing room during testimony on those matters that implicate CBI.

E. The Post-Hearing Process

1. Briefs

The procedural schedule will include deadlines for the parties to submit their initial and reply briefs. The initial brief by each party must include argument and citation to evidence regarding each and every issue for which that party bears the burden of proof. In addition, any new or novel argument that the party might have regarding a matter for which the opposing party bears the burden of proof should be included.

Reply briefs are limited to arguing the evidence and law regarding an issue for which the opposing party bears the burden of proof, and for responding to any new or novel arguments contained in the opposing party's brief that treats an issue for which the party submitting the reply brief bears the burden.

2. Final Initial Determination

Usually within two to three months after the hearing, the ALJ issues his decision in the form of an ID. The IDs are typically quite long and address all litigated issues. The ALJ is also responsible to suggest a remedy and a bond to be imposed during the presidential review period, if the ALJ finds a violation of section 337. This is called the Recommended Determination, and is sometimes included in an ALJ's ID and sometimes made as a separately issued "RD".

3. Commission Review

The parties then may seek review of the ID by the full Commission. If no petition for review is filed and the Commission does not review the ID *sua sponte*, the ID becomes the final decision of the Commission on the issue of violation of the statute. If the Commission determines to review the ID, it may review it in whole or in part, and it may adopt, modify, reverse, vacate or take other action it deems appropriate. Commission Rule 210.42(a)(1)(i) requires the ALJ to certify the record and file the ID on violation "no later than four

months before the target date" set in the investigation. Thus, by rule, the Commission has four months to complete its review process.

The Commission is also responsible for issuing the final decision on remedy and bonding, since the ALJ's decision on those issues is only a "recommended determination." As discussed below, if a violation of the statute is found, and the statutory public interest factors do not preclude issuance of relief, the remedy may be in the form of a general or limited exclusion order and/or a cease and desist order. Exclusion orders are enforced by U.S. Customs and Border Protection; cease and desist orders are enforced by the ITC.

4. Presidential Review

If the ITC orders a remedy, then the President (as delegated to the U.S. Trade Representative) has 60 days during which to review the remedy and disapprove it for policy reasons. During the presidential review period, imports covered by an ITC exclusion order may enter under bond (the bond amount having been determined by the Commission, as discussed above). Presidential disapproval has occurred, but rarely. In 2013, the U.S. Trade Representative, acting for the President, disapproved an ITC remedy due to overarching federal policies related to standards essential patents; it was the first disapproval since the Reagan Administration.

5. Appellate Process

A final ITC determination is appealable to the U.S. Court of Appeals for the Federal Circuit. Any party adversely affected by an ITC final determination may ask the Federal Circuit to review the determination. The Federal Circuit reviews issues of law de novo; issues of fact are reviewed under the substantial evidence standard, based on the record developed before the agency.

IV. Unique Requirements of Proof at the ITC

A. Importation

Proof of importation of an accused product is a necessary element in all Section 337 cases, and relief will not be granted by the Commission in the absence of such proof.[7]

[7] "[S]ection 337 requires an 'importation' or a 'sale for importation' before the ITC may

B. Domestic Industry

In all cases brought to the ITC, the complainant has the burden to prove what is known as the "domestic industry" requirement. This is an aspect of the case that is unique to the ITC. Failure to prove this element will result in a disposition unfavorable to the complainant, and can result in early termination of the case. As explained below, ITC proceedings based on unfair acts or unfair competition use a different domestic industry requirement than ITC proceedings that are based on patents, registered trademarks, or copyrights.

Most section 337 cases are patent-based proceedings, and in those cases a complainant must establish that an industry "relating to the articles protected by the patent...exists or is in the process of being established" in the United States. 19 U.S.C. §1337(a)(2). The domestic industry requirement for those cases, which are referred to as "statutory cases," consists of an "economic prong" and a "technical prong."[8] The "economic prong" of the domestic industry requirement is satisfied when it is determined that the economic activities set forth in subsections (A), (B), and/or (C) of 19 U.S.C. subsection 1337(a)(3) have taken place or are taking place.[9] To meet the technical prong, the complainant must establish that it practices at least one valid claim of the asserted patent.[10] However, unfair act or unfair competition ("non-statutory") cases brought pursuant 19 U.S.C. § 1337(a)(1)(A) require different proof related to the domestic industry than the proof required in statutory cases.

Section 1337(a)(1)(A), which is the subsection that governs trade secrets and other non-statutory claims at the ITC, proscribes:

Unfair methods of competition and unfair acts in the importation of articles (other than articles provided for in subparagraphs (B), (C), (D), and (E)) into the United States, or in the sale of such articles by the owner, importer, or consignee, the threat or effect of which is—

(i) to destroy or substantially injure an industry in the United States;

(ii) to prevent the establishment of such an industry; or

(iii) to restrain or monopolize trade and commerce in the United

---

exercise jurisdiction over any accused goods." *Enercon GmbH v. Int'l Trade Comm'n*, 151 F.3d 1376, 1380 (Fed. Cir. 1998).

[8] *Certain Data Storage Systems and Components Thereof*, Inv. No. 337-TA-471, Init. Det. Granting EMC's Motion No. 471-8 Relating to the Domestic Industry Requirement's Economic Prong (unreviewed) at *3 (Public Version, Oct. 22, 2002).

[9] *Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, USITC Pub. No. 3003, 1996 ITC LEXIS 556, Comm'n Op. at 21 (Nov. 1996) ("*Wind Turbines*").

[10] *Certain Point of Sale Terminals and Components Thereof*, Inv. No. 337-TA-524, Order No. 40 (Apr. 11, 2005).

States.[11]

There are two major differences between statutory cases and non-statutory cases. First, there is no requirement in a non-statutory case that the complainant prove that the domestic industry currently uses the intellectual property involved. Thus, there is no "technical prong" requirement in a trade secrets case. Second, the complainant must prove that a domestic industry exists that is subject to injury as a result of unfair acts, i.e., "the target of the unfair acts and practices."[12] This requirement does not exist in a statutory case. Another notable difference between a statutory case and an unfair trade practices case, is that a complainant in a non-statutory case must satisfy an "injury component," which requires proof by a preponderance of evidence that the "threat or effect" of a respondent's misappropriation or other unfair act is "to destroy or substantially injure" the domestic industry.[13]

[11] 19 U.S.C. § 1337(a)(1)(A).
[12] *See Cast Steel Railway Wheels,* Init. Det. at *31-32; *Certain Nut Jewelry and Parts Thereof*, Inv. No. 337-TA-229, Comm'n Op. at *16-17 (Nov. 1986).
[13] 19 U.S.C. § 1337(a)(1)(A); *TianRui*, 661 F.3d at 1335.

R&D Cost Allocation and Income Sharing for Industry-University Cooperation in Open Innovation Context

Bao xinzhong,[*] Dong yuhuan[**] & Wang yan[***]

ABSTRACT

Open innovation is one of the effective modes to promote the transfer of universities research result of intellectual property into the enterprises demand side of intellectual property. Solving the cooperation mechanism and income distribution problems of demander and provider of intellectual property is the key to guarantee long-term steady development of open intellectual property innovation. This paper studies the cooperation mechanism problems of university and enterprise based on game theory with income distribution model as analysis thought. The study result shows: the demander of intellectual property promises to higher Transfer payment proportion to provider of intellectual property in contract form, which can increase the overall return of open innovation; university and enterprise should prefer collaborative innovation, because the intellectual property rights innovation scale of the demander and provider of intellectual property when carrying out cooperative game is greater than that when carrying out non-cooperative game; reasonable distribution can be carried out for excess earnings produced from cooperation innovation based on Rubinstein subgame perfect equilibrium result.

Keywords: intellectual property, open innovation, cost allocation, income distribution, cooperative game

[*] Professor, Master tutor, Management College, Beijing Union University, Beijing,100101,China.
[**] Postgraduate, Management College, Beijing Union University, Beijing, 100101, China.
[***] Postgraduate, Management College, Beijing Union University, Beijing, 100101, China.

I. Introduction

The modern enterprise operating environment is increasingly presenting the dynamic nonlinear characteristics, which enables innovation research to show new open patterns by constantly breaking through enterprises boundary, and the traditional innovation model faces enormous challenges such as ever-accelerating innovation cycle, huge R & D investment, and inefficient intellectual property transfer. Given new innovation management theory and tool demand, international innovation research develops to the trends of globalization, R&D outsourcing, early integration with supplier, user innovation, etc., and all of these trends share the characteristics of open innovation. Henry Chesbrough firstly put forward the concept of "open innovation", he pointed out that an organization should not only make use of existing knowledge and creativity inside it, but also draw lessons from knowledge and creativity outside it to improve its core competence and enhance its innovation performance.[1] Basically, knowledge supply comes from independent creation, external purchase and external cooperation. In the network environment, the intenser the enterprise competition, the higher the implementation cost of project, the longer time used, the higher the technical advancement, the more inclined it is to obtain knowledge from outside. Compared with closed innovation, open innovation can shorten innovation cycle, speed up the pace of innovation, reduce innovation risk and innovation cost, and increase innovation efficiency, in the intense competitive wave of globalization, open innovation is the necessary choice for organizational innovation. From the point of view of innovation resources, there are two basic paradigms of open innovation of organization, i.e. outside-inside "internally oriented innovation" and inside-outside "externally oriented innovation". The internally oriented innovation emphasizes that the organization should search and acquire innovation resources outside of the organization, while the externally oriented innovation emphasizes that the organization focuses on pushing innovation resources of the organization to outside of the organization to rapidly realize the market value of innovation. Enkel, Gassmann and Chesbrough put forward the "mixed open innovation" based on such two basic paradigms of internally oriented innovation and externally oriented innovation, i.e.[2][3] the organization combines innovation resource spillover and innovation resource acquisition to create value with

[1] Henry W. Chesbrough, OPEN INNOVATION: THE NEW IMPERATIVE FOR CREATING AND PROFITING FROM TECHNOLOGY 8 (2003).
[2] Ellen Enkel, Oliver Gassmann & Henry Chesbrough, *Open R&D and Open Innovation: Exploring the Phenomenon,* 39 R&D MANAGEMENT 311, 311-316 (2009).
[3] Henry Chesbrough & Adrienne Kardon Crowther, *Beyond High-tech: Early Adopters of Open Innovation in Other Industries*, 36 R & D MANAGEMENT 229 (2006).

complementary collaborator in ways of cooperation, alliance, etc.

Many scholars conducted study of open innovation in three aspects including industry source, organizational form and innovation performance. The study of open innovation is initially mainly conducted related to information technology industry, especially open source and open standard, at present, related study has broken the limit of high-technology industry and developed to multi-industry. On this basis, Rigby and Zook proposed to judge whether the enterprise and its industry are suitable for adopting the open innovation model from five indexes including innovation density, capital source, correlation, generality and market fluctuation.[4]

Saguy think collaboration and cooperation innovation ecosystem stakeholders is crucial.[5] The organizational form of open innovation can be summarized into five types: Cooperate with lead user and supplier; purchase patent and ownership of technology; investment to participate in projects of research institute; set up research alliance; set up joint venture. The study conducted by Christensen showed that the selection of organizational form adopted by open innovation depends on three conditions, i.e. position of organization in innovation system, maturity stage of technology regime and value proposition pursued by enterprise.[6] Hippel, Hertel, West and Hemnann conducted study of open innovation strategy team of enterprises;[7] Simard and West held that weak tie is the more organic organizational form for open innovation after distinguishing different ways of contact;[8] Gassmann conducted study of principle that should be followed by organizational form of open innovation;[9] Hienerth conducted analysis of causes for successful adoption of organizational form of open innovation by only few enterprises at present.[10]

In respect of open innovation performance, many systematic empirical studies pointed out that rational allocation of resources by open innovation can

---

[4] Darrell Rigby & Chris Zook, Open-Market Innovation, 10 HARVARD BUSINESS REVIEW 80, 80 (2006).

[5] I. Sam Saguy, *Challenges and opportunities in food engineering: Modeling, virtualization, open innovation and social responsibility*, 176 JOURNAL OF FOOD ENGINEERING 2, 2-8 (2016).

[6] Jens Frøslev Christensen, Michael Holm Olesen & Jonas Sorth Kjær, *The Industrial Dynamics of Open Innovation Evidence from the Transformation of Consumer Electronics*, 34 RESEARCH POLICY 1533, 1533 (2005).

[7] Georg von Krogh & Eric von Hippel, *Special Issue on Open Source Software Development,* 32 RESEARCH POLICY 1149, 1149 (2003).

[8] Caroline Simard & Joel West, KNOWLEDGE NETWORKS AND THE GEOGRAPHIC LOCUS OF INNOVATION 220-240 (2008).

[9] Oliver Gassmann, *Opening up the Innovation Process: towards an Agenda*, 36 R & D MANAGEMENT 223, 223-226 (2006).

[10] Christoph Hienerth, *The Commercialization of User Innovations: The Development of the Rodeo Kayak Industry*, 36 R & D MANAGEMENT 273, 273-294 (2006).

improve enterprises' innovation performance. Laursen and Salter studied the influence of openness on innovation performance from two measurement indexes of breadth and depth, holding that there is an inverted U shape curvilinear relationship between them.[11] Cooke explored the new model between relationship between open innovation and regional intellectual capacity and cluster.[12]Also some scholars hold different views, Ajay, the results also show that "open innovation" might prevent intellectual property across organizational boundaries, have a negative impact. Gambardella.[13] Alfonso study in an open innovation relations has an important asset will enjoy bargaining power, and on the other side of the hinders the investment cooperation.[14]

As the research on open innovation moves along, doubts on sustainability of open innovation appear. Granstrand found that intellectual property allocation problem in the open innovation is more and more prominent.[15] Hagedoorn found that in a highly open environment, enterprises by intellectual property rights protection to ensure that their own innovation ability.[16] Joel West raised questions on open innovation of enterprises of open-source software: Why companies are still willing to contribute their own intellectual property rights and resources for innovation, though they know such innovation is advantageous to others even competitors? How to encourage external innovators to maintain continuous innovation?[17] Rene further discussed the different types of R&D cooperation's value to use and value creation for the influence of the ownership of intellectual property rights.[18] Reinhard P and Martin Schreier

---

[11] Keld Laursen & Ammon Salter, *Open for Innovation: The Role of Openness in Explaining Innovation Performance among UK Manufacturing Firms*, 27 STRATEGIC MANAGEMENT JOURNAL 131, 131-150 (2006).

[12] Phil Cooke, *Regionally Asymmetric Knowledge Capabilities and Open Innovation: Exploring 'Globalisation 2 '-A new Model of Industry Organization*, 34 RESEARCH POLICY 1128, 1128 (2005).

[13] Ajay Bhaskarabhatla & Deepak Hegde, *An Organizational Perspective on Patenting and Open Innovation. Bhaskarabhatla*, 25 ORGANIZATION SCIENCE 1744, 1744-1763 (2014).

[14] Alfonso Gambardella & Panico Claudio, *On the management of open innovation,* 43 RESEARCH POLICY 903, 903-913 (2014).

[15] Ove Granstrand & Marcus Holgersson, *The Challenge of Closing Open Innovation The Intellectual Property Disassembly Problem*, 57 RESEARCH-TECHNOLOGY MANAGEMENT 19, 19-25 (2014).

[16] Hagedoorn John & Zobel Ann-Kristin, *The Future Of Three-Dimensional Printing: Intellectual Property Or Intellectual Confinement?,* 27 TECHNOLOGY ANALYSIS & STRATEGIC MANAGEMENT 1050, 1050-1067 (2015).

[17] Joel West & Scott Gallagher, *Challenges of Open Innovation: The Paradox of Firm Investment In Open-Source Software,* 36 R&D MANAGEMENT 319, 319-331 (2006).

[18] Rene Belderbosa et al., *Co-Ownership of Intellectual Property: Exploring The Value-Appropriation And Value-Creation Implications of Co-Patenting With Different Partners*,

studied how to make use of toolkit to encourage more users to participate in the innovation continuously.[19] Therefore, to establish effective cooperation mechanism between open innovation participants is crucial, research and development cost allocation and cooperation profit distribution are the most key and the most prominent and contradictory problem in cooperation mechanism, how to design reasonable research and development cost allocation and cooperation profit distribution scheme becomes the key to success of open innovation model. S. Siegel Donald pointed out that unreasonable design of profit distribution system is one of primary obstacles influencing technology transfer between universities and enterprises.[20] Deborah H, conducted comparative analysis of university - enterprise R&D alliance of the United States, Japan and France in chemical engineering field, and found that common value rule of alliance member, distribution of results such as patent and dissertation are important factors to success of alliance. The intellectual property relationship and its benefit mechanism in open innovation need to be determined in terms of changes to technology, limitation of law and distribution of economic income.[21]Therefore, the formation, classification, definition and interests allocation mechanism of property rights in the process of analysis of technological innovation need to adopt comprehensive technical, economic and legal analysis method (TEL analysis frame). Henkel, Joachim finded giving up the intellectual property rights in open innovation would help the business development of the enterprise. It also encourages the enterprise initiative to undertake interest allocation in the open innovation.[22]

Relatively, there are few scholars conducting study on cooperation mechanism among main bodies participating in open innovation, so how to design reasonable research and development cost allocation and cooperation profit distribution scheme to ensure the stability of the cooperation among main bodies participating in open innovation can not only enrich the open innovation theory, but also will be great importance for application of this theory in practice. Taking open innovation cooperation between university-enterprise as

---

43 RESEARCH POLICY 841, 841-852 (2014).

[19] Reinhard Prügl & Martin Schreier, *Learning from Leading-Edge Customers at The Sims: Opening Up The Innovation Process Using Toolkits,* 36 R&D MANAGEMENT 237, 237-250 (2006).

[20] Donald S. Siegel et al., *Commercial Knowledge Transfers from Universities to Firms: Improving the Effectiveness of University-Industry Collaboration,* 15 JOURNAL OF HIGH TECHNOLOGY MANAGEMENT RESEARCH 111, 111-133 (2003).

[21] Deborah H. et al., *Sticky Issues for Corporate-University R&D Alliances,* 105 CHEMICAL ENGINEERING 39, 39-42 (1998).

[22] Joachim Henkel, Simone Schöberl & Oliver Alexy, *The Emergence of Openness: How and Why Firms Adopt Selective Revealing in Open Innovation,* 43 RESEARCH POLICY 879, 879-890 (2014).

an example, this paper explores how to design reasonable research and development cost allocation and cooperation profit distribution scheme to push sustained and stable open innovation cooperation. On basis of pertinent literatures, Part 2 proposes the rules of the game between university and enterprise in open innovation cooperation; Part 3 conducts cooperative game analysis and non-cooperative game analysis for cooperation between the two parties; Part 4 presents the residual income distribution model of open innovation, and conducts calculation example analysis.

II. Rules of game of university-enterprise cooperation mechanism in open innovation

A. University-enterprise cooperation mechanism in open innovation

From the perspective of intellectual property rights transfer, in cooperation mechanism in open innovation cooperation mode enterprise and university realize platform operation such as resource integration, information sharing, risk sharing, intellectual property support and fund circulation, pursue the realize the cooperation mechanism enables maximization of the overall interests, produce greater competitive advantage, improve the economic benefit and service level of various main bodies, thus enabling the intellectual property incubating to become the "bridge" for communicating all kinds of innovation main bodies and factor markets, facilitating transfer of system knowledge and transfer among various links of longitudinal movement of intellectual property. From the perspective of cooperation mechanism, its application in open innovation facilitates the market-oriented operation mechanism and safeguard measures of intellectual property transfer; profit distribution will influence the internal cost and future operating conditions of various main bodies, guide the benign development of open innovation cooperative relationship, and stabilize the application of open innovation model in intellectual property transfer.

The determination of the cooperation mechanism not only refers to intellectual property rights cooperated, but also includes products and profits produced in this process, as well as distribution of interests like risk and cost produced during cooperation among enterprises represented by direct economic value in various main bodies, how to deal with benefit and cost allocation properly is very important.

Game theory has important application in research on cooperation mechanism, it is to study the decision and the decision's equilibrium when decision-makers' actions act on each other. It holds that economy is a whole, interpersonal choice interact with each other, persisting in the principle of fairness and rationality is the result of gaming among cooperating parties, game

is mainly divided into cooperation game and non-cooperation game. Where, cooperative game is the best way to solve cooperation bodies' benefit distribution, which can take into consideration of both individual rationality and overall rationality, expects every mediator is able to communicate and collaborate with each other to allow the overall interests being greater than sum of incomes produced from separate operation of internal enterprises, meanwhile, realize respective benefit maximization and maintaining stable relationship of cooperating parties; non-cooperative game emphasizes the individual rationality, which needs to seek to keep benefit equilibrium of cooperating parties to realize the optimal cooperation mechanisms of members in intellectual property incubating.

From the perspectives of game theory, the operation process of intellectual property incubating model can be decomposed into two steps: the first step is to determine a profit distribution scheme (coefficient) as deemed reasonable by two parties, which is a cooperative game process; the second step is that two parties determine their contribution level to virtual enterprise under defined profit distribution coefficient, respectively to maximize their own net income, which is a non-cooperative game process.

B. Rules of game of university-enterprise cooperation in open innovation

The rules of game of open innovation refer to participants, actions of participants and results of such actions in cooperative game. This paper studies the university-enterprise cooperation, participants in open innovation refer to enterprise as demander of intellectual property rights innovation and university as provider of intellectual property rights innovation. So this paper considers the enterprise (hereinafter collectively referred to as "demander of intellectual property rights") as demander of intellectual property rights innovation as one party, and university (hereinafter collectively referred to as provider of intellectual property rights") as provider of intellectual property rights innovation as the other party. The actions of demander of intellectual property rights innovation and provider of intellectual property rights innovation refer to two parties' decision variables in a certain time point of game, generally, a_i represents the specific action of i participant, $A_i = \{a_i\}$ represents the collection of all actions for i to select. In game theory, the actions of both game participants may be discrete or continuous. In the selection of open innovation model in this paper, the actions of game participants are discrete, while the actions of profit distribution are continuous.

The strategies in game refer to rules of action of game participants with given information set, which require game participants to select different actions

in different situations. s_i represents the specific strategy of participant i, the collection of all strategies of participant i is called set of strategy, recorded as $S_i = \{s_i\}$, $i \in N$. Every game participant can select one strategy, and the vector $s = (s_1, s_2, \ldots, s_n)$ composed of all strategies is called a set of strategy, where s_i represents the strategy selected by participant i. In open innovation model, the cooperative parties have their respective strategy in cooperation, and always wish to realize the maximum of their own profit under their respective strategy that they select. If the strategy spaces of demander of intellectual property and provider of intellectual property are S_a , S_b, respectively, then, all strategy spaces of open innovation can be represented as $S = \prod_{i=a,b} S_i$, it can be found that with the increase of their respective strategy of demander of intellectual property and provider of intellectual property, the strategy spaces of the whole cooperative intellectual property rights innovation will have greater increase. If the demander of intellectual property and provider of intellectual property consider from the perspectives of maximization of the overall interests of alliance, then, both parties will negotiate jointly to adopt a certain strategy to improve the overall interests of alliance instead of considering strategy that can maximize their individual interests.

III. Game analysis of university-enterprise cooperation mechanism in open innovation

A. Assumptions of the study

Now the university-enterprise cooperation mechanism in open innovation is analyzed from the perspectives of the framework of static game.

During research and development and creation of intellectual property, the provider of intellectual property needs to bear more research and development failure risk of intellectual property. So the undertaking of research and development failure risk by the provider of intellectual property must be considered in cooperation mechanism model. Besides, the innovation ability of the provider of intellectual property is very important to rapid market respond of the demander of intellectual property. When the demander of intellectual property is very dependent on innovative demand of intellectual property, the enterprise as demander of intellectual property rights may provide a certain percentage of intellectual property rights innovation cost for the provider of intellectual property to promote the development of intellectual property, improve the quality of intellectual property innovation, and shorten the

development period of intellectual property by the provider of intellectual property. So this paper introduces the intellectual property rights innovation cost allocation ratio of the demander of intellectual property so as to stimulate the enthusiasm of the provider of intellectual property for intellectual property innovation.

Suppose the demander of intellectual property manufactures products to meet market demand D, and the unit cost of products is c_m. If the provider of intellectual property reduces $r_m\theta$ ($r_m\theta \le c_m$) the internal production cost of unit product of the demander of intellectual property by means of intellectual property innovation, the intellectual property innovation cost is $\frac{1}{2}I\theta^2$, where I is the constant that can be estimated, θ is the coefficient of effort level of the provider of intellectual property in intellectual property innovation. Huge investment is required to input one new intellectual property into actual production, so the provider of intellectual property may lack stimulation for intellectual property innovation due to huge cost of investment. So the demander of intellectual property needs to adopt price subsidy and transferring payment system to stimulate the provider of intellectual property to carry out intellectual property innovation. Basic assumptions of the model are as follows:

1. In cooperation of the demander of intellectual property and provider of intellectual property, the demander of intellectual property is one party, while the provider of intellectual property is the other party.

2. Market structure is perfectly competitive market, market demand D is the production capacity of enterprise as the demander of intellectual property, here, assume D remains constant.

3. Price p of unit product is determined by overall market supply and demand, here, assume p remains constant.

4.The investment cost for the provider of intellectual property to carry out intellectual property innovation is $\frac{1}{2}\mathrm{I}\theta^2$, where I is an investment cost constant of the provider of intellectual property that can be estimated, θ is the coefficient of effort level of the provider of intellectual property in intellectual property innovation.

5. The price subsidy of unit product for the provider of intellectual property by the demander of intellectual property is $r_s\theta$, r_s is price subsidy factor.

6.If the intellectual property innovation work of the provider of intellectual property is completed successfully, then the demander of intellectual property will give it a certain intellectual property innovation subsidy. Here, suppose the

intellectual property innovation subsidy factor paid to the provider of intellectual property by the demander of intellectual property is t.

7. If the provider of intellectual property reduces the internal production cost of unit product of the demander of intellectual property by means of intellectual property innovation $r_m\theta$. The higher the effort level of the provider of intellectual property in intellectual property innovation, the more amount of reduction of unit cost of product of the demander of intellectual property.

A, B and C represent the net income of the demander of intellectual property, net income of the provider of intellectual property and total net income of cooperation innovation. Based on the above assumptions, one group of expression can be obtained as follows:

Net income of the demander of intellectual property:

$$A = D\left(p - c_m + r_m\theta - r_s\theta\right) - t * \frac{1}{2} I\theta^2 \tag{1}$$

Net income of the provider of intellectual property:

$$B = Dr_s\theta - \left(1 - t\right) * \frac{1}{2} I\theta^2 \tag{2}$$

Total net income of cooperation innovation:

$$C = A + B = D\left(p - c_m + r_m\theta\right) - \frac{1}{2} I\theta^2 \tag{3}$$

B. Equilibrium analysis under non-cooperation game

When the demander and the provider of intellectual property are conducted non-cooperative game, the relevant decision behavior of each party conforms to the principle of economic rationality, that is to say, each party of the industry-university-research cooperation are all "the exterior and economic men", they always adopt the most favorable strategies to themselves, i.e. the priority of individual rationality.

Here suppose the demander of the intellectual property as the initiator of the open innovation of intellectual property, and the provider of intellectual property as the responder of the cooperation. Sequential non-cooperative game model can be established according to this assumption. The demander of the intellectual property promises to provide the cost of intellectual property innovation to the provider of intellectual property, the proportion of transfer payment is t, and confirm that the subsidy factor of price is r_s. After the observation of t, the provider of intellectual property can rechoose θ. The solution to this non-cooperative game is named the Stackelberg equilibrium.

Then backward induction is used, firstly find the reaction function of the

second stage of this game. The provider of intellectual property chooses the effort level θ of intellectual property innovation, then use formula (2) to take first derivative with respect to θ and make it 0, it can get as follows:

$$\frac{dB}{d\theta} = Dr_s - (1-t)I\theta = 0$$

Then it can be obtained:

$$\theta = \frac{Dr_s}{(1-t)I} \tag{4}$$

$\frac{d\theta}{dt} = \frac{Dr_s}{(1-t)I} > 0$ Due to , which proves that the effort level of innovation effort innovation developed by the provider of intellectual property shows positive correlation with the proportion of transfer payment t provided by the demander of intellectual property, the bigger t is, the more investment in intellectual property innovation by the provider of intellectual property is. Hence, to stimulate investment in intellectual property innovation, the demander of the intellectual property can promise higher proportion of transfer payment for the provider of intellectual property through contract form and thus further lower the production cost of unit product of the demander of the intellectual property.

Then the revenue of the demander of the intellectual property can be obtained, plug formula (4) into formula (1), get:

$$\begin{aligned} A &= D(p - c_m + r_m\theta - r_s\theta) - t * \frac{1}{2} I\theta^2 \\ &= D(p - c_m) + \frac{D^2(r_m - r_s)r_s}{(1-t)I} - \frac{D^2 r_s{}^2 t}{2I(1-t)^2} \end{aligned} \tag{5}$$

To maximum the income of the demander of intellectual property, take first derivative with respect to t in formula (5) and make it 0, i.e.

$$\frac{dA}{dt} = \frac{D^2(r_m - r_s)r_s}{(1-t)^2 I} - \frac{D^2 r_s{}^2 (1+t)}{2I(1-t)^3} = 0$$

Then the optimum subsidy coefficient of intellectual property innovation of the demander of intellectual property can be get:

$$t^* = \frac{2r_m - 3r_s}{2r_m - r_s} \left(r_m > \frac{3}{2} r_s \right) \tag{6}$$

Plug formula (6) into formula (4), can get:

$$\theta^* = \frac{D(2r_m - r_s)}{2I} \tag{7}$$

Thus, when the demander and the provider of intellectual property are conducted non-cooperative game, the result of Stackelberg equilibrium is:

$$\left(t^*,\theta^*\right)=\left(\frac{2r_m-3r_s}{2r_m-r_s},\frac{D\left(2r_m-r_s\right)}{2I}\right)$$

Thereby, when the demander and the provider of intellectual property are conducted non-cooperative game, the revenue of the provider and the demander of intellectual property and the total revenue of open innovation A^*、B^*、C^* are:

$$\begin{aligned}A^* &= D\left(p-c_m+r_m\theta^*-r_s\theta^*\right)-t^**\frac{1}{2}I\theta^{*2}\\ &= D\left(p-c_m\right)+\frac{D^2\left(r_m-r_s\right)\left(2r_m+r_s\right)}{2I}-\frac{D^2\left(4r_m{}^2-r_s{}^2\right)}{8I}\end{aligned} \tag{8}$$

$$B^*=Dr_s\theta^*-\left(1-t^*\right)\frac{1}{2}I\theta^{*2}=\frac{D^2r_s\left(2r_m+r_s\right)}{2I}-\frac{2D^2r_s\left(2r_m+r_s\right)}{8I} \tag{9}$$

$$\begin{aligned}C^* &= A^*+B^*=D\left(p-c_m+r_m\theta\right)-\frac{1}{2}I\theta^2\\ &= D\left(p-c_m\right)+\frac{D^2r_m\left(2r_m+r_s\right)}{2I}-\frac{D^2\left(2r_m+r_s\right)^2}{8I}\end{aligned} \tag{10}$$

C. Equilibrium analysis under cooperative game

Equilibrium analysis under cooperative game refers to the demander and the provider of intellectual property pursue overall benefit maximization of both sides as a goal to confirm t and θ under the condition of collaboration, the cooperative game model is established as follows:

$$\max_{t\,,\,\theta} C=A+B=D\left(p-c_m+r_m\theta\right)-\frac{1}{2}I\theta^2 \tag{11}$$

To maximum the whole profits of both sides, it can take first-order partial derivative with respect to this model θ, and make it 0, i.e.

$$\frac{\partial C}{\partial\theta}=Dr_m-I\theta=0$$

It can be obtained:

$$\overline{\theta^*}=\frac{Dr_m}{I} \tag{12}$$

When the demander and the provider of intellectual property are conducted cooperative game, the Pareto optimal solution is $\left(\overline{t^*},\frac{Dr_m}{I}\right)$, in this case, the income of the demander of intellectual property and the university research

party and the total income $\overline{A^*}\ \overline{B^*}\ \overline{C^*}$ of both sides are:

$$\begin{aligned}\overline{A^*} &= D\left(p - c_m + r_m\overline{\theta^*} - r_s\overline{\theta^*}\right) - t*\frac{1}{2}I\overline{\theta^*}^2 \\ &= D\left(p - c_m\right) + \frac{D^2\left(r_m{}^2 - r_s r_m\right)}{I} - \frac{tD^2 r_m{}^2}{2I}\end{aligned} \tag{13}$$

$$\overline{B^*} = Dr_s\overline{\theta^*} - (1-t)*\frac{1}{2}I\overline{\theta^*}^2 = \frac{D^2 r_s r_m}{I} - \frac{(1-t)D^2 r_m{}^2}{2I} \tag{14}$$

$$\overline{C^*} = D\left(p - c_m + r_m\overline{\theta^*}\right) - \frac{1}{2}I\overline{\theta^*}^2 = D\left(p - c_m\right) + \frac{D^2 r_m{}^2}{2I} \tag{15}$$

When the demander and the provider of intellectual property are conducted collaboration, Pareto optimal is not always feasible, neither of the demander and the provider of intellectual property will accept lower income than under the condition of non-cooperative game. Thereby, when the demander and the provider of intellectual property are conducted collaboration, the scheme of effective Pareto optimal shall meet that the net income of each side shall be equal or greater than in non-cooperative game, namely must meet:

$$N\left(\overline{t^*}, \overline{\theta^*}\right) = \left\{\left(\overline{t^*}, \overline{\theta^*}\right) | \overline{A^*}\left(\overline{t^*}, \overline{\theta^*}\right) \geq A^*, \overline{B^*}\left(\overline{t^*}, \overline{\theta^*}\right) \geq B^*\right\}$$

Thus $$\Delta A = \overline{A^*} - A^* = \frac{D^2\left[\left(1-\overline{t^*}\right)r_m{}^2 - r_m r_s + \frac{3}{4}r_s{}^2\right]}{2I} \geq 0 \tag{16}$$

$$\Delta B = \overline{B^*} - B^* = \frac{D^2\left[r_m r_s - \left(1-\overline{t^*}\right)r_m{}^2 - \frac{1}{2}r_s{}^2\right]}{2I} \geq 0 \tag{17}$$

From formula (16) and (17) we can get:

$$1 - \frac{r_s}{r_m} + \frac{1}{2}\left(\frac{r_s}{r_m}\right)^2 \leq \overline{t^*} \leq 1 - \frac{r_s}{r_m} + \frac{3}{4}\left(\frac{r_s}{r_m}\right)^2$$

Thus, when the demander and the provider of intellectual property are conducted cooperative game, the equilibrium solution to cooperative game is as follows:

$$N\left(\overline{t^*}, \overline{\theta^*}\right) = \left\{\left(\overline{t^*}, \overline{\theta^*}\right) | 1 - \frac{r_s}{r_m} + \frac{1}{2}\left(\frac{r_s}{r_m}\right)^2 \leq \overline{t^*} \leq 1 - \frac{r_s}{r_m} + \frac{3}{4}\left(\frac{r_s}{r_m}\right)^2\ \overline{\theta^*} = \frac{Dr_m}{I}\right\}$$

Under given conditions, it is obvious that $N\left(\overline{t^*}, \overline{\theta^*}\right)$ is not null, so when the demander and provider of intellectual property are conducted collaboration,

effective pareto optimal is always existing. On this occasion, the demander and provider of intellectual property can get more net income than the condition of on-cooperative game, thus can get the residual income of cooperation alliance upon the effective Pareto optimal:

$$\Delta C = \overline{C^*} - C^* = \frac{D^2 r_s^{\,2}}{8I} \tag{18}$$

Conclusions can be reached through the above research, when the demander and provider of intellectual property are conducted cooperative game, the scale of intellectual property innovation is greater than non-cooperative game, because when both sides are conducted collaboration, the net income of both sides and the total revenue of cooperation is obviously greater than the result of non-cooperative game. When the demander and provider of intellectual property are conducted collaboration, the system always exist effective Pareto optimal. So the demander and provider of intellectual property generally prefer to collaboration instead of non-collaborative way.

Since cooperation alliance residual income is produced during the cooperation of the demander and provider of intellectual property, then the research into how to distribute the residual income between the demander and provider of intellectual property has very important practical significance.

When the demander and the provider of intellectual property are conducted cooperation as rational individuals, they all want to get more residual income. Thus, the demander of intellectual property expects smaller subsidy coefficient of intellectual property innovation, but the provider of intellectual property innovation expects bigger subsidy coefficient. To confirm reasonable proportion of transfer payment, the bargain model of Rubinstein is used for computing.

The bargain model of Rubinstein certifies the unique existence of the result of subgame perfect equilibrium in infinite alternating-offer game: $r^* = \frac{1-\delta_2}{1-\delta_1\delta_2}$.

Of which δ_1, δ_2 represents the discount factor (negotiation ability) of the provider and the demander of intellectual property respectively. In other words, in given situation, the cooperating party with higher negotiation ability can get bigger share. The negotiation ability depends on the market position and negotiation cost of the demander and the provider of intellectual property. When δ_1, δ_2 is known, the system residual income obtained by the demander and the provider of intellectual property is as follows:

$$\Delta A = r^* \Delta C = \frac{(1-\delta_2) D^2 r_s^{\,2}}{8(1-\delta_1\delta_2) I}$$

$$\Delta B = \left(1 - r^*\right)\Delta C = \frac{\delta_2\left(1-\delta_1\right)D^2 r_s{}^2}{8\left(1-\delta_1\delta_2\right)I}$$

The subsidy coefficient of intellectual property innovation of effective Pareto optimal is:

$$\overline{t^*} = t_{\max} - \frac{\Delta A}{\overline{Z^*}} = t_{\min} + \frac{\Delta B}{\overline{Z^*}} = 1 - \frac{r_s}{r_m} + \frac{1}{2}\left(\frac{r_s}{r_m}\right)^2 + \frac{\delta_2\left(1-\delta_1\right)}{4\left(1-\delta_1\delta_2\right)}\left(\frac{r_s}{r_m}\right)^2$$

Wherein:

$$t_{\max} = 1 - \frac{r_s}{r_m} + \frac{3}{4}\left(\frac{r_s}{r_m}\right)^2, t_{\min} = 1 - \frac{r_s}{r_m} + \frac{1}{2}\left(\frac{r_s}{r_m}\right)^2 \quad \overline{Z^*} = \frac{1}{2}I\overline{\theta^{*2}} = \frac{D^2 r_m{}^2}{2I}$$

When the cooperative game is conducted between the demander and the provider of intellectual property, the equilibrium solution of cooperative game is:

$$\left(\overline{t^*}, \overline{\theta^*}\right) = \left(1 - \frac{r_s}{r_m} + \frac{1}{2}\left(\frac{r_s}{r_m}\right)^2 + \frac{\delta_2\left(1-\delta_1\right)}{4\left(1-\delta_1\delta_2\right)}\left(\frac{r_s}{r_m}\right)^2 \quad \overline{\theta^*} = \frac{Dr_m}{I}\right)$$

Suppose that the negotiation ability δ_1 of the demander of intellectual property remains unchanged, but the negotiation ability of the provider of intellectual property increases to $\delta_2{}^*$ ($\delta_2{}^* > \delta_2$), then the subsidy coefficient of intellectual property innovation of effective Pareto optimal is $\overline{t^{**}}$, which can be achieved through computing:

$$\overline{t^{**}} - \overline{t^*} = \left(\frac{r_s}{r_m}\right)^2\left[\frac{\delta_2{}^*\left(1-\delta_1\right)}{4\left(1-\delta_1\delta_2{}^*\right)} - \frac{\delta_2\left(1-\delta_1\right)}{4\left(1-\delta_1\delta_2\right)}\right] = \left(\frac{r_s}{r_m}\right)^2 \frac{\left(\delta_2{}^* - \delta_2\right)\left(1-\delta_1{}^2\right)}{4\left(1-\delta_1\delta_2{}^*\right)\left(1-\delta_1\delta_2\right)} > 0$$

Thus $\overline{t^{**}} > \overline{t^*}$, i.e. when the negotiating ability of the provider of intellectual property increases, the subsidy coefficient of intellectual property innovation of effective Pareto optimality increase, then the provider of the intellectual property can get more residual income.

Similarly, suppose that the negotiation ability of the provider of intellectual property remains unchanged, δ_2 but the negotiation ability of the demander increases to $\delta_1{}^*$ ($\delta_1{}^* > \delta_1$) then:

$$\overline{t^{**}} - \overline{t^*} = \left(\frac{r_s}{r_m}\right)^2\left[\frac{\delta_2\left(1-\delta_1{}^*\right)}{4\left(1-\delta_1{}^*\delta_2\right)} - \frac{\delta_2\left(1-\delta_1\right)}{4\left(1-\delta_1\delta_2\right)}\right] = \left(\frac{r_s}{r_m}\right)^2 \frac{\left(\delta_1{}^* - \delta_1\right)\left(\delta_2{}^2 - \delta_2\right)}{4\left(1-\delta_1{}^*\delta_2\right)\left(1-\delta_1\delta_2\right)} < 0$$

Thus $\overline{t^{**}} < \overline{t^*}$, i.e. when the negotiating ability of the demander of

intellectual property increases, the subsidy coefficient of intellectual property innovation of effective Pareto optimality decreases, then the demander of the intellectual property can get more residual income.

Thus, conclusion can be reached, the distribution of the residual income mainly depends on the negotiation ability of the provider and demander of the intellectual property, the higher the negotiation ability, the more the residual income.

IV. The application of cooperative game equilibrium solution in the design of open and cooperative cooperation mechanism

A. Estimation of model parameters

1.The estimation of innovation cost I of intellectual property

As the universities and scientific research institutions of the provider of intellectual property innovation, material resource, information resource with certain value and human resource with high intelligence are needed in the development process of intellectual property. Thus, the innovation cost of intellectual property is divided in two parts here: i.e. the input cost of material and information resource and the input cost of human resource. Of which, the input cost of material and information resource can be deemed as two parts, one is fixed cost, the other one is time variable cost, which means that it is concerned with the development time of intellectual property innovation. While the input cost of human resource can be deemed as relating to the length of development time of intellectual property innovation.

Here, consider the fixed cost of material and information of the provider of intellectual property innovation in the development process of the intellectual property is C_k, and the variable cost per unit in innovation with regard to the length of development time is AVC, the variable cost per unit in innovation can be estimated by the following formula:

$$AVC = AVC_I + AC_H$$

Of which AVC is innovative variable cost per unit, AVC_I is variable cost of material information resources per unit, AC_H is human resources cost per unit.

AVCI includes information design cost per unit and the cost of designing and seeking effective information, intellectual property cost per unit and the cost of collecting and processing and the cost of information resource and human resource per unit.

ACH includes the cost achieved per unit: recruiting cost, selection cost,

hiring and placement cost. Development cost per unit is orientation cost and training cost, usage cost per unit is reward paid by enterprise but not including bonus.

After the confirmation of innovative variable cost per unit, suppose T as total time devoted by universities or scientific research institution of the provider of intellectual property in intellectual property innovation, C_k as fixed cost of material and information resources innovation, thus the estimation formula of innovation cost I of intellectual property can be conformed as follows:

$$I = C_k + AVC * T = C_k + \left(AVC_I + AC_H \right) * T$$

2. Confirmation of δ_1, δ_2 the coefficient of negotiation ability

When cooperation is conducted between the demander and the provider of intellectual property, to get more residual income, the demander of intellectual property expects smaller subsidy coefficient in intellectual property innovation, but the provider of intellectual property expects bigger subsidy coefficient in intellectual property innovation. In a given situation, the one with stronger negotiation ability get the bigger share of the residual income, so the confirmation of the negotiation ability seem to be of vital importance. In this paper, fuzzy comprehensive evaluation method is used to confirm the coefficient of negotiating ability of both sides, the negotiation ability depends on factors of the demander and the provider of intellectual property such as the degree of risk appetite, market position, negotiation cost, operational and financial status, etc.

According to what is mentioned above, the evaluation factor set is:

$A = \{$*The degree of risk appetite*, M*arket position*, N*egotiation cost* , F*inancial status*$\}$

Firstly, the analytic hierarchy process can be used to determine the weight of each evaluation index in A integrated with the judgment of the expert for the relative importance of each evaluation factor, the quoting of scale criterion of 1-9 has respectively established factor level of evaluation for the judgment matrix of overall evaluation level and the corresponding evaluation factor of each index in index level of evaluation. Suppose that the corresponding weight vector set $W = \{w_1, w_2, w_3, w_4\}$ and the evaluation set of each factor are $V = \{$*Low*, *relatively low*, *ordinary*, *relatively high*, *high*$\}$ ， the values V given to each factor in the evaluation set is $V = \{0.1,0.3,0.5,0.7,0.9\}$.

To get the degree of membership of each index with respect to the coefficient of negotiation ability between the provider and the demander of intellectual property, 10 experts are invited to score four indexes respectively in

the coefficient of negotiating ability of the provider and the demander of intellectual property. The evaluation set of each factor in the coefficient of negotiation ability is established and the evaluation results of all experts are counted, then single factor can be assessed and fuzzy relation synthetical matrix can be established, i.e. ensure the degree of membership of evaluation target for fuzzy subset from single factor and then get fuzzy relation matrix. The four fuzzy vectors in fuzzy relation matrix that affect the negotiation ability are Arisk appetite, Amarket position, Anegotiation cost, A financial situation. Then fuzzy relation matrix is:

$$R=\begin{bmatrix} W_{The\ degree\ of\ risk\ appetite} \\ W_{Market\ position} \\ W_{Negotiation\ cost} \\ W_{Financial\ status} \end{bmatrix}=\begin{bmatrix} r_{11} & r_{12} & r_{13} & r_{14} & r_{15} \\ r_{21} & r_{22} & r_{23} & r_{24} & r_{25} \\ r_{31} & r_{32} & r_{33} & r_{34} & r_{35} \\ r_{41} & r_{42} & r_{43} & r_{44} & r_{45} \end{bmatrix}$$

Later computing evaluation vector:

$$C=W\bullet R=\left(w_1,w_2,w_3,w_4\right)\begin{bmatrix} r_{11} & r_{12} & r_{13} & r_{14} & r_{15} \\ r_{21} & r_{22} & r_{23} & r_{24} & r_{25} \\ r_{31} & r_{32} & r_{33} & r_{34} & r_{35} \\ r_{41} & r_{42} & r_{43} & r_{44} & r_{45} \end{bmatrix}=\left[c_1,c_2,c_3,c_4,c_5\right]$$

Thus obtaining the coefficient of negotiating ability:

$$\delta=C\bullet V^T=\left[c_1,c_2,c_3,c_4,c_5\right]\bullet\begin{bmatrix} 0.1 \\ 0.3 \\ 0.5 \\ 0.7 \\ 0.9 \end{bmatrix}=0.1c_1+0.3c_2+0.5c_3+0.7c_4+0.9c_5$$

Now the solution to negotiation ability coefficient will be studied, as stated before, the evaluation factor of model is $A=\{The\ degree\ of\ risk\ appetite,\ Market\ position,\ Negotiation\ cost,\ Financial\ status\}$.

Firstly, the analytic hierarchy process (AHP) will be used to ensure the weight of each evaluation index in A. The importance scale of pairwise comparison on four indexes obtains according to the experts questionnaire of feedback, which can compute the weight of four indexes such as the degree of risk appetite, market position, negotiation cost and the operational and financial status:

$$W=\left[w_1,w_2,w_3,w_4\right]=[0.5174,0.3038\ 0.1176\ 0.0612]$$

Secondly, according to the degree of membership of evaluation index in

negotiation ability coefficient of the demander and the provider of intellectual property, their fuzzy evaluation matrix can be obtained:

$$R_1=\begin{bmatrix}0.3 & 0.4 & 0.3 & 0 & 0\\ 0 & 0 & 0.2 & 0.6 & 0.2\\ 0 & 0.2 & 0.5 & 0.3 & 0\\ 0 & 0 & 0.3 & 0.5 & 0.2\end{bmatrix},\quad R_2=\begin{bmatrix}0 & 0.3 & 0.4 & 0.3 & 0\\ 0 & 0.3 & 0.5 & 0.2 & 0\\ 0.5 & 0.4 & 0.1 & 0 & 0\\ 0.4 & 0.4 & 0.2 & 0 & 0\end{bmatrix}$$

The weight of four items in negotiation ability coefficient and fuzzy evaluation matrix of the demander and the provider of intellectual property are obtained, then we can compute evaluation vector C_i, $C_i = W \bullet R_i$

Thus the negotiation ability coefficient of the demander and the provider of intellectual property is:

Hence, the result of subgame perfect equilibrium can be further obtained:

B. Digital simulation example

The estimating and solving of parameter is studied previously, now we study the revenue between the demander and the provider of intellectual property under the condition of non-cooperative game and cooperative game in the innovation of open innovation of intellectual property through digital simulation.

Set

$$p=20,\ c_m=5,\ r_m=4,\ r_s=2,\ D=100,\ c_k=3,\ T=100,\ AVC_I=10,$$

$$AC_H=20,\ \delta_1=0.471,\ \delta_2=0.446$$

From the above parameter, we can get that the cost of innovation in intellectual property is:

$$I=C_k+\left(AVC_I+AC_H\right)*T=3+\left(10+20\right)\times 100=3003$$

1. When the demander and the provider of intellectual property carry through non-cooperative game, the Stackelberg equilibrium is:

$$\left(t^*,\theta^*\right)=\left(\frac{2r_m-3r_s}{2r_m-r_s},\frac{D\left(2r_m-r_s\right)}{2I}\right)$$

$$=\left(\frac{2\times 4-3\times 2}{2\times 4-2},\frac{100\times\left(2\times 4-2\right)}{2\times 3003}\right)=\left(0.333\ 0.0999\right)$$

Now, the revenue of the provider and the demander of intellectual property and the total revenue A^*, B^*, C^* is:

$$A^* = D(p - c_m) + \frac{D^2(r_m - r_s)(2r_m + r_s)}{2I} - \frac{D^2(4r_m{}^2 - r_s{}^2)}{8I}$$

$$= 100 \times (20 - 5) + \frac{100^2 \times (4-2) \times (2 \times 4 + 2)}{2 \times 3003} - \frac{100^2 \times (4 \times 4^2 - 2^2)}{8 \times 3003} = 1508.32$$

$$B^* = \frac{D^2 r_s (2r_m + r_s)}{2I} - \frac{2D^2 r_s (2r_m + r_s)}{8I}$$

$$= \frac{100^2 \times 2 \times (2 \times 4 + 2)}{2 \times 3003} - \frac{2 \times 100^2 \times 2 \times (2 \times 4 + 2)}{8 \times 3003} = 16.65$$

$$C^* = A_1^* + B_1^* = 1524.97$$

2. When the demander and the provider of intellectual property carry through cooperative game, the equilibrium solution of cooperative game is:

$$(\overline{t^*}, \overline{\theta^*}) = \left(1 - \frac{r_s}{r_m} + \frac{1}{2}\left(\frac{r_s}{r_m}\right)^2 + \frac{\delta_2(1-\delta_1)}{4(1-\delta_1\delta_2)}\left(\frac{r_s}{r_m}\right)^2 \quad \overline{\theta^*} = \frac{Dr_m}{I}\right)$$

$$= \left(1 - \frac{2}{4} + \frac{1}{2} \times \left(\frac{2}{4}\right)^2 + \frac{0.446 \times (1 - 0.471)}{4 \times (1 - 0.471 \times 0.446)} \times \left(\frac{2}{4}\right)^2 , \frac{100 \times 4}{3003}\right) = (0.644\ 0.133)$$

Now, the revenue of the provider and the demander of intellectual property and the total revenue A_2^* , B_2^* , C_2^* is:

$$\overline{A^*} = D(p - c_m) + \frac{D^2(r_m{}^2 - r_s r_m)}{I} - \frac{\overline{t^*} D^2 r_m{}^2}{2I}$$

$$= 100 \times (20 - 5) + \frac{100^2 (4^2 - 4 \times 2)}{3003} - \frac{0.644 \times 100^2 \times 4^2}{2 \times 3003} = 1509.484$$

$$\overline{B^*} = \frac{D^2 r_s r_m}{I} - \frac{\left(1 - \overline{t^*}\right) D^2 r_m{}^2}{2I}$$

$$= \frac{100^2 \times 4 \times 2}{3003} - \frac{(1 - 0.644) \times 100^2 \times 4^2}{2 \times 3003} = 17.156$$

$$\overline{C^*} = D(p - c_m) + \frac{D^2 r_m{}^2}{2I} = 100 \times (20 - 5) + \frac{100^2 \times 4^2}{2 \times 3003} = 1526.64$$

Table 1 Result Comparing between Non-cooperative Game and Cooperative Game

	Equilibrium solutions	**The revenue of the demander of intellectual property**	**The revenue of the provider of intellectual property**	**Total revenue**
Non-cooperative game	（0.333，0.0999）	1508.32	16.65	1524.97
Cooperative game	（0.644，0.133）	1509.484	17.156	1526.64

Though Table 1, we can see the results received between non-cooperative game and cooperative game, the Stackelberg equilibrium of non-cooperative game is $\left(t^*,\theta^*\right)=\left(0.333\,0.0999\right)$, the equilibrium solution of cooperative game is $\left(\overline{t^*},\overline{\theta^*}\right)=\left(0.644\,0.133\right)$, so such conclusion can be obtained, the level of effort in the innovation of intellectual property by the provider enhances as the subsidy coefficient in innovation research of intellectual property increases by the demander, which conforms to the foregoing statement.

In both cases, the enterprise party obtains revenues $\overline{A^*}>A^*$, the research party obtains revenues $\overline{B^*}>B^*$ the total revenue is obtained $\overline{C^*}>C^*$, i.e. the obtained revenue of the demander and the provider of intellectual property and the total revenue increases in cooperative game compared with non-cooperative game, which means that more revenues will be created upon collaboration against noncooperation, thus bringing in more revenues for both parties respectively.

V. Conclusion

Open innovation is one of the effective modes to promote the transfer of universities research result of intellectual property into the enterprises demander of intellectual property. To well solve the problem of cost allocation and benefit distribution between the demander and the provider of the intellectual property is the key to keep long-term and stable development of open innovation of intellectual property, the research for cooperative mechanism between universities and enterprises in open innovation is based on game theory and use mixed mode of profit distribution as analysis thought. Through the analyze of

non-cooperative game and cooperative game between the demander and the provider we have discovered that, 1) the commitment of high proportion of transfer payment made by the provider to the demander of intellectual property through contract form can better stimulate the provider to increase investment in intellectual property innovation thus improving the overall return of open innovation. 2) The provider and the demander of the intellectual property shall prefer collaborative innovation to the way of non-cooperative game, because the scale of intellectual property innovation of non-cooperation is always less than cooperative game. 3) The excess earnings brought by cooperative innovation can be rationally distributed according to the results of subgame perfect equilibrium of Rubinstein. The distribution outcomes of excess earnings depend on the negotiation ability of the provider and the demander for intellectual property. The research of this paper has provided effective thought for the establishment of open innovation of cooperative mechanism, the final example also certifies the effectiveness and reasonability of this analytical method.

Sharing Encrypted Data on the Internet – A Grey Area Between Privacy and Intellectual Property Law

Quang Huy Nguyen,[*] Van Nam Tran[**]

ABSTRACT

Online piracy is a current issue, which accompanies file-transferring technology. This problem is magnified by the application of encryption to hide pirated contents. Besides that, encryption is a tool to protect information of Internet users from data breach.

The aim of this paper is to describe the role of encryption in file sharing networks, related to Privacy of Internet users and Intellectual Property rights of content owners. This article proves that both right to Privacy and Intellectual Property rights need to be respected and therefore, the conflict between encryption users and copyright owners is difficult to solve. From this approach, some careful solution will be given to against copyright infringement on file-sharing networks.

Keywords: encryption, copyright, privacy, file sharing

[*] Graduate School – National Economics University, Hanoi-Vietnam.
[**] Dean, Faculty of Law, National Economics University, Hanoi-Vietnam.

I. Introduction

File-sharing technologies have become popular in recent years, as a result of the cost reduction of storing and transmitting data.[1] This development benefits Internet users who upload and download files on the Internet, but also challenges copyright owners who face online piracy. To deal with this issue, right holders often request the file-sharing service providers to remove pirated contents and sometimes file a lawsuit against the piracy.

However, pirates could apply encryption to hide illegal copies from the seeking of copyright holders. The situation becomes worse when some hosting providers encrypt data automatically in an attempt to avoid their responsibilities for copyright infringement, facilitating the piracy and raising a new obstacle for the rights owners. On the other hand, encryption could be used properly to secure sensitive information, protecting the Privacy of users.

This article will clarify the conflict between Privacy of file-sharing users and the Intellectual Property right of content owners. This topic will be analyzed through 4 main sections of this article. Section II will give a definition of encryption. Section III will show the application of encryption in Privacy and Intellectual Property. Section IV will describe file-sharing models and point out the liabilities for copyright infringement of parties involved in file-sharing. Next, this paper will demonstrate how the encryption could be used by pirates and file-sharing service providers to avoid responsibility for copyright infringement. Two encrypting methods and their features will be clarified. After that, section V will propose some solutions to combat piracy, especially sharing encrypted content, but still appreciate the Privacy of users. Finally, a conclusion will be given with some main features.

II. Definition of encryption

Cryptography and encryption are two different terms and people sometimes confuse them. Thus, these two terms need to be clarified and distinguished.[2] A simple definition of cryptography is "*the design and use of communication schemes aimed at hiding the meaning of the message from everyone except the intended receiver.*"[3] Cryptography can use algorithms, protocols and strategies in order to protect sensitive information from

---

[1] Andrew Murray, INFORMATION TECHNOLOGY LAW, 39 (2nd ed. 2013).

[2] Bright Hub, Encryption vs. Cryptography-What Is The Difference?, May 26, 2015, http://www.brighthub.com/computing/enterprise-security/articles/65254.aspx (last visited July 13, 2015).

[3] Susan Loepp &William Kent Wootters, PROTECTING INFORMATION: FROM CLASSICAL ERROR CORRECTION TO QUANTUM CRYPTOGRAPHY, 1 (2006).

unauthorised access and it is not relay on computer science.[4] Cryptography includes 2 main processes: encryption and decryption.[5] Encryption or encipherment is a process which transforms a message (plain text) into coded version (cipher text). On the other hand, decryption or decipherment is the reverse of encryption, which recovers plain text from the cipher text.[6] It is clear that encryption is just one part of cryptography.

III. Applying encryption for Privacy and Intellectual Property

A. Applying encryption for Privacy

1. The right to Privacy

The right to Privacy is recognized as a fundamental human right by the United Nations (UN), under article 12 of Universal Declaration of Human Rights: "*No one shall be subjected to arbitrary interference with his Privacy…Everyone has the right to the protection of the law against such interference or attacks.*" Many countries in the world respect this right and adopt in national regulations to protect their citizens. In America, the Amendment IV of Bill of Rights states: "*The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures*." The EU also regulates the right to Privacy in article 8 of the European Convention on Human Rights: "*Everyone has the right to respect for his private and family life, his home and his correspondence.*" Through these regulations, the Privacy right is an important right and should be protected.

One aspect of Privacy is personal data Privacy, which refers to "*the collection, disclosure, and use of our personal information by known and unknown government and corporate entities.*"[7] Data Privacy is secured by many legislations such as Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such and the Data Protection Act 1998 in the UK. The Data Protection Act emphasizes the stronger protection for sensitive personal data in the article 2, including: the racial or ethnic origin, political opinions, religious beliefs or other beliefs of a similar nature, whether he is a member of a trade union, physical or mental

---

[4] Keyvan Derakhshan Nik, CRYPTOGRAPHY, ENCRYPTION/DECRYPTION AND STEGANOGRAPHY, 4 INDIAN JOURNAL OF FUNDAMENTAL AND APPLIED LIFE SCIENCES 646 (2014).
[5] Rita Esen, *Cryptography And Electronic Data*, 2 THE NEW LAW JOURNAL, at 150 (2000).
[6] Alan G Konheim, COMPUTER SECURITY AND CRYPTOGRAPHY, 2 (2007).
[7] Neil M. Richards, *Why Data Privacy Law Is (Mostly) Constitutional*, 56 Wm. & Mary L. Rev. 1501, 1509 (2015).

health or condition, sexual life and criminal records.[8]

2. The threat to data Privacy

In the digital era, personal data is normally saved in electronic forms such as email, Microsoft word, Excel, video, password and so on. However, the digital data could be seized without the will of information owner in 2 cases. In the first case, personal information is stolen illegally by hackers. Another case is personal data is collected legally by the government. In both 2 cases, the leak of personal data may harm to the live of victim in many aspects such as reputation, property and health.

Firstly, the personal data is a valuable target of cyber criminals on the Internet. According to Kimberly Kiefer Peretti, personal information such as social security number, bank account and credit card number could be stolen to commit identity-related crimes. Especially, criminals often sell the stolen financial information on "carding forums", the criminal websites like "Shadowcrew", allowing their members to exchange stolen personal data. The activity of this black market is complicated and worldwide.[9] Sometimes, the target of criminals is not financial information, but other sensitive information of victims. An example is the data breach of "Ashley Madison", a dating website, in July 2015. The hackers in "The Impact Team" obtain not only credit card details but also "*secret sexual fantasies*" of 37 million customers of "Ashley Madison".[10] The victims are worried about the public criticism, which can damage their reputations as well as their marriages. Furthermore, the criminals may use the secret to blackmail or manipulate the victims.

Secondly, personal data could be compiled by the government for some purposes such as national security or crime prevention. The surveillances are conducted legally and follow specific procedures. For example, in the US, 48 jurisdictions including the federal government, Puerto Rico, the District of Columbia, the Virgin Islands and 44 states authorize courts to order oral, wire and electronic interceptions.[11] The procedure of wiretapping is regulated in section 2518 of Title 18 of the United States Code. However, there are many concerns about the surveillances, although they are totally legal and used for

---

[8] *Data Protection*, GOV.UK, https://www.gov.uk/data-protection/the-data-protection-act (last visited Aug. 15, 2015).

[9] Kimberly Kiefer Peretti, *Data Breaches: What The Underground World of "Carding" Reveals*, 25 SANTA CLARA COMPUTER & HIGH TECH. L.J. 375, 375-376 (2008).

[10] *Ashley Madison Infidelity Site's Customer Data Stolen*, BBC News,.http://www.bbc.co.uk/news/technology-33592594 (last visited Aug. 16, 2015).

[11] *Wiretap Report 2014*, United States Courts, http://www.uscourts.gov/statistics-reports/wiretap-report-2014 (last visited Aug. 16, 2015).

good purposes. These concerns are reasonable: some powerful organizations like the NSA and the UK Government Communications Headquarters (GCHQ) are able to collect individual information without a strict procedure. For instance, the Foreign Intelligence Surveillance Court, which is so-called Fisa court, allows the NSA to collect data of the US citizens without a warrant.[12] For this reason, many Privacy supporters allege that the NSA abuses its power to violate the Privacy of billions of innocents in the world. This argument is emphasized by Kim Dotcom: "*the government's point of view might be: if you haven't done anything illegal, why would you care if the government captures all your data? My point of view is this: if I am not doing anything illegal, why has all my data been captured?*"[13] The government's surveillance sparks the angers from its targets and some people tries to against this activity. In *Jewel v. NSA* case,[14] the Electronic Frontier Foundation (EFF) on behalf of Carolyn Jewel and several other AT&T customers filed a lawsuit against the NSA in 2008 in order to "*stop the illegal unconstitutional and ongoing dragnet surveillance.*"[15] The district court dismissed the claims of the plaintiff because Jewel lacked standing. However, the court did not rule whether NSA collection program violated the Fourth Amendment.[16] There is another concern that the databases of government agencies are also the targets of hackers, which means personal information collected by the government could be breached. An example is the data breach from the United States Office of Personnel Management (OPM) in 2015. The OPM holds personal information of the US citizens including criminal records, histories of drug abuse, financial problems as well as fingerprints and uses these sensitive data to launch background investigations for over 100 federal agencies.[17] Thus, the leakage of OPM data affects to a huge number of people: up to 21.5 million victims.[18] For these reasons,

---

[12] Glenn Greenwald & James Ball, *The Top Secret Rules That Allow NSA to Use US Data Without A Warrant, the Guardian*, http://www.theguardian.com/world/2013/jun/20/fisa-court-nsa-without-warrant (last visited Aug. 16, 2015).

[13] Kim Dotcom, *Mega's EPIC Launch*, https://www.youtube.com/watch?v=LwlLC2PUrH8 (last visited Aug. 16, 2015).

[14] *Jewel v. NSA*, 673 F.3d 902 (2011).

[15] Electronic Frontier Foundation, *'Jewel V. NSA' (2011), https://www.eff.org/cases/jewel* (last visited Aug. 16, 2015).

[16] Dustin Volz, *Judge Dismisses Challenge to NSA Internet Surveillance*, http://www.nationaljournal.com/tech/judge-dismisses-challenge-to-nsa-internet-surveillance-20150210 (last visited Aug. 16, 2015).

[17] Background Investigations, U.S. Office of Personnel Management, https://www.opm.gov/investigations/background-investigations/ (last visited Aug. 16, 2015).

[18] Martyn Williams, *OPM Hackers Stole Data On 21.5M People, Including 1.1M Fingerprints, Computerworld*, http://www.computerworld.com/article/2946031/cybercrime-hacking/opm-hackers-stole-data-on

personal data Privacy is threatened seriously, as Richard Aldrich warned: "*we will soon have to live in a world with no such thing as Privacy and no such thing as secrecy.*"[19]

3. The role of encryption in Privacy

The threat to data Privacy comes from the technology and it also could be prevented by the technology. Encryption is one technological method to protect the personal information from the surveillance of government as well as criminals.[20]

Today, encryption is accepted in almost all countries in the world and there are many encryption programs which could be downloaded easily on the Internet. It means encryption becomes popular and the number of encryption users increases dramatically.[21] There is not anything wrong to encrypt the data to protect the right to Privacy, a fundamental human right. Because encryption is not only for the criminals, which are just a small part of the world, to conceal the sins, but also for billions of the innocents to shelter themselves from the risk of data breach.

Some people are concerned about the strength of encryption programs: could the government or hackers decrypt the cipher text easily? The answer of this question depends on the type of encryption. Even though it is true that: "*it is easier to encrypt information than it is to decrypt it*", according to Julian Assange, but the intelligence agencies may exploit the bugs on program to decrypt quickly. For instance, Microsoft has a policy that enables them to disclose the information about weaknesses in its programs to the US government.[22] Thus, choosing trusted encryption programs is important to ensure that the encryption providers cannot decrypt their products. Unfortunately, the users normally do not know which software do not include backdoors. Perhaps the free and open source software like Tor, LUKS, TLS and Open PGP are trusted, although they are not totally safe.[23]

-215m-people-including-11m-fingerprints.html (last visited Aug. 16, 2015).

[19] Katie Collins, *Espionage In A Post-Privacy Society*, May 20, 2014, http://www.wired.co.uk/news/archive/2014-05/20/espionage-after-the-loss-of-secrets (last visited Aug. 16, 2015).

[20] Daniel J. Sherwinter, *Surveillance's Slippery Slope: Using Encryption to Recapture Privacy Rights*, 5 J. Telecomm. & High Tech. L. 501, 504 (2007).

[21] *Id.* 524.

[22] Micah Lee, *Encryption Works: How to Protect Your Privacy In The Age of NSA Surveillance*, FREEDOM OF THE PRESS FOUNDATION, JULY 2, 2013, https://freedom.press/encryption-works (last visited Aug. 16, 2015).

[23] *Id.*

B. Applying encryption for Intellectual Property

Intellectual Property (IP) is built on the creation of mind and IP law protects some rights of owners such as reproduction and transmission. However, IP law is not enough to protect the creation of owners from the competitors in the market, especially in digital environment, the information can be copied easily.[24] Hence, encryption is a technological solution for the IP owners to prevent the leakage of trade secret and pirated copies.

1. Protecting trade secret

Generally, a trade secret is a confidential information that brings commercial value to its owner and it is kept secret.[25] Section 1839 of Title 18 of the US Code describes: "*the term "trade secret" means all forms and types of financial, business, scientific, technical, economic, or engineering information, including patterns, plans, compilations, program devices, formulas, designs, prototypes, methods, techniques, processes, procedures, programs, or codes, whether tangible or intangible, and whether or how stored, compiled, or memorialized physically, electronically, graphically, photographically, or in writing.*" This section also imposes 2 requirements: the owner of information must use reasonable measures to keep it secret and "*the information derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable through proper means by, the public.*"[26]

Through the definition above, the value of a trade secret depends on the protection of the owner. If the information is disclosed to the competitors, the owner lose his advantages in the market and therefore, this information will become worthless. The trade secret is a target of economic espionage and theft who steal it to benefit foreign government, foreign instrumentality, foreign agent or anyone other than the owner.[27] Today, the risk of trade secret disclosure is magnified by the Internet. According to Elizabeth A. Rowe, the Internet facilitates its users to post information including trade secret without any censorship and cause harmful effects to the owner. Additionally, the law

---

[24] Andrew Stranieri & John Zeleznikow, *Copyright Regulation with Argumentation Agents*, 10 Info. & Comm. Tech. L. 109 (2001).
[25] Francis J. Duffin & Bryan S. Watson, *Best Practices In Protecting and Enforcing Trademarks, Copyrights, and Other Intellectual Property Rights*, 28-WTR Franchise L.J. 132, (2009).
[26] Ronald D. Coenen Jr., Jonathan H. Greenberg & Patrick K. Reisinger, *Intellectual Property Crimes*, 48 Am. Crim. L. Rev. 849, 853 (2011).
[27] *Id.* at 854-855.

does not forbid the leakage from the third parties, who discover the trade secret and disseminate it on the Internet, as a judge comments: "*The anonymous (or judgment proof) defendant can permanently destroy valuable trade secrets, leaving no one to hold liable for the misappropriation.*"[28]

As section 1839 mentions, the owner must apply reasonable measures to protect the trade secret. Joan M. Swartz points out some measures, including encryption software.[29] The encryption requires a proper password to access trade secret and normally just few people know this password. The encryption also can prohibit copying, scan and transfer the encrypted data.

2. Digital Rights Management

In copyright field, piracy is a big challenge for the copyright owner. Particularly, in the digital world, a content could be duplicated and distributed illegally without any cost on the Internet, resulting in huge amount of losses for copyright owners in many industries like music, video and game.[30] According to a research of the Institute for Policy Innovation, an annual loss for music piracy is about $12.5 billion in the US.[31] In game industry, piracy causes $3.5 billion of lost revenue per year in America and Canada, as the Entertainment Software Association (ESA) reports.[32] From these enormous numbers, it is clear that piracy harms seriously to the copyright owner and the economy.

Digital rights management (DRM) is a tool of copyright owner to prevent illegal copying. According to the OECD working party, one essential factor of DRM is encryption, which keeps the protected content unavailable to unauthorized users.[33] Florian Koempel classifies DRM into 2 groups: technological protection measures (TPM) and rights management information (RMI). Encryption falls into the first group.[34] In a general DRM model, the

---

[28] Elizabeth A. Rowe, *Saving Trade Secrets On The Internet*, 42 WAKE FOREST L. REV.1, 4-5 (2007).

[29] Joan M. Swartz, *Is It Safe? Is It Secret? Protecting Business Information*, GPSOLO 13 (2007).

[30] Chih-Ta Yen, Horng-Twu Liaw & Nai-Wei Lo, *Digital Rights Management System With User Privacy, Usage Transparency, and Superdistribution Support*, 27 INTERNATIONAL JOURNAL OF COMMUNICATION SYSTEMS 1714, 1714 (2014).

[31] Who Music Theft Hurts (2012), http://www.riaa.com/physicalpiracy.php?content_selector=piracy_details_online (last visited Aug. 17, 2015).

[32] Peter Holm, *Piracy On The Simulated Seas: The Computer Games Industry's Non-Legal Approaches To Fighting Illegal Downloads Of Games*, 23 INFORMATION & COMMUNICATIONS TECHNOLOGY LAW 61 (2014).

[33] Catherine Stromdale, *The Problems with DRM*, 17 ENTERTAINMENT LAW REVIEW 1 (2006).

[34] Florian Koempel, *Digital Rights Management*, 11 COMPUTER AND TELECOMMUNICATIONS LAW REVIEW 239 (2005).

content is encrypted by the producer. After the content is purchased by the customer, a corresponding license is sent from the producer to the customer through the license broker. The customer uses the license to decipher the encrypted content.[35]

DRM is protected by anti-circumvention regulations, which prohibit the activities to avoid or disable DRM on the content. Article 11 of the WIPO Copyright Treaty (WCT) regulates that: "*Contracting Parties shall provide adequate legal protection and effective legal remedies against the circumvention of effective technological measures that are used by authors in connection with the exercise of their rights under this Treaty or the Berne Convention and that restrict acts, in respect of their works, which are not authorized by the authors concerned or permitted by law.*" Similarly, the article 18 of the WIPO Performances and Phonograms Treaty restates the protection of TPM. The EU adopts TPM protection in article 6 of the Information Society Directive. In the US, TPM circumvention is banned under section 1201 of Title 17 of the US Code: "*No person shall circumvent a technological measure that effectively controls access to a work protected under this title.*"

IV. Sharing encrypted data

A. The meaning of "file sharing"

"File sharing" is a common concept which emerged with the development of computer networks. Nowadays, the term "file sharing" describes the distribution or making available digital materials such as movie, music and photo to other users on the Internet.[36] However, the name "file sharing" is controversial and a question is raised: why is this term called "file sharing"?

According to the Oxford English dictionary, the origin of the verb "to share" appeared in the 16th century, meant "*division, part into which something may be divided*".[37] Base on this meaning, the name "file sharing" could be a misnomer, because the distributor does not lose anything when he transfers a file to a receiver. Richard Parsons, the CEO of Time-Warner states: "*it isn't sharing, it's online shoplifting.*"[38] From this point of view, some copyright owners try to refer "file sharing" to online piracy and criticize that file sharing

---

[35] Yen et al, *supra* note 30, at 1716.

[36] *What Is File Sharing?*, UC San Diego, http://acms.ucsd.edu/filesharing/general.html (last visited Aug. 18, 2015).

[37] Oxfordlearnersdictionaries.com, '*Share Verb'*, http://www.oxfordlearnersdictionaries.com/definition/english/share_1#share_1__4 (last visited Aug. 18, 2015).

[38] Jessica Litman, *Sharing and Stealing*, 27 Hastings Comm. & Ent L.J. 1 ,23 (2004).

networks are the tools for piracy.

From another approach, "file sharing" is similar to "sharing idea". When an idea is widespread, the generator still remembers it.[39] Perhaps this opinion is more relevant because the concept of "file sharing" bases on "perfect copies", which means the digital content is reproduced exactly without any cost. After the reproduction, a copy is sent to another person while the original file is still kept by the creator.[40] With this progress, the content can be distributed to an unlimited number of people.

According to Nicholas John, there are 2 main ways to share the data: via physical media like flash memory and external hard disk drives, or via computer networks. In both 2 ways, file sharing appeared in few decades ago. For example, traced back to 1971, people used File Transfer Protocol (FTP) and IBM floppy disk to transfer the data.[41] However, the term "file sharing" just became popular in 1999 with Napster, a peer-to-peer (P2P) network.[42]

B. Types of file sharing networks

There are several models of file sharing networks such as Local Area Network (LAN), FTP, P2P, email and file hosting service.[43] Among them, P2P and file hosting service are the 2 most popular methods which facilitate the sharing between many participants in these networks.

1. P2P network

According to Ion Stoica, P2P networks "*are distributed systems without any centralized control or hierarchical organization, in which each node runs software with equivalent functionality.*"[44] From this definition, a standout feature of P2P network is pointed out by Markus Hofmann and Leland R. Beaumont that because of the equality between peers, each peer can change its role in P2P system such as client, server, network as well as router. Beside the pure P2P network, the hybrid P2P system can apply hierarchical and centralized

---

[39] *Id.*

[40] Graham Dutfield & Uma Suthersanen, *GLOBAL INTELLECTUAL PROPERTY LAW*, 234 (2008).

[41] Nicholas A. John, *File Sharing and The History of Computing: Or, Why File Sharing Is Called "File Sharing"*, 31 CRITICAL STUDIES IN MEDIA COMMUNICATION 198, 203 (2014).

[42] Stan J. Liebowitz, *File-Sharing: Creative Destruction Or Just Plain Destruction?*, 49 J.L. & Econ. 1 (2006).

[43] Bradley Mitchell, *The Beginner's Guide to Network File Sharing* (2007), http://compnetworking.about.com/od/basicnetworkingconcepts/a/file_sharing.htm (last visited August 18, 2015).

[44] Ion Stoica et al., *Chord: A Scalable Peer-To-Peer Lookup Protocol for Internet Applications*, 11 IEEE/ACM TRANSACTIONS ON NETWORKING 17, 17 (2003).

resources.[45]

P2P networks are divided into 3 generations in chronological order, with different characteristics. The first generation is centralized P2P model and a notable is Napster. Napster was created in 1999 by Shawn Fanning as a music network allowing users to locate and download unprotected songs. Napster had a central server and its function is just introducing the client to a host. A music file was located in the host and it was transferred directly from the host to the client, not through Napster central serval.[46] Thus, Napster did not contain, copy nor create any song on its server. In July 2001, Napster was close down after it was charged with contributory infringement and vicarious infringement in *A&M Records, Inc. v. Napster, Inc.* case.[47]

After Napster, the second generation P2P networks were developed without a central server. There are 2 models: decentralized P2P and semi-structured P2P. In decentralized system, a new member participates in the network by a nearest active node. Every request is forwarded through the network. For example, node A needs a song and asks node B. Node B does not have this song, but it asks node C. If node C has this song, it will connect to node A and transfer this song. If Node C does not, it will pass this request to other nodes. Thus, the number of peers which involve to implement a request could be big, resulting in a huge amount of network traffic as well as slow speed. Another model in the second generation is semi-structured P2P, which combines the features of both centralized and decentralized types. Although semi-structured P2P also does not use a central server like decentralized system, its speed could be faster than decentralized model, because it chooses some temporary information host called super-node to execute requests. For instance, node A, B and C are in a group and node A is a temporary host, who keeps the detail of his group in a list. Node B asks node A for a song, node A will check his list. If A finds that C has this song, he will invite B to C to communicate. If no one in his group contains this song, node A will ask other hosts of other groups. Some notables of the second generations are Grokster, Kazaa, Morpheus, EDonkey and Gnutella.[48]

The third generation is BitTorrent, which is completely different to 2 previous P2P generations. BitTorrent is faster than the older P2P because the file is broken up into small segments and downloaded from multiple people also hosting these pieces.[49] For example, computer A needs a movie which is

---

[45] Markus Hofmann & Leland R. Beaumont, CONTENT NETWORKING: ARCHITECTURE, PROTOCOLS, AND PRACTICE (THE MORGAN KAUFMANN SERIES IN NETWORKING) 148 (2005).
[46] Murray, *supra* note 1, at 266.
[47] *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004 (9th Cir. 2001).
[48] Murray, *supra* note 1, at 271-272.
[49] Natasha Culzac, *What Is Bittorrent? A Short Description of The File Sharing Protocol...* ,

divided into 100 fragments and contained by computer B, C and D. B is a seeder, who keeps full parts of the movie, whereas C and D are leechers keeping 30 and 60 parts respectively. A, B, C and D join a "swarm" to share what they have to each other. A will download from B, C and D; C will download from B and D; D will download from B and B will just upload. With this protocol, BitTorrent facilitate users to download large files with minimum Internet bandwith.[50] To use BitTorrent protocol, users must download a BitTorrent client, a computer program, such as μTorrent, Xunlei and Vuze. The client downloads and upload BitTorrent files containing metadata of movie. A well-known BitTorrent index is the Pirate Bay, a Swedish website, which lists available Torrent files.[51]

2. File hosting service

Compare to P2P networks, file hosting service or cloud storage service is totally different. The users upload files to a space (host) through a web interface and they can manage and share files after that. Files are served in the host with a specific address. A unique link is generated for a file and people use this link to access the address of file and download it.[52] Sometimes, a file could be protected by a password and only permitted people who know the password can download it. Some popular cloud storage services are Google Drive, Dropbox, Microsoft One Drive, Mega and Apple iCloud.[53] In general, cloud storage services divide customers in 2 groups: premium users and free users with different policies. While free users are restricted in downloading numbers, file sizes, waiting time as well as downloading speed, the services facilitate the download of premium customers and give them other supports. With this discrimination, the service providers persuade users to pay premium fee to receive advantages, especially who need to download or upload large files frequently.[54]

INDEPENDENT, http://www.independent.co.uk/life-style/gadgets-and-tech/news/what-is-bittorrent-a-short-description-of-the-file-sharing-protocol-9758805.html (last visited Aug. 19, 2015).

[50] Mark Scanlon, Jason Farina & M-Tahar Kechadi, *Network Investigation Methodology for Bittorrent Sync: A Peer-to-Peer Based File Synchronisation Service*, 50 COMPUTERS & SECURITY 3 (2015).

[51] Murray, *supra* note 1, at 276.

[52] Aniket Mahanti et al., *Characterizing The File Hosting Ecosystem: A View from the Edge*, 68 PERFORMANCE EVALUATION 1085 (2011).

[53] Martyn Casserly, *The Best Cloud Storage Services: Dropbox vs Google Drive, Onedrive, Icloud & More*, http://www.pcadvisor.co.uk/test-centre/internet/13-best-cloud-storage-services-2015-3614269/ (last visited Aug. 19, 2015).

[54] Mahanti, *supra* note 52, at 1085.

The main point of file hosting service is keeping file in the central location, not in HDD of members like P2P. This feature brings both advantages and disadvantages to the users. Users can back-up their data on the cloud and restore or access data in other devices like tablets and mobile phones anywhere, which is so-called "always-on" access. Some cloud services like Google Drive allow users to open online some kinds of files like Microsoft Word without download. Thus, users do not waste the space of their device to keep a copy.[55] Furthermore, because a file is downloaded directly from a host, so the downloading speed does not depend on the Internet speed of the uploader like in P2P system. Practically speaking, the uploading speed is much slower the downloading speed.[56] Thus, the cloud users are able to download with faster speed than in P2P. Moreover, people sometimes want to download rare files, which are contained in few places. However, in P2P network, people only can download rare files when the uploader is online. In contrast, people can download from the host anytime even if the original uploader is offline.[57]

Beside these pros, the cloud storage services also have some drawbacks. In some cases, files are deleted by the service providers because of copyright infringement or unlawful content. The data also could be lost if the server is shutdown. An example is the close of Megaupload in 2012. Megaupload was seized suddenly without any notice by the United States Department of Justice (DOJ). Even though Megaupload refused to delete the data of customers, but it is difficult for users to retrieve their files.[58] Another concern is the security of hosting services. The services could be attacked by the hackers from vulnerabilities and the data could be destroyed or stolen. Resisting the attack is not simple because: "*cloud security is a complex issue influenced by many factors and choices including: solution architecture, service model, deployment model, and hosting environment.*"[59]

C. Liability for copyright infringement

Involving in file sharing, there are 3 main parties: the uploaders, the downloaders and the online service providers (OSP) including P2P provider and

---

[55] Scanlon, *supra* note 50, at 3.

[56] Chris Marling, *How Fast Is My Broadband? A Guide to Upload Speed, Download Speed and How to Check It - Broadband Ge*, https://www.broadbandgenie.co.uk/broadband/help/how-fast-is-my-broadband-upload-speed-download-speed-and-speed-test (last visited Aug. 19, 2015).

[57] Richard Abbott, *The Reality of Modern File Sharing*, 13 J. INTERNET L. 3, 3 (2009).

[58] Electronic Frontier Foundation, *Megaupload Data Seizure*, https://www.eff.org/cases/megaupload-data-seizure (last visited Aug. 19, 2015).

[59] Edit Szilvia Ruboczki & Zoltan Rajnai, *Moving Towards Cloud Security*, 13 INTERDISCIPLINARY DESCRIPTION OF COMPLEX SYSTEMS 9, 11 (2015).

hosting provider (the definition of OSP is written in section 512(k)(1) of title 17 of the US Code). While the number of downloaders is numerous and unidentified, the number of uploaders is much smaller. More importantly, from sharing pirated copies of movies, music and games, the uploaders and the OSP can obtain economic benefit[60] whereas the downloaders just want to entertain themselves. Thus, the copyright owner and the government often allege the uploaders and the OSP in copyright infringement cases.

1. Direct infringement

The direct copyright infringement happens when a person commits some activities without the permission of copyright owner.[61] There activities are given in section 106 of title 17 of the US Code, including: "*to reproduce the copyrighted work in copies or phonorecords*" and "*to distribute copies or phonorecords of the copyrighted work to the public.*" Thus, the uploaders who make and share pirated copies on the Internet are responsible directly for copyright infringement. For instance, a man in the UK who uploaded illegally the World Wrestling Entertainment (WWE) and the Ultimate Fighting Championship (UFC) was arrested by the Police Intellectual Property Crime Unit (PIPCU). These copies were downloaded 2 million times and resulted in millions of pounds in lost revenue for the copyright owners.[62]

Unlike the pirated uploaders who are clearly liable for direct infringement, it is difficult for the copyright owners to claim the direct infringement to the OSP, although the pirated copies are processed automatically by the OSP networks. An example is *Disney Enterprises, Inc. v. Hotfile Corp.* case.[63] Hotfile is a hosting service allowing its users to upload and download files. When a file is uploaded, the server makes 5 additional copies and generates a unique link for each copy. Disney claimed that the defendant violated the reproducing right, an exclusive right of the copyright owner under section 106 of title 17 of the US Code. However, the district court disagreed with plaintiff's argument because the automatic copying conducted by software is not volitional. Therefore, the court held that Hotfile was not liable directly for copyright

---

[60] Calum Darroch, *Problems and Progress in The Protection of Videogames: A Legal and Sociological Perspective*, 1 THE MANCHESTER REVIEW OF LAW, CRIME AND ETHICS 136, 157 (2012).

[61] Direct Infringement | Wex Legal Dictionary / Encyclopedia | LII / Legal Information Institute, https://www.law.cornell.edu/wex/direct_infringement (last visited Aug. 20, 2015).

[62] *Man Arrested over Pirating of 3,000 WWE Wrestling Bouts*, Mar. 18, 2015, http://www.bbc.co.uk/newsbeat/article/31940270/man-arrested-over-pirating-of-3000-wwe-wrestling-bouts (last visited Aug. 20, 2015).

[63] *Disney Enterprises, Inc. v. Hotfile Corp.*, 798 F.Supp. 2d 1303 (S.D. Fla. 2011).

infringement.[64]

2. Secondary liability

A secondary liability or indirect infringement is derived from the primary liability, including 2 kinds: contributory infringement and vicarious infringement. A contributory infringement occurs when the third party has the knowledge about infringing activity and induces or materially contributes to the infringement. A vicarious infringement arises when the third party has a direct financial benefit from infringement and has the right as well as ability to control the actions of the direct infringer but fails to stop these unlawful actions.[65]

The OSP may take secondary liability for copyright infringement. In *Perfect 10, Inc. v. Megaupload Ltd.* case,[66] the defendant was charged with contributory infringement. The plaintiff, Perfect 10, was an adult websites creating pornographic photographs, videos and magazines. However, their products were uploaded illegally to Megaupload by users. The links of pirated contents were disseminated by Megaupload and its users on the Internet. Especially, Megaupload provided substantial payouts to affiliate websites which catalogued the pirated links. Furthermore, Megaupload offered a reward program to the uploaders in order to increase the downloading number. In spite of receiving 22 infringing notices from the plaintiff, Megaupload did not remove pirated contents. Based on these facts, the court held that Megaupload was a contributory infringer because 2 requirements were met. Firstly, the defendant had the knowledge about infringement from 22 notices and the act of affiliate websites. Secondly, through substantial payouts and reward program, Megaupload induced or materially contributed to infringing conduct. Nonetheless, the defendant was not liable for vicarious infringement in this case, because it did not have ability to supervise infringing conduct. Unlike in *A&M Records, Inc. v. Napster, Inc.* case,[67] where Napster P2P network required its users to register and log in, the Megaupload users just needed the links to access and download without registration and login. For this reason, Megaupload could not terminate users' access.

---

[64] Mary Rasenberger & Christine Pepe, *Copyright Enforcement And Online File Hosting Services: Have Courts Struck The Proper Balance?*, 59 J. COPYRIGHT SOC'Y U.S.A. 627, 636 (2012).

[65] Christian E. Mammen, *File Sharing Is Dead! Long Live File Sharing! Recent Developments In The Law Of Secondary Liability For Copyright Infringement*, 33 Hastings Comm. & Ent L.J. 443, 447 (2011).

[66] *Perfect 10, Inc. v. Megaupload Ltd.*, No.11-CV-00191 (S.D. Cal. July 27, 2011).

[67] *Supra* note 47.

D. Encrypting pirated data to avoid responsibility for copyright infringement

Both pirated users and OSP could be liable for copyright infringement. To avoid their responsibilities, encryption is an effective tool, which protects not only Privacy and security, but also piracy.

From the perspective of pirates, encryption can prohibit the access to the content. Hence, the copyright owners could not know whether the data is pirated or not if they do not seize the password. Additionally, encrypted files can avoid the filtering of the OSP. It is noticed that the OSP applies some programs such as deep packet inspection (DPI) to identify and block or remove the known illegal files. Each file contains an exclusive hash value. The hash value of pirated data is listed and the DPI recognises and prohibits files in this list. However, the DPI is unable to scan encrypted data to know its hash value.[68]

The encryption also brings advantages for the OSP who is reluctant to remove and block pirated files on their networks. If the OSP cannot identify the encrypted pirated copies, it does not have knowledge about the infringing conduct and cannot stop the action of direct infringer. Therefore, the OSP could evade the secondary liability for copyright infringement. However, this argument is controversial. The copyright owners argue that applying encryption may lead to willful blindness, which means avoiding liability "*by intentionally putting oneself in a position to be unaware of facts which create liability.*"[69] For example, in *In re Aimster Copyright Litigation case*[70], the defendant, Deep, encrypted songs which are shared via Aimster P2P system to avoid knowledge about infringing acts of his users. The court ruled that: "*a service provider that would otherwise be a contributory infringer does not obtain immunity by using encryption to shield itself from actual knowledge of the unlawful purposes for which the service is being used.*" Thus, the defendant was held liable for contributory infringement.

In contrast, the hosting provider argues that it could get plausible deniability, which means "*a denial of responsibility or knowledge of wrongdoing cannot be proved as true or untrue due to a lack of evidence proving the allegation.*"[71] This protection is given in section 512(c)(1)(A)(i) of title 17 of the US Code (the Safe Harbor for the hosting provider): "*a service provider shall not be liable infringement of copyright by reason of the storage*

---

[68] Abbott, *supra* note 57, at 6.

[69] *Willful Blindness Law & Legal Definition*, Definitions.uslegal.com, http://definitions.uslegal.com/w/willful-blindness/ (last visited Aug. 21, 2015).

[70] *In re Aimster Copyright Litigation*, 334 F.3d 643 (7th Cir. 2003).

[71] *Plausable Deniability Law & Legal Definition*, USLEGAL, http://definitions.uslegal.com/p/plausable-deniability/ (last visited Aug. 21, 2015).

at the direction of a user of material that resides on a system or network controlled or operated by or for the service provider, if the service provider does not have actual knowledge that the material or an activity using the material on the system or network is infringing."

E. Encrypting methods

In general, there are 2 ways to encrypt the data: client-side encryption and shared-key encryption. Each method has some special features and affects to the users and the OSP.

Firstly, the users can encrypt the data prior to sharing by using encipherment software. The data is encrypted on the computers of users and thus, the OSP cannot know the keys as well as contents (zero-knowledge). However, before using this method, the users must trust the software developer. If there is a backdoor on the program, the data could be unauthorized decrypted easily.[72] There are various encryption programs such as Boxcrypto, Ensafer and SharedSafe supporting online storage for the users.[73] Some file hosting providers such as Mega and SpiderOak apply client-side encryption. The P2P users also can encrypt data manually before sharing. With client-side encryption, the users highly secure their Privacy and the OSP with zero-knowledge can obtain plausible deniability to refuse their liability for copyright infringement. However, if the key is lost, it is nearly impossible to recover the data.[74]

The second method, shared-key encryption, is totally different. All files are encrypted after they are stored in the host with a single key. It means the hosting providers know the key and they can decrypt to view the contents. It seems that shared-key encryption just protects data from the attacks of hackers rather than the Privacy of users. The reason of the hosting providers for applying this method is deduplication. The OSP scans the hash values of unencrypted files before uploading to server and recognises which files have already been stored. Hence, the providers just need to keep a limited numbers of each data and save the space storage. If files are encrypted before uploading, the OSP could not examine the hash values and fails to avoid data repeating.[75] A small advantage

---

[72] Andrew Froehlich, *Zero-Knowledge Cloud Storage: Far From Perfect,* Network Computing, http://www.networkcomputing.com/cloud-infrastructure/zero-knowledge-cloud-storage-far-from-perfect/a/d-id/1319158 (last visited Aug. 22, 2015).

[73] Subrata Kumar Das and others, *Performance Analysis of Client Side Encryption Tools*, 4 INTERNATIONAL JOURNAL OF ADVANCED COMPUTER RESEARCH 888, 888 (2014).

[74] Froehlich, *supra* note 72.

[75] *Slight Paranoia: How Dropbox Sacrifices User Privacy for Cost Savings*, PARANOIA.DUBFIRE.NET, http://paranoia.dubfire.net/2011/04/how-dropbox-sacrifices-user-Privacy-for.html (last visited Aug. 22, 2015).

of this method for the customers that they do not need to upload a data again.[76] Some popular hosting services using shared-key encryption are Dropbox, Google Drive and Microsoft OneDrive.

V. Solutions

Sharing encrypted data is a challenge for the copyright owners to attack online piracy in both technological and legal battles. On the other hand, the Privacy of the users also needs to be appreciated. The conflict between copyright owners and cryptographic users is not easy to be resolved, but the situation will be improved if there is a cooperation between multiple parties.

A. Notice and takedown pirated contents

Section 512(c)(1)(C) of title 17 of the US Code requires the hosting providers to remove or disable access to pirated contents when receiving notification of claimed infringement. The notification includes: "*identification of the material that is claimed to be infringing or to be the subject of infringing activity and that is to be removed or access to which is to be disabled, and information reasonably sufficient to permit the service provider to locate the material.*"

Based on this regulation, the copyright owner needs to find out the link and password of pirated content to notice the OSP about infringement. Normally, the owners can find the link and password which is posted on pirated websites and blogs. However, files could be shared in a secret group of people and not be widespread. In practice, the copyright owners focus on popular websites and blogs which are viewed by many people, rather than a small group including several members.

B. Shut down pirated websites and blogs

The next step of copyright owners is attacking websites and blogs which share copyrighted contents. Instead of enforcing numerous pirated uploaders and downloaders, it is more effective to target at administrators of these sites.[77] The Internet users often search links on popular websites, so if pirated websites

---

[76] Kai He et al., *Public Auditing for Encrypted Data with Client-Side Deduplication in Cloud Storage*, 20 WUHAN UNIVERSITY JOURNAL OF NATURAL SCIENCE 291, 291 (2015).

[77] Lucy England, *Police Have Raided the Most Popular Pirate Streaming Site in Sweden and Are Forcing It to Shut Down*, July 29, 2015, http://uk.businessinsider.com/sweden-pirate-streaming-site-swefilmer-shut-down-police-raid-2015-7 (last visited Aug. 22, 2015).

are taken down, people could not get pirated links, at least in a short time. However, other pirated websites may replace closed ones after that. Overall, this method just reduces piracy in a short period if only one site is blocked.[78]

To stop a website and arrest its administrators, an international cooperation is needed. Unfortunately, the conflict between national laws is a barrier for law enforcement. In some countries such as Switzerland, the copyright regulation is not strict. For example, article 19 of the Federal Act on Copyright and Related Rights permits "private use": "*Published works may be used for private use. Private use means: any personal use of a work or use within a circle of persons closely connected to each other, such as relatives or friends.*" This means a person is permitted to download copyrighted contents from every source whether it is legal or not. In the Annual Special 301 Report on Intellectual Property Rights 2015, the US Trade Representative criticizes that domestic environment creates "*a safe haven for piracy on the Internet*"[79]

C. Filtering hash value before encrypting

As mentioned above, there are 2 ways of encryption: client-side encryption and shared-key encryption. One technology which is applied by shared-key hosting providers like Dropbox is hash value filter, which can be used to recognize copyrighted content. Therefore, this function should be applied in every cryptographic programs to detect the hash value of file before encipher a file. The blacklist of hashes could be sent to software developers to adopt in their programs. If the filter identifies a pirated content, the software should refuse to encrypt this content. If the content is original, it will be encrypted.

It is noticed that hash identifier does not violate the Privacy of users although it scan the file. Firstly, the filter does not read the content of file and does not know what this content is. Thus, this filter does not know the sensible information of users. Assuming that a hash value is a fingerprint and it is used to identify a person. But a fingerprint cannot show the detailed information such as age, occupation or characteristic. Secondly, the hash value is irreversible. This means if someone collects this value, he cannot create a copy of file.[80]

To apply this method, a hash value database is necessary. Hash values are contributed by copyright owners to protect their products. A sample database is

---

[78] Torrent Freak, *Shutting Down Pirate Sites Is Ineffective, European Commission Finds*, https://torrentfreak.com/shutting-down-pirate-sites-is-ineffective-european-commission-finds-150514/ (last visited Aug. 22, 2015).

[79] United State Trade Representative, Annual Special 301 Report On Intellectual Property Rights (2015) at 18.

[80] *An Illustrated Guide to Cryptographic Hashes*, UNIXWIZ.NET, http://www.unixwiz.net/techtips/iguide-crypto-hashes.html (last visited Aug. 23, 2015).

the National Software Reference Library (NSLR), a collection of software hash values, established by the National Institute of Standards and Technology, an agency of the U.S Department of Commerce.[81]

VI. Conclusion

The encryption plays a vital role in both Privacy and Intellectual Property. Facing many threats to data Privacy from hackers and government, encryption is a shield to protect sensible data and also the lives. However, the strength of the encryption is questioned under a concern that the government can exploit the backdoors on programs. Thus, the open-source independent encryptions are encouraged to use. In the context of Intellectual Property, the encryption is used to protect trade secrets which are valuable targets of economic espionage and theft. Additionally, the encryption is applied in Digital Right Management to protect copyrights from online infringements.

Besides these benefits, the encryption also raises the conflict between Privacy and copyright in the digital environment. With the development of technology, file-sharing via peer-to-peer networks and hosting services becomes popular and is used to transfer copyrighted contents by piracy. The encryption is an obstacle for the right holders to seek illegal links, which require appropriate passwords to decipher. Furthermore, the encryption disables the file identifier and hides the hash value of data. In contrast, the encryption facilitates the piracy and the service provider, protects them from the liability for copyright infringement.

Facing this situation, it is necessary to apply some solutions to against online piracy, with the requisite is the Privacy of users must not be violated. Two common methods could be used are notice and takedown pirated contents as well as shut down pirated websites and blogs. Moreover, to dealt with encryption challenge, filtering hash value before encrypting may stop the abuse of encryption for piracy while the data Privacy is still secured.

[81] *Library Contents*, NSRL, http://www.nsrl.nist.gov/Library_Contents.htm (last visited Jan. 2, 2016).

Rights to User Generated Content in a VR World

Randy Finch,[*] Jamie C. Yang[**]

ABSTRACT

Virtual reality (VR) generally refers to an artificial environment, constructed using a computer and presented to the user in such a way that they feel they are inside an alternate world.

In 2016, VR – the experience of exploring 360 degree photos and videos and to interact with computer generated characters and objects inside virtual worlds – has finally (after years of development) shown mass market commercial promise.

While much of the VR revenue is currently being captured by hardware and software makers, it is not difficult to imagine value being captured by licensing access to user generated content (UGC) in VR. For example, as with videogames and professional sports, it might be possible to monetize the experience of watching players of exceptional ability as they play a VR game (e.g., gameplay by someone engaged in a VR eSport). Alternately, offering a global audience the opportunity to explore a work of art created by a master in VR (perhaps as the master is creating the work) could also present a source of revenue. Stakeholders, including VR app developers, gaming platforms and game production companies, will likely want to control revenue from UGC as it is in their commercial interest.

In this article, we explore the potential for right of publicity, performance rights, and copyright protection for UGC in VR. VR has only been commercialized very recently and there have not been court decisions concerning the ownership of user generated content in a VR world. Therefore, to consider some of the legal questions that we anticipate will arise around VR, this paper examines court cases regarding the next closest forms of entertainment – video gameplay and sporting events.

Having examined the court decisions and considering the room for creativity and performance given to VR users (in our view, significantly more

[*] Honorary International Chair Professor, Professor of Digital Media Entrepreneurship, Associate Professor of Filmmaking, Taipei National University of the Arts; J.D. 87', Fordham University School of Law; B.A. 78', Harvard College. Contact email: randy@randyfinch.com.

[**] Partner, Innovatus Law. J.D. 11' & LL.M. 09', Columbia University School of Law; LL.M. 08', Institute of Law for Science and Technology, National Tsing Hua University; LL.B. 06', National Taiwan University. Innovatus Law is a full service business law firm located in Taipei, Taiwan. Contact email: jamie.yang@innovatus.com.tw.

authorship and protectable performance than that of video game players at the time of the court decisions), we conclude that in many circumstances UGC in VR could give rise to content that is protectable. In other words, at what appears to be the dawn of commercial VR, the question(s) at issue may not be whether UGC is protectable, but instead what rights exist and who has ownership of VR UGC.

Keywords: Virtual reality (VR), user generated content (UGC), copyright, right of publicity, performance rights

I. Introduction

Virtual reality (VR) is on course to have its first US billion dollar year in 2016. According to Deloitte Global, at least US $700 million of that revenue will come from hardware sales and the remainder from content.[1] And some experts are predicting we are only at the beginning of an unprecedented global VR boom – with some saying that by 2020 VR revenue will hit US $30 billion.[2]

Leaving that speculation aside, it is clear that questions will arise about who owns the user generated content (UGC) in a VR world. As consumers and enterprises begin to explore and develop content available through VR head-mounted displays (HMDs), and users interact in ways that create types of content which are arguably protectable under right of publicity, performance rights (sometimes identified as "neighbor rights" or as "rights neighbouring to copyright" - which in many jurisdictions protect people who are not technically authors, such as performing artists) and copyright, will open up these questions of ownership. In particular, it is in the realm of CGI (computer generated images) and UGC, where we see circumstances arising that are likely to raise thorny issues of ownership.

As the tools for creating original experiences inside VR spread widely, and users record and share their experiences inside VR, we are especially interested in the legal questions that will arise about who owns the rights necessary to distribute and commercialize that UGC. Note: While there are also 360 filmed experiences (non-interactive VR) – made with special cameras, or assemblages of cameras, that can capture a 360-degree field of view of the real world that can be played back inside a HMD - we are focused in this article on the potential for VR UGC which arguably has originality and authorship – perhaps implicating copyright, performance rights and right of publicity. In our view, CGI VR is where the inherent interactivity and potential for creating content by users seem to be the greatest.

---

[1] Paul Lee & Duncan Steward, *Virtual reality (VR): a billion dollar niche,* 2016 TMT PREDICTIONS, *available at* http://www2.deloitte.com/global/en/pages/technology-media-and-telecommunications/articles/tmt-pred16-media-virtual-reality-billion-dollar-niche.html.

[2] Digi-Capital, Augmented/Virtual Reality revenue forecast revised to hit $120 billion by 2020, http://www.digi-capital.com/news/2016/01/augmentedvirtual-reality-revenue-forecast-revised-to-hit-120-billion-by-2020/#.V33hB5N96u4.

II. VR at a Glance

A. VR Defined and its Current Commercial Applications

Using today's most effective VR systems, instead of simply viewing a screen and passively watching events unfold, users feel immersed in a 360 degree world where they are able to choose where to look, move and how to interact.

VR places the user in the center of the action. This can be as simple as donning a headset to watch documentary footage, with the user at the heart of a recorded or live event that can be viewed in 360 degrees as the user turns their head. But with CGI, VR promises more than a spectator's perspective. Building on today's powerful computers and various clever technologies for sensing user movement and rendering images, CGI VR now allows users to interact with objects in a virtual world. Unlike existing media, VR experiences that respond to user's movements can create a unique visceral feeling for the user of immersion sometimes referred to as "presence."

A VR device's most recognizable component is the head-mounted display (HMD). Even an inexpensive HMD (like Google Cardboard or Samsung Gear VR, that are both little more than mounts for a smartphone) will collect motion-tracking information from the user's movement to create the illusion that the user is looking around inside a virtual environment. In more sophisticated systems (like the HTC Vive), there are handheld controllers and the ability to move around within a space - allowing a user to experience even more of the illusion of presence inside a virtual world. And enhancements to existing VR experiences, like better audio and haptics (also known as touch feedback or kinesthetics), promise even greater levels of immersion.

At present, Google Cardboard is the least expensive way to begin to explore virtual reality (a million NY Times subscribers received a Google cardboard for free with their Sunday newspapers in Nov. of 2015). Slightly more expensive is the Samsung Gear VR (US $99), which uses certain Samsung smartphones as its processor and display. While Google Cardboard and Samsung's Gear VR do enable smartphone owners to view photos that have been captured using 360 degree cameras or to watch some 360 degree YouTube videos or to play certain basic apps, these smartphone-based devices can only hint at what VR is capable of achieving. More expensive devices (like the Oculus Rift, HTC's Vive and PlayStation VR) that have been custom-built to track user motion, while offering better screens and access to much better apps, promise much deeper dives into VR.

What current apps suggest the power of VR and where VR might be headed?

Tilt Brush, a virtual reality program where the HTC Vive controllers become tools for painting and sculpting in a virtual 3D space, is a remarkable portal into how VR can encourage creativity.

Ghostbusters: Dimension is a multiplayer virtual reality experience that transports users into the world of the film franchise. It can currently be played (using a HMD, a handheld controller and a haptic vest) at Madame Tussaud's in NYC.

The above are two examples of VR applications that are available today. They demonstrate VR's potential – both aesthetically and commercially. However, as mentioned earlier, we are still in the early days, before VR devices have been sampled and adopted by a large-scale audience.

B. VR Takes User Generated Content to Another Level

If you've ever been immersed in the world of a good book, movie, play or videogame – you understand one of the core attractions of VR. Putting on a HMD can be seen as a shortcut to immersion. But it is not just this sense of visiting another world that has attracted so much attention to the aesthetics of the VR experience. What makes VR special is the depth of immersion and the sense of being able to interact that can be experienced in VR.

To understand the excitement over VR, it is necessary to explore the levels of immersion offered by VR – to see how head-tracking, CGI, HMDs, haptics, etc. can potentially offer a new medium that is more than an enhancement of old forms.

Movies, books and plays are designed for users as *spectators*. Videogames and VR are different. As in some 2D videogames (e.g., *The Sims* and *Minecraft*), it is possible for a VR user to build and to undertake their own actions inside a virtual world. And, as in some videogames, user actions in VR can affect narrative – changing how events will unfold. In other words, as in some videogames, VR computer generated worlds can promise experiences that are not simply narrated (like a book, movie or traditional play) but are rather enacted. With CGI and VR, a user is not limited to merely functioning as a spectator, but can act as a *participant*.

This experience of interactivity with consequences inside the VR world (sometimes described as "agency") is perhaps the most promising element of CGI VR. But traditional videogame players also have agency. What makes VR unique? By placing the user at the center of a virtual world with space to explore in all directions – and then making the user's body motions part of the experience, blurring the lines between *user* and *experience* – a VR user can actually feel like they have become part of the virtual world.

It is difficult to describe the experience with words, but this merging of

body movement and 360 virtual worlds makes immersion in VR unique:
"In VR, the sense of immersion is given by image, sound and tactile sensations. Interactivity is added to the experience by coordinating the display with the movements of the user's body. The physical presence of the body in the virtual environment reinforces the sense of the physical presence of the virtual world. […] It is therefore through the mediation of the body that VR developers envision the reconciliation of immersion and interactivity." (Ryan 1999: 133).[3]

In other words, a key feature of CGI VR – a feature that separates VR from videogames - is the integration of the player and the experience. In many traditional videogames, the user is represented by an avatar (often with great attention paid to how the avatar looks and will behave). By way of contrast, in VR the user *is the avatar*. In traditional videogame play there has always been an element of spectatorship – for example, a player and fans both are watching an avatar. In recent years, that interest in spectatorship has lead to professional eSports organizations, monetizing fan interest in live and online videogame competitions. In some of the more popular spectator multiplayer online battle arena (MOBA) videogames, like *Dota 2* and *League of Legends*, spectators and players watch gameplay from an aerial perspective. It remains to be seen whether gameplay in VR, where players typically have a first person perspective, will also serve as the basis for professional eSports. (One promising blending of overhead spectatorship and first person gameplay can be seen in the VR game Ruckus Ridge, where one protagonist wears a HMD but the other competitors watch a TV screen that has an aerial view as they are battling – using game controllers - as a team against the player in the HMD who lacks their bird's eye view.) The unique experience offered by tracking the user's actual head and body in 360 degree virtual spaces, and then integrating the user's movements and choices into immersive experiences, are what makes VR so exciting and potentially a new medium for the player – and perhaps for fans. Could it be that professional VR sporting events, where fans affiliate inside VR to watch what a player is (or a team of players are) achieving in VR might one day rival older forms of entertainment?

Compared with video games, VR has the potential for users to exercise greater creativity in shaping the elements in the worlds. And, once VR hardware is widely in use, it is likely that some users will want to experience cultural events in VR, including sporting events, performances and arguably "new" works created by other users inside a virtual world.

What are some legal questions concerning ownership of elements created by user actions inside a virtual world? Because there is also interactivity and

[3] Ryan& Marie-Laure, *Immersion vs. Interactivity: Virtual Reality and Literary Theory*, 28 SUBSTANCE 110, 110-137 (1999).

agency in games, and gamers have been recording their actions and the consequences of their action inside game worlds for years now, games seem to offer a productive starting point for a legal analysis.

III. Prior Cases

VR has only been commercialized very recently and there have not been court decisions over the ownership of user generated content in a VR world. Therefore, to consider some of the legal questions that we anticipate will arise around VR, this paper examines court cases regarding the next closest forms of entertainment – video gameplay and sports events. No dispute over rights in gameplay or eSports gameplay has been adjudicated by the courts in Taiwan (where the authors are located), so this paper takes cases in the United States as reference points.

A. Video Gameplay Cases

While video games are subjected to copyright protection, so far there is no established case under Taiwan law or U.S. law that recognizes a copyright interest in gameplay itself.

Allen v. Academic Games League of America, Inc.[4]

Robert W. Allen owns copyright interest in many academic video games. Such games have been employed in many school districts. Allen formed the National Academic Games Project (NAGP) and hosted national tournaments with a high number (800) of students attending in 1991.

Later, some members of the NAGP left and formed a non-profit corporation, Academic Games League of America (AGLOA), which also held national tournaments parallel to NAGP tournaments. Some of Allen's copyrighted games were used in the NAGP tournaments, although NAGP had legally purchased those games.

Allen sought to enjoin AGLOA from using his games in their tournament, under the theory that the AGLOA students made unauthorized public performance of his work.

In the Allen case, the court cited 17 U.S.C. §106(4)[5] of the Copyright Act: "'Perform' and 'publicly' are defined in the Copyright Act as, respectively, 'to recite, render, play dance, or act it, either directly or by means of any device or

[4] *Allen v. Academic Games League of America, Inc*., 89 F.3d 614 (9th Cir. 1996).
[5] The Copyright Act, 17 U.S.C § 106(4) (1994).

progress…' and 'to perform or display it at a place open to the public or at any place where a substantial number of persons outside of a normal circle of a family ant its social acquaintances is gathered…' In applying these statutory definitions to the playing of Allen's games in a tournament setting, **we conclude that the playing of a game is not a "performance within the meaning of the Copyright Act."**

Micro Star v. FormGen, Inc.[6]

FormGen Inc. owns the rights to Duke Nukem 3D (D/N-3D), a popular computer game. The game D/N-3D allows players to explore a futuristic city with the goal of zapping the evils. The game also includes a ''Build Editor,'' which enables players to create their own new levels. Meanwhile, FormGen encourages players to post levels they have created on the Internet, allow these new levels to be downloaded by other players freely. Micro Star downloaded the levels created by 300 players and stamped them on to the CD which later become their product Nuke It (N/I). N/I even contains several screen shots of gameplay - pictures of what the level looks like.

According to 17 U.S.C. § 106(2) (1994),[7] FormGen (copyright holder) enjoys the exclusive right to derivative work. Therefore, the main issue before the court was whether N/I constituted a derivative work of D/N-3D.

The court looked to *Galoob,* 964 F.2d[8] and *Litchfield v. Spielberg,* 736 F.2d 1352, 1357 (9th Cir.1984)[9] for the standard of "derivative work" and found that two conditions must be fulfilled: 1) a derivative work must exist in a ''concrete or permanent form,'' *Galoob,* at 967 and must substantially incorporate protected material from the preexisting work. The court decided that the first condition was met as the N/I's MAP files, which used D/N-3D's art library directly - burned onto a CD-ROM and undoubtedly existing in a concrete form. Regarding the second requirement, the court saw that FormGen will "doubtless succeed"[10] as the displays generated when the player chooses the N/I levels come entirely from D/N-3D's source art library.

Micro Star counter argued that it was the beneficiary of the implicit license that FormGen gave to its customers by allowing them to create new levels and encouraging them to post their new levels on the Internet. Section 204 of the Copyright Act requires the transfer of the exclusive rights granted to copyright owners to be in writing while non-exclusive ones are permitted to be in oral or

---

6 *Micro Star v. FormGen, Inc*., 154 F.3d 1107 (9th Cir. 1998).
7 The Copyright Act, 17 U.S.C § 106(2) (1994).
8 *Lewis Galoob Toys, Inc. v. Nintendo of America*, *Inc*., 964 F.2d 965 (9th Cir. 1992).
9 *Litchfield v. Spielberg,* 736 F.2d 1352, 1357 (9th Cir. 1984).
10 *Micro Star v. FormGen*, 154 F.3d 1107, 1112 (9th Cir. 1998).

implied conduct manner. The court found that FormGen did not grant any license to Micro Star while the licenses granted to players (to create their own new levels) contained the significant restriction that the new works created must be free of charge. The encouragement by FormGen, even though it might be deemed as the abandonment of some rights by implied conduct, was not abandonment of the right to profit commercially. The court concluded that the right to commercial profit of FormGen was infringed by Micro Star and its product (derivative work) N/I.

B. Sport Cases (Including eSports – i.e, sporting events where the gameplay is facilitated by human-computer interfaces)

Another line of precedent, that might be applied to the ownership of user movement and gameplay in VR, concerns ownership of physical sports performances. Court decisions regarding physical performance might in some respects anticipate disputes over virtual performance.[11]

Baltimore Orioles, Inc. v. Major League Baseball Players Ass'n[12]

The case arose out of a long-standing dispute between the Major League Baseball Clubs and the Major League Baseball Players Association. Club owners and players were at odds over the control of player performances in broadcast games.

After years of negotiating with the clubs for revenue sharing in telecasts, the players sent cease and desist letters to the clubs and the cable companies contracted by the clubs arguing that baseball game telecasts were made without the players' consent and thus constituted violation of their rights of publicity and proprietary right in their performances. However, as the court noted, "the players never claimed that the performance of baseball before televised audiences was not within the scope of their employment. Indeed, the only issue as to which Players argued that there was a genuine issue of material fact concerning the parties' written agreement respecting ownership of the telecasts' copyright."

The court ruled that performance of baseball games is within the scope of players' employment, and the players failed to rebut the presumption that baseball clubs own copyright in telecast. Further, the court held that the baseball clubs' copyright in telecasts of major league baseball games preempted the

[11] Dan L. Burk, *Owning E-Sports: Proprietary Rights in Professional Computer Gaming*, 161 U. Pa. L. Rev. 1535, 1550 (2014).

[12] *Baltimore Orioles, Inc. v. Major League Baseball Players Ass'n*, 805 F.2d 663 (7th Cir. 1986).

players' rights of publicity in their baseball game performances. The question of whether physical gameplay constituted performance (of the type protected in some jurisdictions by performance rights, such as those that will be protected in the U.S. should the Beijing Treaty on Audiovisual Performances be ratified) was not adjudicated.

National Basketball Ass'n v. Sports Team Analysis and Motorola[13]

SportsTrax was a portable electronic beeper device created and marketed by Sports Team Analysis and Tracking Systems, Inc. and Motorola, Inc. ("Motorola") which provided real-time information about National Basketball Association ("NBA") games. The NBA brought action against Sports Team Analysis and Motorola on the basis of copyright infringement, misappropriation, unfair competition and other claims.

The court held, "[w]ith respect to the NBA games, NBA is not seeking to protect a written book of NBA rules or coaches' plays or a tangible recording of an NBA game. Instead, it seeks to protect the NBA games themselves—the culmination of interaction of these NBA rules and coaches' plays, the referees, the players, and perhaps even the announcers, members of the press, vendors, patrons, security guards, ticket takers, and the like who are present at the arena during an NBA game and whose interaction comprises an NBA game. **I hold, however, that NBA games do not constitute 'original works of authorship' and thus do not fall within the subject matter of copyright protection under 17 U.S.C. §§ 102, 103.**"

In reaching the conclusion that NBA games do not constitute 'original works of authorship, the court's relied heavily on the statutory text of the Copyright Act, "[w]orks of authorship include the following categories: (1) literary works; (2) musical works, including any accompanying words; (3) dramatic works, including any accompanying music; (4) pantomimes and choreographic works; (5) pictorial, graphic, and sculptural works; (6) motion pictures and other audiovisual works; (7) sound recordings; and (8) architectural works." "Noticeably absent from this illustrative list of works of authorship, however, is a category for sports events or other analogous organized events."

The court granted the NBA permanent injunctive relief against Sports Team Analysis and Motorola on the misappropriation and unfair competition claims.

---

[13] *National Basketball Ass'n v. Sports Team Analysis and Motorola*, 939 F.Supp. 1071 (S.D.N.Y. 1996).

Blizzard vs. KeSPA, OGN and MBC[14]

The Korea eSports Association (KeSPA) is a South Korean body in charge of managing eSports in South Korea, established by the country's Ministry of Culture, Sports and Tourism. The eSports it manages in South Korea included *Starcraft II: Legacy of the Void, League of Legends, Dota 2,* and *Counter-Strike: Global Offensive*.

KeSPA is an important force in South Korean eSports, taking the lead in organizing tournaments, providing career guidance for professional videogame players, and handling aspects of marketing and public relations, and, most importantly for this discussion, negotiating broadcast agreements with cable and television outlets. KeSPA functions within the two broadcasting networks: OGN and MBC. Both are represented within KeSPA ruling body and are in fact a broadcasting platform for all the events.[15]

The copyright in the Starcraft video game is owned by the U.S. company, Blizzard Entertainment, one of the largest video game developers. However, KeSPA is the main contributor for the popularity of Starcraft series on a competitive level.[16] The conflict between Blizzard and KeSPA arose when Blizzard tried to take control and collect royalties from every possible future application of StarCraft II, which includes promotion, players, tournaments, leagues and broadcasts.[17]

Blizzard appointed Gretech Corporation as its license agent and licensed broadcasting right of Star Craft Brood War to Gretech's GOM platform. As towards KeSPA, Blizzard argued that Blizzard owned 100% of the right in derivative works. Blizzard brought lawsuits against MBC and OGN, arguing they did not have rights in any "derivative" work.[18]

According to Il-Gan Sports, the parties eventually settled. The general terms were for Blizzard to recognize the rights of KeSPA, MBC and OGN with respect to running Starcraft 1 Tournaments and ownership rights of derivative works. That is, KeSPA and the broadcasting stations can run tournaments as

[14] The lawsuits were brought in the courts in South Korea, and the parties have reportedly settled in 2011.

[15] Simon "Go0g3n", *Blizzard VS. Kespa, the Ultimate fight*, July 31, 2009, http://www.gosugamers.net/starcraft/news/10265-blizzard-vs-KeSPA-the-ultimate-fight.

[16] Seaky, *Blizzard v Kespa General Discussion*, Nov. 2, 2010, http://us.battle.net/forums/en/sc2/topic/933034276.

[17] Simon "Go0g3n", *Blizzard VS. KeSPA, the Ultimate fight*, July 31, 2009, http://www.gosugamers.net/starcraft/news/10265-blizzard-vs-KeSPA-the-ultimate-fight.

[18] Team Liquid, *Community News and Headlines*, May 9, 2011, http://www.teamliquid.net/forum/community-news-archive/221245-kespa-and-blizzard-near-an-agreement.

they please, and Blizzard will not restrict the sales of any derivative works that are created from tournaments. Meanwhile, KeSPA and the broadcasting stations will pay Blizzard a licensing fee for Starcraft 1, as well as putting in Blizzard's logo during the contests. The license fee will be a yearly fee paid to Blizzard by KeSPA, OGN, and MBC Game separately.[19]

In re NCAA Student-Athlete Name & Likeness Licensing Litigation[20]

Samuel Keller was the starting quarterback for Arizona State University in 2005 before he transferred to the University of Nebraska, where he played during the 2007 season. EA is the producer of the NCAA Football series of video games, which allow users to control avatars representing college football players as those avatars participate in simulated games.

In the 2005 edition of the game, the virtual starting quarterback for Arizona State wears number 9, as did Keller, and has the same height, weight, skin tone, hair color, hair style, handedness, home state, play style (pocket passer), visor preference, facial features, and school year as Keller. In the 2008 edition, the virtual quarterback for Nebraska has these same characteristics, though the jersey number does not match, presumably because Keller changed his number right before the season started.

Keller filed a putative class-action complaint in the Northern District of California asserting that EA violated his right of publicity under California law. EA's main defense theory was that the NCAA Football video game is "transformative use" protected under the First Amendment.

In determining whether the video game was transformative, the District Court inquired, "[w]hether the celebrity likeness is one of the 'raw materials' from which an original work is synthesized, or whether the depiction or imitation of the celebrity is the very sum and substance of the work in question. We ask, in other words, whether a product containing a celebrity's likeness is so transformed that it has become primarily the defendant's own expression rather than the celebrity's likeness. And when we use the word 'expression,' we mean expression of something other than the likeness of the celebrity."

The District Court concluded that EA's use of Keller's likeness does not contain significant transformative elements such that EA is entitled to the defense as a matter of law. On appeal by EA, the 9th Circuit affirmed the holding of the District Court.

---

[19] Daily Sports, *Blizzard StarCraft and E-Sport Solve Conflicts*, May 9, 2011, http://isplus.live.joins.com/news/article/article.asp?total_id=5465743&cloc=.

[20] *In re NCAA Student-Athlete Name & Likeness Licensing Litigation*, 724 F.3d 1268 (2013).

The SpectateFaker Case[21]

The Korean eSport team SKTelecom T1's player Lee Sang-Hyeok (Faker) is one of the top-ranking eSport players of the online game *League of Legends* (*LoL*). In September 2014, Korean E-sport Association (KeSPA) signed a contract under which all SKTelecom T1's gameplay would be exclusively streamed on the Azubu platform. The contractual obligation extended to all the players of the SKTelecom T1 team, including Faker.[22] However, a *LoL* player and Faker fan (StarLordLucian) was able to obtain - from another source - the spectator mode (a bird's eye view of the gameplay) of Faker's solo queue *LoL* games (solo queue refers to online *LoL* games where Faker played without his teammates, simply joining a queue to be assigned random teammates). StarLordLucian established a channel to rebroadcast the Faker solo queue games to another online platform, Twitch, and named the channel SpectateFaker.[23]

Later on, Azubu sent Twitch a takedown notice per the Digital Millennium Copyright Act (DMCA), alleging that the streaming channel SpectateFaker had infringed their exclusive right to stream the gameplay of Faker. Twitch responded by shutting down the channel.

Twitch might have swiftly shut down the channel due to the safe harbor provision of the DMCA (17 U.S. Code § 512). That statute protects an online streaming platform (like Twitch) from the civil liability for copyright infringement, as long as the platform acts "expeditiously to remove or disable access to the infringing material" once identified. However, whether the SpectateFaker channel actually infringed anyone's right is worth giving a second thought. This paper considers the rights of Riot Games and Azubu in turn.

The Copyright Act (17 USC § 106) provides that the copyright holders have the exclusive right to "publicly perform the work and to reproduce copies of the work" while they can also grant licenses to others to use the protected work.

It is unquestionable that the video game *LoL* is a copyrightable work. However, its copyright holder Riot Games had publicly issued and maintained a policy that allowed all players to "use League of Legends IP as the basis for a

[21] No lawsuit was filed after the DMCA takedown notice, and there are no known development of this case after the public announcement made by LoL in 2015.

[22] YeBai, *E-Sport King—Right Infringement Controversy of League of Legends; player rebroadcasted through spectator mode which Azubu threatens to sue*, Feb. 24, 2015, http://www.esranking.com/news/news_content.php?NewsNo=2613.

[23] Bryce Blum, *An esports lawyer breaks down everything you need to know in the SpectateFaker case*, Feb. 22, 2015, http://www.dailydot.com/esports/dmca-faker-azubu-twitch-riot/.

fan project that you're giving away for free or that's only generating ad revenue."[24] In other words, a fan who rebroadcast legally obtained gameplay might argue that they had a license and that they could hardly infringe the copyright of Riot Games (if there was no revenue, or only ad revenue). Apparently, Lucian's SpectateFaker channel was a labor of love that was not being re-sold and did not generate significant ad revenue.

Additionally, one might look to the Beijing Treaty on Audiovisual Performances (BTAP), which has not yet entered into force (adopted in 2012, it must first be ratified by at least 30 eligible parties) but which grants performers economic rights in performances fixed in audiovisual media. Those rights include (i) the right of reproduction; (ii) the right of distribution; (iii) the right of rental; and (iv) the right of making available.

Arguably, Azubu's rights to make Faker's performance available originated from Faker. In other words, if there was a license for others to distribute the copyright elements of *LoL* as long as only ad revenue was collected, Faker might still have asserted a performance right. And Azubu might have argued they had obtained that performance right. The question then might become – especially after the ratification of BTAP - does Faker have performance rights over his *LoL* gameplay? Were his performance rights over all his gameplay (including solo queue play) transferred to SKTelecom T1 by contract and then assigned to the Korean E-sport Association (KeSPA) and on to Azubu?

The whole incident concluded with an announcement by Riot Games on *LoL*'s official website. They reclaimed their IP rights and intervened - shutting down SpectateFaker on their own. The reason they claimed for the shutdown was their philosophy of closing any fan stream "where we perceive that it's causing harm to individual players."[25]

C. Emerging Treatment of Gameplay Cases

1. Copyright in the Traditional Sense

As the holdings in the *Baltimore Orioles* and the *NBA* sports broadcast cases indicate, in the U.S., copyright in fixed performances tends to vest in the individual capturing or recording the event, not in those who are engaged in the

[24] Riot Games, *FAQ and Guidelines for the Community's Use of Our Intellectual Property*, http://www.riotgames.com/legal-jibber-jabber.

[25] Tryndamere, *Spectatefaker—What We Learned and What We'll Do*, http://na.leagueoflegends.com/en/news/riot-games/announcements/spectatefaker-what-we-learned-and-what-well-do.

event.[26] In the U.S., the players of sporting events that have been distributed via television have occasionally tried to assert - based on their common law and statutory rights of publicity - an interest in revenue earned from distribution of that fixation. The US courts have not had a history of siding with players in those cases where physical sports have been recorded by camera operators hired by the clubs or their designees (and not by the individual players). In other words, in jurisdictions where performance rights are not recognized, disputes over the ownership of a performance in traditional sporting events (e.g., *Baltimore Orioles* and the *NBA*) have been decided primarily on copyright theory. And, because the players of traditional sports are not typically the ones who are fixing their performance in a tangible medium of expression, and copyright analysis favors the author who fixed the performance, players have found copyright law a tough field to compete on. Should courts begin to recognize the original expression within gameplay, VR gameplay where the individual player has recorded his or her original expression, could, in theory, lead to different results. In those cases where the player is the one who has recorded screenshots or spectator views of videogame play, the player could arguably assert an author's copyright interest in the gameplay they have recorded.

2. Performance Right

Even if the player has not been the one to fix the gameplay, the fact that a videogame player did not author fixation may be overcome using performance rights. The idea of visual performance rights is not currently part of U.S. law. So it was not at issue when the *Baltimore Orioles* and *NBA* cases were adjudicated. This may change. While the WIPO Beijing Treaty on Audio Visual Performances is not yet in force in the U.S. or elsewhere (and its impact on the state of gameplay in the U.S. is yet to be seen) performance rights (like those contemplated under the BTAP) have been clearly recognized in Taiwan since 1998. Not only are performance rights recognized, they are recognized as a form of copyright under the Taiwan Copyright Act. In Taiwan, there is no question that the "fixation" element (i.e., who has fixed the performance in a tangible medium of expression) would not be an obstacle for players asserting that they have a copyrightable interest in their gameplay. In Taiwan, the player's performance rights should be protected even if someone other than the player had contracted for the recording to be made.

With regards to the "creative expression" element, the *NBA* case clearly

[26] Dan L Burk, *Owning E-Sports: Proprietary Rights In Professional Computer Gaming*, 161 U. Pa. L. Rev. 1535, 1535 (2013).

articulated that NBA games do not constitute original works of authorship. Whether the holding of this case would bar players from having performance right interests in their gameplay even after the Beijing Treaty comes into force in the U.S. remains to be seen.

On the other hand, in practice, Taiwan's courts have set a low standard for the creative expression requirement: As long as the moves in a game are not strictly dictated by the game itself, it seems likely that players could assert that their gameplay was original expression and deserving of protection under Taiwan's copyright law.

III. VR "Gameplay"

A. A Comparison between Various Expressions

Technology has come a long way from the days when the *Allen* court ruled that **the playing of a game was not a "performance within the meaning of the Copyright Act."**[27] Paradoxically, as games have become more complex and the technology of VR incorporates unique behaviors and user choice into virtual worlds, the "rules" have enabled more unique player performances. The potential for unique creativity inside games is growing – and VR which blends unique players into games and virtual worlds – along with a regulatory scheme that seems intent on recognizing increased performers' rights – may push old assumptions to the breaking point.

B. Rights in User Generated Content in VR

VR is just one platform for next generation gameplay. And, as we have suggested elsewhere in this article, VR offers much more than gameplay and passive viewing of 360 entertainment. It can be a tool for artistic expression.

When Tilt Brush was introduced on the HTC Vive VR, Glen Keane, a former Disney animator who worked on *Beauty and the Beast*, *The Little Mermaid* and *Aladdin*, appeared in a promotional video where he sketched his most famous characters in 3 dimensions and walked around them, declaring: "Today, all the rules have changed." Although he probably didn't intend it, Glen Keane could have been announcing that we are "in" a different world from that of *Allen*.

If the judges in *Allen* had experienced Tilt Brush, it would be difficult to imagine them declaring that "the playing of a game is not performance within the meaning of the Copyright Act." Tilt Brush is actually more akin to brush

[27] *Allen*, 89 F.3d at 616.

and paint in the physical world than a simple arcade game. Is there any question that a Tilt Brush drawing would be protected under either copyright, performance rights or both?

As we move away from the traditional world of video games and into VR, the question at issue should not be whether UGC is protectable or not, but instead determining the copyright ownership of UGC. Can the platform or game production companies be able to strip users of their rights in works that the users create in VR by a simple end-user license agreement (EULA)? Or should the app developers and platforms be treated as producers of tools capable of artistic expression (such as a paint brush or camera)?

In some circumstances, the creativity expressed by the VR user may well surpass that of the game production company. There is no question that Riot Games owns the copyright to the various elements (e.g., the supplied elements of the avatars, the supplied buildings and objects, etc.) of the *LoL* games. Thus, Riot Games has a claim for copyright infringement for unauthorized copying when those elements are copied and/or distributed without permission. But what about Tilt Brush? Are the basic elements of red-blue-yellow "ink" in the game protected by copyright as well? Or should they be in the commons? If the end user license agreement of the platform claims all rights in the VR gameplay, is it conscionable? Is it enforceable?

IV. Conclusion

UGC today is markedly different from the days of *Allen*. Long gone are the days when scholars debated whether gameplay was copyrightable. Or so we would hope. But now at the beginning of what seems to be a new era of VR gameplay, questions seem likely to arise about ownership of performances in VR and UGC.

VR gameplay UGC could rapidly evolve into a commodity of great commercial value. The social element has become increasingly important in interactive forms of entertainment including games, and UGC is gaining commercial value. Just as Faker's gameplay can attract thousands of fans, a popular VR player's gameplay could potentially outstrip those numbers.

Stakeholders, including gaming platforms and game production companies, will likely want to control UGC. But will VR players, whose performances will inevitably capture more of their identity than a traditional videogame player's gameplay, want to assert that they have rights?

A future line of VR copyright, performance rights and right of publicity cases, we expect, might arise from disputes between exceptional VR players, VR game production companies and game platforms. Will a platform or game production company argue that the user clicked "agree" in the EULA – and

therefore gave up all rights to UGC and their performance within the game? When the users *are the avatars*, and every tilt of the head and gesture matters in gameplay? When gameplay is inherently intertwined with personality of the players? Will VR gameplay create some form of moral right? As we go deeper into the VR world, we hope to see these legal issues explicitly resolved by courts or authorities.

Editorial Note

NTUT Journal of Intellectual Property Law and Management is one of the first academic journals dedicated to intellectual property law and management in English to be published in Taiwan. Our goal is to encourage those interested in IP to publish the results of their research and express their ideas.

The issue features three articles and one report covering different aspects of the U.S. ITC rules, the economic model for the transfer of intellectual property, the gray area between privacy and IP law resulted from encryption technology, and the emerging legal issue of virtual reality.

I would like to express my sincere gratitude to those who helped the issue of the Journal, especially for the reviewers and editors for their time, thoughtful advice and quick feedback.

We welcome your submissions, comments, and suggestions. The Journal can be contacted by email to iipjournal@ntut.edu.tw.

.

Asst. Prof. Hung-San Kuo
Executive Editor

ISSN 2226-6771
VOLUME 5 July 2016 NUMBER 1

TABLE OF CONTENTS