

Wordwide scientific collaboration and national intellectual property: how to put those things together?

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Abstract

In this paper we made an attempt to discuss some important questions of intellectual property in international collaboration between scientists. Global nature of the scientific research is a nowadays reality, while IP laws still have national character. Though the basic principles of IP protection are similar in all countries, there are certain differences in legislation, and it affects the collaboration. Since the material is presented at World Congress on Optics, we describe it on example from optical sciences.

Keywords: intellectual property, copyright, patent, research and IP, invention, author's rights

1. Types of intellectual property relevant to optics

First of all, we should distinguish between the main types of intellectual property, including patents, trademarks, copyrights, and trade secrets and their relevance to Optics. To grasp the differences among these IP types we'll give some examples of their application.

Patent is a document granted by a government to the authors of an invention that confirms their priority in the discovery and asserts that certain rights are granted to the inventors. Once the patent is granted, everyone but you is excluded from making, using, selling, importing or offering for sale your invention. These rights are given only over a limited time period of about 20 years and in exchange for that the authors agree to public disclosure of their invention with all details necessary to replicate the invention. That said, one must realize that the power of patent is not unlimited as it does not preclude other scientists from work on the same problem and improve existing solutions. It also does not prevent reversed engineering resulted in an alternative solution, which does not interfere with the patented technology.

There exist two types of patents relevant to Optics: utility patents and design patents, each having innate merits and caveats. First and foremost, there are utility patents. This is the prevalent type of patents, which covers the inventions that produce useful results. Practically anything made by humans can be patented as long as it is novel and useful. Novelty may include just about anything: new materials and devices, their methods of usage and the processes involved in their manufacturing, new technological procedures, internet techniques, some novel genes sequence, new ways to facilitate business, innovative software and hardware, pharmaceutical products and many other man-made items and actions limited only by one's imagination. Figure 1 shows an example of such a patent with the capacious title "optical device".

(12) United States Patent Hamada	(10) Patent No.: US 6,798,960 B2
	(45) Date of Patent: Sep. 28, 2004
(54) OPTICAL DEVICE	JP 58-059401 4/1983
	JP 3-44562 2/1991
(75) Inventor: Hidenobu Hamada , Amagasaki (JP)	JP 7-248339 9/1995
	JP 9-145745 6/1997
(73) Assignee: Matsushita Electric Industrial Co., Ltd. , Osaka-fu (JP)	JP 10-261244 9/1998
	JP 11-218627 8/1999
	JP 11-266055 9/1999

Figure 1. Utility patent for
Optical Device

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edited by Ramón Rodríguez-Vera, Rufino Díaz-Urbe, Proc. of SPIE Vol. 8011, 80116O
2011 SPIE · CCC code: 0277-786X/11/\$18 · doi: 10.1117/12.905277

(12) **United States Design Patent** (10) Patent No.: **US D514,531 S**
Takagi et al. (45) Date of Patent: **** Feb. 7, 2006**

<p>(54) OPTICAL MODULE</p> <p>(75) Inventors: Shinichi Takagi, Tokyo (JP); Hiroshi Aruga, Tokyo (JP); Kiyohide Sakai, Tokyo (JP)</p> <p>(73) Assignee: Mitsubishi Denki Kabushiki Kaisha, Tokyo (JP)</p>	<p>OTHER PUBLICATIONS</p> <p>NEC Compound Semiconductor Devices, "Data Sheet, laser Diode NX7313UA NEC", 10 pages, 2002.</p> <p>Product Overview, wysiwyg://mainframe.1101/http://www.shinko.co.jp/e.product/e.glass/e.glass.4.htm, "Glass-to-Metal Seals", 2 pages, 2001-2002.</p> <p>Patent Abstracts of Japan, JP 10-284640, Oct. 23, 1998.</p> <p>Patent Abstracts of Japan, JP 08-031970, Feb. 2, 1996.</p>
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Figure 2. Design patent for Optical module

Not to be confused with the utility patents, the other patent species is the design patent. A design patent covers the unique appearance of an object. It should be purely aesthetic, not functional, design. If the subject of a design patent in addition to being pleasant to one's eye also happens to be have some useful functionality, then the design must be covered by a utility patent. Figure 2 shows an example of optical design patent. (Design patent numbers start with letter D.)

Copyright protects the creative or artistic expression of an idea. Copyrights, identified by the symbol ©, do not cover ideas and information themselves, only the form or manner in which they are expressed. "Original works of authorship" are protected by copyright law once the author writes them on paper or places them on the drive of the computer. Software, which is essential part of modern optical systems, may be protected by copyright. The law today does not require attaching a notice of copyright to the work or registration; the author is the copyright owner even without these formalities.

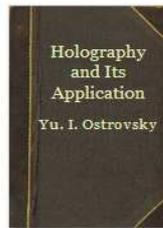


Figure 3. An example of copyrighted material in Optics.

Works ineligible for copyright protection in the United States: (1) Federal Government works, or (2) works without the requisite level of originality to qualify for copyright protection.

If you perform a contract under Federal Government funding, it is not always copyrightable; and whether other government-funded works are eligible for copyright protection varies around the world.. The U.S. government itself states that it "may assert copyright outside of the United States for U.S. government works."¹ In practice, this means that *much* material on *.gov and *.mil, as well as material on some *.us web sites, is in the public domain.

"Creative content" requirement means that works must show sufficient *human* creativity to be eligible to copyright at all. The painting shown in Fig. 4 was produced by the chimpanzee "Congo" and is therefore not copyrightable.



Fig. 4 Painting by chimpanzee.

Unlike copyright, the valid patent does not protect the expression of the idea but the underlying substance of it. For example, a utility patent application for a microchip addresses not the mask itself or the particular integrated circuit layout, but the idea that given circuit can be organized and operate in a particular manner, see Figure 5. A mask work as a two or three-dimensional layout or topography of an integrated circuit, i.e. transistors and passive electronic components such as resistors and interconnections, may be protected by exclusive rights “mask work” [Ⓜ] which are similar to copyright. This right provides time-limited exclusivity to reproduction of this particular layout; it is identified by a sign [Ⓜ] with the owner name written aside.

<p>(12) United States Patent Chen et al.</p>	<p>(10) Patent No.: US 7,014,956 B2 (45) Date of Patent: Mar. 21, 2006</p>
<hr/>	
<p>(54) ACTIVE SECONDARY EXPOSURE MASK TO MANUFACTURE INTEGRATED CIRCUITS</p> <p>(75) Inventors: Fred Chen, Cupertino, CA (US); Jeff Farnsworth, Los Gatos, CA (US); Wen-hao Cheng, Fremont, CA (US)</p> <p>(73) Assignee: Intel Corporation, Santa Clara, CA (US)</p>	<p>6,541,165 B1 * 4/2003 Pierrat 430/5 6,544,695 B1 * 4/2003 Wang et al. 430/5 6,632,576 B1 10/2003 Tejnil 6,821,690 B1 * 11/2004 Bae 430/5</p> <p>OTHER PUBLICATIONS</p> <p>Warren Grobman and Yao-Ting Wang. Practical IC Design in the Subwavelength Regime. Web Page [online]. <i>Integrated System Design Magazine</i>. Posted Jan. 30, 2001</p>

Figure 5. Mask work protection by utility patent.

Mask work example, protected by a mask work sign is shown in Fig. 6.

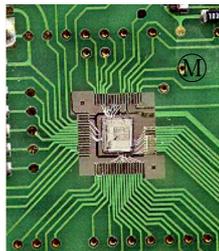


Figure 6. Mask work protection by mask work sign [Ⓜ].

A *trademark* (or servicemark) defends distinctive terms, marks, and names that are used in relation to products (or services) as indicators of origin. Trademarks and servicemarks, identified by the symbols TM and SM (not yet registered) and ® (registered), are distinctive signs used to discern the products and/or services to consumers. An example of a trademark in optical business is shown in Figure 7.

Word Mark CMSTRAIN

Goods and Services IC 009. US 021 023 026 036 038. G & S: Optical metrology apparatus and instrumentation, namely metrology tools for 2D and 3D visualization and measurement of the deformation motion and strain field in advanced electronic packages, system-on-chip and MEMS/MOEMS (micro-electro-mechanical systems | micro-opto-electromechanical systems) product engineering; computer software used for image acquisition, stressing control, image processing.

Figure 7. Trademark for optical business.

A *trade secret* is some confidential information that is kept secret, which provides advantage over the competitors. Obviously, the trade secret is the best way to protect an innovation as long as it can be kept secret. Key employees' departure and joining a competitor company puts trade secrets at great risk. For example, Nortel Networks (Canada) sued Optical Networks, a small US fiber optics company, for violating its IP. Optical Networks lured away dozens

of key technical workers to learn Nortel's trade secrets and then built a similar product. Since Optical Networks does not do business in Canada, the charges were fairly narrow. This example shows fragility of trade secrets; special care is required to keep them really secret.

The last example serves as an introduction to the next section, where we will discuss issues associated with international character of modern science and national IP rights.

2. COPYRIGHTS AND INTERNATIONAL COLLABORATION

As in all areas of intellectual property law, there is no such thing as a coherent “international” copyright law. Each jurisdiction has a separate law that applies domestically. There are international norms and treaties that provide some general guidance as to how various issues will likely be addressed, but there are also important differences among these laws. It has often been assumed that each jurisdiction’s rules applied to anything transpiring within its borders and no further. But technological developments and cross-border collaborations have increasingly called those assumptions into question.

When authors collaborate across borders, the best scenario is to have a contract in place that specifies both the copyright conditions under which they are operating and, in the event of dispute, which national law (or type of arbitration) they will be operating under. Short of having a contract in place, the substantive question becomes a choice-of-law question. Also dependant on the jurisdiction is the extent to which a contract among parties is *per se* valid. For example, under French law, agreements on transfer of rights which fail to define the rights assigned, the territorial scope, the type of exploitation envisaged, and the duration of the transfer are null and void². Measures that may apply include, for example, provisions on moral rights, which are strongly protected in some jurisdictions despite contractual terms, and are less strong or do not exist in other jurisdictions.

In the United States, the Second Circuit case *Itar-Tass Russian News Agency v. Russian Kurier, Inc.* 153 F.3d 82 (2d Cir. 1998) is instructive. The plaintiffs comprised major Russian language newspapers and magazines in Russia, a Russian wire service and a professional writers union located in Russia. The defendant, based in New York City, created a weekly Russian language newspaper that incorporated text and pictures lifted from the plaintiffs’ publications. The copyright infringement was clear but the issue was whose law governed.

The Berne Convention, as incorporated into the World Trade Organization (WTO) Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) provides that the national of a Member State is entitled to national treatment in each other Member State, meaning that a Russian author in the United States is entitled to the same treatment as an American author in the United States, and vice versa. However, international copyright cases present two distinct issues; that of ownership and that of infringement. National treatment under Berne and TRIPS merely assures that the national law of infringement will be applied uniformly to domestic and foreign authors; it provides no guidance on the question of ownership.

Under U.S. choice of law principles, generally, the law of the party with the most significant relationship ties to the property will be the law that governs a dispute. In the *Itar-Tass* case, ownership was determined to be best governed by Russian law because the copyrights implicated were Russian copyrights. The U.S. rights were arguably compilation rights in selection, arrangement and presentation of the articles but the copyright in the underlying works were Russian copyrights. That said, the act of infringement took place in the United States and, as such, U.S. law applied with regard to the *violation* of the exclusive rights.

In the *Itar-Tass* case, the choice of law determination changed what the outcome would have been under U.S. law. For example, based on the U.S. work for hire doctrine, both the newspaper and the news agency would have owned the right in the articles created by their employees. But Russian law does not provide for such employers’ rights and, as such, the Court ruled in favor of the news agency, and remanded for judgment on the right of the union to collect on behalf of its member authors as well as the right of the newspapers to recover for infringement of their limited compilation rights.

Because cases like *Itar-Tass* have become more frequent in the digital age, scholars and practitioners from around the world have discussed a way forward that might provide some predictability for parties in the absence of specific contractual arrangements. The American Law Institute (ALI) published its most recent *Principles Governing Jurisdiction, Choice of Law and Judgment in Transnational Disputes* in 2008. The Principles note that territoriality remains the rule for most issues posed in most intellectual property actions: existence, infringement, validity, duration, attributes and remedies³. It also notes that the Berne Convention itself provides that the law of the State “where” protection is sought will govern matters of existence of protection, as well as infringement and remedies⁴. That said, most scholars agree that “where” should be understood as “for which.”⁵ The *Principles* note that territoriality remains a “powerful intuition,” but that it would be difficult to accept the proposition that an act unlawful in one territory should give rise to liability in another where the same act is permissible. Territoriality is also a safeguard for local cultural and societal values.

The *Principles* offer some useful public-law aspects for how to adjudicate intellectual property law matters. These include the mandatory nature of administrative procedures and fees to seek or maintain registered rights; the validity of those rights; and the formal requirements for recording such things as assignments and licenses. The *Principles* also note that parties may enter into a contract after a dispute arises. The parties may validly select a single law to adjudicate claims of infringement and to compute damages for all infringing acts.

Individual jurisdictions will typically have diverse views on how to adapt long-held values to this relatively new interconnected environment. One country may want to foster the potential of this marketplace by giving latitude to entrepreneurs and international collaborators. Another country may have a more traditional vision. Mediating these differences presents the not infrequent dilemma for cross-border intellectual property litigation. Even with developing private international law, some matters might benefit from the adoption of substantive international norms. The system should calibrate strong feelings of sovereignty/territoriality in order to achieve the benefits of a global society.

In practice, we often have a situation, when we (for example, in the United States) need to use material published in another country (for example, Germany). If the scientific paper is published in the country, which is a member state of the Berne Convention and /or the World Trade Organization (and Germany is such a country), then the German material receives the same treatment as a copyrighted American work in the United States. In other words, everyone will need to receive the permission of the Publisher if he or she wants to use the material published abroad. The exception from this rule is called “fair use.” In other common law countries, it is often referred to as fair dealing and in civil law countries, a similar concept is copyright limitations or exceptions. Fair use is part of copyright law in United States; it allows limited use of copyrighted material without acquiring permission from the rights holders. Examples of fair use include *research, teaching, reviewing*, commentary, criticism, news reporting, library archiving and scholarship.

In general, if a scientific paper is written by two authors from different countries, then it falls under the rules of joint authorship. I.e., if two authors are collaborating on a paper that will be published in an American journal, then U.S. law will govern, absent a contract, and U.S. rules on joint authorship will apply.

Usually authors automatically sign a copyright agreement with a Publisher without even reading it. But the conditions of those contracts are negotiable. Some publishers specify in the contracts with authors that they (the authors) are free to republish their works – in whole or part – for academic purposes after a given amount of time. If there’s nothing specified in the contract, the copyright owner of the publication (let’s say it’s a book review journal) is probably the publishing house and it has the right to tell the author that the author needs the publisher’s permission to republish. This could be arguable if it’s for altruistic/academic/non-pecuniary purposes but that’s where fair use comes into play.

1.1 Electronic publishing

Electronic publishing is becoming more common than traditional paper publishing. It provides a number of valuable advantages over traditional printing: a keyword browsing option, convenient editing, publication and reviewing, and

besides it provides low cost option of the information dissemination. By 2006, almost all scientific journals have, while retaining their peer-review process, established electronic versions; a number have moved entirely to electronic publication. In similar manner, most academic libraries buy the electronic version, and purchase a paper copy only for the most important or most-used titles.

Jurisdictions are handling paper publishing and electronic publishing differently. Currently there is no common approach to copyrights for electronic material. Sometimes, judges look at where the Internet Service Provider for a given website is located and they apply that law. Sometimes they look at who the desired audience of a given website is and they apply that law. Given the prevalence of electronic publishing, both the private sector and legislators are weighing their options to ensure that this becomes a viable form of publishing with predictable legal protection and adequate remuneration for authors, publishers, and those who create the technology to enable e-publishing.

1.2 Software protection by copyright including international collaboration and software outsourcing

With regard to international collaboration in science we cannot avoid the topic of software. Software outsourcing is quite common, so it is important to discuss IP issues of such collaboration. As it became clear in the 1980s that software was being created, reinterpreted and manipulated at increasing rates, there were discussions on whether the patent system, the copyright system, or a new system altogether, should provide protection for computer software. These discussions resulted in the widely accepted principle that computer programs should be protected by copyright, whereas apparatus using computer software or software-related inventions should be protected by patent⁶.

As mentioned above, copyright law and patent law provide different types of protection. Copyright protection extends only to specific, fixable expressions of ideas; not to ideas, procedures, or methods of operation. A patent, on the other hand, provides an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something, or offers a new technical solution to a problem. Copyright protection is formality-free in countries party to the Berne Convention (or, by its incorporation in the TRIPS Agreement, countries that are Members of the World Trade Organization) which means that protection does not depend on compliance with any formalities such as registration or deposit of copies. A patent is generally granted after completing an examination procedure by a government agency.

Copyright protection for computer software is established in most countries and somewhat harmonized by international treaties to that effect. The law relating to the patentability of software is still not harmonized internationally, but some countries have embraced the patentability of computer software while others have adopted approaches that recognize inventions assisted by computer software.

In the United States, in 1980, Congress added the definition of “computer program” to the Copyright Act at 17 U.S.C. § 101 and amended 17 U.S.C. § 117 to allow the owner of the program to make another copy or adaptation for use on a computer. This legislation, plus a range of court decisions, clarified that the Copyright Act gave computer programs the copyright status of literary works. In 1998, Congress passed the Digital Millennium Copyright Act (DMCA). The DMCA criminalizes evasion of copy protection (with certain exceptions), along with the destruction or mismanagement of copyright management information. The DMCA was the United States’ implementation of the World Intellectual Property Organization’s “WIPO Copyright Treat” or WCT, which specifically states that:

Computer programs are protected as literary works....Such protection applies to computer programs, whatever may be the mode or form of their expression.⁷

Different countries have implemented the WCT in different manners. In 2001, the EU adopted a European Copyright Directive which incorporates most of the provisions of the WCT. As of 2009, all 27 EU member states have implemented the European Copyright Directive. As of May 2011, 88 of WIPO’s Member States has become a contracting party to the WCT, bringing copyright law into the digital age across the world and providing specific copyright protection to software and computer programs.

If we are talking about using software which is protected by copyright in another country, we have to respect that copyrights because of TRIPS and Berne.

3. PATENTS

Patent protection provides the right to exclude others in the territory covered by the patent from making, using, offering for sale, importing or selling the invention. Note that patent is not a right given to inventor, but an absence of rights for others. National character of patents means that patent is registered in the national patent office and is valid in the territory of that country. National character of IP means that a US patent does not preclude anyone from starting production of an invention in, say, China and selling it in, say, Germany. Nobody can apply for a patent in any country for the invention that you patented in one country, but everyone can produce and sell on the territory of other countries without obtaining his own patent or licensing your patent.

Once you get your patent, it is easy to learn about your invention since it is published. No one can keep patented invention unpublished. Besides which, the patent needs to include a description of the procedure such as how to build a patented device or how to perform a patented method. It needs to be described to the level of detail that results in relatively quick building of your patented gadget. If you keep some important elements secret, and a person skilled in the art of your invention cannot build the device or it does not work as you described in the patent, then your patent most likely is invalid.

3.1 International Patent Organizations

In order to simplify the patent examination procedure and coordinate efforts of national patent offices, especially in the case when the same patent is filed in a set of countries, a number of international organizations were created. The most important one is the PCT (Patent Cooperation Treaty), which is an agreement for international cooperation in the field of patents between 142 countries. Figure 8 shows the world map, where PCT member are marked in dark color.



Figure 8. Countries, which are members of the PCT treaty, are marked in dark color on the world map (from WIPO website).

The PCT serves to coordinate efforts on filing, searching and the examination of patent applications. It does not grant international patents. After the PCT examination, inventors can see the examination report, and make a conscious decision on filing or not filing patents in a number of countries. The latter procedure is called “entering national stage”. The patent rights are granted by national offices.

World Intellectual Property Organization (WIPO) PCT patent publications have numbers that start with letters WO, see Figure 9 showing “Optical splitter device” patent application. One should keep in mind that those WO patent documents are patent *applications*, not yet patents.

(51) International Patent Classification:
G02B 6/35 (2006.01) *G02B 5/04* (2006.01)

(21) International Application Number:
 PCT/US2008/063325

(22) International Filing Date:
 9 May 2008 (09.05.2008)

(54) Title: OPTICAL SPLITTER DEVICE

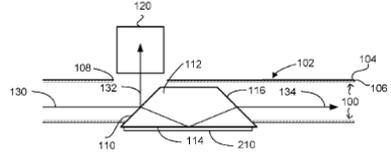


Figure 9. An example of World Intellectual property organization patent application.

The PCT does not grant international patents, and after the PCT examination, the rights are granted – or not -- by national offices. If the invention needs to be protected worldwide, it has to be filed in all countries of interest.

3.2 Software protection by patents

Software patent provides protection on any performance of a computer realized by means of a computer program. A common opinion is that it is hard to patent software. There is a general belief that a patent on an invention that many people would easily develop independently of one another should not be granted since this impedes development. Different countries have different ways of dealing with the question of inventive step and non-obviousness in relation to software patents. Nevertheless, software patents exist, and their number in US grows steadily⁸, see Figure 10.

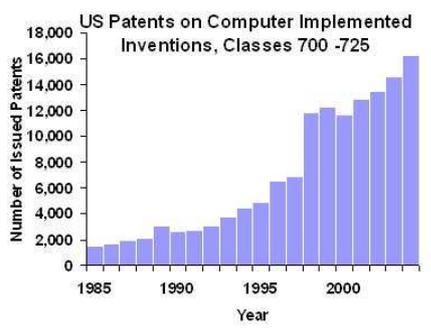


Fig. 10 Temporal distribution of US Patents on software.

Abstract mathematical formulas and algorithms cannot be patented; however implementation of a particular algorithm or formula in functioning of a certain gadget is patentable.

Software patents along with other types of patents have national character as was described in the previous section, and they are valid on the territory of that country where the patent was granted.

Conclusions

We have discussed international aspects of copyright and patent protection, which are relevant to optical sciences. Questions related to copyrights for scientific publications and books are relatively definite: most of those issues are included in the Berne Convention and TRIPS Agreement. The use of copyrighted material, when published in another country, requires following the same rules as it if it is published in your own country. The same is applicable for software protected by copyrights.

Patent protection on the contrary has exclusively national character; they are valid in the territory of the country where the patent was granted. Anyone from another country can start production and selling of a patented product without asking permission from the patent owner. Though they cannot patent it and they cannot import the product to the country where it is patented. In case when the software is protected by patent law, it falls into the same category: it is valid only on the territory of that country where the patent was granted.

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6. World Intellectual Property Organization, About Copyright, Frequently Asked Questions.
7. WIPO Copyright Treat, Art. 4.
8. http://en.wikipedia.org/wiki/File:Software_patents2.JPG