Research Report

Protection of Computer Programs and Topographies of Integrated Circuits by International Law and EC Law

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Abstract

This dissertation is concerned with the historical development of international intellectual-property protection of topographies of integrated circuits and computer programs, and the contents of the currently in-force legal protection systems. Since the main field of interest in protection for integrated circuits and software clearly lies in copyright-, patent-, and *sui generis* law, other fields of protection such as title protection, trademark protection, contractual protection, technical protection, and protection via trade secrets are if at all only marginally touched and may be subject to further investigation. The aim of this dissertation is to outline the particularities that make up the problematic when protecting intellectual property for integrated circuits and software in the different legal protection environments under EC, WIPO, and WTO law. For historical reasons, the protection under U.S. law is also investigated. First the basics of software and topographies are introduced, then software protection and finally topography protection are discussed. For the sake of clarity, software- and topography-related issues will be presented separately. Each section begins with a basic discussion of the possible forms of protection for the respective area, followed by a detailed overview over the historical development of international and European protection, again for each of the two technological areas. Then the substantive protection provisions are discussed, arriving at an outlook for the further developments to be expected. In the final section of this dissertation the two areas of protected technology will be compared and historically discussed.

A. Introduction

A. Introduction

I. Overview over the problems and challenges of topography- and computer program protection

1. Challenges on the field of computer programs

Undeniably, the importance of software has increased tremendously in the past decades. With the fast and widespread distribution of Internet access as well as the increasing data transfer speed, the market for software is one of the world's biggest markets and it is growing at an extraordinary rate. In the future, software is expected to be traded in a carrierless manner, being sold and bought, respectively, licensed over the Internet. Virtual market places already exist, and even payment for downloadable software code can be performed electronically. Software for running electronic business and the networks themselves encounter a booming trend. Where that much profit can be made, piracy in software products is attracted. The interest of software-developing companies hence lies in protecting the intellectual property contained in their products, which means protecting their software from unauthorized use. The developer of software also expects an appropriate revenue in the case he allows his software to be used. In these aspects, software is no different from any other, 'non-soft' product. What is it then, that has made software so much the focus of discussions about intellectual property protection?

The primary difference between software and hardware is the intangibility of software. Therefore, software should be viewed as separate and different from the data carrier on which it resides, be it diskettes, CDs, a memory chip in a computer, or a chip card. The tangible data carrier can clearly be distinguished from the information stored thereon. This fact is directly related to another difference, software is easy to copy, as modern computer technology and the Internet provide for high data-transmission rates, reliable connections, and user-friendly downloading-, respectively, copying-facilities. Furthermore, software is always digitally recorded, which guarantees for error-free reproducibility. Finally, software is not used immediately upon acquisition. It has to be run on a data-processing apparatus comprising a processor and diverse other facilities in order to make the software perform its assigned function, such an apparatus being typically a computer.

Hence, the software product is first purchased, then carried home and installed, and only afterwards the use in fact begins, in that the software is executed by the processor at the home of the user.

Typically, software is not sold, i.e., the ownership is not transferred, although people commonly speak of 'selling' or 'buying' software. In fact, software is in most of the cases licensed, by means of which the licensee, i.e., the paying customer, acquires the right to use the licensed software in accordance with terms and conditions set forth in a licensing agreement accompanying the software, respectively, the data carrier with the software on it. The user may only use the software if he agrees to these licensing conditions. The so-called shrinkwrap-licensing agreement has been commonly used, deriving its name from being an agreement that is contained, together with the data carrier and the stored software, in a shrunk plastic package wrap. The licensing agreement typically comprises an automatic conclusion clause, namely that the license agreement is concluded once the user has opened the wrap. The licensing fee is the sum paid in the store where the software is acquired. This fee is obviously much higher than the material value of what the user has in his hands. The price of a CD is in the cent-range for a professional CD-ROM manufacturer. The major part of the sum paid hence is to cover the development costs of the software. The extreme misrelationship between the price versus material value on one hand and the copying-simplicity on the other has led to a worldwide comprehensive culture of piracy. Software is copied and distributed for free in endless user-to-user chains. But software is even also copied by professional companies, who profit by selling their pirated copies without contributing to the development compensation for the original developer.

Software-developing companies therefore strive to protect what they regard as their own. Intellectual-property enforcement is hence a key activity of software-producers in order not to run out of business. Although unauthorized copying by private users leads to an enormous deficit for these companies, the enforcement of rights is inefficient and in the end more costly than what can be regained. Private-use enforcement is consequently done mainly to set an example, with the intention of deterring others. A newspaper campaign by one of the most famous software houses has been launched, encouraging people to report found misuse to them and another campaign was intended to detect software piracy within companies, since it is estimated that a high percentage of pirated copies is made and run in the business environment of small, medium, and even large companies. The main target of software intellectual-property enforcers are however the 'big'

misusers and particularly the 'factories' where uncountable copies of their software products are produced for subsequent selling on the market.

On the other hand there is the software buyer who is interested in being allowed to use a program for its purpose as well as making archiving copies. The allowance for a backup is a particularity of software, since this is not typical for written works of art. Furthermore the client has a strong interest in being able to run the software in different environments. Since software is only executable in combination with hardware, the user wants to make sure that in case the hardware becomes defective, he can use the once paid-for software on another system. Software is normally delivered on portable data carriers like diskettes or CD-ROMs. The user must be allowed to transfer the program to the system hard-disk for its execution. In a network environment, the remote access to the software either by downloading or by remote execution must also be allowed.

2. Challenges on the field of topographies

Chip producers nowadays face a challenge that is unprecedented in the history of technology. Moore's still unbroken law dictates a period of only 18 months from one chip generation to the next. The number of chips in use has increased tremendously. Almost any electrical device meanwhile contains a microprocessor. The market is hence growing rapidly which is an incentive for chip producers to make profit. Piracy in the chip market however is also growing. Although not as easy as copying software, the technique of reverse-engineering, performed particularly in low-wage countries like Taiwan or Korea, makes unauthorized copying of integrated circuits an attractive business.

A particularity of integrated circuits is that their preparatory material typically is a pattern on paper. One can often see, quite nice-looking layout plans hanging on the walls of integrated circuit design labs. As with software, the design of the integrated circuit is not the product the final client is interested in. The end user is interested in high-quality performance of the software he intends to use, which quality is only indirectly determined by the layout, respectively, program listing. Hence both are generally not made for being looked at by the user. The user needs special tools in order to look at what lies behind the performance; in the case of an integrated circuit a magnification tool, in the case of software a decompiler.

Another interesting property is the exchangeability of hardware, comprising integrated circuits, with software, that means what can be realized in software can also be realized in hardware and vice versa. Hardware realizations are more time-consuming to test, also more expensive, and less easy to update, but faster than their soft equivalent. This characteristic is often overlooked and indeed does give rise to some problems, like why an algorithm realized in hardware form should be patentable, while its implementation in software form is not.

Integrated circuits have in principle two forms of appearance, their physical form and their functional form, i.e., the specification of the tasks the integrated circuit performs. Both forms are logically linked, but there is often more than one physical layout that is able to perform one and the same function.

The enforcement problem with integrated circuits is the same as with software: It is not the end user who is the target of enforcement. The sellers by whom large numbers of integrated circuits are distributed, are the ones that rights owners are mainly after. Since integrated circuits are doubtless technical products the circuitry, in principle, can be subject to patent protection, which at least until recently has been much more difficult for software.

II. Topics of this dissertation

This dissertation[1] is concerned with the historical development of international intellectual-property protection of topographies of integrated circuits and computer programs, and the contents of the currently in-force legal protection systems. It does not deal with means which producers themselves introduce to implement obstacles to piracy, like encryption, passwords, hardware-based copy-preventing tools, etc. This dissertation also does not dig into the field of collision between software- and topography protection and competition[2]- or cartel law[3], since this would clearly be beyond the scope of this dissertation and will be an interesting topic to handle separately.

Since the main field of interest in protection for integrated circuits and software clearly lies in copyright-, patent-, and *sui generis* law, other fields of protection such as title protection, trademark protection, contractual protection, technical protection, and protection via trade secrets are if at all only marginally touched and may be subject to further investigation. Enforcement and legal remedies are only shortly referred to, since this typically is strongly intermingled with national legal systems and the remedies provided therein, which is no concern of this dissertation.

Although there is often declared to be a difference between software and computer programs, and there in fact may be one, both terms will be used synonymously in the present context.

The aim of this dissertation is rather to outline the particularities that make up the problematic when protecting intellectual property for integrated circuits and software in the different legal protection environments under EC, WIPO, and WTO law. For historical reasons, the protection under U.S. law is also investigated.

After an introduction into the basics of software and topographies in this first section (A), the second section (B) follows, which is dedicated to software protection, whereas the third section

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[1] To be noted: In cases a natural person is addressed in the context of this dissertation, the male article has been chosen to be used, for sake of simplicity only. It is expressly stated that as well female persons shall feel addressed and that no sexual discrimination is intended.

[2] See Harte-Bavendamm, Henning, "Wettbewerbsrechtliche Aspekte des Reverse Engineering von Computerprogrammen", GRUR 9/1990, 657.

[3] See hereto for the interested reader Schricker, Harmonization of Copyright and Moritz, Competition Law Aspects.

(C) will be dealing with topography protection. This separated two-part form, i.e., software on one hand, topographies on the other, has been chosen instead of an interleaved discussion for sake of clarity and better understanding. The structure of the two sections has been chosen very similar in order to facilitate the comparison of the different concepts. The sections each begin with a basic discussion of the possible forms of protection for the respective area, followed by a detailed overview over the historical development of international and European protection, again for each of the two technological areas. Then the substantive protection provisions are discussed, arriving at an outlook for the further developments to be expected. In the final section (D) of this dissertation the two areas of protected technology shall be compared and historically discussed.

III. What is an integrated circuit, a topography, a computer program? - Technical background

In order to understand the problems and challenges concerning software and topography protection, a little excursion into the basics thereof appears necessary and helpful.

1. Technical background: integrated circuits and topographies

In 1859, Robert Noyce and Jack Kilby independently from each other invented what is regarded as the first semiconductor chips. In 1971, Ted Hoff invented the microprocessor. Since then the pace of development in integration density, speed of operation and complexity has followed a very steep curve. For the capacity of microprocessors, this progress curve has been formulated as 'Moore's Law"[4], namely a doubling in capacity every 18 months. The computer that controlled the Apollo 11 cruise to the moon in 1969 was less powerful than a contemporary personal computer.

An 'integrated circuit' is "a combination of interconnected circuit elements inseparably associated on or within a continuous substrate"[5]. An integrated circuit is used to store 'information' and to perform logical operations thereon, also called 'information-processing'. An integrated circuit used exclusively for storing information is referred to as a 'memory chip'. Information that is 'instructional' is a 'computer program' that tells a technical entity which actions to perform, 'non-instructional information' is called 'data'. Two types of integrated circuits are generally distinguished: the non-volatile read-only memory, referred to as 'ROM' and the volatile read-write memory, called random-access memory, or abbreviated 'RAM'.

A ROM again exists in two forms: a programmable version, called 'PROM', and an unprogrammable version. The latter carries information in it that is exclusively determined during manufacturing, namely in the form of a circuit pattern. In contrast, the information in a PROM is determined by a programmer subsequent to fabrication. A significant difference exists in design between a RAM integrated circuit and a ROM or PROM integrated circuit: The design of the RAM integrated circuit is independent from the information it stores, whereas the information stored in a non-volatile memory chip at least partly determines the chip design.

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[4] Gordon E. Moore, 1964.
[5] Definition according to the Macmillan Dictionary of Information Technology.

The basic role of an integrated circuit in computing is to provide a physical "corporeal" environment for executing 'incorporeal' instructions coded therein. The integrated circuit is typically referred to as 'hardware', the instructions are referred to as 'software'. Integrated circuits are batch-manufactured using the well-established and common photolithographic process, comprising a repeating series of process steps, namely, coating with a photoresist material, shading predetermined regions with a photolithographic, patterned mask, illuminating this arrangement with light, removing the mask, developing the photoresist, and etching away either the previously illuminated or non-illuminated regions. The thereby patterned photoresist then serves as a processing mask for processes like material deposition, removal, or diffusion. The masks used during such a process in combination form a mask set, which together with the process parameters, like temperatures, materials, concentrations, time settings, pressure, etc., suffice to manufacture the final integrated circuit. Alternative technologies employ beam-writing processes or even mechanical, printing-like methods[6].[7]

2. Technical background: computer programs

Computer programs are defined as a sequence of instructions which are usable by a computer as input to make the computer perform at least one function, being predetermined by the said computer program.

Computer programs are written in a specific language which comprises a fixed set of basic instructions being combinable to form the instruction sequences. Often, such sequences are logically grouped together as modules for performing basic functions. Programs can then be made up of such modules. Preprogrammed modules are also available from libraries. Typically, program development is performed with the specific language, resulting in a human-readable program listing, called source code, which to run on a computer needs to be translated into a computer-readable language, called binary- or object code. Tools for reversing this translation step exist as so-called decompiler programs.[8]

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[6] Jens Stark, "Lichtstempel verringern Kosten", Computerworld, 10. August 1998, Nr. 33/98, 9 and Franz Grotelüschen, "Mit Röntgenlicht und Plastik zum Superchip", Züricher Tages-Anzeiger, 23. Sept. 1998.
[7] More information in Christie.
[8] More in Borking, John J., "Third Party Protection of Software and Firmware, North-Holland, 1985, 33.

IV. What does the owner of an integrated circuit design or a computer program want to prevent his competitors from doing?

1. Interests of topography manufacturers

Since substantial work is performed for the development of an integrated circuit, it is self-evident, that the developers of an integrated circuit want to prevent the final product from being copied for a fraction of the costs incurred during with its development. This is even more obvious when the high numbers of integrated circuits incorporated nowadays in products and also the big variety of products that are equipped with integrated circuits, often even without being noticed by the consumers, are taken into account. Telephones, clocks, radios, CD players, music-playing greeting cards, and children's toys already have one or more integrated circuits embodied. One integrated circuit is therefore often sold by the millions. The famous 8088x processor family is an example with a tremendous number of such processors on the market. This shows that even when the copying process of integrated circuits requires the possession of a key technology, namely the lithography process, hereby demanding a higher investment than a software-copying process, the damage which can result due to unauthorized copying is substantial.

On the other hand, second-sourcing, which is the securing of component supplies from two or more separate sources[9] is in demand, namely by the industries that depend on the supply of integrated circuits. Computer manufacturers thereby want to keep a certain independence, to avoid suffering from supply shortage, and to avoid being subjected to a monopolistic price policy. Integrated circuit producers could simply grant a license to other integrated circuit manufacturers, but could also use monopolistic rights to block their competitors from delivering substitute products.

Another advantage of sharing at least part of the intellectual property contained in integrated circuit design is the exploitation of compatibility. This means in general to share common interfaces in order to gain at least functional interoperability.

A special incentive is given by standardization, which means some kind of commonly accepted compatibility rules, whereby, purchasers and end clients of integrated circuit products are encouraged to buy components or devices with the perspective to be sure that future

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[9] Definition according to the Macmillan Dictionary of Information Technology.

developments will adhere to the same or a compatible standard so that the devices already purchased can be combined and continue being used. This advantage also benefits the integrated circuit manufacturers because they can rely on a ready market, thereby reducing marketing costs. This effect was for instance the reason for Intel's tremendous success in the microprocessor market. Also the term "IBM-compatible" is meanwhile a sign of quality and functional property known as a standard to any computer seller and purchaser.

2. Interests of computer program manufacturers

Computer program manufacturers would prefer to keep the information embodied in a program for themselves, if they could. The benefits and risks of such trade secrets are known. A trade secret only remains granted as long as the secret persists. How risky trade secret protection is, is shown by a recent example of the famous RC4 variable-key-size stream cipher code of RSA Data Security Inc.[10], used for confidential information exchange via data networks, which code has remained proprietary for seven years when in 1994 the code was put into a mailing list by an anonymous person from where it found its way into the Internet and therefrom was accessible by any Internet user. The genie had escaped the bottle and RC4 lost its protection, creating not negligible financial damage to its creator through lost licensing royalties. Examples like this are convincing enough to make acceptance of a legal protection regime granting to some extent, the ownership rights and thereto-coupled remuneration if someone else wants to use the protected program, easier.

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[10] Schneier, Bruce, "Applied Cryptography, 1996, 397.

B. Software protection

I. Which protection regime is suitable for computer programs?

1. Patents versus copyright

Patent right and copyright are both a source of subjective rights for their owner and have effect towards anyone. The patent as the strongest form of protection enfolds an absolute blocking effect, while the copyright on a concrete work does not extend to the identical, independently developed creation, which of course is extremely rare. Protection out of contracts and out of competition law is effective only against selected persons. On the other hand, copyright protection is extremely cheap while the costs for obtaining patent protection are relatively high. Copyright law is actually an exclusive right, however, it does not protect against an independent second creation and in particular does not extend to the general mathematical-logical solution concept underlying the program. It should however not be deduced that the scope of copyright protection for computer programs is narrow, even though it is clearly narrower than the scope of patent protection.

An important issue is the intention to catch an infringer. In the domain of software the problem is that the program itself is run by the end user, not by the seller. This becomes important, taking into account that a patent claim directed to a method that is to be performed by a software, is only directly infringed by the end user and the seller himself does only contributorily infringe. It is out of the question that the patent owner can pursue each and every end user to claim his rights. Legal process costs would quickly render this method of enforcement inefficient. On the other hand the contributory infringement by a seller is not the same as direct infringement, which expresses itself in the additional difficulty of proof, and the fact that countries still exist which do not, or only to a lesser extent, punish contributory infringement. Hence patent protection is unsatisfactory as long as it is not granted to a data carrier with a software program stored on it, which is able to perform a particular method when being installed on a computer system.

This type of claim is often referred to as 'Beauregard' claim, after the famous patent case[11] by the IBM Corporation in the U.S., one of the inventors being the IBM employee Gary M. Beauregard.

In the case of copyright enforcement, the copyright owner to some extent faces a similar situation. Of course, copyright infringement can occur directly in that a company illegally produces copies and sells them. However, in the age of the Internet, the already emerging and drastically evolving method of software sale happens via the network. No tangible data carrier is delivered, but the user gets the code directly via the Internet. The debate is, who is the infringer, when the user clicks on a hyperlink and thereby requests a server to start the downloading routine. It can be argued that the act of copying is performed by the user who has his computer and the server together produce a copy in his local machine. The infringing act would then indeed be performed by the user and the copyright holder would have to pursue each of them. With the growing degree of system standardization, together with the immense degree of Internet use, and the simplicity of downloading, the problem of software piracy has exacerbated.

2. Debate about whether copyright protection is meaningful for computer programs

Many books have been written about the sense and nonsense of copyright protection. In the following a summarized overview is given over the main aspects in the discussion.

a) Copyright and the interests of the involved parties

To see which regime of intellectual property protection is the right one, one analyzed the needs of involved people and entities, i.e., the manufacturers and the users. In 1981 the opinion as to where the interests of hardware and software producers lie, showed that hardware producers do not have a big interest in intellectual property protection of software, since lack of protection made their hardware more attractive to users who have more freedom in utilizing the hardware, without being hindered by third party's rights[12]. In contrast, the interest of software producers was seen as high[13]. A different opinion was that hardware producers do not need protection of operating system software since this software is too machine-specific in order to run on other

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[11] U.S. Patent Application 07/521,858 "System and method for utilizing fast polygon fill routines in a graphic display system", Decision of Board of Appeals and Interferences, Sept. 29, 1993, Appeal No. 93-0378.

[12] Kolle, Gert, "Technik Datenverarbeitung und Patentrecht", GRUR 1977, 74.

[13] See footnote above.

systems and that this kind of software is delivered together with the hardware anyway. User software, however, was seen as the critical issue since it has evolved into more than just a sales argument, and a real competition between producers, be it hardware producers, who also offer software, or pure software producers, has arisen. These producers are depending on a return on investment for software development. For the public domain, the interest is in rapid development, increasing speed and complexity. Users expect software to be improved, keeping pace with the most recent technology. Having too broad a scope of protection hinders development dynamism[14]. That lead to the opinion that software protection should better be found in the domain of copyright protection. The most controversial discussion arose about whether copyright is the correct regime in which to integrate software protection.

b) Artistical freedom for authors of computer programs

An often brought-up argument against copyright protectability of software is that it does not have an individual quality, i.e., it is the result of the expression of artistical freedom. This argument is based on the opinion that software is predetermined by the laws of nature, logic, or other determining factors which reduce the artistical freedom to a negligible scope[15]. The software as a final result is seen as being determined by its task. This view leads to the main caveats against copyright protection of software. The set of predetermined conditions arising from the field of the underlying problem, the possible solution methods, the system components to be used and the preexisting software-components, push the author of a software product into the background. However, this view must be seen as too strict. Although in principle it is correct that software has quite a number of determining factors which influence the final result, it can be shown that the outcome of a software creation work is by far not predetermined such that it no longer possesses artistical quality. In fact, in order to be protectable under the copyright regime, the work need not be in total new and individual. Copyright can be granted for a partially novel work as well. Since not only artistical fantasy may give reason for establishing individuality, but also everything that the creator can add to preexisting matter with his personal resources, there is no reason why scientific works should be excluded from copyright protection. A court decision of the main court of Budapest already from 1973, for instance, confirmed the presence of originality and creativity in a computer program.

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[14] Wittmer, Hans Rudolf, "Der Schutz von Computersoftware - Urheberrecht oder Sonderrecht?", Stämpfli & Cie, Bern, 1981, 82.

[15] see above, p. 90.

This is not the place to pursue in depth the reasons why the protection afforded to authors who wish to publish their works cannot simply be transposed to the context of programmers and data technicians, or their employers, who are primarily concerned with maintaining the secrecy of their software. One can summarize generally, that some arguments exist which declare software as too different from classical artistic works. The supporters of this view therefore tended towards *sui generis* protection for software.

3. Debate about whether patent protection is meaningful for computer programs

a) Technicity of computer programs

It has been propagated that software protection only makes sense, when it extends beyond the mere design layout to the algorithm lying behind the software[16]. At that point in time, this was seen as meaning to extend patent protection to problem solutions of a non-technical nature, which clearly contradicts the very nature of patent protection. Although the term 'invention' is not defined in the EPC for example, there has never been any doubt that a patentable invention has to have a technical character. This is confirmed by the guidelines for the examination in the EPO[17]. The regulations to the EPC also state that an invention needs to be related to a technical area[18], solve a technical problem[19], and be characterized in the patent claims through technical features[20]. Non-technicity of software has been, until recently, the main reason for rejection of software patents. This does not mean, however, that any computer- or software-related invention was rejected. In the European Patent Convention (EPC), only software 'as such' is excluded from patentability[21]. Several decisions of the Board of Appeals of the EPO have dealt with the question what 'as such' means. It has been found that with computer programs which influence the internal working manner of a data-processing unit in a way such that a new technical effect becomes apparent, the contribution of the invention to the state of the art may be of technical nature and hence the invention would qualify for patentability. The Guidelines cite possible claim categories for computer-program-related inventions[22].

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[16] Kolle, Gert, "Technik Datenverarbeitung und Patentrecht", GRUR 1977, 74.
[17] Guidelines, Chapter C IV 1, 2.
[18] EPC Rule 27(1)b.
[19] EPC Rule 27(1)d.
[20] EPC Rule 29(1).
[21] EPC, Art. 52(4).
[22] Guidelines, Chapter C III 21. 32. and 4.1.

Further reflections were made on the question, why software should be patentable, when it represents nothing but a computerized instruction to the human spirit[23], which is also excluded from patentability by law. Finally, also practicability considerations led to the denial of patent protection for software. The assessment of novelty and searching for and identifying equivalent prior art is with view to the increasing complexity of software a task that was seen unsolvable. No suitable classification for computer programs exists yet.

b) Inventive step in computer programs

Another aspect in the discussion about patentability of computer programs was the question whether a computer program per se can be inventive, e.g., in the sense of Art. 56 EPC. The deeper meaning behind that question becomes clear when one again looks at Beauregard-type claims. Since the interest of software manufacturers lies in catching another software-manufacturer or seller as a direct infringer and not only as a contributory infringer, the corresponding claim is in principle directed to a computer-readable medium, such as a diskette, having stored thereon a computer program code of a computer program that when being executed enables the computer to execute a method which comprises a number of predetermined steps, which steps are then listed in this claim. The mere suitability of the program to execute a method has in many cases not been accepted as a technical feature of the claim. Hence the patent examiner concentrated on a computer-readable medium having stored thereon some code in the form of a bit pattern. The argument is then obvious and hardly counter-arguable that such a bit pattern lacks an inventive step. As long as one cannot convince the examiner that a program stored on a diskette is not bought for its bit pattern but exactly for the suitability to make the computer perform a series of functions, one cannot arrive at a granted patent.

With these considerations in mind, together with the established fact that software has essentially always been excluded from patent protection, the decision was clearly to go for a copyright- or a copyright-like protection in the form of a *sui generis* right.

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[23] See Van Raden, Lutz, "Die Informatische Taube", GRUR 7/1995, 451.

4. First attempts at providing *sui generis* protection for computer programs

In the seventies several proposals were made with regard to alternative legislative frameworks under which protection for software could be sought, most of these proposals argued for a copyright-based system[24], but some others tried for a more user-oriented system[25] or for a combination of copyright elements and patent protection[26]. Another proposal went for a legislative attachment to copyright law with a supplementary section exclusively for computer programs[27]. The Japanese Ministry of International Trade and Industry (MITI) drafted a proposal in 1972 with a national registration system and a copyright-type of protection[28]. The model provisions of the WIPO[29] were the most discussed[30].

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[24] Galbi, "Proposal for legislation to protect Computer Programming", 17 Bull. Cr. Soc. No. 4, 280.

[25] Öhlschlegel, "Sollen und können Rechenprogramme geschützt werden?", GRUR 1965, 465.

[26] Kirby, "Industrial property protection for software", at AIPPI-MIE Conference on "Some Topical Questions Concerning Protection of Industrial property", (Budapest 1973), 56.

[27] Senhenn, "Wanted - A New Law to Protect Computer Program Material", 12 The Computer Bulletin, 112.

[28] See DOI, "Legal Protection of Computer Programs", Patents & Licensing, Dec. 1973, 3.

[29] WIPO document AGCP/NGO/II/11 of July 14, 1975.

[30] Kindermann, Comparative Study.

II. The International Conventions - Paris Convention, RBC, UCC

Efforts were hence directed towards an integration of software protection into the well-established domain of copyright. Copyright protection has been internationalized already some time ago and concentrates itself on three main conventions.

1. Paris Convention

The Paris Convention of 1883 (PC) comprises provisions about intellectual property in the broadest sense and has been subjected to several revisions, the last of them in 1967 in Stockholm, Sweden. It is the oldest and one of the most important treaties on the area of protection of Industrial property. It contains the basic principle of national treatment, as well as a list of material rules which directly concern trademark law, such as the union priority, the protection of notorious marks, the duty of use, and the exclusion of descriptive expressions from trademark protection. It also covers the protection of trade names and in Art. 10[bis] protection against unfair competition. The revision negotiations which took place at the beginning of the 80's in Geneva and Nairobi were terminated without any result because the wishes and expectations of the various interest groups were too diverging.

2. Berne Convention

The Revised Berne Convention[31] (RBC) for the Protection of Literary and Artistic Works of 1886, has since been revised several times and is still today one of the most important bases for the international copyright protection. More than one hundred states have joined, among them the U.S.A., Japan, the Russian Federation, China, and the majority of the European countries. It guarantees in its most recent version from 1971 with respect to the minimum rights the highest protection level in comparison with other copyright treaties. The RBC has as aim to protect the rights of authors in their works in the contracting states in a most effective and balanced way. It applies to works of literature, science and art without respect to type, form of expression, content, or purpose. Article 2 provides that "the expression literary and artistic works shall

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[31] See analysis hereto in Rauber, Georg, "Der urheberrechtliche Schutz von Computerprogrammen", Schulthess Polygraphischer Verlag, Computer und Recht Band 17, 1988.

include every production in the literary, scientific, and artistic domain, whatever may be the mode or form of its expression."

In the RBC the principle of national treatment and the territoriality principle are contained among others. The RBC, in contrast to the UCC, contains self-executing provisions that hence can be applied by private parties searching for legal protection.

The RBC, as does the Paris Convention, provides for the function of an international Office that preceded the WIPO, the World Intellectual Property Organization. Today the WIPO is responsible for the administrative tasks with respect to the Paris Convention and the RBC.

3. Universal Copyright Convention

The Universal Copyright Convention (UCC) was adopted in 1952 and is administered by the UNESCO. Ninety-two countries are currently party to this convention, which was also revised in 1971. The UCC emerged from the desire to create a copyright convention with universal character. Therefore, the provisions in the UCC were drafted aiming to attract many countries and above all the important industrial countries such as the U.S.. This lead to the fact that the scope of the UCC, concerning its substantive provisions, stayed far below the scope of the RBC, even while providing for national treatment. The UCC represents an international law obliging only the national legislators, therefore lacking direct applicability for authors[32].

The UCC aims at guaranteeing the protection of copyright for works of literature, science, and art in all its member states. Its Art. 1 obligates the member states to "provide for the adequate and effective protection of the rights of authors and other copyright proprietary in literary, scientific and artistic work", whereby the scope of the protected works is listed to include "writings, musical, dramatic and cinematographic works, and paintings, engravings and sculpture." Like the RBC, the UCC does not contain a restriction concerning type, expression, content, or purpose.

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[32] See analysis by Keplinger, Michael S., "Authorship in the information age: Protection of computer programs under the Berne Convention and Universal Copyright Convention", WIPO, Copyright, 3/1985.

4. Copyright protection under the UCC and RBC

The two conventions are the basis for the meaning of the term 'copyright', since a substantial number of states have expressed their adherence to this term definition. For the number of different copyright-systems of these countries, this term provides for a sort of smallest harmonized entity. None of the conventions defines the requirements for protection. However from the purpose and wording of the conventions it becomes clear that the protection extends only to original works[33] and that the choice and arrangement of known matter are to be seen as a protectable intellectual creation[34]. Matter of protection is the work, not the method of creating it. Protection extends to the exclusive right to copy, publish, distribute, translate or otherwise modify the work, the transferring of these rights by contract, and according to the RBC, also the right to acknowledgment of authorship and the protection against a reputation-damaging disfigurement or other spoiling of the work.

The conventions aim to ensure the protection in the member states and to treat authors from other member states like own nationals. While the RBC does not mention any requirement for the start of protection, the UCC demands the attachment of a copyright notice as a necessary act. None of the conventions requests a registration or deposition procedure. While the UCC defines as a minimum protection term twenty-five years after the death of the author, the RBC provides for a minimum of fifty years. Independent works do not fall under this scope.

A crucial question was, whether software could be regarded as literary work under one or both conventions. The general opinion is that both conventions are in principle open for new work species and that the list of eligible works is non-exhaustive. Furthermore, the principle of national treatment could lead to a coverage that extends beyond the direct obligations under these conventions. Computer programs are not protected *de jure conventionis* and the member states are also not obliged to protect them under these conventions, but a country granting copyright protection must extend this protection to other member states as well.

It has been recognized that copyright protection which catches a large variety of intellectual creations should be well suited for computer software. In the U.S., the first computer programs were already registered in the copyright register in Washington in 1964. The U.S. Copyright

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[33] Art. 2(3) RBC.
[34] Art. 2(5) RBC.

Office released a notice about copyright-registration of computer programs[35] in the same year. The acceptance of computer program copyright protection showed up in various countries, such as Japan in 1973, or the U.S. in 1976[36]. This demonstrates that the applicability of copyright protection to software has been confirmed in the meantime[37].

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[35] Mitteilungen, "Zum Stand der Urheberrechtsreform in den USA", GRUR Int. 12/1964, 634.

[36] See also Köhler, Reimar, "Der urheberrechtliche Schutz von Rechenprogrammen", München, 1968.

[37] See detailed discussion in Keplinger, Michael S., "Authorship in the information age: Protection of computer programs under the Berne Convention and Universal Copyright Convention", Software Law Journal, and Copyright, March 1985.

III. U.S. initiative for protection of computer programs

1. History of U.S. computer program protection

It is in the U.S., where software protection under copyright law has one of its major roots. Despite the U.S. Copyright Office granting a copyright registration of computer programs already in the mid-sixties, the legal status of the programs was insecure. The U.S. Copyright Act of 1976[38] supposed a protectability under copyright of computer programs, but it was only with the Computer Software Copyright Act of 1980[39] when explicit protection was expressed, and with the Amendment Act of December 12, 1980, it was clarified that computer programs belong to the copyright-protectable matter under the Copyright Act. The legislator followed the recommendations of the National Commission on New Technological Uses of Copyrighted Works (CONTU), which had been founded for the preparation of this act. The amendment consisted of two parts, (i) the term 'computer program' was included in the definitions in Sec. 101, (ii) a new Sec. 117 was introduced which provided that the lawful owner of the original copy of a program is entitled to make copies necessary for the use of the program on a computer or for archiving reasons. These copies may only be disposed of together with the original copy. The consent of the copyright owner is necessary for the distribution of lawfully made derivative works.

2. Protection under the U.S. Copyright Act

In some cases, the U.S. courts had already decided upon different aspects of protection for computer programs under copyright aspects. In Apple *vs.* Franklin, August 30, 1983, the U.S. Court of Appeals had held that system programs were not to be classified differently from user programs as far as their copyright protection was concerned. The court further stated that object code is protected as well as source code and that the copyright protection does not get lost when the program is stored in a memory. In Whelan *vs.* Jaslow, August 4, 1986, the Court of Appeals for the 3rd circuit had decided that copyright protection extends not only to the direct copy or partial copy but also to the program structure, transcodings and transformations from one system platform to another. A revision by the U.S. Supreme Court was denied. According to the decision

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[38] 17 U.S.C. Sec. 117 (1976).
[39] 17 U.S.C. Sec. 101 (1980).

in the case NEC *vs.* Intel, September, 23, 1986, of the Federal Court, copyright protection is to be applied also to the microcode of a microprocessor.

According to the USCA, the protection requires the fixation of the program in a "tangible form of expression"[40]. The rightful acquirer may only make copies or derivative works in order to facilitate the use of the program or for the purpose of protecting it against damage or destruction, i.e., typically in the form of so-called backup copies. Although since March 1, 1989, the registration requirement for copyright protection of computer programs is no longer present in the legal scope of the RBC, outside the scope of the RBC, registration in various countries is still necessary to file a suit against infringing acts. Registration is therefore generally widely used for its purpose of serving as *prima-facie* evidence of an established right. It is also so in the USCA[41]. In 1990 the U.S. legislator increased the rights of the software producers by making commercial dealing with computer programs dependent on an approval of the rights holder[42]. For infringement of computer program copyright, the law provides in civil law and criminal law for sanctions with damages up to U.S. $250.000 and imprisonment of up to ten years[43].

3. Digital Millennium Copyright Act

On October 12, 1998, the U.S. congress gave its final approval to the 'Digital Millennium Copyright Act', (DMCA), which intends to implement U.S. obligations under the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty. Consistent with the obligations under these WIPO treaties, the DMCA establishes new measures improving the ability of copyright owners to protect and control uses of their works in the electronic environment. Although some concessions to a number of interest groups, particularly telecommunications- and online-business companies, and the consumer electronics industry, were necessary to secure enactment of the legislation, it is recognized that the bill gives copyright owners new tools in the fight against unauthorized usage of works, while preserving existing causes of action for copyright infringement.

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[40] 17 U.S.C. Sec. 102(a).
[41] 17 U.S.C. Sec. 407-410.
[42] 17 U.S.C. Sec. 109 (1990).
[43] 17 U.S.C. Sec. 506(a); 18 U.S.C. Sec. 2918(b), 2559, 3571.

The DMCA comprises anti-circumvention provisions in recognition to the great potential harm that could result from today's advanced computer networks. In response, the DMCA declares it illegal to manufacture, import, distribute, or provide products or services that are primarily designed or produced for the purpose of circumventing technological measures, such as encryption, scrambling or other methods, used by copyright owners to protect their works. Commercial dealing in products or services that are knowingly marketed for the purpose of circumventing protective technologies, or that lack other commercially significant purposes or uses, is also prohibited. In addition, the DMCA also prohibits the act of breaking through encryption barriers or similar technologies in order to gain unauthorized access to copyrighted materials. This is a new basis for protection of copyrighted works.

As required by the WIPO Copyright Treaty, the DMCA also grants protection for the integrity of 'copyright management information', i.e., data identifying works, their creators, copyright owners, and other key facts including licensing information. Copyright management information can be linked to or transmitted with works in a network environment to facilitate detection of unauthorized uses, promote the payment of royalties, or provide other similar benefits to the copyright owners. The DMCA provision closely follows the WIPO treaties by prohibiting the falsification, alteration or removal of copyright management information, or commercial dealing in copies of works that are linked with copyright management information that has been falsified, altered or removed, if the offending party knew or should have known that its actions would promote or facilitate infringement. The second title of the DMCA defines some standards of copyright infringement liability for online service providers and Internet access providers, also referred to generally as service providers. While inclusion of such provisions is not required under the WIPO treaties, it became politically necessary to consider the concerns raised by telephone companies and others. In the end, a compromise between copyright and service provider communities was sought. It is held that the DMCA does not immunize any service provider from copyright infringement liability, but rather limits the form and scope of the remedies available against service providers in certain narrowly defined circumstances. The DMCA also provides for a 'notice and takedown' system that should promote cooperation between copyright owners and service providers in tracking and fighting against online infringements. Title II DMCA therefor defines some situations in which service providers are not subject to damages or other monetary relief, but in which injunctive remedies, under special rules, remain available. In short, a service

provider can profit from that regulation if he is merely acting as a conduit for the transmission, or routing of infringing material, or only performs automatic system caching for purposes of improving network performance, or does not receive a direct financial benefit for innocently providing access to infringing material posted or stored on its system by a user, or provides a directory, pointer or hyperlink, that facilitates access to infringing material, even if posted outside his system. Current liability law for direct- or contributory infringement, and vicarious liability remains applicable to acts of service providers falling outside the above described situations. To promote efforts to police online infringement, the DMCA set guidelines for alerting service providers about infringing material on their systems or networks. The DMCA also provides for a counter-notification in which the material can be restored to the system if an alerting notification is challenged by a data poster.

The DMCA is too young to be able to report on its success or failure. It can generally be said that it represents in suit of the WCT and together with other national Acts implementing the WCT, an important step towards a quick and nevertheless well considered adoption of copyright law to the fastly developing technology of communication and data processing. Insofar it is to be acknowledged that legislation has accelerated to keep the pace of technology. That there are and will be new challenges to face and experiences to be made with the new DMCA is evident and will certainly lead to future amendments in order to stay at the pulse of technology and be sensitive to the arising needs of the involved parties.

4. Protection of computer programs under the U.S. Patent Act

The U.S. also played a significant role as forerunner concerning the eligibility of computer-related or software-related inventions for patent protection. For a long time, Sec. 101 U.S.C. 35 was the basis for rejections of such inventions, giving rise to a 'printed matter' rejection and coupled thereto an obviousness rejection under Sec. 103(3) U.S.C. 35. This trend has changed progressively. Already in 1981[44], a computer-controlled process was held patentable. It was held that the mere fact that the claims required a computer to apply a mathematical formula to the control of a process is not to be seen as an attempt to patent the formula itself. Provided the application of a program used for that process was not obvious, the computer-controlled process was seen as patentable even if the process per se, when otherwise controlled, was already known.

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[44] U.S. Supreme Court, Diamond v. Diehr, 450 US 175.

In the case *in re* Abele[45] the Court of Customs & Patent Appeals had decided that claims relating to a program for carrying out calculations on X-ray data from a CAT scanner are patentable whereas claims directed to a program for calculation per se were held unpatentable. In suit of this jurisdiction the so-called 'Freeman-Walter-Abele' test was applied by the U.S. Patent and Trademark Office, which test in principle asked whether claims directly or indirectly recite an algorithm and if so, whether the algorithm is applied in any manner to physical elements or process steps and furthermore whether this application is circumscribed by more than a field of use limitation or non-essential post-solution activity. Two milestones in software patenting were set by the decisions *in re* Appalat[46] and *in re* Lowry[47]. In the first case, a claim was held patentable directed to a rasterizer comprising means for determining certain features, normalizing these features and finally outputting illumination intensity data. The reasoning specified that the invention concerns a specific machine to produce a useful concrete and tangible result and that the mere fact that the claimed means do perform a function to transform one set of data into another through a series of mathematical calculations does not justify per se to hold this claim unpatentable. In the Lowry case a memory for storing data, including a plurality of attribute data objects was also held patentable[48].

Meanwhile the U.S. Examination Guidelines for patent examination have been revised and now contain special provisions concerning software-related inventions[49] giving the examiners at hand a set of means for determining whether a claim directed to a computer-program-related invention is patentable. Inter alia the 'Freeman-Walter-Abele' test has also been entered therein. Recent caselaw concerns an area of inventions directly coupled to the field of software-inventions, namely the question of patentability of 'methods of doing business'. The famous case 'State Street Bank & Trust Co. *vs.* Signature Financial Group Inc.'[50] has dealt with a data-processing system for maintaining a financial structure[51]. In 1998 the U.S. Patent Office supplemented guidelines to guide examiners on inventions of that type.

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[45] U.S. Court of Customs and Patent Appeals, *In re* Abele, (1982), 684 F2d 902.
[46] U.S. Court of Appeals for the Federal circuit (CAFC), *In re* Appalat (1994), 33 F3d 1526.
[47] U.S. Court of Appeals for the Federal circuit (CAFC), *In re* Lowry, (1994) 32 F3d 1579.
[48] Further information in Reed, Chris (Ed.), Computer Law, 3rd ed. Blackstone Press, 1997, 154.
[49] U.S. Guidelines 1996, 61 Fed Reg 7478.
[50] United States Court of Appeals for the Federal circuit 96-1327, see also http://lw.bna.com/lw/19980811 /961327.htm.
[51] See also U.S. Patent 5,797, 127, Walker Asset/Priceline, concerning a method for electronically pricing and selling airline tickets or U.S. Patent 5,745,681, Sun Microsystems, relating to a method for shopping including an electronic shopping cart.

IV. Copyright protection of computer programs under EC law

The efforts of the EC date back to 1985 when the commission of the EC published the 'White Paper on Completing the Internal Market'[52] in which inter alia a number of barriers to trade and restrictions on the trade in goods on the field of intellectual property were described. Therein the commission announced a number of legislatory proposals for the harmonization of the legal protection of computer programs.

1. EEC Green Paper on Copyright and the Challenge of Technology

In 1988 the EEC presented its 'Green Paper on Copyright and the Challenge of Technology'[53] which among others addressed the protection of computer programs under the copyright protection regime. The commission stressed therein its main interests focussing on work against misappropriation of creative efforts and investments by parties outside the Community and avoidance of unnecessary restriction of competition through excessive use of copyright monopolization, particularly in the protection scope or term. In the awareness that software will constitute the most important future computer systems component, the commission took the standpoint that computer software protection should come out of the application of national copyright laws and its neighboring rights, whereas patent protection should be reserved for inventions which involve computer programs to achieve a technical effect. It may be assumed to some extent, that the predominance of the U.S. in the software market put political pressure on the commission to accordingly accelerate and strengthen the growth of the European semiconductor industry. Hence the commission pressed for a directive on the protection of computer programs.

The proposed directive was intended to dictate explicit protection, whether by copyright or by a neighboring right, against copying computer programs. It should extend to programs fixed in any form, including storage in tapes, discs, microchips, etc.. Only original programs should be protected, even though the concept of originality was still an issue to be solved.

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[52] White Paper, EC Document KOM (85) 310, 14 June 1985, 36.
[53] Schricker, Gert, "Harmonization of Copyright in the European Economic Community", IIC 04/1989, 466.

In the Green Paper the commission discussed the different concepts of originality in the member states. According to the German Federal Supreme Court, only programs which disclosed a standard of creativity clearly superior to the average skill displayed in the relevant field were protectable. Arguing that the German approach failed to meet the needs of practice, the commission rejected the high German standard, according to which only programs that disclose a standard of creativity clearly superior to the average skill displayed in the relevant field should be protectable. The commission preferred to adopt the definition of originality from the TSD. Hence the program had to be the result of the intellectual effort of the creator and not be commonplace in the software industry. The commission further held that copyright protection for computer programs should provide a broad use right, including the right to authorize reproduction, rental, adaptation, and translation. The adaptation of a program by a legitimate user exclusively for his own purposes and within the basic scope of the license should be permitted, as well as the production of backup copies, whereas reproduction for purposes other than private should not be permitted.

In the Green Paper the commission did not decide whether it intended to create binding rules in this regard or merely to provide an interpretation guideline. According to the commission, the term of protection should extend from the creation date of the program and last either twenty to twenty-five years or fifty years; the decision was left open. The problem of compatibility with the Berne Convention was not discussed. The issue of authorship, especially in the case of employed creators, was left to the decision of the member states.

Two models of availability of protection were discussed. One was to grant protection to all programs which would benefit from the protection of the Berne Convention or the Universal Copyright Convention, if these Conventions were applicable to programs. The other possible solution was to grant protection to all natural and legal persons irrespective of origin or domicile. No reciprocity principle was planned for any of the models.

2. EC Directive on the Protection of Computer Programs

a) Commission Proposal for a Council Directive on the Legal Protection of Computer Programs

On January 5, 1989, the commission submitted the 'Proposal for a Council Directive on the Legal Protection of Computer Programs'[54] to which it had itself committed in its 'White Paper on Completing the Internal Market'. In adopting the proposal by means of copyright, the commission expressed its conviction that computer programs merit adequate legal protection, with regard to the intellectual effort and the financial investment typically related to their creation and the ease with which they can be copied. Although still, in the Community, protection for computer programs was uncertain and unequal between member states, at that time the trend worldwide, and in particular among the main trading partners of the Community, was seen as moving already towards protection by copyright. It was hoped that granting exclusive rights under copyright law would create incentives for software developers to invest their intellectual and financial resources and thereby promote technical progress in the public interest.

The proposal for the CPD addressed three main areas, (i) the definition of the type of legal provisions for protecting programs, (ii) the right owner and term and conditions of the right, and (iii) the definition of which acts require the authorization of the rights holder and which do not. The protection of computer programs was seen as an urgent but also complex matter. The proposal for the CPD aimed at being broad in its application in order to take into account and anticipate future changes in technology. At the same time, it was considered important to encourage standardization and competition in the software sector.

According to Art. 2 ECT, (Art. 2) one of the aims of the European Community it is to achieve inter alia a continuous economic growth in its member states by the establishment of a common market and an economic and monetary union and by implementing the politics and measures referred to in Art. 3 ECT, (Art. 3) and Art. 4 ECT, (Art. 3a). By acknowledging the importance and the need of protection of computer programs, in that an extensive protection is provided, the interests of software producers would be best met and a growth of the respective economic sector would be promoted. However, it has to be taken into account that the exclusivity of industrial

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[54] News, "EC: Commission Adopts Proposal for Council Directive on Legal Protection of Computer Programs", IIC 2/1989, 265.

property rights can only prove useful to the Community as long as the advantages are predominant over the drawbacks. Hence the aim of harmonic and balanced development of the economy can only be reached when the scope of protection for computer programs is defined in awareness of the interests of all involved parties, the producers of any economic size, their clients, and the Community as a whole. Otherwise the growth would be less than optimal, for instance reducing the diversity of product offerers, which would lead to lower compatibility, or by removing the incentive to offer products by granting a protection level which is too low. Hence, excessive rights can be as destructive to the market as their opposite. This result was also reached by the commission[55].

Whereas the preamble of the CPD mainly refers to the content of the CPD itself and gives only a general statement on the underlying reasons for the Directive, the proposal[56] gives deeper insight into the motivation of the commission. Bearing in mind to the introductory part of the commission's general statement to its proposal, one becomes aware that the commission had a general interest in creating a fair balance of interests in drafting the CPD. It takes into consideration the interests of small and medium as well as larger companies and tries to balance these[57]. The commission further states explicitly that the harmonization of software protection is mandatory in order for the Common Market to function. Any differences, which may impair the function of the Common Market shall be abolished. This is seen as necessary for computer software as a movable good and hence be traded cross-border without limitation due to different protection provisions on the field of intellectual property. It is also interesting to note that while the commission defined computer programs as a sequence of instructions which serve to induce an information-processing system, such as a computer, to carry out its functions, it preferred not to give a definition in the final CPD, in order to avoid the risk of an outdating thereof.

The commission also explained its considerations about the nature of the intellectual property to be protected. In short, computer programs are seen as a work of intellectual creativity, which does not interfere with their inherent usefulness. Creativity, skill and inventive genius appear in the resulting work in that they determine the different tasks to be performed by the program, the way of analyzing underlying problems, the choice among different solutions, and the different steps for the final realization. The underlying algorithms may not be protected as such, and

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[55] See EC Commission Document KOM(88) 172, 5, 8.
[56] Amtsblatt der Europäischen Gemeinschaften 89/C 91/05.
[57] Amtsblatt der Europäischen Gemeinschaften 89/C 91/05, Erster Teil: Allgemeines, 1.3.

protection is only granted for the contribution that differentiates the work from the works of others. Here the commission implicitly defines the condition of sufficient 'originality'. Also the problematic of independently created identical works is addressed and it is found that such cases are expected to occur extremely rarely due to the regular non-triviality of programs. This does not explain, what is to be done in such cases, but the silence may be interpreted as acknowledgment that independent secondary creations do not fall under the protection scope of a program.

An interesting chapter is the one in which the commission considers the various possibilities of protection. Patent protection is only discussed briefly and the result states only that in the end patent protection plays rather a minor role in the legal protection of computer programs and hence is not considered as a suitable solution for the basic legal protection of such works. It is submitted that this very short discussion does in principle not exclude patent protection for software, but merely considers it as the wrong basis for an internationally harmonized legal system. The discussion of contractual protection shows that the protection arising out of contractual obligations is of a very limited nature. In fact, the packaging licenses, often referred to as shrink-wrap licenses that are deemed to provide an automatic agreement by tearing open a seal or the package of a software product, are subject to repeated discussions about their legal certainty and enforceability. It can be generally said that it will be a matter of national law whether a valid licensing agreement can be concluded through the wrap-tearing or a similar act. Therefore, the commission comes to the logical conclusion that contractual protection is also no basis for harmonized protection. Coming to the final result that copyright provides the best basis for protection the commission acknowledged that this legal means has already proved its ability to adapt to new technologies and media, which gives hope that this will also be the case for software. Another advantage is seen in the fact that, since copyright only provides protection for the expression it neither hinders the technical progress nor independent creators in the exploitation of their works. It also leaves enough room for creating similar or even identical programs, where no copying is performed. The commission stressed hereto its finding that the number of algorithms at disposal is not infinite. The provisions specific to computer programs should, according to the commission, be limited to the minimum necessary extent, in order not to dilute or undermine the protection scheme provided by the RBC.

The problematic of interoperability in combination with access protocols and interfaces is considered in light of the finding that in reality several aspects thereof have already been

standardized by international organizations. The commission interpreted this as a general interest of the computer industry in the interoperability and compatibility of their software products and that this industry is therefore willing to accept the transfer of ownership rights in some program parts to common property. It is a declared purpose of the CPD, also with view to the fact that for achieving interoperability only ideas, rules and principles, specifying the interfaces between systems are to be reproduced but not the underlying code itself, to encourage that trend by increasing legal certainty concerning the exclusive rights of the program author. The commission further found its view confirmed by the fact that reverse-engineering is regarded as a time-consuming, expensive and inefficient way of obtaining the desired information about access protocols and interfaces and that it would be more efficient if the parties involved would agree to conditions about access to this information. Since the basis leading to the above assumptions and considerations might change drastically with time, it appears appropriate that the commission committed itself to a regular investigation of the above points.

Concerning the relationship to state-law conventions, the commission had no doubt about the intention that those conventions, e.g., the RBC, should apply to new technology as well, provided that those new work types fulfill the established requirements, above all that of originality. Concerning a possible *sui generis* law, the commission defends its viewpoint by stating that any drawback of applying copyright law to computer programs is eliminated through the advantages of the existence of these state-law conventions.

b) Adoption of EC Directive on the Legal Protection of Computer Programs

The commission finally submitted an amended proposal on October, 18, 1990, which lead to the adoption of the Directive 91/250/EWG on May 14, 1991. By virtue of the adoption of the 'Council Directive on the Legal Protection of Computer Programs'[58] the copyright laws in the computer program sector of the economies in the member states have been harmonized. The Directive was based on Art. 95 ECT (Art. 100a) and intended to grant computer program protection in the same way as literary works and to harmonize the preconditions for and consequences of this protection, since these were till then not identical in all the member states. In the grounds of the proposal for the CPD, the commission had abandoned Art. 94 ECT (Art. 100) as a basis and had reflected on the free movement of computer programs as goods as well as on

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[58] Amtsblatt der Europäischen Gemeinschaften EC Document 91/250/EEC.

the freedom of establishment[59] connected therewith for the companies involved. Furthermore, growth of the software industry and incentive to innovation and technical progress were listed as reasons for the CPD. An exception under Art. 20 ECT (Art. 8c) was not seen as justifiable. On the question concerning the need for harmonization, the commission pointed out in its memorandum that the protection of computer programs as literary works was not guaranteed in all member states, and that as a consequence competition was distorted and the freedom of establishment was restricted. It is worth noting in this context that in the Green Paper the commission had expressly denied the need for the harmonization of patent law, protection of business and trade secrets, and contract law as a means to achieve effective legal protection for computer programs 'at the present time'.

c) Content of EC Directive on the Legal Protection of Computer Programs

(i) Preamble

In the preamble the commission acknowledges that different protection levels exist in the EC member states, and that the misrelationship between development costs and reproduction costs of computer programs in combination with the increasing importance of computer programs for the common market 'have direct and negative effects' on its functioning. This general statement differs significantly from the objectives set forth in the proposal, for what reason is not known. The commission further holds that "in the first instance" the member states should accord protection to computer programs under copyright law. Hence the described investigation and historical development have led the commission to the insight that copyright law is the best common basis for protection of computer programs. This does not mean that the commission excludes other protection regimes from their applicability on the same field, as is as well stated in the preamble. It is thereby indirectly pointed out that copyright nevertheless has already found a very broad acceptance, namely by the established conventions on that field, the RBC and UCC, which makes it easier for the member states to bring their national laws into conformity with the new CPD. For the commission this means that it was expected that the member states would not make difficulties in the implementation. On the other hand, the commission could certainly also assume a general acceptability of the CPD in that it provides for a relatively weak form of protection, in comparison with patent protection, so that no member state would have arguments against this minimum protection scope.

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[59] Art. 43 ECT (Art. 52).

(ii) Object of protection (Art. 1)

By virtue of Art. 1(1) of the CPD, it obliges the member states to "protect computer programs by copyright, as literary works within the meaning of the Berne Convention". It is to be noted that also preparatory design material is subject to protection. Hence, technical drawings of the layout, mask work data, etc. are protected as well. At first sight it seems obsolete to declare these items protected under the copyright regime, since they are already, e.g., under Art. 2(7) RBC as industrial designs or even more generally under Art. 1 RBC as "illustrations, maps ... and three-dimensional works relative to ... science". But with the inclusion in the CPD the preparatory design material is introduced into the context of the CPD and hence is subjected to the particular rights and exclusions therefrom under the CPD. Manuals and installation and repair instructions are in contrast not treated as such preparatory material. As discussed in the grounds for the CPD, a definition of the term 'computer program' is not given, on one hand thereby avoiding any obligation to adapt such a definition to technological developments, and on the other assuming that the term is self-explanatory in the meaning of 'a sequence of instructions that make a computer perform a specific task'.

Copyright protection applies to all expressions of the computer program, in particular to the form of source code and object code. The CPD contains in Art. 1(2) the idea/expression exclusion principle already well known from national copyright laws. The commission stressed that computer programs are to be treated 'as literary works' under the RBC and hence neither 'as if they were' nor only 'to the same extent as' literary works, in order to avoid any possible assumed difference in the nature and scope of protection.

In its third section, Art. 1 CPD demands the originality of the work for its eligibility to protection. Computer programs must be original in the sense that they are the author's creation. In other words, they must be individual works with a contribution that differentiates them from ordinary improvements. It is explicitly forbidden to make the eligibility for protection dependent on other criteria.

(iii) The author and his rights (Art. 2, 3, 4)

By virtue of Art. 2 it is defined, who is to be deemed the author in the meaning of the CPD. The CPD leaves to some extent the definition to the member states, namely the case of acceptance of

legal persons as authors. For cases of an employed author the CPD is very explicit and declares the employer as the beneficiary of the exclusive economic rights. Moral rights are not addressed and by logic it can be supposed that these stay with the employee. This indeed was stated in the commission's grounds to its proposal, acknowledging that typically the creation of computer programs is done by employees or under commission and that it appears reasonable for the employer or commissioner to claim the rights for himself, with the exception of the moral rights. Concerning the right to maintain the integrity of the original work, the commission found that this right has a much lower significance than the traditional literary works. When a program is created with the aid of a development tool, the commission took the standpoint that in principle the creator of the tool shall not be allowed to claim ownership but rather the user of the tool. But even if the contribution by that user is neglectable, a human author was deemed always to exist, who then must have the right to claim his authorship. The national-treatment principle has been adapted to the above-mentioned particularity of software as being typically the result of a group effort. Hence it suffices that only one member of that group fulfills the requirements of Art. 3(1) CPD.

Articles 4(a) and (b) list the exclusive rights of the rights holder, respectively, the author. Thereafter this person has the exclusive right to reproduce, translate, adapt, arrange and otherwise alter the computer program. It is to be noted that a difference is deemed between reproduction and copying, which has been declared by the commission. Thereafter a mere running of a program can involve a copying but no reproduction in the sense of a persistent copy of the original. Running the computer program is also protected by virtue of Art. 4(a) if this requires a reproduction of the program, for example by loading it into the main memory. Hence it is not clear whether it is intended that even a temporary reproduction is part of the author's rights. If so, such a reproduction act which with certainty is not recognized as being one, although it is performed billions of times each day, is web-browsing. Each time a computer user takes a look at a web-page accessible via the Internet, a temporary, sometimes even a persistent copy of that page is stored in the cache memory of his computer, not to speak of the many copies stored transiently in various web-servers that lie in the communication path that the page data has taken from its home domain to the user's computer. In principle even the simple web-browsing is a copyright-relevant action and subject to the rights holder's consent. One could however contemplate that by making the page on a web-server available for public access the consent of

the rights holder to such access at any time at any location around the world is implied. This interpretation will however be up to the national courts.

(iv) Exhaustion (Art. 4(c))

Any form of public distribution of the program or a copy thereof is part of the rights of the rights holder according to Art. 4(c). This article also contains an express regulation on the exhaustion of the right of distribution, according to which the first sale of a computer program copy by the rights holder or with his consent in the Community exhausts the right of distribution of this copy within the Community. The exhaustion rule of Art. 4(c) CPD allows the first sale of the program to grant the rights holder the possibility receive his remuneration. Thereafter, except for the further rental of the computer program, the rights can no longer be enforced. It is of interest that this exhaustion is only confirmed for the inner-communitary market and that international exhaustion is likely to be negated even by the ECJ. This provision reflects a principle that the EC has applied ever since and which gave reason to criticism[60].

The strong position of the author, respectively, copyright holder given him under Art. 4 CPD is also weakened slightly by the exceptions in Arts. 5 and 6 CPD, which describe actions that, under certain circumstances, do not require the consent of the author/copyright holder. Such an exception is granted for copies that are necessary for the use of the program, provided the user is a lawful acquirer. This person may also make backup-copies. The addendum "as far as it is necessary for that use" sounds insofar strange, as in principle a backup copy is never necessary for the use of the original. The legislator might have wanted to restrict the extent to which such copies are made, but has chosen an unsatisfactory phrase. Another exception is granted for the observation, studying, or testing the functionality of the program, "in order to determine the ideas and principles which underlie" the program[61], but only while performing an allowed act of loading, running, transmitting, or storing process. This is therefore no act of reverse-engineering, unlike the exception of decompilation in Art. 6 CPD. Here the rightful user may 'translate' the program, which typically means to decompile from object code to source code. The information obtained thereby is however restricted in its legal use. Only information not already otherwise readily available and necessary for interoperability with an independently created program may be

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[60] See mainly in Silhouette International Schmied GmbH & Co KG / Hartlauer Handelsgesellschaft GmbH, EuGH vom 16. Juli 1998, C-355/96 and also in Urteil des Gerichtshofs vom 28. April 1998, Javico International und Javico AG gegen Yves Saint Laurent Parfums SA (YSLP), Rechtssache C-306/96.
[61] Art. 5(3) CPD.

extracted and used. The use for developing, making or selling a program substantially similar in its expression, often referred to as its 'look and feel', is particularly not allowed[62]. The tightness and precision of this decompilation exception show the importance that it has for software authors, who fear that a too far-reaching right of decompilation will deprive them of their exclusive rights.

A similar provision can be found for integrated circuit protection under *sui generis* legislation, namely the 'reverse-engineering defense'[63]. In the integrated circuit topography protection regime, reverse-engineering may only be done for the purpose of development of non-identical devices. Second-sourcing may hence not be based upon such decompilation, respectively, reverse-engineering. Article 6(3) CPD does not cite Art. 9(2) RBC by reference but implicitly addresses the 'fair use' principle laid down therein. According to Art. 9(1) and (2) CPD, contractual conditions contrary to Art. 6 CPD or to the exceptions in Art. 5(2) and (3) CPD, are null and void.

(v) Remedies (Art. 7)

Article 7 CPD is the one that for the EC member states is insofar of importance as it determines which concrete measures are to be implemented in order to render the protection set forth therein applicable and effective. A timely implementation is crucial for the member states since their governments can be held liable for damages arising out of a delayed implementation[64]. Anyway, the member states are also obliged to interpret their legislation in conformity to the Directive, even if it has not yet been implemented[65].

(vi) Term (Art. 8)

The CPD provides for a term of fifty years after the death of the author. However, the EC gave itself by virtue of Art. 1(1) of the EC 'Directive for Harmonization of Term of Protection of

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[62] Art. 6(2)(c) CPD.

[63] See herein Chapter C IV 2. a) (vi) Exclusive rights of the right owner and exceptions thereto.

[64] See Urteil des Gerichtshofes vom 8. Oktober 1996. Erich Dillenkofer, Christian Erdmann, Hans-Jürgen Schulte, Anke Heuer, Werner, Ursula und Trosten Knor gegen Bundesrepublik Deutschland. - Haftung und Schadensersatzpflicht des Mitgliedstaats. Verbundene Rechtssachen C-178/94, C-179/94, C-188/94, C-189/94 und C-190/94. Slg. 1996 S. I-4845.

[65] See ,e.g., in Urteil des Gerichtshofes vom 13. November 1990, Marleasing SA gegen La Comercial Internacional de Alimentación SA, C-106/89, Slg. 1990, S. I-4135.

Copyright and Certain Neighboring Rights'[66] a longer term of seventy years *post mortem auctoris* (p.m.a.). With this new term in Art. 11 of that Directive, the Art. 8 CPD was explicitly superseded. It is allowed to ask oneself, which computer program is deemed to be used for more than 70 years. The prolongation from fifty to seventy years is therefore more than questionable. The reason behind that step may simply lie in the wish to achieve a unitary term all over the Community and to not necessitate a special term for each and every species of work. However, in order to balance the interests of all parties involved in computer programs, a significantly shorter term would have seemed justifiable.

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[66] Richtlinie 93/98/EWG des Rates vom 29. Oktober 1993 zur Harmonisierung der Schutzdauer des Urheberrechts und bestimmter verwandter Schutzrechte, ABl. 1993 Nr. L 290/9.

V. Protection of computer programs under the laws of the WIPO

1. WIPO Model Provisions on the Protection of Computer Software

Between 1974 and March 1985, the WIPO conducted comprehensive studies on the question of protection of computer software. In the six years from 1971 to 1977 the International Bureau worked on a draft of model provisions which were finally published in December 1977[67]. The project for these model provisions originated from a request from the UN to the WIPO to work out a study on the appropriate form of protection for computer programs. In this first phase, the necessity, criteria, and suitable forms of protection were investigated, in cooperation with representatives of around twenty-five international and national expert associations. The question of *sui generis* protection was one of the most dominantly worked on. The WIPO worked out a draft international agreement which provided for a uniform international registration and deposition, in order to serve as a safeguard for the accessibility of the software for a licensing deal during the term of protection and for free access after that period of time. The draft proposed a term of ten years. In the subsequent intensive discussions about an adequate term of protection it was taken into account that the costs for manufacturing of a software product occur until the first exemplary is manufactured, whereas costs for manufacturing additional copies thereof are negligible. The subject matter of protection being the program itself, one found ten years as an inadequately short term of protection. The draft agreement was not successful in the end. The drawbacks of an obligatory registration and deposition were seen as unacceptable and the incentives for a voluntary registration and deposition as not sufficient. The 'WIPO Model Provisions on the Protection of Computer software' were intended to serve the contracting states in that these could complete their national provisions on computer software protection, respectively, give them the necessary strictness. The model provisions were not supposed to be realized in the form of a new *sui generis* law, but the WIPO intended to have the principles that were laid down in the model provisions incorporated in existing legal systems in the form of clarifications or extensions, if at all found to be necessary. In this context, particularly copyright law, unfair competition law, and trade secret protection were mentioned as possible environments. The model provisions gave a meanwhile broadly accepted definition of the term 'computer software', and contained provisions for ownership of rights, protection requirements, scope, and term of protection. In their substantive rules the model provisions followed mainly the

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[67] WIPO, "Model provisions on the protection of computer software", Industrial property, December 1977, 259.

copyright provisions. Protection is granted for the form of expression not for mathematical, logical, or technical content of software. Originality is required in the sense of personal intellectual work of the software author. The protection extends to the exclusive rights to copy, sell, or otherwise dispose of and use, but also to translation of a program description into a program code or into another program description and vice versa. Protection does not include the program concept, i.e., method and algorithm, and independently developed software. The model provisions do not contain any requirements of formalities for the attainment of protection.[68]

2. Second draft agreement of the WIPO

The second phase of the WIPO investigations took advantage of the contribution by experts of the governments of the various participating countries. During four sessions, beginning in November 1979 and ending in February 1985, the adequacy of *sui generis* protection and a corresponding international agreement was contemplated. Therefor the WIPO had prepared a second draft agreement[69]. Again, this draft found no acceptance. Furthermore it was investigated, if and to which extent the existing international agreements, the RBC and the UCC were applicable to computer software. The UNESCO, being the administrator for the UCC, participated in the further investigations. In February Martin S. Keplinger[70] submitted his expert report on the protection of computer programs in the international context to the session, to which experts from about forty states, several legal experts, and spectators from more than 30 international and national organizations were participants. This conference resulted in a majority voting against a *sui generis* right. A major part of the delegations, the UNICE among them, found the existing copyright regime applicable and sufficient.

3. WIPO Copyright Treaty

The latest efforts of the WIPO are hence based finally on the copyright laws. In 1996 the WIPO Copyright Treaty (WCT) was adopted and signed during a diplomatic conference. This treaty adds to the provisions of the RBC in that it explicitly provides for the copyright protection of computer programs in Art. 4 and for databases in Art. 5. Article 4 WCT hence is comparable to

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[68] Further analysis in WIPO, Mustervorschriften für den Schutz von Computersoftware, GRUR 7/1978, 286 and in Wittmer, 155.

[69] WIPO document LPC S/II/3 of February 24, 1983.

[70] See Keplinger, Michael S., "Authorship in the information age: Protection of computer programs under the Berne Convention and Universal Copyright Convention", Software Law Journal, and Copyright, March 1985.

Art. 10(1) TRIPS[71] because it also declares computer programs as literary works under the RBC. In an agreed statement the WIPO made clear that the scope of protection of computer programs under Art. 4 WCT, read with Art. 2, which defines the scope, is consistent with Art. 2 of the RBC and also on a par with the relevant provisions of the TRIPS agreement. Article 7 extends the right of rental to computer programs, cinematographic works, and works embodied in phonograms. For computer programs, the right does not apply where the program itself is not the essential object of the rental. These provisions in Art. 7 are hence similar to those in the TRIPS agreement[72]. Article 7 earned criticism in that its application would also cover temporary copies, hence also those reproductions that are made in the course of Internet access to a copyright-protected work. This right indeed will be difficult to accept and even less more difficult to enforce. A possible, but not then harmonized, resort could be found via national legislation, either by interpreting such copies not as reproductions in the sense of the WCT or by deeming the author's consent for such cases. Another resort could be searched via Art. 10 WCT.

The owners in the rights receive in Art. 8 WCT an exclusive right in making their works publicly available. Art. 8 WCT extends this right for publication to all categories of works, including any communication by wire or wireless means. It states that "the making available to the public of their works in such a way that members of the public may access these works from a place and at a time individually chosen by them" belongs to the author's rights which clearly includes the placement of a work on a server where this document can be accessed on demand by others, i.e., the typical situation with documents being made available on the Internet. This formulation does not include broadcasting since the time can then not be chosen individually. Article 8 WCT was also criticized[73] with regard to the question of liability of network providers for copyright infringement. National caselaw[74] exists that has meanwhile defined a sort of 'innocent provider', i.e., a provider who does not know and has no reason to believe that copyright-infringing web-pages or links are provided through his services. Such an exception could also be thought of in an international context.

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[71] See Chapter B VI 2. b) (i) Computer programs as subject matter of protection.
[72] Art. 11 TRIPS.
[73] See http://www.public-domain.org/copyright/law-profs.html.
[74] E.g., Amtsgericht München, 28. Mai 1998, "Verbreitung pornographischer Schriften durch Internet-Provider", 8340 Ds 465 in Computer und Recht, CR 8/1998, 500.

Article 11 WCT covers the acts of anti-circumvention, i.e., prohibitions concerning devices or services that can be used to circumvent copyright protection systems. Because of concerns about covering even non-infringing uses, such a provision was not adopted in the U.S. copyright legislation. Article 11 WCT states that each signatory to the WCT "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."

Rights Management Information (RMI) is defined in Art. 12 WCT as "information which identifies the work, the author of the work, the owner of any right in the work, or information about the terms and conditions of use of the work, and any numbers or codes that represent such information, when any of these items of information is attached to a copy of a work or appears in connection with the communication of a work to the public." Art. 12 requires that adequate and effective legal remedies be provided for unauthorized removal or alteration of electronic rights management information; and distribution, importation, communication, or broadcasting, works or copies thereof, knowing that electronic rights management information has been removed or altered without authority.

Provisions concerning the application of the right of reproduction to temporary, transient, or incidental reproductions, were also discussed at the Diplomatic Conference, but were not adopted since it was considered that those issues may be appropriately handled on the basis of the existing international norms on the right of reproduction, and the possible exceptions to it, particularly under Art. 9 of the RBC.

The Business Software Alliance has recommended to ratify the WCT[75] because according to them it brings copyright into the digital age, is beneficial to users and authors, promotes creativity and jobs and is international, thereby according with the internationality of the Internet.

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[75] See on http://www.bsa.org/policy/copyright/index.html?/policy/copyright/wipointro_c.html.

VI. Copyright protection of computer programs under the TRIPS agreement

1. Introduction - The way to the TRIPS agreement

The adoption of software protection under the roof of the General Agreement on Tariffs and Trade (GATT), respectively, the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), is best understood in the context of the development of the TRIPS itself. In the following an overview of these developments is given to show which forces have lead to the conclusion of the TRIPS agreement and which interests influenced the final outcome. One will see that the inclusion of copyright protection of software under the TRIPS agreement is a logical outcome to the game of nations that preceded the final outcome. Furthermore one will better understand the relationship between the WTO and the WIPO on the field of intellectual property.

a) Way towards the Uruguay round

With the increasing importance of the transnational trade and increasing technical progress, one realized that missing or rather different Industrial property right standards in different states are no longer a neglectable commercial problem. For a long time the opinion had prevailed, that the monopoly-like patent right is above all suitable to obstruct trade and build up protection barriers. But then one became conscious of the fact that in the case of lower protection in the import country an exporter exposes his product to imitation, whereby the development- and research costs incurred by the making of the original product do not become a burden on the imitator, who hence can profit from a clear competition advantage. In the course of the increasing digitization of information recording and -transmittal and with the rapid spreading of electronic data exchange, it becomes apparent that with little expenditure copies of works are producible without degradation in quality, e.g., music recordings, but mainly also software. The inexorable fight against product piracy, particularly in the sector of digital works, and with brand articles, examples from the textile and clock industry prove, how closely interrelated trade and protection of immaterial goods in fact are.

Another trigger for the beginning entwinement of international trade and protection of intellectual property was the fact that the international conventions existing up to then, for instance the revised Berne Convention (RBC) or the Paris Convention (PC), had not attained the effect they had claimed. This followed particularly from the hesitation by many economically significant states to access the respective revised versions. This applied likewise to the RBC, the Geneva Tone Carrier Convention, the World Copyright Agreement, but also the GATT 1947. The hesitant access of the different states, amongst them the industrially well developed as well as the developing countries, was not the least consequence of the insufficient attractivity of the different agreements. Even less developed countries feared strengthening the economic imbalance more by a harmonized protection of immaterial goods. The disadvantage of the missing protection of intellectual property appeared to many states as the obviously smaller evil, who hence preferred not to access the international copyright agreements in their different versions. The advancement of these conventions in the context of the revisions had not been sufficient to create the missing incentive. This experience of lacking effectiveness of existing conventions pointed towards the necessity of a reorientation.

From 1980 to 1982, an effort was conducted to amend the Paris Convention for the Protection of Industrial property. While the third-world countries hoped to obtain faster and easier access to the new technologies of the developed countries, the U.S. led the opposition thereto. Since the developing countries constitute the majority of the Paris Convention parties, the improvements in harmonizing legal protection of Industrial property came to a halt. The GATT would later prove the better forum for implementing the desired developments. On the international terrain the WIPO, as a suborganization of the UN, has for a long time been the traditional forum for the topics of protection of intellectual and industrial property, administrating the most important international conventions, the RBC and the PC. However, the WIPO failed to satisfy all the needs of international protection of intellectual property.

In connection with the development of the information society, data-processing programs and systems were also rapidly growing in economic importance. Many researchers and specialists were concerned with the question of how to protect software from unpermitted copying and use. Various countries had provided for protection of software, based on copyright principles, without, however, using the RBC as the international basis for such protection. In order to provide momentum, the United States was seeking to make it clear in the Uruguay Round of

GATT that free world trade in software products must lead to international recognition of copyright protection.

Up until the Tokyo Round the relationship between the GATT and intellectual property had been limited to the provision in Art. XX(d) of the GATT agreement, which indirectly pointed out that patent-, trademark- and copyright protection do not constitute a serious impediment to free world trade. In the context of the GATT negotiations it was the U.S., who pushed for not longer amending the PC in order to make it more attractive, but rather to add to the GATT the trade-related aspects of the law in immaterial goods. According to the U.S. the existing agreements on intellectual property were no longer sufficient to offer appropriate protection, and above all no reasonable enforcement mechanisms and dispute settlement procedures were to be found. The U.S. felt that the GATT should grant a high international standard for the protection and enforcement of intellectual property rights. Furthermore, the parties should adapt their national laws and agree to an effective dispute settlement procedure. The initiative of the U.S. was consented by the GATT member states. To what extent the route suggested by the U.S. was at all compatible with the existing conventions was emphasized in that the minimum standard of the Paris Convention could and had to remain untouched. Article 19 of the Paris Convention was thereby understood in such a way that the member states could form special communities, in order to achieve specific targets of the legal protection of Industrial property. The EPC is to be seen as an example of such a special agreement.

This trend led to the discussion of the trade-related rights in intellectual property in the forum of international trade, namely the GATT. Apart from offering a more dynamic process of decision-making, the GATT contains well-established provisions on dispute settlement for international litigation. The GATT was particularly known to be a forum where, with global negotiation packet-deals, even the developing countries could be persuaded to adopt rules in exchange for preferential treatment particularly in the field of textile and agriculture. According to the EC, the GATT offered a further advantage that despite the EC being a formal member to neither the WIPO nor the GATT, the internal regulation of the foreign-trade competence according to Art. 133 ECT (Art. 113) gave to the EC commission a vote which made it an equal partner, e.g., to the U.S.. Hence the Agreement on Trade-Related Aspects of Intellectual Property Rights, shortly referred to as the TRIPS agreement, was adopted as a new topic in the Uruguay round of the GATT.

Initially, different strategies how the protection of Industrial property should be linked with the existing GATT were analyzed. The negotiations of the Uruguay round finally led to the solution, that the trade-related aspects of intellectual property should not be realized in the GATT text itself, but in the form of a convention alongside the GATT, with the WTO forming their common roof. This proved appropriate, since the existing regulations of the GATT did not offer a meaningful basis for an extension into the area of legal protection of Industrial property. The U.S. finally submitted, together with Japan and the EC, a detailed suggestion to accommodate the intellectual property into the context of the GATT. In September 1986 the Uruguay round commenced in Punta del Este[76] beginning with the Statement of Ministers, and was scheduled to last until December 15, 1993. Starting on the premise of trade-related aspects of intellectual property rights, the Statement of Ministers explained that these aspects must lead to the establishment and guarantee of a workable and appropriate protection for intellectual property rights, and that the negotiations should aim to clarify the existing GATT provisions and if necessary to develop new rules and doctrines. The statement further indicated the need to develop a multilateral framework of basic principles, rules, and doctrines to prevent the trading of counterfeit goods. It also noted that these efforts should proceed without prejudice to the activities of the World Intellectual Property Organization or other organizations.

b) Uruguay round of GATT

The multilateral negotiations in the context of the GATT were led in several rounds, which dealt with packets of planned measures. The GATT that entered into force in 1948 was created as one of the three multilateral institutions beside the World Bank and the International Monetary Fund. The Uruguay round was initiated under participation of one hundred and five nations in September of 1986 with the intention to update and extend the rules of the international trade. The stabilization of the legal protection of industrial property was negotiated in the form of the TRIPS agreement under the mandate decided upon by the member states in Punta del Este. Regarding computer programs, a United States proposal sought to extend copyright protection "to all forms of creative expression including all traditional works, to newer forms of expression such as computer programs and data bases, and to forms yet to be developed." In other words, the GATT negotiations were obviously viewed as a means to overcome the reservations of

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[76] See Faupel, Rainer, "Von Punta del Este zum Midterm Review: GATT und geistiges Eigentum", GRUR 4/1990, 255.

recognition of programmers and data technicians as authors in the context of the Berne Convention.

In the context of a midterm review the Ministers of the GATT member states came together in 1988 for assessing the results achieved. At this time it became clear that the efforts towards a common acceptable result had to be increased, since the fronts between the industrial nations and the developing countries had strengthened. Although the two different groups were in agreement on certain areas, the developing countries lead by Brazil and India opposed the position of the industrial nations, fearing that for them the access to high-level technology could increase in price and that the economic distance to the industrial nations would increase as well. One also argued, that only the WIPO could be the correct authority for the determination of the desired regulations and that the GATT lacked the necessary authority, except for combating piracy in trademark- and copyright law. The developing countries succeeded in that the later Montreal mandate emphasized that the TRIPS negotiations may not prejudice the WIPO. In view of the threatening failure of the negotiations a continuation of the Midterm Review was decided in April 1989. The area of intellectual property was continued to be treated with emphasis since the opinion prevailed that an improvement in the position of the WIPO was not to be expected, rather the opposite. The variety of interests interacting with pressure of time and the interrelation of the attainable targets resulting from the merging of topics finally enabled the success of the TRIPS agreement. It was in everyone's interests to lead the negotiations to a positive termination such that a high readiness to compromise had evolved. The results of the midterm review already pointed in the direction, on which the members had agreed, that appropriate standards and principles for the presence, scope, and use of the protection of intellectual property were to be introduced. Following the position of the EC, the result should be directed to a participation of as many member states as possible, in contrast to the position of the U.S., which wanted to be as reserved as possible in the concessions to developing countries, even if risking a lower state participation quota. India stressed its opinion that protection of intellectual property was in its core monopolistic and restrictive. They said that the GATT had to restrict itself to the trade relations, i.e., to the restrictive and competition-adverse practices of industrial-right owners, and found it absolutely unjustified to create in the GATT any new substantial standards.

After lengthy negotiations, Arthur Dunkel, the general manager of the GATT, submitted a paper, carrying the title 'Draft Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations' which contained a draft of the TRIPS agreement. Concerning copyright, a common point of view existed from both the industrialized countries and the developing countries, according to which the Paris version of the RBC offered sufficient protection. Only in the term of protection were the opinions different. In the area of the neighboring rights, one approached essentially the Rome Treaty. The mention of the basic principles of the traditional conventions revealed already the tendency to move in the direction of a tuning and side-by-side arrangement of the existing conventions with the to-be-negotiated TRIPS. When finally the general manager of the WIPO himself participated in the negotiations, and India accepted the principle of 'policing', the counter-pressure from the developing countries was reduced significantly whereby the way became free to an agreement of all involved parties. The fact that the TRIPS agreement was decided at the end of the Uruguay round in the final form surprised many specialists, considering it represented a conceptual leap that is at best comparable in the area of international agreements with the RBC and the Paris Convention. The TRIPS agreement managed to fill the substantial gaps of these conventions, among them the absence of an effective mechanism for the adherence to the standards. On one hand the conventions themselves had prescribed few obligations for the member states for the introduction of enforcement measures, and on the other gave no effective mechanism that equipped the member states with the necessary power to apply enforcement. Although both conventions had provided for calling the International Court of Justice, they had left it to the member states, to what extent they recognize and implement its jurisdiction.

c) Results of the Uruguay round

On April 15, 1995, in Marrakesh the final act of the Uruguay round of the GATT was signed. The WTO took up its work on January 1, 1995, in Geneva and has ever since been forming the common institutional framework for the perception of the trade relations between its members in affairs in connection with the conventions and right instruments specified in the appendix to the Agreement establishing the World Trade Organization. Among these conventions rank the GATT 1994 as appendix 1A, and the TRIPS as appendix 1C. The TRIPS agreement is, contrary to the plurilateral commercial conventions, a multilateral convention which is adopted automatically upon the entry to the WTO and which is obligatory to all members of the World Trade

Organization. It is therefore an integral constituent of the World Trade Organization agreement, whereby the legal protection of industrial property is closely tied with the world trade.

For the legal protection of industrial property, the minimum standards were decided on in the TRIPS negotiations which made necessary adjustments in the law for the legal protection of industrial property and copyright in almost all member states. Against all expectations, the harmonization in the TRIPS agreement did not take a negative turn, but the general protection standard was defined on a high level, in acknowledgment of the importance of intellectual property for a correct functioning of trade with consideration, however, to the dangers threatening through excessive and abusive practice of industrial property rights. The emergence of the TRIPS agreement in the context of the Uruguay round of the GATT represents thereby one of the most important developments in the history of the protection of intellectual property, since the creation of the substantial international conventions in this area, the RBC and the Paris Convention, more than one hundred years ago.

In addition to its provisions concerning national treatment and the most-favoured-nation treatment, the TRIPS agreement binds the member states to adhere to the basic provisions of some of the existing conventions, namely the Paris Convention, the RBC with its annex on the developing countries, and the Treaty on Intellectual Property in Respect to Integrated Circuits (IPIC). The preamble of the TRIPS agreement stresses the desire for the mutual assistance of the WTO and the WIPO. Although the Rome Treaty provisions have not been directly adopted, some of them are reflected in the TRIPS agreement. Every signatory of the TRIPS, respectively, the GATT, obliges himself to adhere to these provisions of the international conventions, even if the signatory is not a party to these conventions. Besides, the continuing validity of the Rome Treaty is expressly acknowledged as are all versions of the RBC. But the TRIPS agreement goes one step further and contains in its part II far-reaching substantive obligations which complete those from part I. Remembering the cumbersome progress of the older convention's revisions, it becomes clear that those regulations of the TRIPS agreement extend substantially farther, than one would have achieved in a traditional way by means of the WIPO. Thus, the TRIPS agreement in addition extends also to the areas of confidential information and anticompetitive license conditions, which were completely excluded in the previous conventions. The supplement to the regulations of the RBC by Art. 10 to 13 TRIPS was often cited as the 'Berne-plus' approach of the TRIPS agreement, whereby it is to be admitted that also a 'Berne-minus' is to be

acknowledged, where the regulations of the RBC were not adopted. The express designation of the individual articles of the Berne Convention in Art. 9 TRIPS instead of being a general reference serves to solidify future dispute settlement processes. For the international conventions in the area of copyright, not mentioned in the TRIPS agreement, it should be noted that the *Lex-posterior* principle is not to be applied without reservation since the differing of the contracting parties and of the subject of the conventions, and the extent to which the conventions are at all incompatible with the TRIPS agreement, remain open points in this context.

All intellectual-property-related measures in the TRIPS agreement would be strongly reduced in their effectiveness, would there not be the global catalogue of enforcement standards, to whose application the member states are obliged. This assures the members that their intellectual property is respected by the other TRIPS members and protected accordingly. Such detailed measures had not been included in any of the traditional conventions for the protection of intellectual property. There, one had only relied on the principle of national treatment and on foreign plaintiffs having access to the same remedies as national residents. Both the RBC and the Paris Convention were silent as to what would happen if those remedies themselves proved insufficient. The regulations in part III of the TRIPS agreement therefore imposed fundamental mutual obligations on the members and made an effective enforcement means available, namely the Dispute Settlement Procedure of the GATT.

2. Provisions in the TRIPS agreement concerning copyright protection of computer programs

The TRIPS agreement is divided into seven parts, Part I contains the principle of national treatment, the most-favored nation treatment principle, and provisions determining the relation between the TRIPS agreement and the other international intellectual property conventions. Part II contains the substantial provisions for the protection of seven different rights in intellectual property, namely, copyright with the related rights, trademarks, geographic indications, industrial designs, patents, topographies of integrated circuits, and protection of undisclosed information. Part III concerns regulations on enforcement.

a) Relation to existing intellectual property conventions

The RBC provides a relatively high international protection level for the copyright area, in contrast to the Paris Convention for the areas of intellectual property contained therein. Taking this into account, there seemed at first view little need for a copyright revision in the framework of the TRIPS agreement. Accordingly, the first draft by the EC for substantive provisions in the TRIPS agreement was restricted to trying to get the contracting states to adhere to the provisions of the RBC, to provide for certain rights for software producers, and to cite the provisions of the Rome Treaty concerning neighboring rights. It is to be noted that the provisions in the TRIPS agreement set a minimum standard which the contracting states are free to exceed[77].

As mentioned, the 'Berne-plus' approach[78], obliged the contracting states to follow the main substantive provisions of the RBC, as set forth in Art. 9(1) TRIPS, whereby the moral rights, i.e., Art 6bis RBC, are excluded therefrom in the second phrase. This exclusion provides a compromise which the EC accepted involuntarily, bowing to pressure from the U.S., where moral rights are more emotionalized. However, this exemption only concerns the TRIPS member states and the RBC member states will of course have to adhere to the RBC regulations anyway. The 'plus'-elements which exceed the scope of the RBC, are contained in Art. 10 to 13 TRIPS. These provisions concentrate on the protection of computer programs, databases, rental rights, and some horizontal provisions. Not even in the latest version of the RBC from 1971, were either computer programs or databases mentioned. The member states who are party only to the RBC are hence deemed to be not obliged to protect the types of works not explicitly mentioned in Art. 2 RBC, such as computer programs, but if they choose to do so, the principle of national treatment should render this protection available to all other Union members[79]. For the protection of neighboring rights a 'Rome-plus' approach was not adopted. From the wording of Art. 11 TRIPS it remains unclear, whether the right to lend copies of works should be interpreted as to requiring the author's permission for each loan of a copy of a work already put on the market or whether an exhaustion is to be assumed.

Already the incorporation by reference of the RBC represents an enormous success, having in mind that a revision and modernization of the RBC had failed due to the unanimity requirement.

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[77] Art. 1(1) TRIPS.

[78] Lehmann, Michael, "TRIPS/WTO und der internationale Schutz von Computerprogrammen, Computer & Recht, 1/1996, 2.

[79] Katzenberger, Paul, "TRIPS und das Urheberrecht", GRUR Int 6/1995, 447.

With this reference, countries like Thailand and India, which were not parties of the RBC, but of the WTO, automatically became bound to adhere to the Berne principles. Having committed this step, these countries could feel seduced to then access the RBC. The 'Berne-plus' could by this effect be rated as a plus for Berne.

b) Provisions on copyright protection of computer programs

(i) Computer programs as subject matter of protection (Art. 9 and 10)

The protection of computer programs was one of the most hotly debated in the TRIPS negotiations. The interests were extremely split, the U.S. went for a high level of protection, Japan stressed exceptions, and developing countries tended to limit the protection in time and scope as much as possible. The position of the EC was dominated by internal discussions on the same topic, namely the EC CPD, to be adopted in parallel to the Uruguay round.

By virtue of Art. 10 TRIPS, computer programs are to be "protected as literary works under the Berne Convention". This wording closely resembles the wording of Art. 1(1) of the CPD. The developing countries did not manage to assert the deletion of the word 'literary'. Such a deletion would have rendered the scope of Art. 10 TRIPS much more vague and imprecise, leaving interpretation space concerning the form[80] or the term[81] of protection.

Despite the effort of formulating exceptions from the protection of computer programs, Art. 10(1) TRIPS does not even contain one. Instead, it was agreed upon not to extend protection to ideas, procedures, methods of operation and mathematical concepts 'as such'. There is room for discussion as to what in particular is meant by 'as such' and the interpretation of this formulation by the EPO[82] discussed below could give an example therefor. Since this 'idea/expression'-principle is valid not only for computer programs but for any copyright-protectable matter, it appears correct to place it not only into the context of Art. 10, but of Art. 9 TRIPS and hence to generalize its applicability to the whole chapter of copyrights. This helps also to avoid an otherwise possible incorrect controversial conclusion. Article 9(2) resembles Art. 1(2) of the Computer Program Directive (CPD) and Sec. 102(b) of the U.S.

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[80] See Art. 2(7) RBC for works of applied art.
[81] See Art. 7(4) RBC.
[82] See Chapter B VII 4 Recent developments of computer program protection under the EPC.

Copyright Act[83], which may have been intended in order to establish a compatibility with these computer protection regimes. This way makes it clear that this exception does not introduce a new restriction but reflects a known and well-established standard. Hence, software protection does extend to the form of expression and not the algorithm behind it.

Concerning the prerequisites of computer programs for receiving protection under the TRIPS agreement, the TRIPS agreement itself remains silent with the exception of databases for which the 'intellectual creation' criterion is explicitly mentioned, following Art. 2(5) RBC. The general formulation in Art. 9(2) TRIPS is broader than that provided in the CPD. It hence does leave room for the narrower and preciser criteria for eligibility to protection in the U.S. or EC legal frameworks. The TRIPS regulation hence provides the largest common denominator for the idea/expression dichotomy of the U.S. versus the differentiation between form and content contained in the protection regimes of other states.

The definition of computer programs in Art. 10(1) TRIPS is defined insofar as such programs are protected in source- and in object-code. The CPD is ahead of the TRIPS in this definition, since the CPD provides in its Art. 1(1) that protection extends also to the preparatory design material.

(ii) Rental rights (Art. 11 and 14)

In granting a right for rental, the TRIPS agreement also exceeds the limits of the RBC, which neither knows a rental right nor a general distribution right. The EC emphatically strived for the adoption of a rental right for authors for all categories of copyright works. With its EC Directive concerning rental and lending rights[84] the EC had introduced a community-wide lending- and rental right in favor of protected work types, which had already been anticipated in the CPD. Many developing countries were hard to convince of the advantages of the introduction of such a right, and the U.S. opposed a rental right for films until the very last minute. In the TRIPS agreement, the result is a relatively intransparent rental right, regulated in Art. 11 TRIPS and partly in Art. 14(4) TRIPS. According to Art. 11 the contracting states are obliged to provide for a rental right for authors of computer programs and films, but not mandatorily for databases. This right is a prohibition right and not a remuneration right. So far the approach of the EC Directive

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[83] 17 U.S.C..

[84] Richtlinie 92/100/EWG des Rates vom 19. November 1992 zum Vermietrecht und Verleihrecht sowie zu bestimmten dem Urheberrecht verwandten Schutzrechten im Bereich des geistigen Eigentums, ABl. 1992 Nr. L 346/61.

concerning rental and lending rights has found entry into the TRIPS agreement. A definition of 'author' has been renounced, the TRIPS leaves the interpretation, who is to be regarded as the author of a computer program or a film, to the contracting states.

Rental is defined as the commercial rental to the public of originals or copies. This does not help too much for clarification, since the terms 'commercial' and 'public' are not defined in the TRIPS agreement, again leaving the interpretation to the contracting states. For computer programs, Art. 11 phrase 3 TRIPS clarifies that rentals are only prohibitable under the TRIPS agreement, if the program is an essential object of the rental. The background thereto is that in cases of a computer program being an inessential part, for example in combination with a car, a telephone, etc., a copyright rental right must be granted when renting these objects, and this only because they inter alia contain some computer program code. It remains up to the national courts to define the meaning of essentiality in this context. This provision bears one danger, one might be seduced to conversely deduct similar situations for other categories of works. An exclusion, as in phrase 2 of Art. 11 TRIPS for film works, is not provided for computer programs since it is self-evident that rental will lead to widespread copying which materially impairs the exclusive right of reproduction. With the increasing use of digital video, such as with DVDs, one will probably face the same situation with films as already exists for software and any rental will materially impair the exclusive rights to film works, rendering the provision for films meaningless as well.

(iii) Term and limitations (Art. 12 and 13)

In Art. 12 and 13 TRIPS two further plus-elements of the RBC are contained. Both are horizontal regulations in that they have validity for several copyright work types. Whereas the RBC generally makes the term of protection dependent on the date of passing of the author, and only in exceptional cases permits a different calculation, Art. 12 TRIPS obliges the contracting states to provide for a minimum term of fifty years starting from publication or creation in those cases where the calculation is not conducted *post mortem auctoris*. This has importance in the case of a legal entity being accepted as the author of a work. Whether this is allowed by the RBC is neither addressed by the TRIPS agreement nor explicitly by the RBC itself. In cases with the term being calculated *post mortem auctoris*, the term is in accordance with Art. 7 RBC fifty years p.m.a. The EC gave itself by virtue of Art. 1(1) of the EC Directive for Harmonization of Term of Protection

of Copyright and Certain Neighboring Rights[85] a longer term of seventy years p.m.a.. Hence, the international term is fifty years and the EC-wide term seventy years p.m.a.. From this difference legal uncertainties could arise, in the area of cross-border trade with copyright-protected works. Those uncertainties however only can exist in the period after the lapsing of the fifty years and before the lapsing of the seventy years. For software the risk of a conflict can be deemed negligible since lifetime of software products is typically far below ten years, hence even much less than either of the expiration terms. One could speak of a *de facto* unitary term for computer programs.

Article 13 TRIPS contains a very general rule of interpretation for the application of exceptions. Which exceptions are permitted by the RBC is not stated and the permitted exceptions in the RBC are not prejudiced. In this sense Art. 13 TRIPS rather recites the wording of Art. 9(2) RBC in order to maintain the spirit given in the RBC provision for all exceptions from copyright which the contracting states provide. Given the generality of this article, it will remain up to dispute settlement procedures in the framework of the GATT to provide for the necessary interpretation rules in order to clarify the meaning and scope of this regulation. Another parallel appears in Art. 6(3) of the CPD. The exception according to Art. 13 TRIPS may become important to the act of decompilation, respectively, reverse-engineering of software. According to Art. 6 CPD the rightful owner of the software may under certain circumstances perform such acts in order to obtain unknown and necessary interoperability information, even if this rightful owner is a competitor of the original software author. Also competition- and cartel-related aspects could lead to an exception under Art. 13 TRIPS, even more so as under Art. 40 TRIPS a general control of anti-competitive practices in licensing agreements is seen as admissible. For example exclusive grantback licenses, conditions preventing challenges to validity and coercive package licensing, and other "abuse of intellectual property rights having an adverse effect on competition in the relevant market" are allowed to be prohibited. For the EC this clearly opens the door to the application of Art. 81 ECT (Art. 85) on copyright licensing deals. The so-called 'fair-use' defense[86] known in the U.S. is also an example for a respective exception.

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[85] Richtlinie 93/98/EWG des Rates vom 29. Oktober 1993 zur Harmonisierung der Schutzdauer des Urheberrechts und bestimmter verwandter Schutzrechte, ABl. 1993 Nr. L 290/9.
[86] 17 U.S.C. Sec. 107.

c) General provisions

The value of the substantive regulations of the TRIPS agreement like the degree of its multilateral acceptance crucially depend on the general, horizontal regulations; the principle of national treatment or the temporal applicability are examples of such general rules. Their effects on the obligations of the contracting states are not as transparent as desired. This applies particularly within the area of copyright and the neighboring rights.

(i) National treatment (Art. 3)

The principle of national treatment is contained in the relevant international conventions for the protection of copyrights and the neighboring rights, and in the GATT[87]. This important principle was nevertheless repeated in Art. 3 TRIPS in order to guarantee that national treatment also applies to the extensive rules of enforcement and to all substantive rights of intellectual property, which are specified in the TRIPS agreement, but not in the other relevant existing conventions. For substantive copyright this would not have been absolutely necessary; because as far as copyright is concerned the principle of national treatment in accordance with Art. 5 RBC also applies to such substantive copyrights, which, extending over the RBC, are contained in the respective national legal order. Additionally, Art. 5 RBC is to be considered by all GATT/TRIPS contracting states, in accordance with Art. 9(1) phrase 1 TRIPS. National treatment is to be granted to citizens according to the relevant conventions[88], and also only within the boundaries of these conventions[89].

(ii) Most-favored nation treatment (Art. 4)

The most-favored nation clause is one of the fundamental principles of the GATT but, in contrast to the principle of national treatment, is unknown to the existing conventions for the protection of intellectual property. An unlimited most-favored nation clause within this area could also have substantial effects on certain multilateral or bilateral agreements, whose validity and use have so far not been doubted. Those agreements which deal with the international cooperation or the acknowledgment of acquired rights abroad would be concerned, which typically are industrial property rights, because with other international agreements the most-favored nation clause would not have any more effect than the anyway valid principle of national treatment. Therefore,

[87] Art. 3 GATT.
[88] Art. 1(3) TRIPS.
[89] Art. 3(1) TRIPS.

the European Community to this point was of the opinion in the TRIPS negotiations that the principle of national treatment already sufficiently considers the interests of all contracting states, and that no place remains for a general most-favored nation clause. According to the EC, a general prohibition of arbitrary discrimination in international contracts, if at all necessary, could have been added to the national-treatment clause instead of setting up a most-favored nation clause. The result of the negotiations, laid down in Art. 4 TRIPS does not follow this approach of the European Community, the most-favored nation clause contained there is hardly limited in its range of application. Future agreements, in particular, which provide for a higher protection level than the TRIPS agreement, are not excluded from the application of this most-favored nation clause. This can offer undeserved advantages to states, who do not belong to the respective agreement and who without furnishing 'returns' could profit under the most-favored nation clause as 'free riders' from the higher protection level agreed upon in that agreement. Such an effect however could prevent states from committing themselves in the future on a bilateral or multilateral level to a raising of the protection level for intellectual property. It will have to be seen which effects on future bilateral and multilateral agreements this most-favored nation clause in Art. 4 TRIPS will have within the area of copyright, but it is anyway clear that any reciprocity principle, except if it falls under one of the categories exempted under Art. 4(a) to (d) TRIPS, has no right of existence any longer.

(iii) Applicability (Art. 70)

Politically just as important and technically rather more complicated is the temporal applicability of the TRIPS agreement, particularly on the rights and the protected subject matter, which already existed at the time of its entry into force. The crucial regulations herefor concerning copyright and neighboring rights are contained in Art. 70 TRIPS. Article 70(1) contains the natural principle that the TRIPS agreement applies only to future use actions, thus not retroactively. A quite similar clarification is contained in the EC Directive on Lending and Rental Rights. Article 70(2) TRIPS sets up the general rule of the temporal applicability, and paragraphs (3) to (9) thereof contain exceptions and special rules. Of the remaining paragraphs in Art. 70 only paragraph (5) applies to copyrights and neighboring rights, because Art. 70(2) TRIPS in all other respects refers, for this entire area, exclusively to Art. 18 RBC. This means above all that the TRIPS contracting states must accord to all existing copyright works the protection provided by the RBC and by the TRIPS, unless due to the expiry of the term of protection they have

become common property. In the special case of rental rights in accordance with Art. 11 TRIPS, Art. 70(5) TRIPS contains a type of good-faith protection. A contracting state is not obligated to grant a rental right regarding those originals or pieces of duplication that were acquired, before the TRIPS entered into force in that country. A corresponding regulation is also contained in the EC Directive on Lending and Rental Rights.

(iv) Enforcement of rights and dispute settlement (Art. 41-61, 63, and 64)

According to the proposals of the U.S. submitted for the TRIPS negotiations, authors should be provided with administrative and judicial remedies which permit them to enforce their rights. This requirement has also been reflected in the Berne Convention for over one hundred years, since the principle of equal treatment for domestic and foreign authors permits any author to make use of those legal remedies which each country provides for its own authors. The Berne Convention contains a provision[90], according to which each member state can bring a complaint against another member state before the International Court if the dispute cannot be resolved through direct negotiations. Member states are also free to pursue other means of regulating their differences of opinion. No country can however be compelled to appear before the International Court, which is deemed to prevent the settlement of any serious dispute, since the defendant may choose to stay away from an International Court proceeding, as long as no additional economical or political pressure forces him to. The World Copyright Treaty also provides for such a principle[91].

The mechanism for dispute settlement[92] relates to the question whether a treaty is 'self-executing', i.e., whether it is incorporated into national law as a basis for enforceable private-law claims or merely obligates the state agencies to act in accordance with the TRIPS agreement. The GATT treaty grants no direct right of action to private parties, while the RBC grants each author all rights guaranteed under the laws of the member states[93]. The UCC, in view of its reference to the laws of its member states, may be considered self-executing, but since there is no minimum level of protection an author cannot directly enforce any rights provided for in the convention. As a private party, one hence will rather have to rely on the principle of GATT-conformal interpretation of national laws.

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[90] Art. 33 of the 1971 version of the RBC.
[91] Art. XV WCT.
[92] Part V TRIPS.
[93] Art. 5(1) of the 1971 version of the RBC.

Moreover, it was requested by the U.S. to allow each author to petition the government to prohibit the importation of unlawfully produced copies of his work. This possibility has been available to each author in the member states of the RBC, with an amendment from 1908 that authorizes confiscation when the infringing copies originate in a country where the work is not protected or the protection has expired. Specific regulations for the enforcement of rights, however only exist occasionally in the international agreements on intellectual property. In the important multilateral conventions on intellectual property, in particular in the area of copyright and neighboring rights, this area is almost left blank. According to the U.S. proposals, the procedures of GATT for resolving and settling disputes between contracting states were also to be implemented in the area of copyright conventions. Apparently this proposal encountered broad consent by the other parties. Part III of the TRIPS agreement deals with enforcement. Contentwise this part III of the TRIPS agreement was nevertheless based to a large extent on the suggestions of the European Community. The first section contains general regulations to the procedure and to the course of law. The following sections contain detailed rules to the civil and administrative procedures, among them regulations to the payment of damages, remuneration, destruction of counterfeit or infringing goods and other sanctions. The third section deals with provisional legal protection. Special attention for the area of copyright merits section 4, which contains regulations for enforcement measures at the country borders. The contracting states are obligated thereafter to make available such measures at the border at least against trademark falsifications, also referred to as trademark counterfeit goods, and pirated copyright goods. The necessity for a more effective fight against copyright piracy is hence recognized as important enough that border injunctions are provided as being internationally binding. The European community was however not able to assert its demand to prescribe the possibility of border injunctions for all violations of intellectual ownership rights. Nevertheless, computer programs on diskettes that infringe a copyright within a country, may be destroyed at the border, since the principle of proportionality[94] applied to such goods will certainly justify this. Article 45 TRIPS justifies payment of damages even in case of innocent infringement.

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[94] Art. 46 TRIPS.

d) General perspective

The TRIPS agreement contains substantial improvements for the international protection of intellectual property. This applies particularly to the area of copyright and neighboring rights. The copyright protection for computer programs on a high level, is to be acknowledged as clear progress, so too the detailed rules for the enforcement of these rights.

Articles 9 ff. TRIPS constitute the most important rules of law-of-nations for the international protection of computer programs. They declare copyright as the, to be noted non-exclusively, applicable protection regime. Bearing in mind that the number of member states of the WTO is currently 134[95], it is an unprecedented success and more than understandable that this roof of protection has been realized in a relatively general formulated way which is not as detailed as are the European and the national protection laws on this field. The software and computer industry achieved a major success, since the current questions and problems of software protection have received an adequate place in the TRIPS agreement. A few years ago, no one would even have hoped to have software protection on a copyright basis on such a high level of harmonization and with such a broad international scope.

With the actual, more or less dual, system of protection divided between the competencies of the WIPO and the WTO, one has to recognize the achievements and merits of the WIPO and to acknowledge the preparatory and basic meaning of the RBC that has evolved over a century. But it has also to be accepted that the inquiries undertaken in the GATT/TRIPS negotiations are to be recognized as a different and obviously more attractive and acceptable approach to modernization of copyright protection, even more so because the new competence of the WTO by no means precludes cooperation with the WIPO or other organizations. In total one surely can expect that this cooperation will contribute to a more effective intellectual property protection system, particularly in the protection of computer programs.

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[95] Membership status on February 10, 1999.

VII. Patent protection of computer programs

As already mentioned, copyright protection is not seen as the exclusive protection mechanism for software. Even on international terrain, this has been acknowledged and subjected to significant changes during the past years.

1. Exclusion of computer programs under Art. 52 EPC

The European Patent Convention is a special agreement as specified in Art. 19 of the PC and also a regional patent treaty as specified in Art. 45(1) PCT. Article 52 of the EPC determines which inventions can be granted a patent for. It mentions three basic requirements, namely novelty[96], inventive step[97] and industrial applicability[98]. Under its paragraph (2), the exceptions to patentability, i.e., the items that are not to be regarded as inventions, are listed, whereby the words 'in particular' make it clear that this list is non-exhaustive. Under subparagraph (c) of paragraph (2), programs for computers are explicitly mentioned. Paragraph (3) adds to this that patentability is only excluded when a European patent application or patent relates to the program 'as such'. What can first be seen, is that with this phrase alone it remains unclear whether software is not accepted as invention in the sense of paragraph (1), because it does not qualify as 'invention', or if it is deemed to be unable to satisfy all three named requirements.

The EPO has for a long time followed a very restrictive route in patenting software-related inventions. Although recognizing with time the need for an adoption of the patent law to the growing significance of software and the increasing number of software-related inventions, the EPO tried to keep within its established principles based on the exclusion of software 'as such' laid down in Art. 52(2)(c) EPC. In several landmark decisions the EPO therefore tried to grant a certain freedom of interpretation to software-related patents, provided the outcome thereof was consistent with the *lege lata*.

The decision T 208/84[99] laid down the principle that computer-related inventions are patentable. Even when the idea underlying an invention is directed at a mathematical method and the claim of the patent is directed at a process using that method, the interpretation of the EPO is that no

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[96] See Art. 54 EPC.
[97] See Art. 56 EPC.
[98] See Art. 57 EPC.
[99] O.J. EPO 1987, 14.

protection is sought for the method 'as such'. Thereafter a claim directed at a technical method that is driven program-controlled, is not seen as directed at a computer program 'as such'. A similar interpretation was given in decision T 26/86[100]. It was also held that a combination of technical and non-technical features does not render a method unpatentable. This could be used as a hint for combining programs 'as such' with at least one technical feature in order to have a patentable subject matter. An important decision concerning which computerized methods are patentable, is T 6/83[101]. Therein it was decided that an "invention relating to the coordination and control of the internal communication between programs and data files held at different processors in a data processing system having a plurality of interconnected data processors in a telecommunication network, and the features of which are not concerned with the nature of the data and the way in which a particular application program operates on them, is to be regarded as solving a problem which is essentially technical. Such an invention therefore is to be regarded as an invention within the meaning of Art. 52(1) EPC".

However, in T 158/88[102] the Board of Appeals decided upon a method for displaying letters in a predetermined form on a display screen and held that this method is not a technical operating method in its nature, but rather a program idea. The statement in a patent claim that technical means, in this case a visual display unit, are to be used to carry out a process, was considered not alone sufficient to render patentable within the meaning of Art. 52(1) EPC a process that is in essence a computer program 'as such'. A computer program hence was not considered part of a technical operating procedure if the claimed teaching merely modifies the data and produces no effects beyond information processing. Finally, in investigating, whether the claimed method serves for solving a technical problem, it was stated that when the data to be processed by a claimed process neither constitute the operating parameters of a device nor affect the physical, respectively, technical, functioning of the device and when the claimed process does not solve a technical problem, the invention defined in the claim does not use technical means and under Art. 52(2)(c) and (3) EPC cannot be regarded as patentable within the meaning of Art. 52(1) EPC[103].

Taking into account that the interest of the public domain lies in a principle need for freedom to use, practicability and legal certainty, together with the basic principles of intellectual property

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[100] O.J. EPO, 1988, 19.
[101] O.J. EPO, 1990, 5.
[102] O.J. EPO, 1991, 566.
[103] See also T 26/86, O.J. EPO 1988, 19.

protection, a broad scope of protection, including the content of conceptual and algorithmical solutions was not seen as acceptable by the EPO. With increasing pressure from the software industry, and given that other countries - the U.S. again at the forefront - had begun to grant patents in a much more tolerant fashion to software-related inventions, the trend towards granting of software patents became visible at the EPO as well.

In its decision T 769/92[104] the Board of Appeal came to the conclusion that an invention comprising functional features implemented by software, i.e., computer programs, is not excluded from patentability under Art. 52(2)(c) and (3) EPC, if technical considerations concerning particularities of the solution to the problem which the invention solves[105] are required in order to carry out that same invention. Such technical considerations are deemed to lend a technical nature to the invention in that they imply a technical problem to be solved by technical features. Again in contrast thereto stands the decision T 953/94 in which a method for analyzing the cyclic behavior of a curve with a digital computer, was seen as not patentable, for being considered a mathematical method. The reference to the digital computer, according to the EPO, only tells that the claimed method is performed under use of such a computer, whose function is controlled by software that is excluded from patentability.[106]

2. Patentability of computer programs under TRIPS provisions

On the patent area, the provisions in the TRIPS agreement show up in Art. 27, containing the definition of patentable subject matter and admissible exceptions, as well as the definition of the prerequisites for patentability based on novelty, inventive step and industrial applicability. Added to that are the prerequisites concerning the filing documents[107], the exclusive rights[108], compulsory licenses[109], and the term of protection of uniformly at least twenty years[110]. For the first time a clear international statement about the fundamental prerequisites for patentability was made. The regulations of the Paris Convention are hereto in contrast limited to priority rights[111], inventor

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[104] O.J. EPO, 1995, 525.
[105] The EPO prefers to use the so-called 'problem-solution' approach for establishing inventive steps.
[106] A comprehensive study of EP caselaw can be found in Kolle, Rechtsschutz international, a German perspective in Kolle, Rechtsschutz BRD.
[107] Art. 29 TRIPS.
[108] Art. 28 TRIPS.
[109] Art. 31 TRIPS.
[110] Art. 33 TRIPS.
[111] Art. 4 PC.

denomination[112], patentability in the case of legal sales limitations[113], and compulsory licenses[114]. Only special agreements, like the PCT, EPC, or the Budapest agreement contained procedural and substantive rules for patent applications.

In section 1 of part II, the TRIPS agreement states that software is to be protected as literary work under the Berne Convention. Whether the legislator intended an exclusive protectability of software under the copyright regime thereby can be answered as follows: In its Art. 27, the TRIPS agreement holds that "patents shall be available for any inventions ... in all fields of technology". It cites two requirements therefor, namely, an inventive step and industrial applicability. The member states are allowed to exclude inventions from patentability for reasons of *ordre publique*, or morality. In paragraph 3, a list of specifically excludable subject matter is given, which does not contain software, respectively, computer programs.

One could ask oneself, whether this means that software is not excludable, in the sense of this list being exhaustive, or whether the list only contains some chosen examples and the member states are free themselves to choose whether they want to protect software in the form of patents or not. In the latter case this would clearly mean that patent protection of software would be a purely national topic and hence subject to a lack of harmonization, typically being treated differently in different countries. That this cannot have been intended by the legislators when drafting the TRIPS agreement follows when one recalls the spirit and target of the TRIPS agreement. Making use of the principles laid down in the Vienna Contract Law Convention[115], reflecting common law principles, the spirit and purpose of a treaty is to be used to interpret its rules. According to the preamble of the TRIPS, it is the aim of the treaty to "reduce distortions and impediments to international trade" and to "promote the effective and adequate protection of intellectual property rights". Taking the reality as an example, one can see that while some countries do afford protection to software in a quite broad sense, like the U.S., other countries are still reluctant and conservative in granting patents on software-related inventions. Bearing in mind the huge turnover made in the software market, one can easily understand that such a difference in protection indeed distorts a significant part of the market. This makes it clear that harmonized

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[112] Art. 4ter PC.
[113] Art. 4quater PC.
[114] Art. 5 PC.
[115] See comment to the applicability in Schricker, Gemeinschaftskommentar.

patent protection for software is necessary to ensure achievement of the aim of the TRIPS agreement.

It would hence be incorrect to state that since the term 'invention' is not defined in the TRIPS agreement, the member states are free to treat software as not falling thereunder. Their interpretation has to conform with the TRIPS agreement. Of course the TRIPS agreement contains only minimum standards and the member states are free to exceed those. 'Exceeding' can here however not mean to exclude software from patentability in that it is added to the list of Art. 27(3) TRIPS. This would constitute a means for circumventing the basic meaning of Art. 27(1) TRIPS. It also would contradict the principle of protecting inventions in "all fields of technology".

Now the argument has to be tested as to which software could not be 'technical'. Also here it is submitted that the interpretation of 'technicality' is to be made on a supranational basis. By the very nature of software, one can hardly deny its technicality, since a sequence of instructions can effect a physical alteration of parts of a computer[116]. This was also confirmed by the famous U.S. case '*in re* Lowry'[117]. Whereas mathematical methods and algorithms are seen as too abstract to have a physical effect, their application and reduction to practice must be seen as technical.

Taking the preparation sessions and the requests of the member states submitted therein into account, one can see that the submissions proposed to exclude subjects like discoveries, games, etc., but did not mention software. The TRIPS draft of Arthur Dunkel did not contain these lists, perhaps it was thought to be obsolete and already implicitly clear from the wording that those proposed exceptions do not qualify for 'fields of technology'. It was however clear that the member states did not want software excluded from patentability. Excluding software would also mean that again the very aim of the TRIPS agreement would be circumvented, thereby depriving this treaty of its *effet utile*.

The explicit reference and protection obligation under copyright law in the TRIPS agreement, could at a glance seduce to assume that once a copyright protection has been chosen as 'the' protection, one cannot have patent protection for the same subject as well. It is however submitted that the scope of copyright is very different from that of patent protection. Article 9(2) TRIPS declares that "ideas, procedures, methods of operation or mathematical concepts 'as

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[116] EPO, Decision of the Technical Board of Appeals, T208/84, O.J. 1987, 14.
[117] U.S. Decision *in re* Lowry, 32 F3d 1579, 32 USPQ2d 1031 (Fed. Cir. 1994).

such' " do not fall under the definition of copyright-protectable matter In contrast, patents are granted to "products or processes" according to Art. 27(1) TRIPS. Simply put, copyright protects the expression and patents protect the underlying concept or idea. Hence the two regimes rather complement each other. One has to keep in mind that the protection under the TRIPS has a minimum scope and is free to be added to by additional protection[118]. The cumulation of patent- and copyright protection has in addition already been confirmed by the EC, namely in the preamble and in Art. 9(1) of the CPD, wherein it is stated that computer programs are to be protected as literary works under the RBC, whereby the provisions of the CPD may not prejudice the application of other forms of protection, such as patent rights, trademarks, etc..

3. Compatibility of EPC provisions with TRIPS provisions regarding patentability of computer programs

Since software has been found, in accordance the with the TRIPS agreement, to be subsumed under the terms 'invention' and 'field of technology', the exclusion under Art. 52(2)(c) EPC in connection with Art. 52(3) EPC is to be seen in a different light. The Technical Board of Appeals has itself stated that the non-patentability of computer programs 'as such' does not prevent the patenting of computer-related inventions and that which technical contribution the claimed subject matter has is to be assessed. Indirectly the technicality has thereby been made the criterion after which software is to be characterized as patentable or non-patentable. This differentiation is however not reflected in the EPC. The exclusion in Art. 52(1)(c) with view to this appears too broad, since taking Art. 27(1) TRIPS literally, computer programs 'as such' must be patentable when having a technical effect. It seems that the EPO tries to argue in the direction that the addition of the terms 'as such' has the inherent meaning that this computer program has no technical effect. The expression 'as such' then would be taken as a synonym for 'non-technical'. This interpretation is however difficult to understand. The newest developments in the jurisdiction of the EPO Board of Appeals[119] are discussed below in more detail.

4. Recent developments of computer program protection under the EPC

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[118] Art. 1(1) TRIPS.
[119] See Chapter D III Developments for the EPC.

Newest developments in the jurisdiction on granting of patents under the EPC, have already shown a turn point in the interpretation of the technical character of software.

The case T 935/97[120] in which the Board of Appeals of the EPO, under chairman Van den Berg had to decide upon Beauregard-type patent claims being submitted in an appeal by IBM United Kingdom Limited, can be seen as a milestone decision. The Board came to the conclusion that "on condition that they are able to produce a technical effect ... all computer programs must be considered as inventions within the meaning of Art. 52(1) EPC, and may be the subject-matter of a patent if the other requirements provided for by the EPC are satisfied." Furthermore, it was acknowledged that "it is the clear intention of TRIPS not to exclude from patentability any inventions, whatever field of technology they belong to, and therefore in particular, not to exclude programs for computers as mentioned in and excluded under Art. 52(2)(c)."

It is of utmost interest to see which arguments and findings have lead to that decision. The claim to be investigated was directed to a computer program code stored on a computer-readable storage medium. The examining division of the EPO had concluded that the claimed subject-matter was only distinguishable from the prior art by the information pattern, in the form of bits and bytes, represented by the stored program code and had therefore decided that there was a lack of technical problem to be solved and also a lack of technical effect to the solution. This decision was in accordance with the guidelines[121] which indicate that "a computer program claimed by itself or as a record on a carrier, is not patentable irrespective of its content". The examining division also stressed the bona fide protection of the public relying on the validity of the guidelines.

The Appellant had argued that the EPO should interpret the EPC in a manner compatible with the TRIPS agreement, in particular its Art. 27 and further pointed to the provisions of the CPD. Furthermore it was argued that the amendment of the PCT Rules 39.1 and 67.1, where the requirement to search and examine in the field of computer programs was removed, did not mean that computer programs were found to be not patentable, but rather considered the fact that some Searching- or Preliminary Examining Authorities might not be equipped with the necessary facilities to carry out these tasks.

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[120] Http://www.european-patent-office.org/dg3/biblio/t970935eu1.htm.
[121] Guidelines, Chapter C-IV, 2.3.

The Board of Appeals firstly clearly expressed its agreement with the Appellant's opinion on the significance of the TRIPS agreement. Although the TRIPS agreement is not seen as directly applicable to the EPO as a non-member of the WTO, the Board of Appeals admitted that it was appropriate to take it into consideration, acknowledging that the TRIPS agreement aims to set common standards and principles with regard to the availability, scope, and use of trade-related intellectual property rights and also indicates current trends. The Board of Appeals therewith gave a clear positive sign for the significance of the TRIPS agreement and its at least indirect effect. This sign is expected to be clearly recognized by the national states in order to harmonize, in due course, their jurisdiction and, if necessary, legislation with the TRIPS regulations.

The Board of Appeals also confessed the importance and authority of the Vienna Convention - which entered into force after the EPC and hence generally is not applicable thereto - by expressing its willingness to nevertheless apply the provisions contained therein. The fact that in its part II the TRIPS agreement provides for protection of computer programs, left the Board of Appeals in no doubt that this protection does not give rise to any conflict between Art. 10 and Art. 27 TRIPS and that each protection regime serves its own purpose.

In its detailed investigation about the true meaning of Art. 52(2)(c) and (3) EPC, the Board of Appeals had to interpret the addendum 'as such', since it provides the only means of distinguishing patentable computer programs from non-patentable ones. Acknowledging that it clearly was not intended to exclude any program from patentability, the Board of Appeals then investigated the requirement of a 'technical character'[122]. Stating that programs for computers have to be considered as patentable inventions when they have a technical character, the Board of Appeals came to the above cited conclusion that, once they are able to produce a technical effect, all computer programs must be considered as inventions and may be the subject-matter of a patent. In the end, it was admitted that claims directed to such a program *per se*, as well as to computer-readable media on which the program is stored, are admissible since there is no reason for distinguishing between a direct technical effect, i.e., of the program when being run, and an indirect technical effect, i.e., the program not being run but only offering the potential to produce a technical effect.

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[122] See thereto ,e.g., EPO, Implementing regulations to the Convention on the Grant of European Patents, Rules 27, 29.

The Board of Appeals had its interpretation confirmed as being in accordance with the Vienna Convention[123]. Hence, for the first time, the EPO did explicitly affirm the patentability of software and above all the admissibility of Beauregard-type claims. The EPO already indicated, that upon this decision[124] the guidelines would be subject to a revision. It is finally an open question as to whether this interpretation of Art. 52 EPC is acceptable and logical enough for a revision of this article not to be necessary, or if in one of the following revision rounds of the EPC the opportunity is used to amend it according to the new jurisdiction.

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[123] WVRK, Art. 31.
[124] See also similar decision T 1173/97.

VIII. Outlook and conclusions for software protection

1. Outlook for GATT/TRIPS

There are still individuals that would prefer to see software protected in a *sui generis* law. They argue that software is still too different from literary works to be put into the same context and to be similarly protected. On the other hand one cannot deny that software is comparable to technical literature. Looking at the national and regional developments in patent protection, the impression arises that both sides of software, the artistical and the technical, have meanwhile gained the protection they merit. Any *sui generis* law would differ not much from a combination of patent and copyright, adapted to the special environment of software. One can easily see that the TRIPS agreement offers a perfect place for unifying the different protection schemes and has managed to set a standard that fits the current needs of the industry as well as of their trading partners. By involving the industrialized nations and the developing nations, a protection scheme has been achieved that is undeniably well balanced. The copyright solution for software under simultaneous inclusion of software into patent protection seems to be exactly what fits the needs. The acknowledgment of the TRIPS agreement in the most-recent EPO caselaw discussed above also confirms that the TRIPS agreement already demonstrates its effectiveness.

2. Outlook for the Berne Convention

For the RBC the observed trend was that it was revised approximately every twenty years as long as it fell under the Swiss Confederation's responsibility. When the WIPO took over, this pace unfortunately slowed even more. The success of the GATT negotiations seemed to confirm that the climate of the GATT is better suited for further development of copyright protection and maybe even for the other intellectual property protection laws than that of the WIPO. Now more than ever one has to ask oneself, if the RBC can survive or if it is a rather antiquated relic that will soon be completely absorbed into the GATT, as soon as all RBC members are also GATT members. So probably the only long-term view for survival is that of a next revision, adapting to current problematics, just as the TRIPS agreement did. The Convention for the Protection of Producers of Phonograms for instance could be incorporated into the Berne Convention and be extended to all sound and picture recordings. In addition, the Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite could be included in a

revised Berne Convention as part of a regulation that would also cover direct satellite transmissions, and of course the World Copyright Treaty also offers itself for inclusion. The RBC might be mature enough for tackling the software copyright protection as well. One may on the other hand ask oneself, if, with view to the TRIPS agreement, a revision of the RBC is in fact necessary and suitable, and if the WTO has not already taken over the responsibility for all trade-related topics, including any field of intellectual property, just as the broad coverage of the TRIPS agreement already indicates.

3. Outlook for the EPC

Since the European Patent Organization is not a member of the WTO agreement, no obligations arise for it directly out of the GATT/TRIPS. Although, with the exception of Monaco, all member states of the EPO are also member states of the WTO, the GATT/TRIPS only exerts pressure on national provisions and not on international agreements. It has further to be accepted that although the TRIPS is younger than the EPO, the principle of precedence for the more recent law cannot be applied here since the parties of the two treaties are not identical[125]. Hence, no direct obligation to amend the EPC to conform with the TRIPS agreement is given. However, there arises an indirect pressure to all WTO members who are members of the EPO, to bring the EPC into line with the TRIPS agreement, by way of a Diplomatic Conference. With the intention to harmonize the EPC with the national laws of its member states, the act of conforming it with the TRIPS agreement appears inevitable.

The Standing Advisory Committee before the European Patent Office (SACEPO) has submitted its standpoint, after which the provisions of Art. 52(2) EPC concerning computer programs do not conform with Art. 27(1) TRIPS[126]. The SACEPO expressed that they would prefer Articles 52(2) and (3) EPC to be deleted entirely and Art. 52(1) EPC to be amended so that its wording corresponds with the TRIPS wording, i.e., European patents shall be granted for any inventions in all fields of technology provided they are new, involve an inventive step, and are industrially applicable. However, taking into account the most recent developments concerning patentability of computer programs, the EPO seems at the moment to prefer to revise the guidelines for the examination.

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[125] See Art. 30(3) WVRK.
[126] SACEPO 2/98 and also in http://www.cipa.org.uk/cipa/notices/epcamend.htm.

4. General conclusions

It can be summarized that for software, respectively, computer programs the copyright protection regime has placed itself near the now established patent protection for the underlying technical inventions contained in the software.

The preparation work of the WIPO had revealed that a general agreement exists regarding the necessity and desire to use the national-treatment principle for intellectual property protection of software. The international trend to provide copyright protection for software developed very quickly, so that the efforts to design a *sui generis* law were mainly abandoned. Since the U.S. had used the principle of reciprocity in order to exert pressure on other countries to introduce software protection into their legislation as well, this development encountered an artificial acceleration. Choosing and keeping copyright as the main protection scheme was also grounded on the view that the need for international protection, above all the principle of national treatment, was substantially satisfied by the respective copyright provisions. Furthermore one relied on the fact that the national-treatment obligation will oblige any member state of the RBC granting software copyright to provide this protection to the other members as well. Software copyright protection finally seems to provide an adequate balance between the interests of all involved parties, whereby one has to acknowledge that this image will change dramatically, now that software patenting has just started. A significant increase in software patents in the near future may be expected, which will to a large extent classify copyright as the second choice, being in comparison a much weaker right. The combination of copyright and patent right for software appears to have clear advantages over any *sui generis* right, maybe with the exception of the copyright protection term. The twofold protection scheme is more flexible, profits from established protection schemes, and, instead of diluting the existing conventions, rather modernizes them.

C. Integrated circuit topography protection

I. Which protection regime is suitable for topographies?

Whereas the discussion about the best protection scheme for software led to the main strength in copyright protection assisted by patent protection, this discussion ended differently for topographies. Bearing in mind that the estimated cost of reproducing an integrated circuit design is about 1% of the manufacturing cost of the copied integrated circuit it is undeniable that integrated circuit design merits legal protection for rewarding creative performance, for innovative contribution, for protecting the investment costs, and for helping to preserve competition, thereby giving an incentive to future technical developments in the integrated circuit area. As with software it was not easy to decide which protection regime was the most suitable for integrated circuit layout design. It has been found that its character was neither clearly attributable to patent law nor to copyright law. Since the integrated circuit is a technically sophisticated product with a concrete technical functionality and at the same time possesses the qualities of a drawing, the decision between either copyright or patent law is not unambiguous. The integrated circuit layout being a sort of combination of design and electronic circuitry would not be adequately protected, neither solely under patent law nor exclusively under copyright law. Taking into account that patentable subject matter needs to fulfill the requirements of novelty, inventive step, and industrial applicability, the design will hardly be able to be regarded as a realization of an inventive step. On the other hand the sanctions of copyright law are not deemed to cover the sale of products made with the aid of illegally reproduced topographies. It was further argued that topographies are in principle very different from artistic works, in that their graphical aspect is only of secondary nature and not of interest to the end user. It is in principle not intended to make the layout visible as it is not necessary for the use of the integrated circuit. In fact, to make a layout visible, a special magnifying tool is required and it would be difficult to find an aesthetic characteristic in a layout, just as well as one would normally not find a bit pattern of a stored computer program aesthetically appealing. Furthermore, in the field of topographies one hardly finds a single and self-responsible creator but rather a team of employees working together. All these differences were deemed to make a substantial number of exception clauses and adaptations necessary, which one had to ensure did not negatively influence the already

established rights of authors of other works. This led to a very early demand for a *sui generis* protection for integrated circuit design instead of a modified existing legislation. One had also to be aware of the possible dangers arising with a *sui generis* law, like the threat of disintegration of the existing laws or the threat to international protection granted by the RBC and the Paris Convention. In contrast to software, where despite all criticism, the worldwide tendency was towards a twofold structure, using copyrights for the program *per se* and patents for program-related inventions, the majority of the countries undertook steps towards a *sui generis* system for protection of integrated circuit design.

II. Protection of topographies under existing laws

1. Patent law

Patent law protection is available for manufacturing methods, for other methods that have a technical effect, and for their products. Hence the basic semiconductor structure, as well as any process applied during the steps of production, and also circuitry functions find their protection under patent law. The problem arises that for a topography, even though it might easily cross the hurdle of novelty, it is hard to define, how it can overcome the requirement of non-obviousness. It is arguable that the design is more of a handicraft nature than of a technically inventive one. Even under the requirements of utility models, which are, based on experience, lower than those for patentability, the above problem exists, since it is required that the creative ability of the average person skilled in the art be exceeded.

2. Copyright law

Whereas copyright law in principle grants protection for drawings and for other graphic and descriptive primary products, in some countries a change in dimensionality effects an emergence from the scope of protection. The protection for two-dimensional drawings does not cover three-dimensional realization thereof. In that sense, copyright does protect against illegal reproduction of the source information containing the design, but not against the distribution of the products manufactured under the use thereof. Whether simple topographies can attain the level of originality required for protection also remains unsolved. Even the protection of the masks as photographs, whereby no personal intellectual creation is demanded, does not provide protection against three-dimensional realization. Moreover, under that provision, the manufacturer of the masks would be entitled to protection under the law even when he did not design the topography himself. Finally it might also be asked whether the standard duration of copyright protection is not extraordinarily long for integrated circuits. Another open issue was whether the RBC or the UCC could oblige their member states to protect topographies as 'works'. It was acknowledged that for the making of a topography some creative effort is necessary. Only in those few countries where, as in the United Kingdom or Australia, copyright protection includes transposition into another dimension, was topography protection thereunder a possible solution.

3. Unfair-competition law

A third alternative could be protection under unfair-competition law. But as the title implies, competition between the right owner and the infringer is a regular prerequisite, although this requirement has already been renounced by some national jurisdictions. Secondly, unfairness in the sense of violating moral principles is demanded; the mere copying of a topography lacking such immorality is not prohibited. Cases of direct unethical passing off or slavish imitation could fall under this law. Since there is no given term of protection against unfair competition, a legal uncertainty exists.

4. Trade secrets

The protection by trade secret is also an unacceptable form since keeping the topography secret in an integrated circuit that is on the market is somehow not realizable and once the secret has been revealed no trade secret protection can be claimed for ever more.

The above non-exhaustive list shows a brief summary of what was reflected on over the applicability of existing laws to integrated circuit design protection. The impression substantiated that prevailing laws did not protect integrated circuit design in a manner sufficient to what was deemed necessary. A widespread consensus arose that topography design requires special legal protection or at least a number of special provisions, if existing protective laws are to be used. This consensus led to a trend to adopt *sui generis* protection on a national and international level. The U.S. SCPA provided an example therefor and the pressure exerted by the requirement of reciprocity laid down therein had an accelerating and policy-making effect on *sui generis* law development.

III. U.S. initiative for *sui generis* protection of integrated circuit topographies

1. Historical development of the SCPA

In January 1979 the Bill H.R. 1007[127] was introduced into the U.S. House of Representatives. In its shortness it proposed to treat lithographic masks and the semiconductor patterns created therewith, despite their use in production of a 'useful article', as being included in the pictorial and graphic works as defined in the USCA. However, this initiative failed due to split opinions in the semiconductor industry. In 1982 further Bills were introduced into the House and the Senate, again trying to introduce integrated-circuit design into the USCA. The heard parties however raised concerns as to whether copyright was the right form of protection, since the issue of reverse-engineering was not resolved. In 1984 the SCPA was adopted. It provided a copyright-based *sui generis* protection regime, which did not oblige the U.S. to offer national treatment, as it had under the international intellectual property conventions. Instead, it contained a reciprocity clause, hence granting integrated circuit design protection to nationals of countries that either provided the same protection to the U.S.[128] or headed towards providing reciprocal protection while not engaging in misappropriation[129].

The SCPA was the first legislation to provide *sui generis* protection for the 'mask work', i.e., the design of a semiconductor integrated circuit. After years of legislative debate with extensive participation of the industries involved, particularly concerning the definition of the subject matter, the scope of protection and the exceptions of reverse-engineering, innocent infringement, and exhaustion, a protection scheme resulted which mainly protects investments in these integrated circuits. It follows some U.S. copyright law principles without being integrated into the Copyright Act, however it does not grant truly exclusive rights. The principle of substantive reciprocity erased the fear of U.S. manufacturers that foreign producers might obtain protection in the U.S. for their chips under the new SCPA without themselves granting a corresponding reciprocal right. The SCPA however provides for the possibility of any country to petition for an order of interim protection, which will be issued if the foreign nation concerned is able to convince the U.S. Patent and Trademark Office (USPTO), that it is making "good faith efforts

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[127] See http://bors.nando.net/billstat/.
[128] SCPA, Sec. 902(a)(1) and (2).
[129] SCPA, Sec. 902(a)(1) and 914.

and reasonable progress" toward enacting corresponding legislation. On one hand the SCPA played the forerunner and on the other it was a model for future national legislation and in the attempt to provide international protection under an international treaty dealing with this limited field of new technology, after protection under the Paris Convention, the Revised Berne Convention or the Universal Copyright Convention has been questioned.

2. U.S. Semiconductor Chip Protection Act of 1984

In the following the SCPA is analyzed with regard to its content and scope. Because the SCPA has been in some respect the starting point for semiconductor chip protection for any subsequent legal act in this field, it is crucial to have an understanding of the basics laid down therein.

a) Subject matter of protection (Sec. 901 and 902)

Section 902 SCPA defines as the subject matter of protection "a mask work fixed in a semiconductor chip product". Section 901 SCPA contains the definitions for the key elements of protection, 'semiconductor chip product', 'mask work', and other key terms.

The expression 'series of related images' plays an important role, it makes it clear that principally no single masks are protected under the SCPA. In addition, the statement in the Senate Judiciary Committee Report on the Bill S.1201[130] in which the parallelity of the definition of a mask work for integrated circuits to the definition of audiovisual works and motion pictures in the Federal copyright law becomes apparent, is interesting. Just as single pictures from a film do not constitute a substantial part of the said film, in order to be protected by copyright as a separate entity, single masks do not profit from the protection which the SCPA provides for the whole mask work. This exclusion reveals its importance when one considers an important kind of integrated circuit, the mask-programmable ROMs. These ROMs save information that was stored thereon in a final patterning step. Hence the intellectual property lies substantially in the structure of the final patterning mask and hence in the top layer on the integrated circuits. This top layer of such mask-programmable ROMs is however not protected under the SCPA.

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[130] U.S. Bill S.1201, 98th congress, 2nd session.

Furthermore, these images need to be 'related', i.e., they must be unified by their common property of being used in the manufacturing process for one and the same integrated circuit. The required three-dimensionality also has a deciding consequence on the protectability of chips. An integrated circuit with only one layer is not seen as protectable, whereas integrated circuits operating at quantum level, being regarded as 2-, 1-, or even 0-dimensional - in the case of single quantum dots being used as information units - do not fall under the scope of the SCPA definition.

The term "however fixed or encoded" also merits a deeper investigation, since the word 'however' seems to suggest a very broad scope of this term. There have been opinions that criticize this definition as too narrow[131]. It was accused of not covering maskless techniques like laser-beam-assisted writing schemes. This criticism falls on fertile ground as lithographic technology, using light as an information transmitter, is supposed to reach its limits in the near future due to the predetermined wavelength-dependent diffraction limit of light. Alternative patterning methods partly head towards serial patterning, i.e., using a single write head or beam. Although, the serial methodology for writing ultrafine patterns is still considered slow and hence inefficient, recent developments proved that by applying an array of such serial heads the lack in speed can be compensated[132], rendering these technologies potential methods for future submicron lithography. The above view was objected[133] to by finding any kind of encoding, be it visual, literal, or physical, as being included in the SCPA wording. Indeed, it has to be admitted that the same information encoded in a mask in the form of transparent holes versus shading areas, is contained in the control software or even hardware, that is used to control the path and on/off cycles of a laser-, ion- or e-beam. It is also contained in any drawing, photograph, or bitmap that reproduces the resulting topography image.

Section 902(a)(1) SCPA makes an important constraint, namely that the mask work only profits from protection when it has been "fixed in a semiconductor chip product". The definition thereto in section 901(a)(3) SCPA makes it clear that a concrete realization has to have happened. Merely planned and even completely conceived chips are not eligible for protection. The question arises as to whether data base tapes containing all the necessary data to manufacture the integrated circuit should fall under that definition. This interpretation has been objected to, arguing that the

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[131] Meijboom, "International Computer Law Adviser"; Dec. 1988, 14, 19.
[132] E.g. Der Spiegel 40/1998, 40, Grundlagen, "Kleine Dellen".
[133] Christie, Andrew, "Integrated Circuits and their Contents: International Protection", Sweet & Maxwell, 1995.

physical characteristics of data base tapes do not at all coincide with those of the final integrated circuit. One might challenge this by asking whether an intermediate form of an integrated circuit must share its physical properties. Thinking of ice melting into water one could consider the ice as an intermediate form of water, although they do not share a physical property with each other. However, the House of Representatives in its report[134] expressed that it does not intend to protect a plan or drawing of a semiconductor chip product.

This leads directly to the investigation on what is meant by a 'semiconductor chip product'. Of importance in the definition in Sec. 901(a)(1) SCPA is the fact that the product must have a semiconductor substrate. Silicon-On-Insulator (SOI) technology as well as integrated circuits built upon superconducting substrates are not protected under the SCPA. The condition that the device has to perform electronic circuitry functions covers a functionality area that is not sharply delimited. It certainly does not cover the design of simple single elements, since the circuitry aspect is missing. It also certainly covers electronic functionality less complex than that of a standard integrated circuit. But where the limit of sufficient functionality lies will be a matter for jurisdiction. Also open is whether hybrid functionality such as integrated circuits performing mixed optical/electronic/mechanical functions, is still covered. Taken literally, Sec. 901(a)(1)(B) SCPA does not exclude such integrated circuits from protectability. Protectability is provided for the final as well as any intermediate form of the product that includes transitional forms of the integrated circuit, even if this form is not even partly visible in the final integrated circuit. An unprogrammed PROM is an example of such an intermediate form. The SCPA remains silent as to whether components of an integrated circuit are also protected under the SCPA. While the House Report addresses this issue from an infringement-point-of-view, in that it considers copying in part, under certain circumstances, an infringement of the whole integrated circuit, it also does not answer the above question.

An important exclusion statement is contained in Sec. 902(c) SCPA which introduces the so-called idea-expression principle, known from copyright legislation, into the SCPA. Must-fit features of integrated circuits are not explicitly excluded from protection. Hence even interconnectability-enabling features of integrated circuits, being realized in the form of the interface components of the physical integrated circuit design, are protected under the SCPA.

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[134] Report No. 98-781 of the House of Representatives to accompany Bill H.R. 5525, 16.

In the U.S. originality is also the basic requirement for mask works and designs in order to profit from *sui generis* protection. The phrasing of Sec. 902(b) SCPA places the originality for mask works and the stapleness, commonplaceness, or familiarity of mask works, equally as requirements for protection. The term not defined in the SCPA is deemed to have the meaning used in copyright law. An exemption is codified in Sec. 902(c) SCPA where it states that no protection is to be granted for the "idea, procedure, process, system, method of operation, concept, principle, or discovery" embodied in a mask work. This provision realizes the idea/expression principle and is in fact identical to the common law principle codified in the corresponding provision in the U.S. Copyright Act[135], with the exception of the application field.

The jurisdictional requirement for protection is laid down in Sec. 902(a)(1) of the SCPA. Thereafter, a mask work can qualify for protection in three ways, (i) by virtue of location of the first commercial exploitation, (ii) via the nationality of the mask owner, or (iii) by a Presidential proclamation. Section 914 SCPA adds a fourth way, namely by an order of the Secretary of Commerce. Under Sec. 902(a)(1)(A)(ii) SCPA the reciprocity principle is set forth. Since the U.S. did not sign the WIPO IPIC, this treaty does not qualify as a "treaty affording protection to mask works to which the United States is also a party". It might be argued that one of the three basic international intellectual property conventions, the RBC, the Paris Convention, and the UCC could be used in order to satisfy the reciprocity requirement. However the U.S. does not consider integrated circuit designs as subject matter under one of these copyright conventions since it has chosen not to use copyright law for their protection. But even the Paris Convention is denied by the U.S. to be applicable to integrated circuit designs. Hence, at present there is no treaty which falls under the provisions of Sec. 902(a)(1)(A)(ii) SCPA.

Up till now no Presidential proclamation has been made, however the empowerment of the Secretary of Commerce lead to several interim protection extensions. Under the prerequisite that a foreign nation is making progress towards 'appropriate' protection of U.S.-originating mask works, that its nationals are not engaged in mask work piracy, and that an interim order is in the interest of the U.S. and international mask work protection, extensions were granted to the member states of the EC, as well as to Australia, Austria, Canada, Finland, Japan, Sweden and Switzerland. The term for all these extensions expired on July 1, 1994.

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[135] 17 U.S.C. Sec. 102(b).

b) Ownership (Sec. 903)

When it comes to determining whether the requirement of the owner's nationality or domicile is fulfilled, the issue of ownership becomes important also because the owner is the person who is the proclaimed primary holder of rights under the SCPA. While the SCPA explicitly assigns the ownership of works created under employment to the employer, it does not assign the rights of a commissioned work to the commissioner. Though not addressing the issue of multiple owners through collaboration, it is the practice of the U.S. Copyright Office to accept the registration of several owners to a mask work, thereby apparently implicitly adopting the possibility of joint ownership as applied in copyright law. The SCPA remains silent as to who should to be regarded as the owner in cases where a tool like a CAD program is used to create the design. According to Sec. 903(b) SCPA the "owner of the exclusive rights in a mask work may transfer all of those rights, or license all or less than all of those rights". This codifies the doctrine of indivisibility which states that an owner can only grant less than the totality of his rights by licensing.

c) Duration of protection (Sec. 904)

The term of protection is given in Sec. 904 SCPA. The protection lasts for ten years, the first commencing at of either registration or commercial exploitation of the mask work. Commercial exploitation is the "selling, leasing, bailing, or otherwise transferring to the public, or offering for that purpose of a semiconductor product embodying the mask work"[136]. Registration is not a prerequisite since protection commences on either the registration date or on the date on which first commercial exploitation occurs anywhere in the world. However, the protection is terminated if a registration has not been made within two years after the first commercial exploitation. The act of registration becomes particularly important because only for registered mask works can an action for infringement be filed. Affixation of a notice of protection is hence no requirement for protection but can serve to render a good faith purchaser knowing and hence avoid innocent-infringement excuses.

d) Exclusive rights in mask work (Sec. 905)

Pursuant to Sec. 905(2) of the SCPA, the mask work owner has the exclusive right "to import or distribute a semiconductor chip product in which the mask work is embodied." In addition, Sec.

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[136] SCPA Sec. 901(a)(4) and (5).

901(b) SCPA also declares that "distribution or importation of a product incorporating a semiconductor chip product as a part thereof is a distribution or importation of that semiconductor chip product." This makes it clear that not only dealing with a protected integrated circuit but also with for example a computer containing that integrated circuit, is an exclusive right of the owner and when this is exerted without authorization it constitutes an infringement. It, however, also becomes clear that commercial dealing with a photolithographic mask, design drawing, or other preparatory work is no infringement under the SCPA. One might think of copyright protection under the Copyright Act for those. Another criterion for infringement is that the act be performed "in or affecting commerce". This private-use exception is to be interpreted by the courts, since at first glance any action certainly affects commerce to a minimum extent. To clarify that commercial dealing with a lawfully acquired integrated circuit, or product containing it is not illegal, the exhaustion-of-rights doctrine is applicable[137]. Finally, the 'innocent-infringer' excuse is also permitted[138] for the 'good-faith' purchaser of a potentially infringing product. From the wording of the above cited provisions it follows that the mere use of an infringing integrated circuit, even for commercial purposes is not considered an infringement.

With regard to innocent infringers and not-liable end users the seller of such products would be contributing to an illegal act, were there not the exception clauses. Section 905(3) SCPA provides the right for the mask work owner "to induce or knowingly to cause another person to do any of the acts described in paragraphs (1) and (2)", which define his exclusive rights. The right owner can thereby catch those who sell such products, knowing of their protection, and of the exclusive usability of the product for an infringing act.

e) Exceptions (Sec. 906 and 907)

The act of reverse-engineering is exempted from infringement by Sec. 906(a) SCPA. The wording of this section makes it clear that the legislator intended to allow reverse-engineering for the purpose of increasing the general knowledge in the art of integrated circuit design. This knowledge is then allowed to be exploited in the creation of a 'new' integrated circuit which for itself does satisfy the requirement of originality. The defense provided herein is not limited to non-commercial use.

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[137] SCPA, Sec. 906(b).
[138] SCPA, Sec. 907(a).

Exhaustion of rights under the SCPA is regulated in Sec. 906(b) SCPA. The owner of a particular semiconductor chip product made by the owner of the mask work, or by any person authorized by the owner of the mask work, may import, distribute, or otherwise dispose of, or use, but not reproduce, the particular semiconductor chip product without the authority of the owner of the mask work. A debated issue hereto is whether the herewith codified immunity of import also applies for products manufactured and sold outside of the U.S.. Recently the U.S. Supreme Court had to decide about this in connection with exhaustion of copyright on a label that was attached to a hair care product and sold outside of the United States[139]. The manufacturer L'anza had sold his products outside of the U.S., which products were afterwards reimported by the company Quality King who thereupon was sued for infringement of copyright under Sections 106, 501, and 602 U.S. Copyright Act. Section 106 contains the exclusive rights of an author, thereunder in paragraph (3) the right to distribute publicly copies through sale, transfer of ownership of any kind, rental, or lending. Section 501 USCA defines the case of copyright infringement and Sec. 602 determines under which circumstances the import into the U.S. is considered an infringing act. Quality King referred to the exception rule under Sec. 109(a) USCA, containing the doctrine of 'first-sale', restricting the copyright to the first sale of the protected work, such that a legal purchaser does not need to ask permission of the copyright owner for a subsequent sale. L'anza however claimed the right under Sec. 602(a) USCA to prohibit unauthorized import into the U.S. territory. Whereas the Court of Appeals for the Ninth circuit had decided in favor of L'anza, the Supreme Court held that the rightfully owning importer must also be able to apply the principle of 'fair use'. Hence the first-sales doctrine is not restricted in its applicability range.

The excuse of innocent infringement, respectively, being an innocent purchaser of an infringing semiconductor product is possible, when the purchase was made in good faith and without notice of protection[140]. Such a purchaser is only liable for a reasonable royalty after having received notice of protection. Therefore it is important for U.S. mask work right owners to provide notice as early as possible.

f) Infringement and enforcement (Sec. 910 and 911)

[139] U.S. Supreme Court, Syllabus, Quality King Distributors, Inc. v. L'Anza Research International, Inc., Certiorari to the United States Court of Appeals for the Ninth Circuit, No. 96-1470.
[140] SCPA Sec. 901(a)(7).

What is conceived as infringement is defined in Sec. 910(a) SCPA. Providing for the fact that infringing reproduction can occur by "optic, electronic, or any other means" the SCPA puts a very broad meaning on reproduction, even including 3-dimensional realization of a 2-dimensional drawing. The infringing action is to be done "by conduct in or affecting commerce", which again has a very broad interpretation range, even private use could be summarized thereunder as it affects commerce namely by reducing the number of potential purchasers. It could be conceived that a certain *de minimis* rule might be set up through jurisdiction. It will also be a task for the jurisdiction to define the degree of similarity required in order to assess a fact of infringing reproduction. Only the owner or an exclusive licensee can bring a legal action before a U.S. court.

The U.S., being vigorously against non-voluntary licenses, did neither provide for a regulation for any case in which such a license may be granted nor did it accept their provision in the WIPO IPIC.

IV. Integrated circuit topography protection under EC law

1. Historical development

On December 23, 1985, the EC Commission, who had already received interim protection in the U.S. for the citizens and residents of the EC member states until November 8, 1987, submitted to the Council a proposal about a Directive on the Legal Protection of Original Topographies for Semiconductor Products. Since the U.S. SCPA had only provided for a transitional provision of three years which was to expire, this put a time pressure to the national legislators who were to decide whether protection should be granted and if so, how and for what subject matter.[141] The European Community followed up the U.S. SCPA with the Council Directive on the Legal Protection of Topographies of Semiconductor Products on December 12, 1986, (TSD), the Directive binding the member states and obliging them to at latest on November 7, 1987, bring into force the necessary legal and administrative provisions.

2. EC Directive on the Legal Protection of Topographies of Semiconductor Products (TSD)

a) Content of the EC Directive on the Legal Protection of Topographies of Semiconductor Products

(i) Preamble to the TSD

In the preamble of the TSD, which was established with regard to Art. 94 (Art. 100) of the Treaty establishing the European Economic Community (ECT), the Council of the European Communities acknowledged the importance of semiconductors for the Community's industrial development as well as the misrelationship between the know-how development costs incorporated in the semiconductor products and the costs for their reproduction. The Council further takes the view that the existing differences in national legislations of the member states may directly disturb the functioning of the common market concerning semiconductor products. However, the Council clearly enlists the exceptions from the harmonization that was to take place following the Directive. These exceptions are of particular importance, namely, application of the

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[141] Kindermann, Manfred und Körber, Arno und Kolle, Gert, "Berichte der deutschen Landesgruppe für den XXXIII. Kongreß der AIPPI in London vom 8. bis 13. Juni 1986, Bericht erstattet im Namen der Deutschen Landesgruppe von München", GRUR Int 5/1986, 329.

national protection legislation to persons outside the Community, the question of whether registration or deposit shall be required for acquiring the right to protection, and also the allowance of compulsory licenses were left to the discretion of the member states. Finally the Council declared that other forms of protection shall not be prejudiced by the topography protection in accordance with the TSD.

(ii) Definitions (Art. 1 TSD)

Article 1 TSD contains the definition of what is to be understood as a semiconductor product, a topography and the commercial exploitation thereof. The definition of 'topography' is very similar to the definition in the SCPA. The TSD understands under an integrated circuit design the 3-dimensional surface pattern of layers on a semiconductor integrated circuit product in any material form, i.e., layout data, photolithographic mask, design drawing, or photograph and finally the actual integrated circuit. The difference to the SCPA is that in the TSD the protection does not depend on a first integrated circuit having been manufactured. The definition of 'semiconductor product' also strongly resembles the SCPA model. Since the definition explicitly mentions a layer of semiconducting material, the TSD does not confer protection to non-semiconductor-based integrated circuits. The electronic functionality is also mentioned as obligatory. Because the electronic function need not be the only function of the integrated circuit, even a hybrid functionality including electronic function would suffice to qualify the integrated circuit for protection under the TSD. Again in suit to the SCPA, the TSD says *expressis verbis* that the semiconductor product definition does include the final and intermediate forms of the product. Hence protection extends to unprogrammed programmable integrated circuits like PROMS, PLAs, etc.. Whether cells and cell libraries can profit from protection by falling under that definition is questionable[142]. It will be up to the national courts to decide how far they interpret the scope of this definition.

(iii) Protectability (Art. 2 TSD)

Article 2 is insofar the heart of the TSD, as it contains in the second paragraph the conditions for protectability. The paragraph reads, "The topography of a semiconductor product shall be protected in so far as it satisfies the conditions that it is the result of its creator's own intellectual

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[142] However, paragraph 16 of the Explanatory Memorandum for the Draft Directive says hereto: ""Semiconductor product" is used rather than "integrated circuit" so as to include items that are not in fact circuits because they are not complete circuits.".

effort and is not commonplace in the semiconductor industry. Where the topography of a semiconductor product consists of elements that are commonplace in the semiconductor industry, it shall be protected only to the extent that the combination of such elements, taken as a whole, fulfills the above mentioned conditions." This article sets up a two-step check for the eligibility to protection, novelty in the sense of the result not being commonplace, and a sort of creative step in the sense of being a result of the creator's own intellectual effort. A parallel can be drawn to the patent field, where novelty[143] as well as inventive step[144] are being requested for an invention to be patentable. The difference between patent prerequisites and topography conditions and the scope of protection derivable therefrom will hence be the extent to which the 'intellectual effort' in creating an integrated circuit design differs from to the 'inventive step' of a technical invention. The intellectual effort must be executed by the author, i.e., be his 'own' effort. This condition is intensified by the condition of not being 'commonplace'. This is often recited as the condition of 'originality'. Designs once having become commonplace have lost the ability of being claimed as original.

(iv) Ownership (Art. 3 TSD)

Article 3 TSD states which persons are to be seen as the owners of the right. The creator must be a natural person being a national or a resident of a member state. The TSD leaves it to the member states to decide in their implementation, that the right to an integrated circuit designed in the course of an employment or under a commission, shall belong to the employer, respectively, commissioner, if he is himself qualifying as a national or resident or in the case of a legal person having a real and effective industrial or commercial establishment in a member state. Where no right to protection exists in accordance with other provisions of Art. 3 TSD, the right to protection shall also apply in favor of the persons referred to in paragraph 3(b)(i) and (ii) TSD who first commercially exploit within a member state a topography which has not yet been commercially exploited anywhere in the world and who also have been exclusively authorized to exploit commercially the topography throughout the Community by the person entitled to dispose of it.[145]

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[143] E.g. for European patent applications in Art. 52 EPC.
[144] E.g. for European patent applications in Art. 54 EPC.
[145] Art. 3(4) TSD.

With integrated circuits it is regularly the case that not only one but many individuals do contribute to the final design. These may often be employees of different companies or be contractors from different companies. Also typically, predesigned components are used such as cells from available cell libraries or unprogrammable 'raw' programmable devices. The design process is typically done with the aid of a CAD program. The TSD does neither make express provisions for topographies created by collaboration nor by using a CAD process. Since the regulation concerning a design made by an employee is only applicable in the case where a human being is regarded as the creator, the question as to who the creator is in the case of use of a CAD process, is not trivial. Since the TSD does not address this problem, it is to be dealt with under the national laws of the member states.

Article 3(7) allows the member states to enter into negotiations with third countries, i.e., non-member states, in order to extend the right to protection to these. Such cases have to be notified to the commission and the proposal must be held in abeyance if the commission decides to try to extend the case to all member states. In fact, a number of such proposals have occurred and the commission adopted several of them to extend the application of the TSD, hence binding all member states. For instance Japan, Switzerland, Liechtenstein, Norway, Sweden, Iceland, Austria, Finland and Australia have all been such countries that hence are treated like member states with respect to the TSD. Of course this act of extension has always been based on a reciprocal right granted by the respective country.

Protection is also granted to the person who as a national or resident of a member state does for the first time commercially use a topography acquired outside of the EC. The respective U.S. regulation asks in such cases for a first use in the U.S. territory.[146]

Since the TSD mentions the right of successors in the title of the creator[147] and the possibility to require registration of transfers of rights, the TSD itself clearly acknowledges the *sui generis* right to topographies as a matter subject to commercial dealing. Licensing is however not a topic in the TSD.

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[146] Art. 3(4) TSD.
[147] Art. 3(5) TSD.

(v) Registration and deposit (Art. 4 TSD)

Article 4 TSD gives the member states the freedom to put up their own regulations as to whether a registration procedure has to be pursued in order to obtain the respective rights. The member states can decide whether protection shall not come into existence or shall cease to apply unless an application for registration is made within two years of the topography's first commercial exploitation. The same applies to the requirement of deposition of a topography. Once a member state chooses to require a deposit and registration, the scheme therefor must be in a predetermined form.

(vi) Exclusive rights of the rights owner and exceptions thereto (Art. 5 TSD)

Article 5 TSD contains the provisions for the content of the rights, i.e., prohibition rights and also the exceptions to these rights. It simply says that the owner has the right to authorize or prohibit "reproduction of a topography in so far as it is protected under Art. 2(2)." The TSD does not say what would be regarded as an act of infringement. Infringement can, in principle, happen in the form of an act of reproduction, or commercial dealing, or the in the form of contribution thereto. Reproduction can happen in various material forms since an integrated circuit design contains visual, literal and physical aspects. Hence the TSD leaves it to the member states to provide for the necessary legal remedies in order to render the TSD effective. The term 'reproduction' is also not explained in the TSD. This is insofar important as it is not self-evident which form of reproduction is in fact to be regarded as infringing and which not. A typical example where an act of infringing reproduction being present is questionable, is the three-dimensional realization of a two-dimensional literary work. Another question is whether for a reproduction in the sense of the TSD a concrete, either direct or indirect, copying step is necessary or whether even coincidental identity or similarity is sufficient. Finally, the degree of similarity in the reproduced work is decisive, it may range from total identity to mere resemblance in the form of functional resemblance, or even consist only of a realization of the underlying idea. The TSD does not limit reproduction to cases which occur for commercial purposes. It does in fact permit the member states to allow reproduction for private non-commercial aims. This purpose indeed will be of minor interest for a right owner, since it is highly unlikely that such a case could happen and cause significant harm.

Another right that the TSD gives the owner is to prohibit "commercial exploitation or the importation for that purpose"[148]. This is also referred to as 'commercial dealing'. While it is obvious that such dealing shall comprise dealing with the topography itself and also with an integrated circuit manufactured after this topography, it is not self-evident, that commercial dealing with a device containing such an integrated circuit is also considered as infringement. The TSD leaves this to the member states. Whereas not only unlawfully made topographies are covered by the provision of Art. 5(1) TSD, according to Art. 5(5) TSD the innercommunitary import of such products having been "put on the market in a member state by the person entitled to authorize its marketing or with his consent" is not subject to the author's consent. This exhaustion provision protects the lawful owner. It is to be noted that the exhaustion is only confirmed for the member states of the Community. An integrated circuit or topography lawfully obtained outside the EC hence may be subjected to the import prohibition right.

Another exception is the commercial dealing by the so-called 'innocent infringer', i.e., the person who does not know and had no reason to believe that the product is protected under the *sui generis* protection legislation of a member state. This person is insofar excluded from being regardable as infringer as it does acquire an integrated circuit under the above conditions.[149] This makes it clear that innocent manufacturing or reproducing is not possible. The legislator expects from a commercial manufacturer of integrated circuits that he knows which designs are protected or not. However, under the definition in Art. 1(1)(c) TSD the mere use of an integrated circuit even in a business environment is not covered under the definition of 'commercial exploitation' and hence not prohibited as infringement. In that sense any acquirer who does not commercially exploit the acquired integrated circuit cannot be held as an infringer. One might contemplate if such an acquirer, could be held as contributory infringer if he is not in good faith. Once an acquirer has obtained knowledge or has reason to believe that the product is protected, a remuneration can be claimed by the right owner.

Concerning contribution to infringement, the TSD remains silent. Although it provides that the right owner shall have the right to authorize the acts mentioned in Art. 5(1) TSD, which implies that others may not authorize these acts it is open what authorization means and one could argue

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[148] Art. 5(1)(b) TSD.
[149] Art. 5(6) TSD.

that only a person who can prohibit can also authorize, such that contribution might not fall under this right. It is up to the member states again to decide upon such cases.

In the TSD it is stated that "the exclusive rights ... shall not apply to reproduction for the purpose of analyzing, evaluating, or teaching the concepts, processes, systems, or techniques embodied in the topography or the topography itself." [150]This means that it is not prohibitable to reproduce an integrated circuit design in order to understand, teach, or analyze its functional or physical aspects. Furthermore, "the exclusive rights referred to in paragraph 1 shall not extend to any such act in relation to a topography meeting the requirements of Art. 2(2) and created on the basis of an analysis and the evaluation of another topography, carried out in conformity with paragraph 3."[151] In other words, the reproduction and commercial dealing with a topography or an integrated circuit manufactured thereafter does not constitute an infringement as long as this topography exhibits a sufficient degree of originality[152] and is based on the analysis or evaluation of an original integrated circuit according to Art. 5(3) TSD.

Reverse engineering is the process for determining the design of a technical product by detailed study thereof. In principle the owner of an integrated circuit design does want to prevent competitors from reverse-engineering because it enables them to develop substitution products allowing a third party to enter into direct price competition with the originator. Using found information for developing new products, particularly for creating compatible products, might nevertheless be in the interest of the original creator in order to make his product better known and perhaps indispensable. In the field of software such compatibility can be of vital and decisive importance for a product. The famous Windows operating system series of Microsoft Corporation owes its tremendous success and degree of distribution mainly to the broad range of software products being able to run on the Windows platform. In that sense a certain standardization that might arise out of reverse-engineering can be a desired effect. On the other hand it is in the interest of integrated circuit users to profit from second sources and price competition, both are typical results arising from reverse-engineering since once the design has been investigated thoroughly, a competitor has the chance to build a compatible or even identical integrated circuit. It has been recognized that reverse-engineering does not mandatorily lead to misuse of intellectual property, for instance establishing whether a product has errors in it which

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[150] Art. 5(3) TSD.
[151] Art. 5(4) TSD.
[152] Art. 2(2) TSD.

can be eliminated for product improvement. It also seems fair to allow such action for the assessing of whether an integrated circuit infringes the intellectual property of another party. It hence appears rational to allow reverse-engineering for predetermined, restricted purposes, such that it does not lead to a circumvention of intellectual property rights. It has been decided by the legislators to allow analysis of topographies. In the area of integrated circuits, however, such analysis automatically implies an initial reproduction step, namely a photographical step followed by a magnification of the image. Unless a legal exception can be applied here, this first step of analysis constitutes an act of infringement. Concerning reverse-engineering for the purpose of enabling the development of a new product it has to be decided in which cases the difference between the new product and the original integrated circuit is sufficiently big enough to justify that the reverse-engineering exception can be applied and no infringement of the integrated circuit owner's rights has occurred. Simply spoken, the degree of originality of the new product vis-a-vis the original product has to be evaluated. All in all, it becomes clear that two opposite interests exist, where each has to be recognized as rational. Hence the provision of a reverse-engineering defense must be criticized as being a merely political issue. For instance the U.S. legislators clearly support the point of view that it is technologically and economically desirable to permit the creation of compatible or substitutable integrated circuits. The reason behind this is to encourage price competition and thereby give an incentive to efficiency and further innovation, and also to provide a more stable supply of integrated circuits. This essentially meets with the EC target of establishing a fair and working competition among a multitude of suppliers. The general interest of price competition under avoidance of monopolies and cartels is set higher than the private interests of integrated circuit creators. It has on the other hand to be submitted that a protection of intellectual property rights that is too restrictive, in whatever domain, reduces the commercial value of products and thereby decourages innovation. The collision of intellectual property protection with the freedom of competition is the topic of controversial opinions. The principle of exhaustion discussed below is also one of those exemptions which apart from trying to achieve a fair system of remuneration to a right owner, also has the avoidance of market splitting and unfairness in competition in mind.

Exhaustion is the topic of Art. 5(5) TSD. Within the European Community it has been the subject of hotly debated controversial discussions as well as decisions. The principle of exhaustion can be circumscribed by the question as to whether a product once being put legitimately on a market

can be imported into another market without requiring the consent of the holder of rights to intellectual property incorporated in the said product. Cross-border trade in such products is referred to as 'parallel importation'. An in-depth discussion could be the topic of additional investigations. Here it should suffice to point to the jurisdiction in the EC and to some major points therein.

In the famous 'HAG' decisions[153], the collision between intellectual property rights, in this case trademark rights, and the provisions in the ECT concerning free movement of goods, particularly Art. 28 ECT (Art. 30) and Art. 30 ECT (Art. 36) was decided upon[154]. The same theme, for patent rights however, was treated in the 'Merck' decision[155]. In this case the specialty was that no patent protection was available for pharmaceuticals in Spain and that the supplier Merck had felt itself deprived of its rights when it could not object to gray imports from Spain into the other Community states. The ECJ decided that exhaustion is valid even in the case of non-existent patent protection, arguing that the right owner must take into account the consequence of exhaustion when deciding his market strategy, even when in certain market areas he has no industrial property right protection. This decision is hard to accept by manufacturers since they are in a catch-22 position of either renouncing those markets where they do have no protection or supplying those markets and risking gray imports from there into other markets. It becomes clear that the ECJ has put a concrete barrier against intellectual property protection in favor of the unity of the Common Market. A respective provision is also contained in the Community Patent Agreement where the doctrine of exhaustion is covered by Art. 76. In any case, the commission and also the ECJ consider that Art. 81 ECT (Art. 85) and Art 82 ECT (Art. 86) will be applicable to the use or misuse of monopolistic rights, and thereby provide a safeguard with respect to the main targets of the Community market.

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[153] Urteil des Gerichtshofes vom 3. Juli 1974. Van Zuylen Frères gegen HAG AG, (Ersuchen um Vorabentscheidung. vorgelegt vom Tribunal d'arrondissement de Luxembourg, Rechtssache 192/73. Slg. 1974, 731 and Urteil des Gerichtshofes vom 17. Oktober 1990. CNL-SUCAL SA gegen HAG GF AG, (Ersuchen um Vorabentscheidung: Bundesgerichtshof - Deutschland. Freier Warenverkehr - Warenzeichenrecht, Rechtssache C 10/89, Slg. 1990, 3711.

[154] See also decisions Rs 78/80 Deutsche Grammophon Gesellschaft mbH / Metro-SB Großmärkte GmbH & Co KG, Urteil vom 8. Juni 1971, Slg. 1971, S. 487, and Rs. 119/75 Terrapin (Overseas) Ltd. / Terranova Industrie C.A. Kapferer & Co., Urteil vom 22. Juni 1976, Slg. 1976, S. 1039.

[155] Urteil des Gerichtshofes vom 5. Dezember 1996. Merck & Co. Inc., Merck Sharp & Dohme Ltd und Merck Sharp & Dohme International Services BV gegen Primecrown Ltd, Ketan Himatlal Mehta, Bharat Himatlal Mehta und Necessity Supplies Ltd und Beecham Group plc gegen Europharm of Worthing Ltd. Ersuchen um Vorabentscheidung: High Court of Justice, Chancery Division - Vereinigtes Königreich, Verbundene Rechtssachen C-267/95 und C-268/95, Slg. 1996, I-6285.

Since Art. 5(5) TSD states that "the exclusive rights to authorize or prohibit the acts specified in paragraph 1(b) shall not apply to any such act committed after the topography or the semiconductor product has been put on the market in a member state by the person entitled to authorize its marketing or with his consent.", the exclusive right to exploit commercially and import for that purpose is only subject to inner-community exhaustion whereas the right to authorize or prohibit the reproduction is not exhaustible. A critical point could be when one can speak of consent and when not[156].

Recently it has been decided that innercommunitary exhaustion is the current perception, whereas international exhaustion is at the moment negated[157]. Since no caselaw for integrated-circuit-design exhaustion exists up to now, the issue is unsolved but it is to some extent self-evident, that the exhaustion principle set up for trademark- and patent protection is also applicable to integrated circuit design rights. It also remains to be seen to which extent the *sui generis* provision on exhaustion will interfere or overlap with the provisions on exhaustion of copyright, taking into account that integrated circuits in trade will often combine integrated-circuit-design with computer code stored thereon and that the computer program stored in a ROM and the logic embodied in the circuitry of an integrated circuit logic device are protectable under the CPD.

(vii) Compulsory licenses (Art. 6 TSD)

Non-voluntary licenses are not allowed on the grounds of effluxion of time. The member states are not expressly prohibited in subjecting right owners to compulsory licenses for reasons of national interest or defense of the realm.

(viii) Commencement and term of protection (Art. 7 TSD)

This provision distinguishes between two cases: member states requiring registration as a condition for granting protection and member states who don't. In states where the registration is necessary, protection starts on the earlier date of the registration application or date of first commercial exploitation, which means commercial distribution or offering therefor. In the case of a later application hence a retrospective protection is granted. In states where no registration is

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[156] See above in re Merck.

[157] Silhouette International Schmied GmbH & Co KG / Hartlauer Handelsgesellschaft GmbH, EuGH vom 16. Juli 1998, C-355/96 and also in Urteil des Gerichtshofs vom 28. April 1998, Javico International und Javico AG gegen Yves Saint Laurent Parfums SA (YSLP), Rechtssache C-306/96.

asked for, the registration application date is replaced by the date of first fixation or encoding, which means in the form of a photograph, drawing, bitmap, layout map, or description, or the integrated circuit itself. The term of protection is made dependent on the necessity of registration. In case of registration requirement, the term is ten years from the commencement date. In the other case, the term is ten years from the date of first commercial exploitation. Both cases require that the commencement date lies within fifteen years from the date of first fixation; if no commercial exploitation occurs within these fifteen years, protection discontinues.

(ix) Exclusions from protection (Art. 8 TSD)

No protection is granted for underlying ideas or concepts, etc.. This exclusion was derived from the respective exclusion given in copyright law. However, the TSD does not explicitly exclude from protection neither 'must fit' or 'must match' aspects of integrated circuit design, nor decorative surface elements, nor methods or principles of construction. However, one could summarize the latter under the more general exclusion term of 'concept, process, system, technique' and the decorative elements could be seen as not even falling under the definition of a topography in its actual meaning. Of importance is in comparison hereto the non-exclusion of the 'must-fit' features.

An important aspect that has already found its way into the copyright legislation is the so-called 'idea/expression defense'. What is meant thereby is that "the protection granted to the topographies of semiconductor products in accordance with Art. 2 shall not extend to any concept, process, system, technique, or encoded information embodied in the topography other than the topography itself." The typical defense of an accused infringer is that the *corpus delicti* is not infringing since it only copies the concept. One can interpret the idea as the information embodied in a subject matter and the expression as the description of that information, or simply say that the idea is the message and the expression is the medium. Considering that there is no solid line drawable between what is idea and what is expression, it becomes clear that in fact the lines can only be drawn in hindsight and taking into account the specific circumstances of an infringement case. The line will in the end be drawn such that the scope of protection is appropriate for the degree of expression present in the idea. Put into the context of integrated circuits, the functional aspect of the design is the idea, and the physical aspect is the expression thereof. The deciding point is that with integrated circuits there is *de facto* no real freedom for

expressing the underlying functionality in any greater detail than the minimum necessary for implementing that functionality, since the purpose of an integrated circuit is nearly exclusively functional. Hence the integrated circuit may at best be compared with fact-based books and compilations. In these cases it has been found that copyright infringement requires a very high degree of similarity, i.e., complete or at least substantial identity. Hence it becomes clear, that since too little freedom in leaving the causal chain between function and design exists, there is no real scope of extending the degree of detail with which the function can be implemented. This in the end makes it clear that protection of integrated circuit design *de facto* is restricted to the topography image itself. The fear of *sui generis* protection leading to a patent-like monopolization of the underlying concept, is hence unfounded. On the other hand, practically no functionality that can only be realized in one form seems to exist. The scope of protection for integrated circuits arising out of *sui generis* legislation therefore appears very limited.

The exclusion of Art. 8 ends with the words "other than the topography itself." There is room for interpretation on its meaning and it appears to only make sense in that only the topography *per se* shall be protected. The line of infringement is therewith drawn directly below the physical design. In addition to the exclusions found in the SCPA, the TSD expressly excludes encoded information from protection. This being interpreted as stored information, is to some extent self-evident, with the stored information not being a tangible aspect of the integrated circuit.

(x) Marking of protected products (Art. 9 TSD)

The member states also have the option of providing for a way of giving notice of protection on integrated circuits, such notice playing a relevant role in the question of remedies for infringement. The innocent infringer is here namely the one who acquires an integrated circuit without knowing or having a reason to believe that it is protected. This person shall not be prevented from commercially exploiting the integrated circuit, but he can be held liable for infringement right after he has gained knowledge or reasonable belief that the integrated circuit is protected. The notice hence removes the innocence.

(xi) Relationship to other laws (Art. 10 TSD)

In this article the independence of topography protection from other forms of protection, i.e., patents and utility models is declared. Just as computer programs are declared, in principle, protectable under several protection regimes including copyright- and patent law the TSD is declared non-prejudicial to other forms of protection. This principle of cumulation of protection is mainly based on a typical difference in scope of the various species of protection.

(xii) Implementation deadline (Art. 11 TSD)

The TSD having been adopted on December 16, 1986, specified as date of implementation November 7, 1987, hence not even one year was allowed for the adaptation of national legislation.

The TSD does neither address the subject of remedies for infringement nor procedural provisions thereto. Hence it is left to the member states to implement the TSD such that it is most effectively applied. This duty arises out of Art. 10 ECT (Art. 5) and the '*effet utile*' principle.

b) Implementation of the EC Directive on the Legal Protection of Topographies of Semiconductor Products

The Directive left the member states to decide which form of legislative instrument they wanted to use in order to implement the provisions of the Directive. The requirement of deposit or registration had also not been harmonized. Due to the short time frame given by the Directive, it could not be implemented by the majority of the member states in time. However, the interim protection from the U.S. was extended such that there was only little risk of a time gap for the protection in the U.S. of integrated circuits stemming from the EC.

(i) United Kingdom

The UK implemented the EC Directive in 1989 by way of a statutory instrument, through adoption of the Design Right (Semiconductor Topographies) Regulations, i.e., an unregistered design right which is in principle identical with other *sui generis* legislation, with exception of the lack of registration as a prerequisite of protection. In the UK must-fit features are excluded from protectability, which contradicts the TSD.

(ii) The Netherlands

In the Netherlands, a working group prepared a draft legislation for the protection of semiconductor chips in March 1986, which was then submitted to the Parliament on March 24, 1987. According to this law the person entitled to protection is the creator and, if there is an employment contract, the employer, whereby the employee then keeps the right to be named in the registration. Protection terminates upon the end of the tenth calendar year after deposit or the first commercial exploitation, whichever occurs first. The protective law can only be claimed against third parties after registration with the patent office. Before registration the owner is not entitled to injunctive relief but after registration, he may claim damages even retroactively. Furthermore, the protection expires two years after the right to the topography has come into existence, unless a deposit is made before. The scope of protection of the exclusive right under the Dutch Act is slightly broader than that of the TSD, since in addition to reproduction itself, not only commercial but any method of exploitation is prohibited. The parallel application of copyright and *sui generis* right is not allowed in the Netherlands.

(iii) France

The French Act for Protection of Semiconductor Integrated Circuits provides for *sui generis* protection upon deposit of the topography, in a completed or an intermediate form or a first commercial exploitation thereof. The French Act implemented Art. 4(1) of the TSD, hence refusing the coming into existence of protection when a deposit is not made within two years after first commercial exploitation. However Art. 3(2) was not made use of, so that the right to protection under a contract of employment or any other contractual agreement applies in favor of the employee. The scope of the exclusive rights corresponds literally with that of the TSD. However, the reproduction of a topography for private or non-commercial purposes has not been permitted, though the TSD allows this under Art. 5(2). The French Act might encounter an implementation problem concerning the protection term, since protection according the French Act terminates when no commercial exploitation has occurred within fifteen years from creation, which contravenes Art. 7(4) TSD as a lesser degree of protection. An uncertainty arises out of the fact that since protection is granted only upon deposit, it remains unclear whether the French Act fulfills the obligation imposed by Art. 7(2) TSD which makes it mandatory to grant a legal remedy for the period prior to the date when the exclusive right came into existence. Finally, the French Act grants protection only for citizens or residents of those states with which there is reciprocity.

This does mean that of course all member states of the EC will, by virtue of the TSD, respectively, the implementation thereof, automatically be on that list, whereas non-EC states will have to fulfill this requirement on their own.

(iv) Germany

The German Act has not expressly implemented Art. 5(5) TSD. However, since in the Federal Republic of Germany, caselaw makes use of the doctrine of exhaustion once a product protected by intellectual property laws has been put on the market, it appears that an express implementation was not necessary. The German legislation did also not expressly implement Art. 5(7) TSD.

(v) Other EC countries

Similar to the United Kingdom, Sweden renounced registration as a formal prerequisite of protection. Their special protection system is therefore closer to that of copyright. The other countries make registration, if not a prerequisite to protection, a prerequisite to enforcement of the exclusive rights which, under the wording of the legislation, already come into existence upon first commercial exploitation or application for registration. In the end, practically no significant difference between the different registration conditions exists. Before registration and/or commercial exploitation, the legal owner is only entitled to damages against third parties and not to an injunction.

(vi) Switzerland

Initially, the non-EC country Switzerland followed an approach in the area of unfair competition law. Switzerland, though not being bound to the EC TSD, implemented the protection for topographies in 1988 based on the SCPA in the form of Art. 5 of the New Federal Act Against Unfair Competition which provides that "whoever, without adequate personal expenditure, through a technical reproduction process, appropriates and exploits another's marketable product as such acts unfairly." This broadening of protection for industrial achievements which are not protected by special legislation, without requiring the existence of conditions of competition or the even slavish imitation, might in principle cover the illegal copying of the integrated circuit design.

V. Integrated circuit topography protection under WIPO

1. Historical development

a) First session for the IPIC

Under the roof of the WIPO the discussion about protection of computer programs had faded out to some extent, while the protection of topographies became the new major focus. Still the question was, whether existing laws or rather a *sui generis* law was the better approach to ensure national treatment by an international treaty. It was not the rapid evolution of technology alone but mainly the initiative of the U.S. that accelerated the respective efforts. The SCPA of November 8, 1984, as supplemental chapter 9 of the U.S. Copyright Act, was the very first national *sui generis* protection which threatened to push aside the international protection by the Paris Convention, RBC, and UCC. The U.S. SCPA contained as a driving force for a respective protection of topographies in other countries the principle of substantive reciprocity which clearly deviated from the principle of national treatment, one of the central principles in international laws. It provided that an extraterritorial owner who had not used his mask work first in the U.S. or had not transferred ownership therein to a U.S. citizen or a U.S.-domestic corporation, could not obtain protection for his mask work, unless his home country was covered by a presidential declaration that set up as a condition that mask works of American owners had to enjoy the same scope of protection in the foreigner's country. An interim protection could only be granted if the respective state could prove sufficiently concrete efforts to work out such a protection scheme. Such an interim protection exception was granted for example to the member states of the EC. The WIPO responded to the reciprocity approach with an endeavor to ensure national treatment and worked towards an international draft treaty. It set up a Committee of Experts on Intellectual Property regarding integrated circuits which worked on a proposal for an international convention on integrated circuit design protection. The WIPO held four sessions of this Committee of Experts which had to work out the draft for an international convention, aiming to guarantee national treatment, to enhance the creation of national protective systems and to avoid a far-reaching disintegration in the field outside the Paris Convention, RBC, and UCC. The choice of the substantive form of protection was left mainly to the discretion of the various countries, but the WIPO had already suggested a legislation that contained a number of special provisions.

In the program for 1984/85 the WIPO had only provided for a negotiation over an agreement on computer programs including integrated circuits but at the end of 1985 it decided to have an expert commission exclusively sitting on integrated circuits. The reason herefor was on one hand that many countries already had categorized the protection of computer programs under copyright law which rendered a *sui generis* right obsolete, and on the other hand, that the special laws of the U.S. and of Japan had intensified the fear that the existing copyright conventions would not provide for adequate and sufficient protection for integrated circuits. The goal of the planned international convention was hence threefold, (i) to accelerate widespread national protection systems for integrated circuits, (ii) to have them harmonized in their main content and (iii) to guarantee national treatment.

b) Second session for the IPIC

The results of the first session, together with a new second draft treaty revised and completed with explanatory notes by the Director General of the WIPO, were taken as starting documents for the second session. The Director General further provided a memorandum concerning the relationship between the future treaty and the international copyright conventions. Experts from thirty-seven states consulted on this second draft, together with experts from the EC, experts from the EPO, and representatives from a number of non-governmental organizations. Concerning the goal and the content of an international treaty for the protection of integrated circuits two controversial standpoints arose.

The industrialized countries essentially voted in favor of the draft treaty submitted by the Director General. They found convention-based protection an urgent and desirable matter and appreciated the flexibility of the treaty provisions which gave the various member states enough freedom on how to implement the protection of integrated circuits within their national law systems which could thereby be realized without colliding with existing national laws. With the exception of Switzerland who intended to operate without a special law, a general tendency towards *sui generis* protection with a registration requirement became apparent. Surprisingly, an expected controversy between the U.S. and other chip-manufacturing states did not evolve, there was instead an unanimity on applying the national-treatment principle for integrated circuits in the future. What split the parties was the question of scope and content of the admissibility of

reverse-engineering, having first been introduced in the SCPA and afterwards adopted in Japan, the EC draft, and by WIPO.

On the other hand, the less developed countries, led by Brazil, expressed their reservations against a quick adoption of a regulating convention, arguing that too few experiences had yet been made with the national laws in place for the integrated circuits. They further argued that underdeveloped countries do not yet have the necessary expertise for this important technological subject and that the urgency is not understandable in light of the U.S. legislation proceedings having taken six years. They considered therefore that bilateral and regional consultations and further studies by the Secretary General with respect to the effect of an international treaty on the technology transfer into developing countries be conducted. Of particular concern was that the draft did not provide preferential treatment for them and that compulsory licenses, e.g., in the case of abuse of rights or general national interest, were even prohibited. They also found the draft to be an unfair solution between the interests of the authors and the public. The treaty was not found to simultaneously protect the author and promote technology transfer.

c) Third session for the IPIC

At the beginning of the third meeting only the U.S. experts supported the absolute prohibition of non-voluntary licenses. In contrast, the EC commission together with the United Kingdom and Australia explained that it would not be possible to renounce compulsory licenses, because in narrowly defined cases these would be needed to prevent abuse of exclusive rights in exchange for fair remuneration. As a compromise it was proposed to leave the application of national legislation for the prevention of a monopoly abuse undisturbed. Finally, the industrialized member states only warily supported the U.S. proposal to ensure the observance. According to GATT, a dissatisfied member state having complained another states's practice and having failed to settle the problem by consultations and with a panel of experts, is allowed to suspend the application of the treaty to that country.

The third version of the Draft Treaty had a better potential of being accepted by the industrialized nations, because there was general agreement on the exception of reverse-engineering. However, the objections from the newly industrialized and developing nations already expressed in the second session, had further intensified during the third session, again focusing on preferential

treatment, an expansion of the limitations of the exclusive rights, the introduction of non-voluntary licenses, and a reduction of the duration of protection. Apart from criticizing the Draft Treaty in detail, these nations viewed any activity on an international level as an attempt to safeguard existing market positions. They claimed that the rules of unfair competition from the Paris Convention would be sufficient, and that integrated circuits neither show the necessary creativity nor the inventivity required for protection under copyright law, respectively, patent law. The developing countries generally did not support the industrialized nations's view that the enactment of protective legislation in technology-importing countries will promote rather than hinder technology transfer. As an alternative proposal the Indian delegation introduced a draft Codicil to the Revised Berne Convention shortly before the beginning of the third meeting. This proposal, aiming at a protection without formalities, with only a ten-year minimum term and national treatment, was however not discussed. This draft contained for the first time a concrete and extensive formulation on how a preferential treatment could look like.

Since the nations became aware that they could no longer protect their interests simply by refusing ratification of international treaties and hence either had to prevent their coming into force or influence their content, after intensive discussions within WIPO an understanding was reached that a diplomatic conference would be convenient.

d) Diplomatic Conference in Washington for the IPIC

Finally on May 8, 1989, a diplomatic conference was initiated in Washington. The preceding sessions and consultations built a good basis for having a consolidated draft treaty, usable as a basis for the conference. The U.S. showed a real interest in adopting an international treaty as long as it provided for a minimum protection and a sanction-enforced mechanism for dispute settlement, a mechanism unprecedented in the context of WIPO treaties. On the other hand, Brazil, Argentina, India, and some other developing countries saw themselves hindered in building up an integrated circuit industry by a treaty following the U.S. example. The demand for preferential treatment still stood. The contrapositions were due to the definition of the subject matter, scope and term of protection, compulsory licenses, remuneration in case of good-faith acquisition, and the mode of a dispute settlement process. Although within the EC essentially similar integrated circuit protection laws existed, the coordination of the EC negotiations proved to be as complicated as those with the developing countries. While the Community's position

concerning the treaty content was mainly uniform, a common negotiation strategy was hard to find. The aim was to support the WIPO without giving in too much to the developing countries.

The conference was characterized by the extreme positions of developing countries versus the industrialized nations which rendered the conference very dramatic. Even on the last day it was still open whether the conference would have a positive end or fail totally. In literally the last minute, a common solution was adopted with an overwhelming majority of the participating countries. At the end of the Diplomatic Conference in Washington D.C. on May 26, 1989, the Treaty on the Protection of Intellectual Property in Respect of Integrated Circuits (IPIC) was adopted. It is to be noted that while forty-nine nations voted in favor of the IPIC, the U.S. and Japan voted against it, mainly objecting to non-voluntary licenses[158]. The fact that the worldwide leaders in integrated-circuit manufacturing were not willing to agree to the compromise that was accepted by the majority of the other nations, is unsatisfactory. The main issues that lead to the veto by the U.S. and Japan were the provisions concerning non-voluntary licenses and the *bona-fide* use of the protected product by third parties[159], the term of protection[160] and the dispute settlement in the case of infringement of the IPIC by contracting states[161]. This however does not mean that the U.S. will never be a party to the IPIC. An accession may be pushed by accessions of other important industry nations, such as has been the case with the accession of the U.S. to the RBC.

e) Basic successes in the IPIC

The IPIC has encountered substantial negative views. Its positive aspects however, remain to be compared thereto. The IPIC is the very first legislative basis for a worldwide multilateral protection of integrated circuits, guaranteeing national treatment and including the developing countries as bound parties. Although the SCPA represents the first national regulation on protection of integrated circuits based on the principle of reciprocity, the national-treatment principle found entry into the IPIC. The IPIC furthermore provides for binding minimum standards on intellectual property protection to integrated circuits, which although remaining below the standard of the EC Directive, show a substantive degree of harmonization. To be stressed is also the definition of the subject matter which not only comprises complete

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[158] Art. 6(3)(a) IPIC.
[159] Art. 6(4) IPIC.
[160] Art. 8 IPIC.
[161] Art. 14 IPIC.

semiconductor products but also topographies as such, and which also extends to parts of the topographies and to intermediate products. This definition very much resembles the one in the laws of the industry nations.

The obligatory protection of industrial trade secrets defeated the reservations of the developing countries. Bearing in mind that the developing countries had pleaded for a term of three years and that the Soviet Union had voted for a term of five years as a maximum solution, the final term of eight years can also be regarded as a clear success. For the first time a settlement of disputes on the area of protection of intellectual property on a broad international basis and without reservations, albeit without sanctions, was achieved. This regulation manifests a decisive breakthrough for the whole area of protection of intellectual property. For the first time the EC may access a worldwide treaty for protection of intellectual property as a party[162].

In comparison to the patent-related provisions of the Paris Convention, the IPIC contains further-reaching protection provisions. The goal of the IPIC is in the first instance not to promote and harmonize integrated circuit protection between the western industrialized nations which to some extent have already granted a high level of mutual protection by bilateral agreements. The goal was more to make the protection of intellectual property to microelectronic semiconductor products possible between these countries and the developing countries. With this in mind, the restrictions on the results do not appear inadequate. The adoption of the IPIC has however a much greater importance for the WIPO, since on the grounds of worldwide international debates on the field of intellectual property, at that time the Uruguay round of the GATT negotiations was running.

The poor ratification and accession status of the IPIC, however, even ten years later showed that apart from some developing countries still no real major player on the market of integrated circuits found the IPIC to be worth accessing. In 1991 it also became clear[163] that the U.S. had no intention of joining the IPIC, but wanted to rely on its bilateral arrangements and on the GATT as far as possible. Like the Community Patent Agreement, the IPIC in hindsight proved to be stillborn. Article 16(1) IPIC mandates that for entering into force, at least five countries have to

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[162] Art. 15(1)(b) IPIC.
[163] Christie, Andrew, "integrated circuits and their Contents: International Protection", Sweet & Maxwell, 1995, 6.

deposit their instrument of ratification, acceptance, approval, or accession. Since the IPIC has as yet only been signed by eight countries and ratified by one[164], it is still not in force.

2. Content of the WIPO Treaty on the Protection of Intellectual Property in Respect of Integrated Circuits (IPIC)

a) Institutional issues (Art. 1, 9, 10, and 15)

The parties of the IPIC together form a union[165], as is the case with all other treaties in the field of intellectual property administered by the WIPO. This does however not mean that the states undergo financial commitments[166]. Eventual costs arising from the IPIC will be charged to the general WIPO budget. Amendments to this can only be concluded in a revision conference, not by the assembly of the union. The union has an assembly consisting of all contracting parties.[167] It has three tasks to fulfill, it has to decide upon any questions concerning the union and the application of the IPIC, it decides upon the call for revision conferences, and it has a central function in the dispute resolution process[168]. It is further authorized to amend some of the treaty provisions such as the definition of 'integrated circuit' and 'layout-design (topography)'. The International Bureau handles the administrative tasks of the union. The Director General of WIPO is also the representative of the union. All WIPO and UN member states can become party to the IPIC[169] and, for the first time on the area of intellectual property protection, the IPIC is open for any international organization which binds its member states under its own legislation on the area of integrated circuit protection. The EC qualifies as such a member.

b) Substantive regulations

(i) Subject matter of protection (Art. 2 and 3)

The IPIC obliges the contracting parties to provide for intellectual property protection for layout designs, respectively, topographies. The protection extends to the final as well as any intermediate

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[164] Status on February 25, 1999: Signatory states: China, Egypt, Ghana, Guatemala, India, Liberia, Yugoslavia, Zambia, Ratification: Egypt.
[165] Art. 1 IPIC.
[166] Art. 10 IPIC.
[167] Art. 9 IPIC.
[168] Art. 14 IPIC.
[169] Art. 15 IPIC.

form of the integrated circuit[170]. In its Art. 2(ii) the IPIC defines what is meant by a layout design or topography and makes it clear that the subject matter of protection may be in any form, i.e., the integrated circuit itself, its layout data, a drawing, or the photolithographic mask set. The industry nations primarily managed to assert themselves. Since the topography only needs to be "prepared for an integrated circuit intended for manufacture", the existence of the integrated circuit is no precondition to the protection of the layout-design. In contrast hereto, the SCPA requires the design to be "fixed in a semiconductor chip product"[171]. The definition of an 'integrated circuit' is to be found in Art. 2(i) IPIC, and it contains two striking differences with respect to the U.S. SCPA. Firstly, it does not require the integrated circuit to be manufactured with a semiconductor material. This qualifies technologies like SOI or those based on superconductive substrates and other future technological developments for protection under the IPIC. However, this definition is not mandatory, since in Art. 3(1)(c) IPIC the contracting parties are allowed to restrict their scope of protection to semiconductor integrated circuits. Hence, the U.S. SCPA would not interfere with the IPIC provisions. Secondly, the integrated circuit is in its lowest form made up of one single active element and 'some' interconnections, integrally formed in or on a piece of material. This *de minimis* requirement will literally allow protection to extend to discrete components of integrated circuits, although there is room for argumentation against that view[172]. The IPIC does not exclude must-fit features from protection, nor does it make use of the idea/expression principle. In this respect the IPIC goes much farther than the TSD or the SCPA. The *sui generis* protection of integrated circuit design covers the physical aspect thereof. This includes interface components of the integrated circuit[173]. However, it is to be noted that electrical compatibility is not included in the protection scope of *sui generis* rights. This is logical since this type of compatibility is not expressed directly in a tangible three-dimensional form on the integrated circuit.

The requirement of 'originality' is described similarly to the respective regulation in the SCPA and the EC TSD. Hence the topography must be the result of an own intellectual effort by its creator and may not be commonplace among topography designers or chip manufacturers at the time of

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[170] Art. 3(1)(a) IPIC in connection with Art. 2(i), (ii) IPIC.
[171] Sec. 902(a)(1) U.S. SCPA.
[172] See opinion by Correa in European Intellectual Property Review 6/1990, 196.
[173] In contrast, the SCPA excludes "must-fit" components from protection: Section 213(3)(b)(i).

its creation. A combination of commonplace elements must as a whole fulfill these requirements[174].

(ii) Legal form of protection (Art. 4)

In which form of law - *sui generis* or existing law or even a combination of both - a contracting state wants to protect topographies is at his discretion[175], subject however to some limits. The law may not contradict the IPIC provisions which here according to Art. 12 IPIC means that in addition the provisions of the Paris Convention and the RBC have to be applied, if the state is a member to these treaties. Simply put, the chosen protection regime must then be compatible with the IPIC, RBC and the Paris Convention. When choosing patent law for instance, the requirement of absolute novelty may not be applied to topographies since this would contradict the protectability provisions of the IPIC. The choosing of copyright law means to adhere to the principles of the RBC. A protection has hence then to be granted for fifty years *post mortem auctoris*, even though the IPIC would allow a shorter term.

(iii) National treatment (Art. 5)

The principle of national treatment is laid down in Art. 5 IPIC. Under the IPIC, each contracting party is obliged to secure, throughout its territory, intellectual property protection of original layout-designs (topographies) of integrated circuits, whether the integrated circuit concerned is incorporated in an article or not. Each contracting party must accord the same treatment to natural persons and legal entities of other contracting parties as it accords to its own nationals. This is one of the main points wherein the WIPO deviates from the path of various other countries including the U.S.. It is not surprising that the national-treatment principle, which also found its way into the later GATT[176] and into TRIPS[177] was adopted in the IPIC. The basis of this principle can be found in the Paris Convention, providing a priority right[178] for its members that is based on a national patent application.

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[174] Art. 3 (2) IPIC.
[175] Art. 4 IPIC.
[176] Art. III GATT 1994.
[177] Art. 3 TRIPS.
[178] Art. 4a PC.

(iv) Scope of protection (Art. 6)

Article 6(1) IPIC lists the acts to be considered unlawful if performed without the authorization of the rights holder. These are the "act of reproducing, whether by incorporation in an integrated circuit or otherwise, a protected layout design (topography) in its entirety or any part thereof, except the act of reproducing any part that does not comply with the requirement of originality referred to in Art. 3(2)." The protection hence extends to the reproduction of a topography as a whole or in its protected parts as well as its use for manufacturing an integrated circuit. It even extends to any material form be it a photograph, design drawing, layout data, or photolithographic mask set. With the exception of infringement for independent creations[179] in mind it becomes clear that only reproductions based on copying an original or a copy thereof (indirect copying) are considered infringing. Another exception is given for acts of reproduction for private purposes. The formulation has a deeper meaning since this does neither exclude commercial nor non-commercial non-private use from the scope of protection. A typical example for the latter is non-profit exploitation in the form of research. Of interest is that the wording of this exception was amended during the Diplomatic Conference and first read "for private or commercial purposes", which makes it clear that the legislator was well aware of the non-commercial non-private use and hence intentionally included such use in the scope of protection. The reproduction of a protected topography for private use, science, teaching, and for analysis is allowed.[180]

It remains open, what the IPIC means by 'reproduction'. The literal reading of Art 6(1)(a)(i) IPIC apparently requires at least a copying of original parts of the topography. It appears that a topography, albeit a close resemblance, is not considered an infringing reproduction. Close resembling topographies are not mandatorily regarded as infringing. In fact the preparatory notes for the Washington Diplomatic Conference suggest that only similarity by identity was regarded as sufficient for infringement. Since the IPIC as a minimum level of protection leaves the question of infringement by sufficient resemblance open, the contracting states are free to provide for such cases constituting an act of infringement.

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[179] Art. 6(2) IPIC.
[180] Art. 6(2)(a) IPIC.

In the list of unlawful acts are further named the unauthorized "importing, selling, or otherwise distributing for commercial purposes a protected layout-design (topography) or an integrated circuit in which a protected layout-design (topography) is incorporated."[181] While commercial dealing in a photolithographic mask, a design drawing, photographs of integrated circuits, layout data embodying an integrated circuit design, and an integrated circuit manufactured to such a design, are clearly protected, the IPIC leaves doubt as to whether commercial dealing in products containing such a protected design or integrated circuit is also not allowed. This issue was not resolved in the Washington Conference since primarily the members of the 'Group of 77' found it unreasonable to treat commercial dealing of a topography on the same level as in a product containing it. Nevertheless, the issue appears to be resolved by the provision of Art. 3(1)(b) IPIC reading that the "right of the holder of the right in respect of an integrated circuit applies whether or not the integrated circuit is incorporated in an article." The right owner further exclusively holds the right to import, sell, or otherwise distribute for commercial purposes the topography or an integrated circuit incorporating the same. The member states are allowed to grant a more extensive protection[182]. Since the IPIC only defines the holder of the right as a person which "according to the applicable law, is to be regarded as the beneficiary of the protection referred to in Article 6"[183], it is up to the national law of the contracting parties to resolve the issue of ownership of rights.

The IPIC applies, in principle, to lawfully made as well as unlawfully made copies. The exhaustion of rights is addressed in the IPIC[184], but only to the extent that the handling is left to the contracting states. The wording of Art. 6(5) IPIC is to be recognized as ambiguous. It is not clear which 'market' is meant in the provision for the product "that has been put on the market by, or with the consent of, the holder of the right." In fact, the market could be the market of any country, only of the contracting parties, or only of a contracting party applying the exhaustion doctrine. This distinction is important when it comes to the question as to what qualifies as parallel importation. Hence the contracting states are free to decide whether to introduce the doctrine of exhaustion and if so, to which countries they choose.

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[181] Art. 6(1)(a)(ii) IPIC.
[182] Art. 6(4) IPIC.
[183] Art. 2(iii) IPIC.
[184] Art. 6(5) IPIC.

Innocent infringers may receive exceptional treatment[185] if their contracting state makes use of the possibility under Art. 6(4) IPIC. The IPIC namely allows the contracting states to provide for that exemption. The provision is essentially identical with the one from the TSD. A good-faith purchaser of integrated circuits that contain infringing topographies, and of goods containing such integrated circuits is allowed to distribute these items even when he has received knowledge of the fact of infringement.[186] The IPIC does not provide for a remuneration in such cases. Although the laws of the industrialized nations do possess such a remuneration, it was decided during the debate not to have this, as a concession to the developing countries. The IPIC makes no provisions concerning the giving of notice of a subsisting protection.

As to contributory infringement, the IPIC does not enlist this as an unlawful act under Art. 6. However, the IPIC provides that the contracting parties are allowed to consider unlawful acts other than those specified in Art. 6(1)(a) IPIC[187]. Contribution to infringement is not specified therein. This means that the IPIC does not compel the contracting states to consider contributory infringement unlawful. Nevertheless, the contracting states are free to do so.

The same applies to the idea/expression principle. Surprisingly this topic was not even heatedly debated in the Washington Diplomatic Conference and is not to be found in the records thereto. Only in the second WIPO draft, was a provision proposed according to which copying of parts of an integrated circuit design should be allowed when these parts are exclusively dictated by the functions of the integrated circuit. This provision did however not find its way into the IPIC.

Even more surprising was the unexpected relative unanimity regarding the reverse-engineering exception. The final version of Art 6(2)(a) IPIC specifies that "no contracting party shall consider unlawful the performance, without the authorization of the holder of the right, of the act of reproduction referred to in paragraph (1)(a)(i) IPIC where that act is performed by a third party for private purposes or for the sole purpose of evaluation, analysis, research, or teaching." This provision hence does not allow a subsequent commercial exploitation, for example, a sale or creation of a compatible or substitutable integrated circuit. However the subsequent paragraph of Art. 6 IPIC makes it clear that such an act may also profit from the above exemption, provided the thereby created integrated circuit design, referred to as the 'second layout design', itself fulfills

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[185] Art. 6(4) IPIC.
[186] Art. 6(4) IPIC.
[187] Art. 6(1)(b) IPIC.

the requirement of originality. Furthermore, certain acts may be freely performed for private purposes or for the sole purpose of evaluation, analysis, research, or teaching.

An intensively discussed point was the question of compulsory licenses and under which conditions they should be allowed. While the developing countries tended towards compulsory licenses in the case of general interest, some member states of the EC would have preferred to provide for reservations instead of compulsory licenses, this proposal was however not supported by the majority of the EC member states who went for a precise and narrow compulsory-license regulation. Taking into consideration that compulsory licenses in reality do have a minor significance, one was willing to accommodate to the wishes of the developing countries in the area of integrated circuits, in order not to have the IPIC fail due to the differences on this question. However, the U.S. and Japan denied categorically any compromise in favor of the developing countries, maybe because of the fear of precedence to the simultaneously running GATT negotiations of the Uruguay round, concerning the 'Trade-Related Aspects of Intellectual Property Rights' (TRIPS). So the IPIC treaty now contains a lengthy compromise regulation, which was followed by the EC member states but not by the U.S. and Japan. According to the IPIC, a compulsory license is only allowed if it is non-exclusive, used only for exploitation in the national territory, remunerated for and available only in extraordinary circumstances and revocable upon cessation of the reasons justifying its grant. It must be subject to a judicial review[188]. A serious effort to conclude a license agreement has to have failed and there must exist a national vital interest. The granting of compulsory licenses on the ground of national competition and cartel laws is also admissible[189]. Hence, the grant of a non-voluntary license is possible if a third party has made unsuccessful efforts, in line with normal commercial practices, to obtain the authorization of the holder of the right and where by the specific authority granting the license, it is found to be necessary to safeguard a vital national purpose. Similarly, any contracting party may apply measures, including the granting of a non-voluntary license, in application of its laws in order to secure free competition and to prevent abuse by the holder of the right.

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[188] Art. 6(3) IPIC.
[189] Art. 6(3)(b) IPIC.

(v) Registration (Art. 7)

Concerning requirements for obtaining protection, the IPIC follows the path of the TSD, i.e., it allows but does not compel the contracting states to require registration and/or deposit.[190] More importantly, it allows for a protection contingent on a prior first commercial exploitation[191], i.e., no member state is obliged to grant protection before a first commercial use[192]. Further, the member states may require a registration and set a deadline that may not be less than two years from the first commercial use. The registration may also be subjected to a drawing or an exemplary of the industrially usable integrated circuit together with a description of its electronic function. The legislator has to take care of protection of trade secrets, as long as the identification is not rendered impossible[193].

(vi) Term of protection (Art. 8)

The U.S. and the EC member states started at ten years versus a maximum of only three years being offered by the developing countries. The Soviet Union and some other states headed for a maximum term of five years. The compromise was a minimum protection term of eight years.[194] The protection commences from the date of creation, where the commencement of protection is not made conditional upon prior commercial exploitation or registration. It is interesting that the terms 'commercial exploitation' and 'creation' are not defined in the IPIC. It is also of interest that in the TRIPS agreement the duration of rights is set at a minimum of ten years. Here one of the advantages of *sui generis* law becomes apparent in that a term was found that appears reasonable with view to the normal lifecycle of integrated circuit technology.

(vii) Dispute settlement (Art. 14)

The dispute settlement process, which had been requested by the U.S. since the beginning of the WIPO sessions, was one of the most discussed issues. At first, most other countries expressed reservations against this process, but during the conference the necessity of an effective dispute settlement process was recognized, also in respect to the running GATT negotiations. This became even more important since the WIPO also tended towards a comprehensive dispute settlement regulation which should be applicable to any contract on the field of intellectual

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[190] Art. 7(2) IPIC.
[191] Art. 6(4) IPIC.
[192] Art. 7(1) IPIC.
[193] Art. 7 IPIC.
[194] Art. 8 IPIC.

property. The dispute settlement regulation of the Washington Treaty hence could have had some prejudicial effect on this effort. The IPIC now contains provisions concerning the settlement of disputes, including consultations and other means intended to lead to an amicable settlement of a dispute between contracting parties.

The IPIC contains no provision for the procedure of obtaining remedies for infringement. Nevertheless it obliges the contracting parties to "secure adequate measures to ensure the prevention of acts considered unlawful under Art. 6 IPIC and appropriate legal remedies where such acts have been committed."[195] The IPIC further does not address the questions of assignment or granting of licenses to the *sui generis* exclusive rights on integrated circuit design protection. All these issues hence remain in the legislation of the contracting states.

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[195] Art. 3(1) IPIC.

VI. Integrated circuit topography protection under the TRIPS agreement

1. Incorporation of the IPIC

Topography protection is the topic of Art. 35 to 38 of the TRIPS agreement. The semiconductor topography protection under the TRIPS lead to the revival of a treaty not applied up till then, the IPIC[196]. Notwithstanding that the IPIC treaty is still not in force, it has been incorporated by reference in the TRIPS agreement. Just as Art. 9 TRIPS incorporates by reference the substantive provisions of the RBC, Art. 35 TRIPS incorporates the IPIC provisions and obliges the GATT member states to adhere to those. The regulations guarantee that the signatory states grant specific protection for circuit layouts. Thus the attempt that had begun eleven years before with the adoption of the U.S. Semiconductor Chip Protection Act in 1984, finally found its way into the TRIPS.

The provisions, incorporated by reference, concern inter alia the definitions of the terms 'integrated circuit' and 'layout-design (topography)', the requirements for protection, exclusive rights, and limitations, as well as exploitation, registration, and disclosure. A repetition of those provisions is here discarded and, in the following, only the differences are discussed.

In addition to requiring member countries to protect the layout-designs of integrated circuits in accordance with the provisions of the IPIC treaty, the TRIPS agreement regulates three points explicitly, namely, the term of protection, the treatment of innocent infringers and government use, and the applicability of the protection to articles comprising infringing integrated circuits.

2. Exclusive rights

The exclusive rights of the rights holder are contained in Art. 36 TRIPS. Thereafter "importing, selling, or otherwise distributing for commercial purposes a protected layout design, an integrated circuit in which a layout-design is incorporated, or an article incorporating such an integrated circuit" are acts to be exclusively performed or authorized to be performed by the rights holder. Hence performing one of these acts for private or non-commercial purpose is allowed. Mere use

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[196] See Chapter B V 2: Content of the WIPO Treaty on the Protection of Intellectual Property in Respect of Integrated Circuits (IPIC).

of a protected integrated circuit is also not prohibited. The scope of Art. 36 TRIPS includes not only the design material and the integrated circuit but also any product containing this integrated circuit. Prohibition covers only commercial purposes and hence not private or non-commercial purposes, such as non-profit organizations.

The enumerated acts are only prohibited as long as the integrated circuit continues to incorporate an unlawfully reproduced layout-design. It is not clear whether this condition applies to all three enumerated protected devices or only to the last mentioned. It generally resembles an exhaustion provision.

3. Exceptions

Article 37(1) TRIPS provides for the innocent-infringer exception. The innocent infringer cannot be hindered in continuing infringing acts, once he has gained knowledge of persistent protection, but the rights holder is granted a remuneration based on a reasonable royalty. Hence, the TRIPS goes the more practical way of not prohibiting use but rather granting the rights holder his fair share for such use. In that sense the *bona fide* purchaser can rely on his lack of knowledge and does not have to fear being blocked by gaining knowledge, since he has acquired a continuation right for "the stock on hand or ordered before".

4. Term

The term of protection is dealt with in Art. 38 TRIPS. Differing from the IPIC, the term is set at ten years instead of eight. The meaning of this amendment is certainly of minor importance.

5. Compulsory licenses

Article 35 TRIPS exempts Art. 6(3) IPIC from being adopted. Instead, Art. 37(2) TRIPS applies regarding compulsory or non-voluntary licensing of a layout-design, referring to Art. 31 TRIPS which sets forth the detailed provisions for compulsory licenses. In short, the circumstances in which layout-designs may be used without the consent of rights holders are more restricted than under the IPIC. This also explains the willingness of the industrialized nations to accept those provisions.

Of course the enforcement and dispute settlement provisions of the TRIPS apply also to the *sui generis* right on topographies. Generally one has to admit that the reference of the TRIPS to the IPIC is currently the greatest success of the IPIC and might also lead to a wave of accessions to, respectively, ratifications of the IPIC since its substantive regulations essentially have to be adhered to via the TRIPS anyway.

VII. Comparison of the EC, WIPO, TRIPS, and U.S. protection schemes for integrated circuit topographies

1. Subject matter of protection

The object of protection in the legislation, respectively, draft carries different names: 'mask work' in the SCPA, 'layout design (topography)' in the IPIC, or 'topography' in the TSD. Nevertheless, the different designations substantially agree in their meaning, with the exception that fixation in a semiconductor material is required in the U.S. and EC. The TSD protects, in addition, the topography *per se* as an independent marketable product. The WIPO IPIC has not adopted the limitation to semiconductor material in order to avoid amendments in case of possible future technical developments. The underlying drawings of the protected object and its storage in whatever medium are also protected by way of different statutory techniques. Of significance is the delimitation of the subject matter of protection in comparison with the traditional intellectual property laws. Protection here only extends to the object of protection as such, i.e., the topography, and does not cover underlying processes, concepts, systems, techniques, or the information stored in a microchip. Patent protection may then be available for the manufacturing process of an integrated circuit or for the circuits contained in topographies and copyright protection for the computer program stored in a ROM. The expiration of topography protection will not prejudice the duration of the term of protection for these laws. It remains to be challenged whether a topography as such, in addition to *sui generis* protection, could cumulatively be subject to protection under copyright law or maybe also utility model law.

The material conditions of protection, though described in different ways, are in consensus as regards the content, namely the object of protection must be 'original', i.e., it may not be copied, or it has to be the result of one's own intellectual effort. What is usual and commonplace in the semiconductor industry is not eligible for protection. The question of whether, and if so to what extent, the object of protection may contain parts of other integrated circuits, is not regulated in any of these laws and will be subject to national caselaw.

2. Deposit and registration

The U.S. Copyright Office, as office for registration of integrated circuit topographies, sought a compromise between the interests of all relevant parties to have a visible public record and the interest of the industry to retain as much secrecy as possible and simultaneously to request administratively practical application documents. Intermediate products, as one of the most complete forms of an integrated circuit can be independently registered in the U.S.. Hence, masters of gate array integrated circuits are independently protectable, but most likely not the cell libraries or their parts since they do not fulfill the fixation requirement under the SCPA.

In contrast to the U.S., no member state of the EC has yet provided for the possibility of identification of protected topographies. The term of protection is unanimously fixed at ten years; but the calculations of when the period begins differ. The term of protection in the U.S. begins upon the earlier of either the date of the first public commercial exploitation or the date of registration, having a retroactive effect to the application date. In the EC member states, making use of their right to require registration, it is from the first public commercial exploitation or application for registration, with the term running from the beginning of the subsequent calendar year. Therefore, even if an object of protection is first commercially exploited and subsequently registered in several states, slight differences in the terms of protection will arise. The different arrangement of sanctions is also of practical importance. The extent of legislative regulations ranges from detailed provisions to a total lack of references to other intellectual property protection legislation.

3. Right to protection

Under all four laws, the person entitled to protection is the creator of the object of protection, which clearly reminds of the copyright-like character of the *sui generis* protection. In contrast to many copyright conventions, special provisions for topographies which have been created under a contract of employment or on commission exist. This is even the case in states where copyright law does not contain a 'works-made-for-hire' doctrine. The right in favor of the employer or the commissioner will be either presumed by a rebuttable presumption or implied in law. Nevertheless, express contractual agreements to the contrary in individual employment contracts or in collective agreements remain possible. Since with topographies and the typical large expense

involved in their development it is hardly imaginable that a designer could create a topography outside an employment relationship, the protection of topographies can be seen as a *de facto* protective law for the employer and protecting industrial performance. Keeping in mind the legislative aim to protect the investments made for an integrated circuit, the subordination of the employed or commissioned creator's rights appears acceptable since, typically, a personal intellectual creation is not at stake. As a positive side-effect, designing the law as a protection of industrial performance, which benefits the employer, may to a large extent help to circumvent the question who in terms of the modern CAD process is to be seen as the creator of the topography, a question at least difficult to decide using conventional copyright or copyright-like criteria.

4. Scope of protection and exceptions

a) Prohibition of copying

Under all schemes, the exclusive right of the rights holder is designed to provide protection against copying in order to ensure fair competition. The owner is also entitled to the right of commercial exploitation, including the right to offer the object of protection or a semiconductor product containing it, to bring it onto the market, distribute it, commercially exploit it, i.e., to sell, rent, lease, or in any other method distribute it commercially, and to import for that purpose. The formulations in IPIC, TSD, and SCPA deviate only slightly from one another. However, in the SCPA, only the semiconductor itself is protected against commercial exploitation and not the mask work, which evidently is not considered a marketable economic product on its own. On the other hand, the legitimate possession, use, purchase and exploitation of the object of protection are not subject to the owner's consent.

b) Good-faith purchaser

It is not considered an infringement if a person exploits a semiconductor product without knowing or having reasonable grounds to believe at the time he acquired the product that it contained a protected topography. Even after attaining knowledge, the good-faith purchaser is entitled to exploitation, provided the legal owner is adequately compensated. The *bona fide* purchaser is however not permitted to reproduce the innocently owned topography. In this way, the protection of an innocent third party is reasonably harmonized with the owner's interest, the

latter being granted a claim for reasonable compensation instead of a prohibition right. This can be justified insofar as the aim of the *sui generis* law is to protect investment costs necessarily incurred in producing a semiconductor product, rather than the creative performance contained therein. Which case is regarded as a case where a third party has had reasonable grounds to believe that an exclusive right exists, will certainly depend upon the circumstances. The existence of an exclusive right can be checked with the register, at least following the expiration of two years after the first public commercial exploitation. It will certainly be a question of to which extent one can expect a duty of care from a purchaser. The legal owner will on his side attempt to publicize his right by advertising in the relevant technical press. The standard for an adequate remuneration could be a usual license fee, provided, values from real markets are available. Certainly, this remuneration should also compensate the legal owner's loss of profits. The innocent-infringer exception puts the rights holder at a higher risk of verification of infringement, especially in the cases of microchips contained in appliances and also as to proving when the knowledge was attained.

c) Reverse engineering

Reverse engineering is insofar of great importance as it would probably be the most successful defense in an infringement suit, the rights holder having no possibility of prohibiting it. In a reverse-engineering process, a protected topography typically will be photographed and enlarged, i.e., copied, and its functions analyzed and utilized for a separate second topography. This process has become very common in the industry and has been found economically desirable due to the fact that it creates additional supply sources and compatible ICs, which was also acknowledged by the legislator. The legal regulations are new insofar as, under traditional principles of intellectual property, such as improvements to patented inventions, or the adaptation of a copyrighted work for commercial purposes, the consent of the respective rights holder is required. In the U.S., a regulation under copyright's 'fair use' was rejected, as one feared possible undesirable repercussions for software producers and copyright owners of traditional works. The reverse-engineering exception has hence decisively influenced the choice of system of protection as one of sui generis. In the SCPA and also in the TSD and the IPIC unanimity led to the adoption of reverse-engineering as an exception to the exclusive right, thereby limiting the scope of protection. Reverse engineering, for the purpose of commercial exploitation of compatible or competitive topographies, will require separate legislative permission. It is not clear whether and

to what extent it is permissible to directly transfer, i.e., copy unchanged parts of a first topography into a new, second topography. In IPIC, TSD, and SCPA under almost identical wording, reverse-engineering is permissible as long as the result itself fulfills the prerequisites of protection of the mask work, topography or layout design, i.e., it shows itself to be 'original' or the 'result of the creator's own intellectual effort'. This permits two possibilities of interpretation. Either, apart from the use of the copy at the beginning of the reverse-engineering process, only the utilization of the underlying concepts is permissible, or parts thereof and hence not the complete first topography could also be copied into the result of the reverse-engineering process. The legislative history of the SCPA points in the direction that the result of reverse-engineering is not considered an infringement of a protected first mask work when it is not 'substantially identical' to the original, and its design involves 'significant toil and investment'. A similarity, even to a substantial degree, therefore, appears permissible. A similar conclusion may be arrived at under the TSD taking into account the legislative purpose to prevent mere copying without hindering the economically sound production of improved or compatible chips for serving the technical progress. Under all four laws where to draw the line between permissible and impermissible partial copying is still open. Now, if a number of countries do permit direct copying of protected parts, while others do not, two different reverse-engineering standards will be the result, a status which is desirable to be avoided, as much as possible. Otherwise, producers in a more 'liberal' country could obtain competitive advantages over the manufacturers in a more 'restrictive' country and the export of semiconductor products created by way of reverse-engineering in a 'liberal' country to a 'restrictive' country would be impeded. Inside the EC, one will hence have to see that such questions of interpretation do not lead to the above outlined impediment to crossborder trade.

d) Exhaustion

As a further limitation on the scope of protection, all three legislations expressly provide for the exhaustion of the distribution and exploitation rights, once a semiconductor product has been produced or put on the market by the legal owner or with his consent. In consensus, however, the reproduction right remains unaffected. Article 5(5) TSD, when applied in the member states, allows exhaustion of these rights with regard to those topographies and semiconductor products that have been put on the market solely in a member state by the legal owner or with his consent, hence contributing to the often ironically named 'Fortress Europe'.

VIII. Conclusions and outlook for semiconductor protection

Whereas computer programs have found their roof of intellectual property protection in the established field of copyright, integrated circuits were subjected to a *sui generis* right.

Although the starting point for topography protection in the U.S. was the copyright, one arrived during the preparation phase of the SCPA at a favorization of *sui generis* rights, mainly since the narrow 'fair use' doctrine did not allow for an exception of reverse-engineering. Furthermore the U.S. feared being bound under national-treatment obligations of the UCC while possibly in other countries no protection for topographies would be granted under copyright regimes. Placing topography *sui generis* law with full intent outside of the international copyright conventions, was the solution that provided the U.S. with the weapon of reciprocity. As discussed above, this weapon proved extremely effective and in the end was the ignition key to a worldwide adoption of *sui generis* law for topographies. Due to the economical power of the U.S., the other countries seemingly rapidly bowed to the pressure and adopted the principles defined by the SCPA.

It can be stated that in the end the decision for intellectual property protection of integrated circuits has irreversibly lead to *sui generis* legislation. It has been generally recognized that protection is necessary in the interests of the single manufacturer as well as of the general public. It has obviously been found that integrated circuits are not easily integratable in the existing copyright conventions, in contrast to software. To a large extent the U.S. initiative had certainly anticipated the final decision and probably also biased the opinions at the very beginning. Nevertheless, the clear consensus to be found in the national laws but also in the international laws can be rated as a sign of common conviction, although there are some differences concerning the limits in the scope of protection, the calculation of the term of protection, or the prerequisites for registration. One has to keep in mind that such differences have always existed and are to some extent almost inevitable, acknowledging the different cultures unified in the worldwide attempt to harmonize intellectual property protection. The role of the US shall neither be under- nor overestimated. Although the U.S. to some extent exerted concrete pressure on the rest of the world with its reciprocity requirement, the SCPA would not have been adopted as a basis for the harmonized integrated circuit protection regime, if it had not offered a really acceptable solution. One has to acknowledge therefore that the SCPA worked out as a usable model solution that has not been all too difficult to be adopted by those industrial nations which have similar economic

interests. The intervention of the EC commission contributed to the avoidance of a greater disintegration of the laws and, finally, WIPO provided the forum for an international discussion about the multitude of questions that required clarification.

Not everybody is happy about this development. Opinions arose which clearly state that the generation of a *sui generis* right for each and every new technology will soon lead to a jungle of different laws and an atomization of intellectual property law. On the other hand there are arguments against introduction of new developments and technologies into established laws, since this would lead to a set of exceptions with each time, making the original law more complicated and less transparent. Furthermore one argued that the long terms of copyright do not fit the areas of computer programs and topographies, since the industry expressed its wish for the free access to programs after a reasonable term of protection, such that those programs can be used in the then present technical environment. There is no doubt that after even only twenty-five years computer programs will be completely outdated, knowing that today most programs have a typical life time of no more than five years. This problem is certainly not present with *sui generis* law for topographies. In general one may also acknowledge that topographies do incorporate artistical efforts to a much lesser degree than computer programs. As far as the idea-side of the two technological fields is concerned, patent protection is available for both. The TRIPS agreement has at last clarified this and will, as the already recognizable trends signalize, harmonize patent protection to also include software. Now that the decision has been taken, one will be able to compare both protection regimes: Protection of computer programs under copyright and patent law versus *sui generis* protection of integrated circuits. It appears that the historical development lead to a very acceptable solution for computer programs as well as integrated circuit topographies. This has been confirmed by the outcome of the international negotiations and the final results in the respective international treaties and conventions.

The roots of integrated-circuit protection reach back to 1984, the enactment of the SCPA. More than sixteen years have passed since then and it has to be admitted that some of the conditions which were prevalent at that time, have altered significantly. Twenty years ago, technology was to a high degree standardized and it was fairly easy for a chip pirate to use copied mask works on his own processing equipment. The increasing complexity and integration density of chips, and with it the increasing number of mask layers necessary for a single integrated circuit, have in the meantime led to fabrication procedures which require more specialized and hence more unique

processing lines. For copying such high-tech circuits, a chip pirate must not only have access to the whole mask set of the integrated circuit but also to a large extent have knowledge about the manufacturing process and the machinery on which the process is supposed to run. This technological change has probably put a higher barrier in front of pirates than the legal acts do. In addition, the scope of products has changed. Since the modern ICs rely more and more on VLSI technology and are more complex than ever, circuit design and manufacturing expertise alone are not enough to provide the market with a functional integrated circuit. Providing development tools, customer support, microprogramming, and management of a whole family of interoperable ICs are closely related tasks which put the real developer of an original integrated circuit in a position where he can control the market for his product better than any misappropriator. As a seller of copied ICs the pirate finds himself in a much worse position than he would have had in former times. All in all, the importance of semiconductor intellectual property protection has probably faded and technology progress has to some extent adopted the role of self-protection.

D. *Sui generis* law or copyright - a political or a legal question?

So far the different concepts of *sui generis* law - being in force for semiconductor ICs - and copyright law - having survived in the field of computer programs - have been explained and discussed. It has also been shown that the resulting protection and the conceptual basis can be eventually accepted as effective and usable. The adoption and constant maintenance of *sui generis* law for ICs and copyright protection for software may be interpreted as a lasting sign of almost worldwide consent. The preceding sections should also have demonstrated that both different concepts prove well-designed and applicable.

The SCPA is regarded as the first intellectual property law establishing a *sui generis* right expressly designed for protecting a new technology. The chairman of the House Committee on the Judiciary Subcommittee on Courts, Robert W. Kastenmeier, together with the chief counsel thereof, Michael J. Remington, set up a political test[197] for evaluating whether the new legislation proposal in fact meets with general standards. This test includes the assessment of (i) whether the new interest of semiconductor protection, brought forward by the industry, can fit harmoniously into the existing legal framework without violating existing principles or basic concepts thereof, (ii) whether the new interest is committed to a satisfactory and reasonably clear definition, in order to leave no doubt about what is protected, (iii) whether the costs and benefits of the proposed legislation have been honestly analyzed in order to make it possible to identify the beneficiaries of the new legislation as well as those parties that bear its adverse consequences, and (iv) whether on the record it is visible how granting protection according to the new interest will enhance or enrich the aggregate public domain. The new legislation for semiconductor ICs is deemed to have passed that test.

This does however not relieve from questioning how far the path that led to this solution was dominated by profound substantive discussion and pure legal considerations and how far it was determined by political reasons or even concrete political and economical pressure. Is it true that "any history of an American law is really nothing more than an assessment of American society"[198]? In the following, some thoughts hereto shall be explained.

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197 Kastenmeier and Remington, 438.
198 Kastenmeier and Remington, 468 after L. Friedman, "A history of American Law", 1973, 595.

I. Economical structure of the semiconductor market

The history of the semiconductor industry is very unique and its beginning can best be compared to a gold rush. Hardly any industry has ever encountered a comparably quick progress in science as well as in economical value[199]. Whereas the United States have been throughout the industry's history the largest market for semiconductors and also, until the beginning of the eighties, the largest producer on that field, the U.S. industry faced at the beginning of the ninth decade a tremendous deterioration of its once leading position, which was about to be more and more taken over by Japanese firms. At that point in time, the U.S. and Japan were the two major players in the semiconductor game, whereas Europe was only one of the marginal players and South Korea was just emerging as a serious competitor[200]. The semiconductor industry has also been one of the most highly concentrated industrial sectors with 94% of the world market being accounted for by only twenty-five companies, among which again ten accounted for 71% of this market. These companies have in their majority been transnational companies of a significant size, since the high investments for mass chip production can typically be only compensated and turned into profit by supplying more than one national market. The production of ICs was hence beyond reach for most developing countries. Although the design of ICs is in fact not limited to industrial countries, the supremacy of the United States and Japan in that sector was nevertheless still far from being severely jeopardized by developing countries.

Bearing in mind, that the microelectronic technology has a pervasiveness that is practically unprecedented, the impact of a regulation on semiconductor protection becomes obvious, namely exceeding the mere production and trade with semiconductors and extending to the international trade in any kind of products which incorporated semiconductors. The United States would not deliberately allow a foreign nation to take over the lead in such a huge market segment.

It was the concern over the decline of the competitive advantages of the U.S. chip producers which pushed forward the quick enactment of the SCPA[201]. The U.S. industry had the firm perception that there was a direct causality between the increasing strength of Japanese firms and illegitimate copying of American chip designs, and went to congress to ask for special legislative protection. One can read this as an effort to protect semiconductors but it may be also read as an

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[199] Rauch, 95.
[200] Correa: Implications for Developing Countries, 85.
[201] Carmichael, 434.

attempt to protect the industry itself from its competitors. In the initiatives that lead to the approval of the SCPA in 1984, the American semiconductor industry hence played a crucial role.

II. Influence of the industry on the SCPA

The prevailing perception in the United States about a feared decline of the strength of the domestic semiconductor industry[202] had led to the motion for a corresponding protection act.

The first bills, starting in 1979, introduced in the House of Representatives, were all based on the copyright act and proposed an amendment to include mask works into its material scope. The Senate was first in favor of using copyright law as the basis for a stable and enforceable statute for chip protection, fearing the potential hazards of new statutes, which lack jurisdictional history. The concerned industry however had a number of reasons why the hitherto selected approach was not to be accepted as the most suitable one. On the one hand, the domestic industry did not want to be forced under the UCC to grant protection to freeriders, which means that they did not want to grant protection to ICs originating in countries which profit from the US protection scheme, which countries however not in return grant for their own territory the similar protection to U.S.-originating ICs. On the other hand, publishers of the traditional copyright-protected works feared that the incorporation of new subject matter into the existing law might distort it to a degree that might disturb the balance struck for the conventional protected works and the balance between public and proprietary rights, reflected in the existing intellectual property conventions. They particularly strongly opposed the extension of the fair-use doctrine to cover reverse-engineering. The practice of reverse-engineering however, according to the unanimous opinion of the concerned industry, was in all cases to be allowed, since this was the common and allegedly legitimate practice for examining ICs in the United States before the SCPA. Those who had proposed a protecting act for ICs, hence anxiously tried to preserve this practice.

The congress gave in to the massive pressure of the industry and recognized the urgency of the need for intellectual property protection for semiconductor ICs. It was admitted that "Congress does not initiate policy easily, but ... given sufficient cause and provocation, it rises to the

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[202] See statement of Rep. Norman Mineta, member of Congress, according to which "protection of the semiconductor industry was essential to long-term American economic interests", in Rauch, 94.

challenge."[203] The congress first tried to include ICs into copyright law by including photographic masks for imprinting patterns on ICs, and the patterns themselves into the coverage of 'pictorial, graphic and sculptural works', although the new matter may be used as a useful article[204]. This proposal did not survive for very long. That failure showed that the searched quick and easy approach to a legislative solution did not do justice to the complexity of the protection of semiconductor technology. The violation of the Useful-Article Doctrine was also seen as an insurmountable problem. During the 97th congress in 1982, two new bills were introduced into the House and Senate[205], this time proposing a *sui generis* right for ICs. During the 98th congress the decision to adopt these bills was pronounced[206], accelerated by the impending presidential and congressional elections. President Ronald Reagan signed the bill into law on November 8, 1984, only two days after the national election[207].

At the time when the SCPA was discussed and finally adopted, the undermining of the formerly unchallenged U.S. superiority by other nations had already led to a drop from virtually 100% to about 60%. Japan was seen as enemy number one[208] and therefore any legislation for integrated circuit protection should be designed to counteract Japan's rising power. The SIA had urged that any interim order issued to Japan should be limited to half a year because of the large interest of the United States in this economical relationship. In contrast thereto, Sweden, second applicant for an interim order in the row, was found to be eligible to a longer order period, since its semiconductor industry was deemed to be a lower threat than Japan. The amount of chip copying occurring in a specific country was put in relation to the period of a granted order and hence considered in the evaluation thereof. It was clearly stated that not only should reciprocity be used as promoter for the U.S.-originating protection system, but in addition, besides the stage of progress and the form of the proposed legislation in another country, the importance of this country to the American economy, or even more precisely, its jeopardy potential, was to be evaluated and taken as basis of an unequal treatment of different countries. The United States did not hide this perception, and the foreign countries reacted. Japan held against this method, that a shortened order period would cause skepticism in the Japanese industry and could lead to a

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[203] Mivka & Saris, "The American Congress: The First Branch", 367, in Kastenmeier, 424.
[204] House Report 1007, 96th Cong., 1st Session 1979.
[205] House Report 7207, 97th congress, 2nd Session, 1982.
[206] Senate amendment to House Report 6163, 98th Cong., 2nd Session, 1984.
[207] Metalitz, "Legislative Chronology: Semiconductor Chip Protection", in The Semiconductor Chip Protection Act of 1984, ed. J. Baumgarten, 189.
[208] Carmichael, 443.

practice of assignment of chip design rights to American subsidiaries of Japanese firms or to the introduction of a principle to have a first sale in the United States. It was therefore found necessary to exert pressure on Japan[209], and on any other country that followed Japan's footsteps. The only way to achieve this goal was seen in introducing a reciprocity clause.

The reciprocity concept would have made problems, or even have been impossible, to be introduced into the established conventions of copyright law. The later WTO negotiations in Uruguay which implied setting up a national-treatment principle for the TRIPS agreement, would have interfered with this idea. The SCPA was meant to strongly influence the other nations to adopt similar protective schemes. In contrast to the UCC and the Berne Convention, the SCPA allowed the United States to selectively grant the protection of the SCPA to foreign nation citizens, based upon the instrument of Presidential proclamation[210]. Reciprocity, as already discussed, was in contrast thereto the weapon armed with which the SCPA went for the international grounds. Foreign nations had to apply for an interim protection if they could provide evidence that (i) they were making real progress towards a protection scheme similar to that of the SCPA, that furthermore (ii) the citizens of that nation did not engage in illegal activities concerning mask works and finally (iii) that the entry of the Secretary of Commerce's order for interim protection would promote the purpose of the SCPA. The principle set forth therewith, achieving recognition via reciprocity, was hence the driving force from an initially monolateral approach to a purely bilateral protection agreement network with the United States being the common partner to all these agreements. This network let no room for freeriders, as there would have been under the regulations of one of the international intellectual property systems.

The disadvantages of the SCPA versus a copyright-based solution stood against these arguments but apparently did not suffice to outweigh the above discussed advantages. The SCPA extends only to mask works that have been fixed in a semiconductor chip, and does only protect the mask works but not the chip itself. The registration requirement of the SCPA was also not present in copyright law. The finally resulting SCPA offered a much lesser degree of protection than the right provided by copyright law, but did find no support by the concerned industry.

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[209] In the House hearings 1979, Intel presented as evidence photographs of an Intel DRAM chip and an exact copy of the same chip produced by Toshiba, Japan.
[210] §902(a) SCPA.

The extraterritorial pressure that the United States via the reciprocity clause exerted upon other countries, to a large extent determined the establishment and international adoption of the *sui generis* regime. But even after the SCPA had come into force, the U.S. did not rely on this Act alone, but concluded a chip pact with Japan, trying to monitor and maintain chip export prices above a certain level. The MITI even issued administrative guidance to companies, requiring them to report their export price data to the government and to not export semiconductors below cost. Furthermore, production control through supply-demand forecasts was envisaged. It was not surprising that the GATT Council found that guidance to be in violation of the GATT agreement[211]. Nevertheless, this measure clearly shows that Japan also assigned great economical importance to the IC industry. It is interesting to note, that although there was an aggressive competition between Japan and the U.S., Japan expressed its consent with the United States proposal, and apparently expected to profit from its impact and to increase the distance vis-à-vis the developing countries and to solve the freerider-problem. In that respect the industrialized nations fought side by side[212].

In 1987, the Sematech, a government-funded consortium was established with the goal to generate improvements on the field of semiconductor production equipment. Companies like IBM, ATT and others contributed with their technology, such as the 4 MBit DRAM from IBM[213]. Over six years the U.S. Defense Department contributed 600 million US$, which signaled the military interest in the semiconductor technology, although the critics arose "that a strong military involvement is not the right formula for the commercial competitiveness of the U.S. chip industry"[214]. Finally, the 1988 amendment to the Trade Bill provided for a National Advisory Committee on Semiconductors, primarily acting as counsel for the allocation of funds in research and development.

The dominance of the U.S. American firms in addition to the risk of being deprived of a regular supplier of chips or the risk of being subject to some other retaliatory action[215] have probably been the main accelerating factors in the diffusion of the newly created intellectual property title over the American borders and into the legal systems of the industrialized nations. The SCPA also was

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[211] The Japan Economic Journal, 1988, 22.
[212] See e.g. statement of Akio Morita, President of the Electronic Industries Association of Japan (EIAJ), Chairman and CEO of Sony Corporation, Letter to Robert. W. Kastenmeier, July 18, 1984, Minnesota Law Review.
[213] Warshofsky, 367.
[214] Molina, 168.
[215] such as provided in Section 301 of the U.S. Trade Act.

the impetus for the next step, namely to have such protection also in the developing countries, approached via the multilateral discussions of WIPO during the Washington Conference. But again the United States and Japan went against the stream and voted against the treaty, mainly dissenting with the regulations on non-voluntary licenses and the provisions concerning industrial articles containing infringing ICs. It was only under the auspices of the WTO in the framework of GATT, that the U.S. finally gave in to the principle of national treatment in favor of an international standard of chip protection.

The United States succeeded to have their national law essentially adopted into other national laws via the reciprocity requirement. The SCPA broke new ground by attempting to serve as catalyst for establishing a regime of international comity in integrated circuit protection. Experts criticized that the U.S. had chosen the regression to the already widely abandoned reciprocity principle. It was seen as a sort of brute force, inadequate for achieving harmonization in international intellectual property legislation[216]. On the other hand it has to be acknowledged that the American bilateralism paved the way to multilateralism, whereby the technological but also the political power of the United States dominantly determined the shape and extent of the regulations in the semiconductor area.

Concerning the practice of interim orders, it is interesting to note that the USPTO was relatively sympathetic to all applicants, following a respective suggestion of the House Committee on the Judiciary[217]. This behavior was heavily criticized and found to be counterproductive for the goal to obtain meaningful protection for U.S. chip designs in other countries.[218] The identical treatment of all applicants was judged to be contrary to the congress's intent to deal less favorably with nations that copy designs of U.S.-originating ICs. The USPTO was reproached of having provided too little guidance to applicant countries for an interim order, although there was evidence that those countries would have been responsive to such guidance.

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[216] Cohen Jehoram, 1987.
[217] House Report 1028, 18.
[218] Carmichael, 438.

III. Infringement under the SCPA

Between 1985 and September 1987, the U.S. Copyright Office received more than 3400 registration applications, a share of 3000 being from U.S. companies. But although the SCPA was signed and adopted in 1984, it took four years to have a first case under this Act decided by a U.S. court. Also afterwards, the number of litigations remained relatively low.

That litigation in the field of ICs practically not occurred for a number of years indicated either that the US premise that Japanese competitors were intensive chip pirates, was wrong, or that the SCPA did not provide the effective protection that had been desired.

1. Infringement standard

The SCPA lacks an express guidance to an infringement standard. As one source of interpretation, a House Report hereto stated that "it is intended that the concept of infringement of rights in a mask work be essentially the same as that of infringement of a copyrighted work"[219] whereas a Senate Report took the standpoint that "a semiconductor chip constitutes infringement of the copyright in a mask work when the pattern etched into the chip is 'substantially similar' to the pattern of one or more images of the copyrighted mask work"[220].

The SCPA was enacted without definition of an infringement standard, despite the intensive industry debate concerning reverse-engineering as a fair-use exemption, and its implications for infringement actions, as well as conflicting legislative pronouncements over what is to be used as the appropriate standard for infringement. There are two possible explanations for this fact: Either the senate did not yet know which standard to apply, or, the senate wanted to leave the decision to the addressees of the SCPA, i.e., mainly the industry[221], respectively, to the jurisdiction to apply a caselaw-oriented standard.

As soon as the first infringement case was brought before court, one expected to get an interpretation of the expressions 'substantial identity' and 'originality', which up to then had rendered the SCPA vague and to a large extent unpredictable in scope and enforceability. Both

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[219] Report 98-781, 25.
[220] Senate Report 98-425, 16.
[221] Fisher, "Beyond fair use: Reverse Engineering and the Semiconductor Protection Act of 1984", 3 The Computer Lawyer 9, April 1986, 18.

expressions have nonetheless been judicially tested and interpreted for the area of copyright law[222]. Thereafter, 'substantial similarity' in its meaning for copyright purposes is given when it can be determined that, provided the access to the allegedly infringed work can be proven or at least inferred, an act of copying has in fact taken place. The concept of 'originality' in the SCPA at least differs insofar from the concept under copyright law, as a mask work is excluded, which consists of commonplace designs, whereby the mask work as a whole is not original.

2. Brooktree *vs.* AMD

On November 9, 1988, the Californian Brooktree Corporation filed suit against the Delaware corporation Advanced Micro Devices Inc.[223], known under its initials AMD, alleging that AMD had copied two CMOS ICs from Brooktree as a replacement for their less-efficient bipolar version of a similar chip. Brooktree's chips had been registered for protection under the SCPA. Three years after Brooktree's chip market debut, AMD had come up with a CMOS chip that was advertised as 'plug-in replacement' for the original Brooktree CMOS chip, but sold at a lower price. In an AMD product strategy report, AMD itself had referred to its chip as the 'Brooktree Killer' and had also laid down that AMD's manufacturing efficiencies would enable AMD to sell at a price at which Brooktree would be unable to compete.

After filing suit, Brooktree had pleaded for a preliminary injunction which was however refused by the court, holding that the plaintiff had failed to prove whether the defendant's work was 'substantially identical' to its own work and that a strong likelihood of success on the merits was not sufficiently established[224]. AMD in opposition to Brooktree's motion presented evidence that their development of the said chip had begun before the market introduction of Brooktree's corresponding chip and further argued that their actions with respect to their competitor's chip were restricted to pure reverse-engineering activities. Whereas AMD further stated that the copied portion only covered less than 35% of the chip area, Brooktree countered with the finding that nevertheless 80% of the transistors of the whole chip were contained in that area.

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[222] E.g., Bleistein v. Donaldson Lithographing Co., 188 U.S. 239 (1903) and Batlin & Son, Inc. v. Synder, 536 F. 2nd, 486 (2nd Circ. 1976).

[223] AMD, as well as Intel Corp. and National Semiconductor Corp. were founded by former employees of Fairchild Camera and Instrument Corp..

[224] Gesmer, Brooktree/AMD, 17.

The surprising judgment of the Federal District Court made the identity requirement dependent on the existence or non-existence of a paper trail, being presentable by the defendant and giving evidence for a performed act of reverse-engineering. The court thereby obviously interpreted the SCPA as a means for prohibiting direct piracy at low cost rather than barring long-term and cost-intensive re-engineering. Although this judgment shows an inherent logic, it probably deprived the law of a decisive sharpness. It may be suspected that topography-right infringers rarely have difficulties in delivering a paper trail which results in the court applying the favorable 'substantial-identity' standard rather than the 'substantial-similarity' principle. On the other hand, reverse-engineers may, under use of modern reproduction and analysis tools, be unable to provide for the necessary paper trail in order to exculpate themselves under the SCPA.

Although AMD through sworn testimony managed to confirm that their reverse-engineering activity was restricted to the mere study of circuitry and component organization, and hence the final finding of the court may be correct, it is to be criticized that the court opened via the given evidentiary importance of the 'paper trail' an escape for many mask-work pirates, except maybe for some very extreme cases of piracy. The interpretation by the court stands on a swamp ground, as far as a confirmation in the legal statutes is concerned and can be attacked as departing too far from the true and desired meaning of the regulations. A very critical statement claimed that "When the Russians copy American chips, it is considered a threat to national security. When the Japanese do it, it is considered highly questionable trade practice. When U.S. semiconductor companies do it to each other, it is often called "reverse-engineering", winked at, and in some cases even encouraged."[225] This observation pronounces loudly what many people think, namely that the U.S. Courts apply different law interpretation to different cases, or even to be more specific, to parties of different nationality, thereby satisfying a trade policy it deems appropriate.

3. Long-term effects of the SCPA

The little judicial activity under the SCPA may be interpretable as a sign that the SCPA and its foreign counterparts are not yet the ultimate solution for semiconductor topography protection. Japan has despite the SCPA and the chip pact of 1986 arisen to a mighty competitor. The excellence of the Japanese industry in manufacturing technology, product technology and production equipment in this sector apparently outperformed the American companies to a

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[225] Fisher, The New Alchemists, 180 (1982) in Gesmer, Brooktree/AMD, 23.

considerable extent. The rising power of innovation of Japan's industry is also reflected in a significant increase of Japans share in semiconductor patents.

One may ask oneself what factual effect in the end the SCPA has had. Undeniably, a protection legislation provides a right owner with a certain monopolistic right in return for his contribution to the state of the art and public knowledge. This granted protection can function as an incentive for innovation but can also, once the granted monopoly gets too strong, have the opposite effect. Once being protected by law, chip producers can become inert, since there is no threat by competitors who are being blocked by the intellectual property rights, and hence no need for improvement is felt. Opponents of strong semiconductor protection hold this against the legislators of the SCPA. Recalling the Brooktree/AMD case, on the other hand, it seems that the exceptions under the SCPA leave enough room for innovation and development without getting into conflict with the SCPA regulations. To be able to keep up with those non-infringing competitors should suffice as innovation incentive for an originating entity. It has been argued that the encouragement of innovation was one of the main reasons for choosing *sui generis* law for semiconductor protection, but outside of the scope of the SCPA, gaining lead time in development, and exploiting the so-called learning curve[226] will be the primary surviving methods for securing the returns on investments in semiconductor technology.

The IC industry which has always been an oligopolistic group of big companies, now encountered a new potential barrier for access to its technology. The concentration in this market segment consequently was reinforced, the reluctance to technology transfer increased, and the diffusion of microelectronics innovations through trade[227] certainly affected significantly. The provision of border measures for stopping importation of industrial articles basing on the presumption that these infringe a topography right can establish a distortion in cross-border trade. The countries that mainly import or export semiconductor chips hence belong to the most affected ones.

It can hence be concluded that the SCPA contributed to the opening of the gap between the developing countries and the industrialized countries, since the SCPA per se does not sufficiently promote diffusion and transfer of semiconductor technology to developing countries. The pervasiveness of microelectronics technology even extended the consequences of the SCPA and

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[226] "Learning curve pricing" is the method of reacting to or even anticipating a cost declination by cutting own costs in order to increase or retain market share and discourage new entry by competitors (see also Kastenmeier, Remington, 453).
[227] Correa: Implications for Developing Countries, 98.

of any corresponding legislation around the world over the mere production and trade of semiconductors as such, towards international trade in any product that incorporates semiconductors. This makes the integrated-circuit protection legislation very burdensome, in particular for developing countries, being subjected to a lack of diffusion concerning the trade in microelectronics-based innovations. By preventing copying and raising the cost of access to technology, the *sui generis* protection of layout designs at the international level will probably increase the barriers for entering the industry, but will not affect those companies and countries that have the potential to establish a technological infrastructure in the field. The perception and fear of the American industry with respect to their competitors in the end made the SCPA a means for "maintaining technological and commercial supremacy"[228].

It has been argued a lot about the benefits of *sui generis* legislation for semiconductors, but it may not be forgotten that it was mainly a tool of the U.S. American extraterritorial power play, of their external trade policy, that put *sui generis* law on the agenda of the congress and which drove it through the decision process at a significant speed. Regardless of what finally remained of it, the SCPA is the perfect example of how a trade-political instrument has matured into an internationally recognized protection regime.

IV. Success of the SCPA - a lesson for software protection?

Having learned about the implications of trade policy on semiconductor protection, the question arises of how this lesson may be applied to software protection. Did the reflections on international trade in semiconductor chips have an impact on software protection?

The chip protection history turned out to be a successful approach for the United States for diffusing their legal system into other countries. So it is not surprising that opinions exist according to which the system of software protection is to be designed in the same way, particularly to enable the domestic industry of the United States to create software at a rate consistent with that of its foreign competitors.[229] Software protection is seen as a means of economic welfare.

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[228] Correa: Implications for Developing Countries, 100.
[229] Braselton, 338 but also Samuelson argued in favor of this approach.

This proposal is supported by the finding that copyright protection does not provide adequate protection, since it does neither protect against independent creation nor does it limit fair use. Also the 'useful-article' limitation[230] of copyright is not seen adequate, since computer programs do show doubtless a usefulness[231].

It was hence proposed to create also for software a *sui generis* protection regime, in legal parallelism to the SCPA, thereby taking into account the technical parallelity of software and ICs. The proponents of the *sui generis* law did not try to hide the perception that apart from the technical parallelities, software and ICs do have in common that "each of these industries is central to the growth of America economy yet vulnerable to foreign competition. A *sui generis* approach would allow the United States to grant protection for foreign-developed computer programs only if the country from which a particular program originates grants reciprocal protection"[232]. Hence once again reciprocity should be the key to dissemination of a U.S.-originating protection scheme.

The fact that the industry is turning to other forms of protection[233] was interpreted as a failure of the copyright regime to adequately protect software[234]. It has however to be taken into consideration that the industry has always sought and will continue to seek protection wherever it can be found. There is no single intellectual property protection regime available which covers all intellectual aspects of a specific article of manufacture or method. Hence, protection thereof via a combination of different intellectual property regimes, like trademarks, designs, patents, etc., is an expression of the natural aim to protect intellectual assets that prove of high value as much as possible. Furthermore, a specific intellectual property right is always susceptible to a specific attack. The more numerous and the more different the protective rights are, the harder it becomes to invalidate all of them with a single attack. Hence the conclusion that the availability of dual copyright/patent protection undermines the purpose of the patent system or of any singular intellectual property right, cannot be maintained. The only issue to be decided is which intellectual property right lies in the center of interest for a specific item to be protected.

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[230] §101 US Copyright Law.

[231] Usefulness is however since the Decision Apple v. Franklin Computer Corp. res judicata and hence no longer an issue.

[232] Braselton, 355 and Samuelson, 486.

[233] Braselton, 350.

[234] See also in Samuelson, 514.

While it has been argued[235] that the success of the SCPA is the best argument for *sui generis* protection of computer software[236], it was unlikely that the software producers or the congress would work towards a new statute to protect software in a similar manner. The computer industry invested already significant time and money to bring the copyright law into its present state. Meanwhile, the industry knew well the limitations of copyright protection, even though its boundaries may be still not clear. The congress, having worked hard to create the SCPA to appease one segment of the computer industry was not as willing to start over in order to do it again for another segment of the same industry, knowing that this industry already requested and received amendments to the Copyright Act. Finally, the international treaties under the WIPO and the WTO which solidified the copyright regime as the worldwide unified and accepted standard regime for software protection, made any subsequent approach to a different type of protection look like a step backwards. The unilateral U.S. method performed for semiconductor protection, biased strongly with economical and trade-political considerations, and resulting in the sui generis protection for ICs, will with high certainty remain unique in the history of intellectual property protection. The modern, multilateral way of harmonization, being pursued by the GATT including the TRIPS, should ban such efforts for the future.

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[235] Wilf, 259.
[236] Samuelson, 471.

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F. Abbreviations

Art	Article
CAD	Computer-Aided Design
CD	Compact Disk
CMOS	Complementary Metal-Oxide-Semiconductor
CONTU	National commission on New Technological Uses of Copyrighted Works
CPA	Community Patent Agreement
CPD	Council Directive of 14 May 1991 on the Legal Protection of Computer Programs (91/250/EEC), O.J. No. L 122/42
DMCA	Digital Millennium Copyright Act
DVD	Digital Versatile Disk
EC	European Community
ECJ	European Court of Justice
ECT	Treaty establishing the European Community, Amsterdam notation, (old notation given in brackets)
EPC	Convention on the Grant of European Patents of 5 October 1973
EPO	European Patent Office
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade 1994
GRUR	Gewerblicher Rechtsschutz und Urheberrecht, VCH
GRUR Int	Gewerblicher Rechtsschutz und Urheberrecht, Internationaler Teil, VCH
IC	Integrated Circuit
IIC	International Review of Industrial Property and Copyright Law, VCH
IP	Intellectual Property
IPIC	Treaty on the Protection of Intellectual Property in Respect of Integrated Circuits of 26 May 1989, WIPO

MITI   Japanese Ministry of International Trade and Industry

O.J.   Official Journal of the EPO

p.m.a.   post mortem auctoris

PC   Paris Convention for the Protection of Industrial Property of 20 March 1883, WIPO, (Stockholm Revision 1967)

PCT   Patent Cooperation Treaty

PROM   Programmable Read-Only Memory

RBC   Berne Convention for the Protection of Literary and Artistic Works (19. September 1886), WIPO, (Paris Revision, 1971)

ROM   Read-Only Memory

RT   International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations, adopted at Rome on 26 October 1961, (Rome Treaty)

SACEPO   Standing Advisory Committee of the European Patent Organization

SCPA   Semiconductor Chip Protection Act 1984, (U.S.), 17 U.S.C. Sec. 901

Sec   Section

SIA   Semiconductor Industries Association

TRIPS   Agreement on Trade-related aspects of Intellectual Property Rights, Including Trade in Counterfeit Goods (GATT)

TSD   Council Directive of 16 December 1986 on the Legal Protection of Topographies of Semiconductor Products (87/54/EEC), O.J. No. L 24/36

UCC   Universal Copyright Convention of 6 September 1952 (Paris Revision 1971)

UN   United Nations

UNESCO   United Nations Educational Scientific and Cultural Organization

UNICE   Union of Industrial and Employer's Confederations of Europe

US   United States of America

USCA   U.S. Copyright Act, 17 U.S.C.

USPA   U.S. Patents Act, 35 U.S.C.

USPTO   Patent and Trademark Office of the United States

VLSI   Very Large Scale Integration

WIPO   World Intellectual Property Organization

WTO   World Trade Organization

WVRK   Wiener Vertragsrechts-Konvention