NOTE

Expanding the Patent Law of the People's Republic of China: A Proposal For Patent Protection of Computer Programs

I. INTRODUCTION

When the People's Republic of China (PRC or China) promulgated a patent law in 1984,[1] some viewed the new law as an effort to protect and encourage inventions, to stimulate international exchanges, and to facilitate technology transfers to the PRC.[2] Although it is apparently successful and generally complete,[3] the Patent Law largely

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1. Zhonghua Renmin Gongheguo Zhuanlifa [Patent Law of the People's Republic of China] (adopted Mar. 12, 1984, promulgated Mar. 12, 1984) [hereinafter Patent Law]. For an English translation, see FAR EASTERN LAW DIVISION OF THE LIBRARY OF CONGRESS, 98TH CONG., 2D SESS., CHINA'S NEW PATENT LAW AND OTHER RECENT LEGAL DEVELOPMENT appendix (Comm. Print 1984) [hereinafter Committee Print]. Pursuant to article 68 of the Patent Law, the State Council issued on January 19, 1985, the Implementing Regulations of the Patent Law of the People's Republic of China [Zhonghua Renmin Gongheguo Zhuanlifa Shishi Xize], in 1935 ZHONGHUA RENMIN GONGHEGUO GUOWUYUAN GONGBAO [GAZETTE OF THE STATE COUNCIL OF THE PEOPLE'S REPUBLIC OF CHINA] [hereinafter STATE COUNCIL GAZETTE], No. 3, at 53-69 (an unofficial English translation of the regulations released by the Patent Office of the PRC is available at the Center for Chinese Legal Studies, Columbia Law School) [hereinafter Patent Regulations]. The Patent Law took effect on April 1, 1985.

Patent rights are negative in nature. The patent holder or patentee may prevent others from practicing the invention. Thus, it is incumbent on anyone who wishes to exploit the patented technology to seek a license from the patentee. Such licenses usually provide that the patentee will not seek an injunction or damages against the licensee if the licensee pays royalties as he or she exploits the invention and satisfies other specific terms in the license.

2. *See* Committee Print, *supra* note 1, at 23-25.

3. One indicator of the Patent Law's acceptance is the number of applications that have been submitted under the Law. By the end of July 1990, the PRC had processed more than 147,000 patent applications, which comprise of over 27,000 applications from 64 countries and regions. The China Patent Office had granted 52,171 patents, 47,439 of which were to domestic inventors. These figures represent a 33% yearly growth since April 1, 1985, in the number of patent applications submitted. Huang Wei, *Burgeoning Patent Industry in China*, BEIJING REV., Dec. 3-9, 1990, at 19, 19-20. Approximately 30% of the patents have been implemented, generating US$140 million in foreign exchange earnings. *Patent Office Sees Growth*, CHINA

dodges the important subject of protecting computer programs.[4] The PRC government has decided to permit computer software copyrights,[5] which may imply a denial of patentability of computer programs. Because computer programs are a relatively new and increasingly important technology, many countries, developed as well as developing ones, have encountered legal and intellectual difficulties in dealing with programs. The PRC is no exception.

This note argues that the PRC should bring computer programs within the structure of its Patent Law, even though copyright protection is concurrently available. As a foundation for this proposed legal reform, Part II of the note places the Chinese patent system in its historical and contemporary contexts, viewing computer program protection from the Chinese economic, ideological, and political perspectives. Part III then examines two major methods for protecting computer programs: copyright and patent. This note contends that patent protection of programs is necessary in the PRC because copyright protection is too limited in scope. Furthermore, if the PRC's

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DAILY, Oct. 29, 1990, at 2, col. 2.

4. In the simplest terms, a computer program is a sequence of commands that a physical computer or hardware executes. These commands are written in a programming language appropriate for the specific physical computer in use. A computer program in a form that is intelligible to human beings is sometimes called "source code" in the technical literature. The physical computer may automatically convert the source code into a form that the computer can directly execute. The converted program, or "object code," is a string of "1"s and "0"s. Without programs, computers cannot operate as the machines would not know what to do.

5. *See* Zhonghua Renmin Gongheguo Banquanfa [Copyright Law of the People's Republic of China] (adopted Sept. 7, 1990, promulgated Sept. 7, 1990) art. 3 [hereinafter Copyright Law]. An English translation of the Copyright Law appears in BRITISH BROADCASTING CORPORATION, SUMMARY OF WORLD BROADCASTS, PART 3: THE FAR EAST [SWB/FE], Sept. 11, 1990, at C2/1. The Copyright Law became effective on June 1, 1991. Pursuant to article 53 of the Copyright Law, the State Council has promulgated specific regulations to protect computer software, Jisuanji Ruanjian Baohu Tiaoli [Regulations for the Protection of Computer Software] (adopted May 24, 1991, promulgated June 4, 1991), *in* 1991 CHINA PATENTS & TRADEMARKS, No. 3, at 75-76 [hereinafter Software Regulations]. For an unofficial English translation, see BAKER & MCKENZIE, NEW REGULATIONS FOR THE PROTECTION OF COMPUTER SOFTWARE IN CHINA (1991) or 1991 CHINA PATENTS & TRADEMARKS, No. 3, at 77-81. The Software Regulations have been effective since October 1, 1991. *Id.* art. 40.

This note follows the terminology of the Software Regulations. Thus, "computer software" refers to both the computer program and its related documentation. *Id.* art. 2. "Computer program" includes source code and object code. *Id.* art. 3(1). "Documentation" means the "information and diagrams written in natural or formal language used to describe the contents, composition, design, function specifications, development details, testing results and method of use of a program." *Id.* art. 3(2).

copyright system does not require full disclosure,[6] society would lose the benefits from learning new technology. In addition, computer program patents are common among developing countries, and they are particularly appropriate for the Chinese economy. Having shown the theoretical attractiveness of patent protection, the note proceeds in Part IV to apply the Chinese Patent Law to programs. The note argues that computer programs are proper subject matter within the existing patent framework, and that the Chinese Patent Law is designed to minimize administrative difficulties and to prevent patents from disrupting the progress of technology. Finally, in Part V, the note concludes that copyrights should protect the expressive aspects of computer programs, while the functional features of programs should be patentable.

II. THE SOCIETAL CONTEXT OF THE CHINESE PATENT SYSTEM

A. Development of the Treatment of Technical Achievements

The government of the PRC has always recognized the importance of encouraging domestic inventive activity in order to avoid reliance on foreign technology.[7] Under Mao Zedong's leadership, the government promulgated various regulations providing economic and ideological incentives to stimulate technical advances.[8] The particular emphasis of the compensation schemes on material awards or intangible honorary awards shifted over time, depending on the prevailing political situation. Consistent with the radical egalitarianism espoused by some Maoist leaders, the PRC suspended monetary awards to inventors during the Cultural Revolution years.[9]

During the post-Mao era, a renewed emphasis on monetary rewards emerged. On March 16, 1982, the Chinese government issued the "Regulations Governing Rewards for Rationalization Proposals and

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6. The extent of disclosure required under the Software Regulations is ambiguous. Article 25 specifies "software identifying material" as part of an application to register computer software but does not elaborate on what those words mean. Software Regulations, *supra* note 5. Whether and to what extent source code is part of such "identifying material" are questions the PRC has yet to answer.

7. For a discussion of the evolution of PRC's technological policy, see RUDI VOLTI, TECHNOLOGY, POLITICS, AND SOCIETY IN CHINA, 33-54 (1982).

8. *See* Tao-tai Hsia & Kathryn A. Haun, *Laws of the People's Republic of China on Industrial and Intellectual Property*, 5 L. & POLICY INT'L BUS. 743 (1973).

9. *See* Committee Print, *supra* note 1, at 20.

Technical Renovations" (Rewards Regulations).[10] Since some categories of domestic achievements that may qualify for monetary awards and for certificates of merit are specifically excluded from the Patent Law[11] and are not eligible for copyrights,[12] the PRC now has a multi-track system of patents, regulatory rewards, and copyrights. Until the promulgation of the Copyright Law, the Rewards Regulations track of protection presumably covered computer programs.[13] Patent protection for programs per se, that is programs not "integrated" with hardware, has not been recognized.[14]

B. Current Needs of the People's Republic of China

In its regulatory scheme, the Chinese government is attempting to strike a fundamental balance between the recognition of intellectual property rights and the preservation of a nonindividualistic socialist society. On one hand, intellectual property protection gives just reward and incentive to inventors in order to drive the economy and society forward.[15] Protecting intellectual property also increases the willingness of foreign entities to invest intellectual property capital via joint

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10. A translation of the Rewards Regulations from an April 12, 1982, Xinhua broadcast appears in FOREIGN BROADCAST INFORMATION SERVICE, DAILY REPORT: CHINA [FBIS—CHINA], Apr. 13, 1982, at K11.

11. Two examples are improvements of biological varieties and of medical and health techniques. *Compare id.* art. 3, §§ 1, 2 *with* Patent Law, *supra* note 1, art. 25, §§ 3, 6.

12. For the forms of works that copyrights protect, see Copyright Law, *supra* note 5, art. 3.

13. *See* Rewards Regulations, *supra* note 10, art. 3, § 5. Nothing in either the Rewards Regulations or the Copyright Law prohibits their simultaneous application to a particular computer program.

14. A program integrated into hardware which can solve a specific problem can obtain patent protection as a combination of computer program and hardware. Liu Gushu, *Patent Protection in China is the Prerequisite for Importation of Foreign Advanced Technology*, 1985 CHINA PATENTS & TRADEMARKS, No. 3, at 39, 40. At least since 1987, the hardware aspect of the invention need not incorporate changes from existing equipment. Novel and creative operation of a computer system are the key standards for patentability. Instances where patents were granted to program-related inventions involve the protection of entire systems. Li Yong, *Patentability of Software-Related Inventions*, 1990 INTELL. PROP. IN CHINA, No. 2, at 3. This approach obscures the true innovation, creates confusion over the scope of protection, and lacks intellectual clarity.

15. The Patent Law itself acknowledges the need to stimulate enthusiasm for inventive activity. According to article 1, the Patent Law "is enacted . . . to encourage invention-creation . . . for meeting the needs of . . . socialist modernization." *Supra* note 1.

Similar language appears in article 1 of the Copyright Law, which states: "This law is . . . for the purpose of . . . encouraging the creation and dissemination of works conducive to socialist spiritual and material construction; and promoting the development and flourishing of socialist culture and sciences." *Supra* note 5.

ventures and wholly foreign-owned enterprises. Due to the Chinese Communist Party leadership's concern for rapidly modernizing the economy, acquisition of advanced technology from abroad had played a heightened role before the tragedy of June 4.[16] Despite the Party's retrenchment and rhetoric against liberal influences in the aftermath of June 4, the doors of the PRC have remained open to foreign technology.[17] On the other hand, the intellectual property concept, which provides an inventor exclusive rights to the invention, is unpalatable to Marxist ideology. Superior rights to the products of one's mental endeavors contravene socialism's emphasis on the good of society as a whole.[18]

The current regime has largely avoided this theoretical dilemma by focusing on practical realities and the development needs of the PRC. According to the PRC government, "Without modern science and technology, it is impossible to achieve the modernization of industry, agriculture, and national defense."[19] In addition to native talent, the PRC views industrialized countries as a major source of new tech-

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16. When Deng Xiaoping emerged as China's preeminent leader in December 1978, he announced various economic reform policies, including opening the Chinese market to the outside world. China's desire to attract foreign interest in economic and trade relations has been explained as follows:

> In this world all industrially backward countries have caught up with industrially advanced countries by relying on the adoption of the most advanced technology. We should also do this . . . . [We] must modestly learn all advanced, fine things from foreign countries and import . . . advanced technology from abroad and put it at our disposal so as to accelerate the speed of development of our national economy.

Some Problems on the Acceleration of Industrial Development (draft of Sept. 2, 1975), *in* CHINESE L. & GOV'T, Spr.-Sum. 1979, at 75, 92-93. The excerpt is from one of three documents Deng commissioned in 1975, which outlined his ideas. Overall, the documents espoused a platform of reform, modernization, and openness to foreign influence and trade.

17. *See China's High-Tech Is up to Standard, Minister Reports*, CHINA DAILY, Sept. 5, 1990, at 4, col. 1; *Report on Revisions to Draft Copyright Law*, SWB/FE, Sept. 5, 1990, at C2/1. This is probably due to a combination of inertia from the gains made over the past decade and a realistic assessment of PRC needs and resources.

18. Since Marx opposed the notion of a natural dichotomy between individuals and society, he viewed inventions as basically social products. Thus, no person should have extraordinary rights in his or her intellectual creations. Giving an individual exclusive rights to profit from an invention, which is a form of technological capital, is contrary to socialist ideals. *See* Hsia & Huan, *supra* note 8, at 748-52.

19. Several Problems Concerning Scientific and Technical Work (draft of Aug. 17, 1975), *in* CHINESE L. & GOV'T, *supra* note 16, at 104, 106. Zhou Enlai originally presented the "four modernizations" in January 1975 as his plan to transform China into a "powerful socialist nation" by the beginning of the twenty-first century. The "four modernizations" plan calls for efforts in the fields of science and technology, industry, agriculture, and defense. The plan has been re-formulated somewhat by stressing that modern science and technology is the predicate for the other three modernizations. *Article Criticizes Gang Slander of "Outline Report"* (Peking Domestic Service radio broadcast of June 29, 1977), FBIS—CHINA, June 30, 1977, at E1-3.

nology and is willing to facilitate acquisitions from developed nations.[20] This apparent willingness to compromise strict adherence to Marxist ideology led to the promulgation of the Rewards Regulations, which provide for cash rewards, and to the enactment of the Patent Law.[21] The government's pragmatic approach is also reflected in the post-June 4 adoption of the Copyright Law.[22]

Given the prominent role of computer programs in modern technology, the PRC's ability to both obtain and develop programs is critical to its modernization drive. The existing legal scheme, however, fails to adequately protect the interests of domestic and foreign inventors in their programs. For example, the Rewards Regulations do not apply to foreign individuals or to entities not residing in China.[23] Even if the Rewards Regulations were amended to bring foreigners within their scope, they would remain inadequate because the awards are limited to small lump-sum payments and no property rights vest in the inventor.[24] Turning to the patent track of intellectual property protection, the Patent Law does not explicitly apply to computer programs. Examiners who review patent applications for programs rely

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20. From 1979 to 1989, the PRC entered into 3,800 contracts for foreign technology imports, having a total value of US$23.4 billion. In 1989 alone, China entered into 328 contracts with 25 countries and regions valued at .US$3 billion. *Technology Imports Boost China's Economic Strength*, Xinhua General Overseas News Service, Nov. 7, 1990, *available in* LEXIS, Nexis Library, Xinhua File).

21. *See supra* notes 1 & 10 and accompanying text.

22. One commentary carried in the PRC press hailed the Copyright Law as placing the "country's legal system on a sound basis to protect intellectual property rights." The new law draws "a clear demarcation between the bourgeois desire for personal fame and gain and the lawful rights and interests of mental workers" and implements "policies of respecting intellectual and talented people in the realm of art and science." That is, authors seek copyright

> not because they strive for personal fame but because they hold themselves responsible to society and history . . . . They acquire remuneration from other people who utilize their works and this shows that society recognizes and makes reasonable compensation for their contributions and guarantees that material conditions for continuous creations will be provided for them.

GUANGMING RIBAO [GUANGMING DAILY], Sept. 9, 1990, *trans. in "Guangming Ribao" Comments on Copyright Law*, SWB/FE, Oct. 2, 1990, at B2/1.

Despite the firm assertions in the preceding commentary, however, it is not clear that a "bourgeois desire for personal fame and gain" and "the lawful rights and interests of mental workers" can be distinguished in practice. The net effect of the law is to allow a copyright holder to enjoy rights to an intellectual creation superior to the rest of society. However, it should be noted that the Copyright Law, as adopted, is more political than an April 1989 draft. *See* Jia Zhao, *China Promulgates New Copyright Law*, E. ASIAN EXEC. REP., Oct. 15, 1990, at 9, 11. Specifically, article 1 rings of the official rhetoric in the wake of June 4, but without substantively affecting authors' rights. *See* Copyright Law, *supra* note 5.

23. *See* Rewards Regulations, *supra* note 10, art. 4.

24. *Id.* art. 6.

on the "Examination Guide," which contains patentability standards. Since these administrative practices sometimes change, the standard for patenting computer programs is not clear and the legal rights of program inventors are uncertain.[25] Finally, registering software for copyright protection may involve significant disclosure of the actual source code in return for limited rights.[26]

Due to these legislative and administrative shortcomings regarding computer programs, the PRC government has fallen short of its goal to stimulate inventive activity by providing rewards and incentives.[27] For PRC inventors, the legal regime regarding intellectual property rights installed over the last decade still does not adequately protect their interests in programs. The deficiency is especially acute for prospective domestic programmers and developers without the requisite knowledge, skill, and economic resources to make compensation arrangements directly with those who want to exploit their accomplishments. Considering that such inventors are incapable of self-help and that a major goal of the recent legal developments is to encourage more people to dedicate their energies to inventive activities, the legal failure is dramatic.

Foreigners confronted with inadequacies in the law can only protect their programs through express contract provisions. The ad hoc contract provisions, however, encounter some of the problems that the Patent Law and Copyright Law are supposed to alleviate. Specifically, since a contract only binds the contracting parties, third parties may readily copy the work or produce counterfeits. Without protection under a formal, national intellectual property framework, foreigners are not secured against unauthorized circulation of their innovations. Moreover, such transactions may require lengthy negotiations over contract terms. The aggregate costs may well be higher than the expense for obtaining

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25. *See* Li Yong, *supra* note 14. Since no provision in either the Copyright Law or the Software Regulations thereunder makes copyright protection exclusive, there is at most a negative implication against computer program patentability.

26. Although the exact form of disclosure required to copyright software is uncertain, see *supra* note 6, it presents a particularly thorny issue. If broad disclosure of the source code is necessary, a copyright may be inadequate compensation for the risk of piracy. Computer programs are peculiarly susceptible to modifications which make proof and litigation of infringement difficult. *See Software Firms Slow to Export to China*, CHICAGO TRIBUNE, Dec. 30, 1990, at 7C. But if a copyright registration requires only very limited disclosure of source code, others cannot learn from the advance. This alternative would be contrary to the PRC's attempts to widely disseminate new technology, and it might stymie progress and development efforts. For a more extensive discussion of the limits of copyright protection, see *infra* Part III.A.

27. *See supra* note 15 and accompanying text.

a patent because separate negotiations must be held and separate terms must be drawn for numerous transactions involving the same computer program package. Under these circumstances, it is understandable that foreigners are less interested in transferring their programs to the PRC. This reluctance inhibits China's economic modernization drive.

III. TWO MAJOR METHODS OF COMPUTER PROGRAM PROTECTION

Responding to the unique nature of computer programs, some legal analysts in the PRC have supported *sui generis* or peculiar legislation for programs.[28] However, supporters of *sui generis* legislation have failed to explain why conventional patent and copyright concepts cannot adapt to the new technology. *Sui generis* legislation also involves more complications than does relying on traditional patent and copyright laws: uncertain implementation and effect, additional time to educate people about the law, and difficulties in coordinating with the laws of other nations. Due to these complications and the absence of guidance from *sui generis* legislation in other countries, the PRC has opted for copyright protection.[29] The copyright approach, however, cannot deal sufficiently with computer programs. The Patent Law can remedy many of the shortfalls of copyrights, without need to resort to *sui generis* legislation.

To facilitate the legal analysis of copyrighting and patenting computer programs, several technical details and programming terminology should be explained. A single computer program has a number of features or aspects that require intellectual property protection, including: source code and object code,[30] screen displays, overall design or structure of the code, algorithms, and specific functionalities and process embodied in the program.[31] Due to the diversity of program features, different forms of protection may be better suited to different aspects of a program. A detailed review of the Chinese

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28. Familiar legal concepts, such as copyright, may be dated and inappropriate for computer programs; they were not formulated with programs in mind. Rather than forcing awkward legal forms on a new technology, new approaches may be needed. *See* Guo Shoukang, *Some Opinions on Copyright in the People's Republic of China*, 1 J. CHINESE L. 63, 67 (1987). *See also* Ellen R. Eliasoph, *China's Patent System Emerges*, CHINA BUS. REV., Jan.-Feb. 1985, at 50, 51.

29. *See* Copyright Law, *supra* note 5, art. 53.

30. For definitions of source and object codes, see *supra* note 4.

31. Further refinements of a computer program are possible, such as intermediate levels of the structure of a program and the sequence of display screens. But these added details would not change the basic analysis and arguments. To avoid obscuring the main ideas, only the features listed in the text are discussed further.

Copyright Law and Patent Law and regulations confirms this argument.

A. The Copyright Approach to Computer Programs

Copyrighting computer programs in accordance with the provisions of the Software Regulations has several advantages. First, a copyright holder enjoys both personal rights and property rights in the protected software. Personal rights allow the developer to decide whether to publish the software and to identify and affix his or her name on the software.[32] Property or economic rights are the rights to use the software "through reproduction, revealing, distribution, revision, translation, [or] annotation;" to receive remuneration from others by permitting them to use the software (licensing); and to assign the use and licensing rights.[33] Under article 15, property rights in software terminate on the last calendar day of the 25th year after first publication, but the copyright owner may apply for an one-time 25-year extension. There is no time limit on the developer's right to identify and affix his or her name on the software.[34] The copyright holder may seek a cessation of any infringing act, including any unauthorized publication, distortion of developer identity, revision, translation, annotation, reproduction, distribution, licensing, or assignment of copyrighted software. Other remedies include correction of the effects, public apology, damages, and administrative penalties, such as fines or confiscation of illegal gains.[35] Those who know or should know that they are holding infringing software are liable and may have to destroy infringing copies in their possession.[36] Copyright owners may seek relief through the courts, mediation, or arbitration.[37] The Software Regulations provide a solid, though ultimately inadequate, framework for software protection.

From an international perspective, copyrights are widely accepted for protecting computer programs.[38] By placing software within the scope of its Copyright Law, the PRC can accrue international benefits by joining multilateral treaties such as the Universal Copyright

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32. Software Regulations, *supra* note 5, arts. 9(1) & 9(2).
33. *Id.* arts. 9(3)-9(5).
34. *Id.* art. 15.
35. *Id.* art. 30.
36. *Id.* art. 32.
37. *Id.* arts. 34 & 35.
38. Countries offering copyright protection for various aspects of computer programs include: Australia, Canada, France, Mexico, United Kingdom, United States, and former West Germany. *See* G. GERVAISE DAVIS, SOFTWARE PROTECTION 275-84 (1985).

Convention (UCC)[39] or the more informal Berne Convention for the Protection of Literary and Artistic Works (Berne Convention).[40] Signing these treaties would benefit both domestic and foreign software developers. Local PRC software developers would receive copyright protection in signatory states by simply copyrighting a computer program in China. Foreign owners of copyrighted software would in turn receive automatic protection in the PRC.[41] If China participated in either treaty, it would not only protect the proprietary interests of its software developers abroad, but would also induce foreigners to transfer their computer programs to China.

Despite their attractiveness at first blush, however, the Software Regulations contain several discomforting provisions. Article 9(3) forbids program developers from harming "the public interest" in the exercise of their copyrights,[42] leaving PRC officials with discretion to deny enforcement of particular software copyrights. More importantly, the copyright does not extend to all features of a computer program. Only source and object codes are expressly within the scope of the Software Regulations;[43] the "concepts . . . algorithms, processing

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39. UCC, Copyright L. Rep. (CCH) ¶ 11,250 (as revised on July 24, 1971). UCC article II establishes that published works of nationals of one signatory state are entitled to the same protection in another signatory state that its own nationals enjoy (national treatment). The UCC also establishes certain uniform rights in member states.

40. Berne Convention, Copyright L. Rep. (CCH) ¶ 11,400 (as revised on July 24, 1971). Like the UCC, the Berne Convention requires equal treatment of foreign and native authors and establishes certain uniform rights in member states. The main difference between the UCC and the Berne Convention lies in formalities such as the procedures for registration, deposit, and notice. To obtain copyright protection in the member states, the Berne Convention merely requires publication within a member state.

41. For an explanation of reciprocity and other common copyright principles, see Jon A. Baumgarten, *Basic Principles of International Copyright*, *in* SOFTWARE PROTECTION: THE U.S. COPYRIGHT OFFICE SPEAKS ON THE COMPUTER/COPYRIGHT INTERFACE 73-75 (1984) (excerpt from Baumgarten, *Copyright Relations Between the United States and the People's Republic of China-The Seventeenth Annual Jean Geiringer Memorial Lecture*, 27 BULL. COPYRIGHT SOC'Y U.S.A. 419 (1980)).

42. Software Regulations, *supra* note 5.

43. The source code and object code of the same program represent one work. Thus, a single copyright covers both forms of code. *Id.* arts. 2 & 3(1).

The limitation of copyright to the expression of a work is consistent with the U.S. approach to software copyrights. *See generally* Morton David Goldberg & John F. Burleigh, *Copyright Protection for Computer Programs: Is the Sky Falling?*, 17 AIPLA Q.J. 294 (1989). In the United States, the literal computer code is an expression that the copyright protects. But the process, which a computer executing the code implements, is not within the copyright. Similarly, functional aspects of a program, such as innovations which reduce keystrokes, data inputs, and memory requirement and which allow faster execution, are outside the copyright. *See* Pamela Samuelson, *Survey on the Patent/Copyright Interface for Computer Programs*, 17 AIPLA Q.J. 256, 266-72 (1989); Richard Smith, E. Robert Yoches & John F. Hornick, *Guide for the Perplexed: What Is the Problem and What Do We Do Until It Is Solved?*, 17 AIPLA Q.J. 215,

methods, and operating methods" embodied in a program are unprotected.[44] Although the Software Regulations do not expressly govern screen displays, the general provisions of the Copyright Law probably protect the displays.[45]

Significant additional restrictions exist on the copyright to source and object codes. For instance, people may reproduce "small quantities" of copyrighted software without consent or payment so long as they use the reproductions for classroom teaching, scientific research, or official state duties.[46] Moreover, "similarity" between a copyrighted program and a newly developed program does not constitute infringement if the similarity arises from the necessity to implement state policies or technical standards, or from limited "available forms of expression of software."[47] These open-ended loopholes are especially troublesome if broad registration disclosure is required.[48]

To compensate for the incomplete protection the Software Regulations afford, the PRC government could reduce the registration disclosure requirement commensurately. However, one purpose of the legal framework installed over the last decade is to encourage wide dissemination of new technology in order to spur development efforts.[49] Limited substantive disclosure would contravene this purpose.

Nevertheless, broad disclosure of the source code would be unsatisfactory when many aspects of the program are not adequately protected. Other parties could learn and freely use the overall design, algorithms, functionalities, and the process disclosed in a program registration. Since the technical ingenuity of solving a problem by computer program often involves the algorithms or process employed, a copyright restricted to source and object codes yet requiring broad

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220-21 (1989).

44. Software Regulations, *supra* note 5, art. 7. The restrictions in article 7 are general enough to encompass the overall design or structure, algorithms, functionalities, and process of a program.

45. *See* Copyright Law, *supra* note 5, arts. 3(1) & 3(5).

46. Software Regulations, *supra* note 5, art. 22. However, the provision requires proper disposal of the reproductions after their allowed use ends.

47. *Id.* art. 31. A related concept under U.S. law is merger. That is, when a particular structure for the program is essential to accomplish a certain function in a certain way, then the structure is not subject to copyright.

48. *See supra* notes 6 & 26.

49. *See Copyright Law Protects Authors*, CHINA DAILY, Sept. 14, 1990, at 4, col. 4. *See also* note 16.

disclosure may lack much meaning.[50] The deficiency is severe because the nature of computer programs allows easy modification of the protected expression.[51] A significant portion of the value of the work would therefore be lost. The problem with broad disclosure is further accentuated because registration is a precondition to the filing of infringement actions.[52] The program developer would face a no-win situation: either do not disclose the program and enjoy no copyright at all, or register the code and receive protection of questionable value. Such weak copyright protection would fail to motivate indigenous work, while discouraging the foreign transfers the Software Regulations envisioned.[53]

The PRC could bring more features of a computer program within copyright protection,[54] but an expansive approach is problematic and may defeat important state objectives. As the Software Regulations do not require novelty or inventiveness, program developers may obtain broad rights[55] in return for works of marginal value to China's modernization needs. Moreover, expansive copyrights would withdraw the functional features of programs from the public domain and would

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50. Unlike typical literary works, such as poems and lyrics, which draw heavily upon their particular expressions for value, a program's worth is not necessarily lost if the specific code is altered. A competent programmer could often use the disclosed algorithms and processes to produce useful, non-infringing alternative programs.

51. In discussing the Chinese Copyright Law, one U.S. diplomat stated:

> Companies aren't too excited about registering source codes under the Ministry of Equipment and Electronics, which has research facilities that in the past have copied software . . . . It's easy to rewrite it, modify it, but in a way that's different so they can say it's their own.

Software Firms Slow to Export to China, *supra* note 26.

52. Software Regulations, *supra* note 5, art. 24. Registration provides evidence that the software copyright is valid. It is not clear whether the copyright owner may bring an action against infringements that occur prior to the date of registration.

When read in conjunction with article 23, which states, "Applications for registration may be filed . . . with respect to software published after the promulgation of these Regulations," the registration provision apparently places software published before June 4, 1991 in the public domain.

53. *See* Copyright Law, *supra* note 5, art. 1.

54. The definition of computer program and the limitations of protection under articles 3(1) and 7, respectively, of the Software Regulations would need revision. Software Regulations, *supra* note 5. Minimal modification of the Copyright Law itself would be necessary. *See infra* note 59 and accompanying text. Article 3 recognizes copyright protection for works in the form of computer software. The copyright includes the right to adapt the work. This right could be interpreted to prevent unrestricted use of the overall design, algorithms, functionalities, and process embodied in a computer program. Aside from article 5, which lists exclusions irrelevant to software, nothing in the Copyright Law expressly limits its applicability to legally permissible works when protection is not contrary to the public interest. Copyright Law, *supra* note 5, arts. 3-5, 10(5), 53.

55. *See supra* notes 32-37 and accompanying text.

restrict the communication of information about algorithms and processes.[56] Requiring the payment of licensing fees to the copyright holder may deter others from improving the functional aspects of a program. Free use of the functional aspects in other software applications would likewise be lost, which would hamper any attempt to standardize features in the software industry.[57] In addition to these negative effects on other programmers, an expansive copyright holder, relieved from competitive pressures, has little motivation to improve the protected functional features or to use them in different applications. Given the 25- or 50-year term of a copyright,[58] China may undermine its technological development by granting broad copyrights to computer programs.

Copyrights to functional program features also cause an internal inconsistency in article 12 of the Copyright Law. Article 12 assigns the copyright to a translation to the translator.[59] A plain reading of the provision implies that a literal translation of a computer program from one programming language into another may create a second copyright in the translator. But article 12 also prohibits translators from infringing the original copyrights in exercising their copyrights. Under these circumstances, if article 12 is to have any meaning, a copyright could not protect the overall design and functional features of a program. Since the only difference between the original and translated programs is in the literal source code, the translation would always infringe an original copyright which protects functionalities and overall process. As article 12 forbids this type of infringement, either the copyright must be limited to source and object codes,[60] or article 12

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56. It is even possible that broad copyrights would be invalid as being contrary to the public interest, under article 4 of the Copyright Law and article 9(3) of the Software Regulations. Copyright Law, *supra* note 5; Software Regulations, *supra* note 5.

57. Admittedly, a copyright does not preclude independent creation. *See* Software Regulations, *supra* note 5, art. 5. But, in practice, convincingly proving independent creation is difficult when the alleged infringer created the work subsequent to the plaintiff. This reality greatly diminishes the value of the independent development defense. Programmers would be reluctant to enter an existing area of software application in view of potential infringement allegations.

58. *Id.* art. 15.

59. Copyright Law, *supra* note 5. The translator, however, must first buy the right to translate the original work. *Id.* art. 10(5). *See* Software Regulations, *supra* note 5, arts. 9(3) & 9(4).

60. Copyright to screen displays, *supra* note 45 and accompanying text, does not lead to a conflict within article 12. Some programs do not produce displays. For programs that do produce displays, the display copyright would prohibit the translator from using the displays. In contrast to functional features of a program, screen displays are not always necessarily part of a translation. Thus, program translators would not always violate the original copyright and

should be made inapplicable to computer programs.

In the final analysis, the Software Regulations provide incomplete protection,[61] and the PRC government cannot adequately improve protection within the copyright system.[62] These shortcomings are especially critical from the international perspective because they may inhibit substantial reductions of the widespread piracy of computer programs in the PRC.[63] More generally, the PRC is trying desperately to modernize and in the process it is fighting doubts, particularly among Western nations, about its stand toward intellectual property rights.[64] The loopholes in the copyright system may give rise to foreign fears about any real change in China's views. Foreigners are also concerned that they must rely on bilateral and multilateral agreements with China to protect works first published outside China.[65] The PRC must take further action before foreign programmers can enjoy many of the rights defined in the Software Regulations. The Regulations are also ambiguous on whether foreigners have rights to their unpublished programs or programs that have not been made available to the public.[66]

Although some countries offer only copyright protection to computer programs,[67] an evaluation of the PRC copyright system

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display copyrights do not create an inconsistency within article 12.

61. *See supra* notes 42-48 and accompanying text.

62. *See supra* notes 49-60 and accompanying text.

63. In 1988 alone, U.S. businesses lost an estimated US$300 million to software piracy. Jia Zhao, *Computer Software Protection: New Regulations Go into Effect*, E. ASIAN EXEC. REP., Oct. 1991, at 9. A U.S. trade official warned Beijing to eliminate software piracy or face punitive tariffs on exports to the United States. WALL ST. J., Mar. 4, 1991, at A4, col. 1.

64. The PRC has a notorious reputation of not respecting foreign intellectual and industrial property rights. In the copyright context, see, e.g., *supra* note 51. When the Chinese market became more accessible in the 1970's, the government actively encouraged adaptation and "reverse engineering" of foreign technology. *See* VOLTI, *supra* note 7, at 65. Roughly speaking, the promulgations of the Patent Law in 1984 and of the Copyright Law in 1990 represent the realization that such disregard of property rights to inventions hinders future importation of technology. The legislation reduces uneasiness among foreigners by providing a systematic legal structure and hinting at a shift in government attitude.

The democracy movement demonstrations and their eventual crushing in the spring of 1989 have enhanced foreign apprehensions. These events have increased reluctance to invest in China by raising questions concerning the stability of the Deng regime. Many foreign firms have taken a "wait-and-see" position toward the PRC. The government should overcome its tarnished reputation by actively attracting foreign investments with improved intellectual property protections.

65. *See* Software Regulations, *supra* note 5, art. 6. Article 6 automatically protects software of foreigners first published in China. *See also* notes 39-41 and accompanying text.

66. *See* Software Regulations, *supra* note 5, art. 6. Regardless of publication, article 6 recognizes the copyright of Chinese entities in software.

67. *Compare supra* note 38 *with infra* note 69 and accompanying text.

must consider PRC goals and needs. The inquiry is highly fact specific. Absent an objective litmus test, each country must balance the opposing variables in light of its own situation. The PRC's level of industrial and economic development, its desire to modernize rapidly, its poor reputation for frequently infringing intellectual property rights, and its need to create incentives for domestic programmers all highlight the inadequacy of the copyright system. As such circumstances change, copyright may indeed become sufficient.

The preceding discussion demonstrates that copyright protection alone cannot meet current PRC needs. While copyright appears appropriate for the literal source and object codes and even for expressive display screens, other aspects of a computer program should not be copyrighted. Functional features (including overall design, algorithms, functionalities, and process) should not be withdrawn from free public use without ensuring that society receives equally valuable benefits in return. Since copyright availability does not turn on novelty or inventiveness, an equal exchange could not be guaranteed. Copyrighting the functional features of software may jeopardize the state's goals of economic advancement and extensive public dissemination. On the other hand, China cannot simply disregard uncopyrighted aspects of computer programs. Inadequate protection diminishes incentive and just reward for programmers and discourages foreign transfers. For China to treat computer programs comprehensively, the Copyright Law and its Software Regulations must be supplemented.

B. Patenting Computer Programs: Preliminary Considerations

Reference to international practice helps us to evaluate the wisdom of bringing computer programs within the patent system. To facilitate the comparisons, countries can be broadly classified as developed or developing. Practices among developed nations vary widely. At one extreme, in Japan, the patent law allows patents on algorithms and on functionalities and the process embodied in software.[68] At the other extreme, many Western European countries deny patents to all computer program features.[69] The United States has taken a middle

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68. *Tokkyoho* (Patent Law), Law No. 121 of 1959. For an English translation, see 2F JOHN P. SINNOTT, WORLD PATENT LAW AND PRACTICE, at Japan-1 *et seq.* (1989).

69. *See, e.g.*, Patent Act 1977, § 1(2)(c), *reprinted in* 2D SINNOTT, *supra* note 68, at Great Britain-208; *Patentgesetz* (Patent Law) § 1(2)(3) (1980), *translated in id.* at West Germany-78.21; The New French Patent Law, art. 7(3) (1968), *translated in* 2C *id.* at France-3.

The prohibition of computer program patents is also contained in article 52(2)(c) of the European Patent Convention, which establishes a common system for member nations from the

ground on the issue. Case law interpreting the American patent statute indicates that algorithms are patentable if they are claimed as part of either a computer-implemented process or a machine.[70]

The variety of views among developed nations cannot be easily reconciled. Subject matter restrictions typically reflect policy determinations by the national government about the country's specific technical, economic, and social needs. The costs of granting an inventor a limited monopoly are weighed against the benefits to society from the additional innovations and technology transfers generated by the monopoly incentive. Patent protection also encourages full public disclosure of important technologies and achievements.[71] In the case of computer programs, reluctance to grant patent protection may be based on the possible breadth of program features. European nations may have decided that the patent monopoly will give an inventor overbroad powers to preempt exploitation of benevolent technology. Japan, and to some extent, courts in the United States have reached a different conclusion weighing the same factors in essentially similar economic circumstances as the Western European nations. This discrepancy illustrates the novelty of computer programs, the time needed for existing legal structures to adapt to the peculiar nature of programs, and perhaps cultural differences as well.

Developing nations treat computer programs much more consistently. Only seventeen percent of the developing nations bar matter relating to computers from their patent systems.[72] Most developing countries are willing to trade wide public use for additional incentives and technology transfers.

Of course, common international practice in and of itself does not

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European Economic Community. Convention on the Grant of European Patents, Oct. 5, 1973, *reprinted in* 2A J.W. BAXTER & JOHN P. SINNOTT, WORLD PATENT LAW AND PRACTICE, at App 3-376 (1989).

70. *See* Diamond v. Diehr, 450 U.S. 175 (1981) (industrial process for curing rubber utilizing a computer program based on a well-known mathematical equation is patentable); Paine, Webber, Jackson & Curtis, Inc. v. Merrill, Lynch, Pierce, Fenner & Smith, Inc., 564 F.Supp. 1358 (D. Del. 1983) (cash management business system held patentable). *See also* Gottschalk v. Benson, 409 U.S. 63 (1972) (mathematical algorithm for converting binary-coded decimal numbers to binary ones is not patentable).

71. *See infra* note 104.

72. Thomas C. Creel & Drew M. Wintringham, *Patent Systems and Their Role in the Technological Advance of Developing Nations*, 10 RUTGERS COM. & TECH. L. J. 255, 276 n.174 (1983). The statistic is based on a survey of 83 developing states which are not members of the Soviet Communist Bloc and which have patent laws not strictly dependent on the laws of an industrialized nation. The authors remarked, "Considering the technological advancement of these nations, it is not surprising that a low percentage deny patent protection to subject matter related to computers . . . ." *Id.* at 275-76.

indicate an appropriate position for the PRC, but the underlying reasons can be instructive of sound public policy. The reasons are especially pertinent when the nations are at roughly the same development level as the PRC. In contrast to Great Britain, former West Germany, and France, the PRC does not have the luxury of a developed and technologically-sophisticated economy. Thus, in its decision, the PRC must accord greater weight to encouraging incentives and technology transfers.

With regard to technology transfers, granting more protection than other nations cannot really hurt the PRC, but granting less will impede PRC interests. Western European individuals and entities should be happy to trade with a nation that respects extensive intellectual property rights.[73] More importantly, the PRC has to assure Japan and the United States that they will not incur losses by doing business with China. To preserve and enhance economic relations, China may have to provide rights similar to those the Japanese and Americans enjoy in their native countries. Although PRC nationals cannot uniformly enjoy similar rights abroad, given the current level of technology in the PRC, this seems to be more a theoretical than a real concern as China will not be a major exporter of computer programs to developed nations in the near future.[74] Recognition of program patents should result from a realistic appraisal of China's current technological needs.

A strong argument against patenting computer programs is that patents prevent the wide public use of, and experimentation with, benevolent technology. Development would then only occur in those areas where patent licenses have been obtained. While it is true that use of patented programs would be limited, the PRC government must first concentrate on the threshold problem of acquiring such technology. Patent protection generates additional incentives to create different and improved algorithms and processes, which drive technology forward. The inducement value of patent rights partially offsets any stagnation and resultant harm to society from granting

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73. This does not necessarily mean that Western Europeans can obtain computer program patents in China. Reciprocity expressed in article 18 of the Patent Law requires foreign states to respect Chinese software patents if those states want software patent rights in China. *Supra* note 1. For a brief discussion of reciprocity, see *supra* note 41 and accompanying text. Unless an international agreement provides otherwise, Western Europeans cannot patent the functional features of computer programs in the PRC.

74. China is not even a major exporter of common computer hardware, which is usually considered to be below software on the scale of technological sophistication. *See* Chang Hong, *China Reaps Benefits of Computer Science*, CHINA DAILY, Oct. 1, 1990, at 3, col. 7. An optimistic assessment of foreseeable future exports of computer technology involves sales to developing nations. *See China's High-Tech Is up to Standard, Minister Reports*, *supra* note 17.

rights to the functional aspects of computer programs. Patent rights will also attract foreigners to license their programs in the PRC. With well over a billion people, China faces a herculean task as it tries to modernize its primarily agricultural economy.[75] Patenting computer programs can assist the PRC in its efforts.

Moreover, considering the inadequate infrastructure in the PRC, wholesale adoption of technology is not feasible, and patent limitations may work to the government's benefit. Based on experience since after Mao, the PRC has realized that broad-based import of advanced technologies is not a simple shortcut to modernization.[76] The appropriate infrastructure—including managerial skills, organization, skilled work force, and research and design capabilities—must be in place for an advanced society to emerge.[77] Development of such an infrastructure takes time. From this perspective, the PRC's sacrifice of wide public use is really no sacrifice at all, because it does not have the prerequisite infrastructure to gainfully utilize the technology. Since China would have to pay for licenses, computer program patents will also force the government to prioritize the industries it wants to encourage and to review the adequacy of each industry's infrastructure. The external disciplining effect of patents will further ensure the maximum efficient use of scarce PRC resources.

Setting aside the possible benefits of outright piracy,[78] computer program patents are also favorable in financial terms. Rather than buying technology outright, which requires an initial, large lump-sum payment, PRC entities could spread the cost over a period of time through patent royalties. With royalty payments, costs reflect revenues, thereby reducing the risk of loss to the licensee from preliminary overestimates of a program's value. The licensor likewise faces less risk from underestimates. Since royalties are payable after revenues have been generated, they yield better approximations of a technology's

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75. Statistics indicate 61% of China's labor force was engaged in agriculture and gross national product was US$286 billion in 1987. THE 1990 ALMANAC 172. Imports and exports were worth US$43.2 and US$39.5 billion, respectively, in 1987. CENTRAL INTELLIGENCE AGENCY, CHINA: ECONOMIC POLICY AND PERFORMANCE IN 1987 at 7, *reprinted in* AM. STATISTICS INDEX 9114-5 (1988).

76. During the years immediately following Mao's death, the PRC leadership vigorously imported foreign technology. However, by 1979, it was officially recognized that wholesale technology imports by themselves cannot help China leapfrog all the developmental stages of the industrial world. Infrastructure for the adaptation of foreign technology was a necessary term in the economic transformation equation. *See* VOLTI, *supra* note 7, at 65-67, 232-33.

77. *See id.*

78. Reputation, political, and eventually economic losses in the long-term may more than offset any short-term gains from piracy.

worth. Potentially rough and difficult valuations are avoided. Given China's numerous needs and limited foreign reserves, the benefits of avoiding overpayments would be substantial.[79] Outright purchases of computer programs for industrial automation, production improvements, and data management involve unnecessary risk and are not economically feasible.

Finally, it should be recalled that the Patent Law, like any statute, is meant to serve the public policy goals of the PRC. The definitions of statutory terms are not immutable and should evolve over time to meet new circumstances.[80] Such treatment of laws conforms to international practice.[81] To foster faith in its legal institutions, the PRC cannot impulsively change the scope of patentable subject matter; China must be careful not to nullify its formal legal structure. However, at the same time, the definition of invention need not stagnate. The PRC may now issue patents for functional features of computer programs while reserving the right to deny software patents, for example by explicit legislation or by changing administrative practice, when conditions have changed significantly.

IV. APPLICATION OF THE PATENT LAW TO FUNCTIONAL FEATURES OF COMPUTER PROGRAMS

On balance, the policy considerations analyzed above highly favor a patent supplement to computer program copyrights. The present administrative practice of patenting entire computer systems serves no

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79. As of March, 1988, the PRC had US$17.1 billion in foreign exchange reserves. THE STATESMAN'S YEAR-BOOK, 1989-90, at 360, 370 (J. Paxton 126th ed. 1989). By comparison, Taiwan had reserves of US$82.4 billion in 1991. ECONOMIST, Feb. 22, 1992, 28.

80. Indeed, Yin Xintian, a member of the Patent Reexamination Board in the Chinese Patent Office, remarked, "the definition [of invention] in the Patent Law can never be ossified and immutable, but must develop constantly with the progress of science, technology and human civilization . . . . [A] little room has to be allowed for flexible interpretation." Yin Xintian, *A Preliminary Inquiry into the Definition of Invention-the Question of Patentability Viewed from a Decision on a Request for Reexamination*, 1988 CHINA PATENTS & TRADEMARKS, No. 2, at 26.

81. A particularly interesting illustration concerns the Japanese patent law. In 1976, Japan removed chemical substances from its list of unpatentable subject matter in the patent law of 1959. The amendment accommodated Japanese interests in light of the advancement of its chemical industry. *See* Note, *The Role of the Patent System in Technology Transfer: The Japanese Experience*, 26 COLUM. J. TRANSNAT'L L. 131, 146-49 (1987).

Another example should readily occur to those familiar with the common law tradition. Over time, the courts in the United States and England have modified the meanings of various statutes through the process of "judicial interpretation." Even the American Constitution has been subject to such interpretive development.

necessary purpose[82] and has the disadvantage of causing confusion over what exactly is protected. If the claims[83] are extremely detailed, covering every nuance of the system and giving a very narrow scope to the patent, then almost nothing would infringe, and the patent right is ephemeral. Broad claims may be ambiguous and obscure the true innovation. In that case, it would be difficult to decide whether an infringement has occurred. The solution is to allow individual patent claims for the overall design, algorithms, functionalities, and process of a computer program.[84]

A. Subject Matter Definition under Articles 22 and 25

Article 22 of the Patent Law requires that "any invention or utility model for which patent right may be granted must possess novelty, inventiveness and practical applicability . . . . Practical applicability means that the invention or utility model can be made or used and can produce effective results."[85] The Patent Regulations define an invention as "any new technical solution relating to a product, a process or improvement thereof."[86] A patent may therefore only be issued for an invention that is applicable to the production needs of the developing Chinese economy. Furthermore, patent protection is not available to

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82. *See supra* note 14. It may be argued that patenting entire systems preserves maximum flexibility for the government when the time for enforcement comes. Depending on the circumstances, the PRC could either recognize protection because the current system is nominally within the patent or decline to recognize protection because patenting a particular feature would violate a provision of the Patent Law. For example, the PRC could claim that patenting the feature is "detrimental to public interest" or that the feature is a rule or method for mental activity. Patent Law, *supra* note 1, arts. 5, 25(2). Such flexibility, however, effectively reduces the Patent Law to administrative whim. At best, patenting entire systems is a crude attempt to adapt laws to changing conditions. The Patent Law should permit patents on the functional features of computer programs. The discussion of Part III, *supra*, indicates that patent protection is suitable at this time for China. The PRC always has the option to deny patents on programs if conditions change.

83. Claims are part of a patent application and define the scope of the protected invention. Patent Law, *supra* note 1, art. 59; Patent Regulations, *supra* note 1, rules 20-23. Perhaps the most difficult and most important part of the application is the claims. A patent holder's rights depend directly on the wording of the claims. Patent attorneys familiar with both the law and the technology typically draft the claims.

84. The Copyright Law may have anticipated patent protection for certain computer program features. In relevant part, article 7 provides that the Patent Law is "applicable to those scientific and technical works if they need to be protected" by it. *Supra* note 5. The day before the promulgation of the Copyright Law, the Law Committee of the Standing Committee of the National People's Congress urged the addition of article 7. *Song Rufen on Revision of Three Draft Laws*, SWB/FE, Sept. 10, 1990, at C2/1.

85. Patent Law, *supra* note 1, art. 22.

86. Patent Regulations, *supra* note 1, rule 2.

"rules and methods for mental activities."[87]

These provisions form the statutory and regulatory basis for prohibiting patents on the functional features of computer programs. In the software context, the Patent Regulations' requirement that inventions must be "technical solutions" is not very instructive. A patent applicant will always stress the technical nature of the algorithms and processes. More difficult arguments against recognizing functional aspects of computer programs as proper subject matter are based on the negative language of the Patent Law itself. Two alternative approaches indicate functional aspects are improper subject matter: analyzing the explicit exclusion of "rules and methods for mental activities" in article 25 in isolation, or viewing article 25 in light of article 22's requirement of practical applicability.

Reading article 25 by itself, some commentators have concluded that the overall design, algorithms, functionalities, and process embodied in a computer program are improper subject matter, excluded as "rules and methods for mental activities."[88] This interpretation, however, overlooks the explicit exclusion of computer programs from patent protection in the draft, but not in the final version, of the Patent Law.[89] Chinese lawmakers have apparently reserved the flexibility of including computer program features within the scope of the Patent Law without the need for a specific amendment. Their position is consistent with the argument that computer programs should not receive patents because they hinder the development of a fledgling software industry. That is, patent protection is considered counterproductive, because the benefits of free public use and wide and uninhibited access to technology outweigh considerations of encouraging innovation and foreign transfers in a relatively immature industry.[90] By removing explicit barriers to computer program protection in the Patent Law and the Patent Regulations, Chinese lawmakers can

87. Patent Law, *supra* note 1, art. 25(2). To focus on the main issues in applying the Patent Law to computer programs, this discussion is limited to programs that satisfy articles 4 and 5. Article 4 prohibits patenting an invention that "relates to the security or other vital interests of the State and is required to be kept secret." Moreover, article 5 forbids patents on any invention "contrary to the laws of the State or social morality or . . . detrimental to public interest." Military and gambling software, for instance, may not be patented. Accordingly, they are beyond the scope of the following discussion. *Id.*

88. Timothy A. Gelatt & Ruth O. Sweetman, *China's Ambiguous New Patent Law*, ASIAN WALL ST. J. WEEKLY, Apr. 9, 1984, at 14.

89. *See* Committee Print, *supra* note 1, at 28 n.51.

90. A similar argument has been used to justify the exclusion of chemical substances from patent protection under article 25(5). *See Patent Law Exempts Chemical Discovery*, CHINA DAILY, Aug. 21, 1985. *See also* Gelatt & Sweetman, *supra* note 88.

grant patent protection to program features at their choosing. The functional features of computer programs may, but need not, be unpatentable subject matter.

Alternatively, other commentators have concluded that computer algorithms and processes by themselves do not increase production and are thus not statutory subject matter within the scope of article 22.[91] However, this argument requires a rigid construction of the "practical applicability" requirement. Neither the Patent Law nor the Patent Regulations necessitates such a narrow construction. Even if functional program features do not directly enhance production, it cannot be denied that they play a major role in promoting industrial automation, enhancing information exchange, and increasing data processing capabilities—all of which at least incidentally help improve productivity.

Moreover, a review of article 25 shows that it does not merely list examples of items which fail to meet the general requirements of article 22; instead, its exclusions reflect certain policy considerations. For instance, "methods for the diagnosis or for the treatment of diseases" are excluded because of their proximity to the health and welfare of the people, and "substances obtained by means of nuclear transformation" are excluded as a matter of national security.[92] It is plain that items that article 25 lists may satisfy the requirements of article 22. Thus, it is not entirely satisfactory to draw any conclusion against the patentability of functional features of computer programs based solely on their questionable production value. Relevant policy factors must be taken into account.

B. Novelty, Inventiveness, and Administrative Feasibility

In order to obtain a patent, the invention must possess novelty and inventiveness.[93] An invention is novel if there has been neither public

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91. Article 22's practical applicability requirement may serve two closely related functions. First, it establishes a standard for all patentable inventions. Second, if article 25 is taken as giving examples of items which are not practically applicable, then practical applicability also defines proper subject matter for patent applications. The arguments in the text apply regardless of which function the practical applicability requirement serves.

92. *See* Committee Print, *supra* note 1, at 28.

93. Article 22 of the Patent Law specifies and defines these two requirements as follows: Novelty means that, before the date of filing, no identical invention or utility model has been publicly disclosed in publications in the country or abroad or has been publicly used or made known to the public by any other means in the country, nor has any other person filed previously with the Patent Office an application which described the identical invention or utility model and was published after the said date of filing.

disclosure anywhere nor public use within the PRC. Inventiveness implies that the work is not obvious to technical workers in the field, based on the state of development at the filing date.[94] These two requirements may lead to administrative difficulties with computer program-related patent applications. Due to the nature of computer code, it is extremely difficult to find all relevant prior art upon which to judge questions of novelty and inventiveness.[95] Not only is the search for prior art a major undertaking, but the relatively new Chinese Patent Office is also not likely to have all the necessary resources to support such a search.[96]

China has ameliorated the prior art problem for all patent applications by placing the search burden on the applicant. The Patent Regulations require the applicant to disclose prior art known to be relevant.[97] After a preliminary examination, the application is published; full patent rights vest upon a substantive examination.[98] When the applicant requests a substantive examination, he or she must supply prior art references.[99] The applicant must also persuade the Patent Office of the merits of his or her invention over the prior art.[100] Thus, the Patent Law provides a mechanism for reducing administrative difficulties by shifting some burdens to the applicant.

Another administrative matter concerns the PRC's ability to staff the Patent Office with knowledgeable examiners. This issue is peculiar neither to computer programs nor to the PRC. It is no more difficult to train examiners for electrical circuit patent applications, for instance,

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> Inventiveness means that, as compared with the technology existing before the date of filing, the invention has prominent substantive features and represents a notable progress and that the utility model has substantive features and represents progress.

Supra note 1.

94. Known matter and reference materials on the date of the filing of the patent application constitute "prior art." Both novelty and inventiveness are measured relative to the prior art in the field of the subject matter of a patent application.

95. The large variety of computer programming languages greatly complicates the task. For example, a program which is a literal translation of another program into a different computer language may not be inventive and is certainly not novel. Thus, it is not patentable under article 22 of the Patent Law.

96. Much progress in this area has been made over the last few years. But the Patent Office is still in the process of establishing a data center for foreign patent information and needs to cooperate with foreign data centers. Huang, *supra* note 3, at 21.

97. *Supra* note 1, rule 18(3).

98. Patent Law, *supra* note 1, arts. 34, 35.

99. *Id.* art. 36. Indeed, article 41 permits inventors of prior art to challenge related patent applications. *Id.* The earlier inventor would want to oppose a patent application to prevent the applicant from gaining a limited monopoly on previously invented subject matter.

100. Patent Regulations, *supra* note 1, rule 18(6).

than for computer program applications.[101] Examiners for both types of technology would require formal education, training, and familiarity with the requirements of the Patent Law. Allowing patents on the functional features of computer programs would not raise complications beyond the general concern over examiner competence. In practice, full disclosure in patent applications[102] helps to alleviate the difficulty of the examination procedure. The complications of obtaining a patent[103] act as an applicant-regulating mechanism and decrease the likelihood of unfounded applications and consequent examiner mistakes.

C. Applying for a Computer Program Patent

A significant barrier to acquiring any patent is the complicated application process. First, the Chinese Patent Law usually requires a detailed patent application.[104] The PRC practices a delayed substantive examination procedure. In the Patent Office, the application initially undergoes a nominal examination and is published within eighteen months of filing if the disclosure conforms to formal legal requirements.[105] However, full patent protection is not available until after a substantive examination of the application. The applicant may request such an examination within three years of the filing date.[106] Once a patent is issued, the patent holder may lose his or her rights by failing to pay annual fees to keep the patent in force.[107]

As a result, even if the overall design, algorithms, functionalities, and process of a computer program are patentable, obtaining and maintaining a patent on these program features is very expensive and time consuming. Thus, patent protection is inappropriate for most run-of-the-mill computer programs. These attributes of the patent system

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101. It is difficult to see why an examiner who is fit to review patent applications for computer programs integrated with hardware, which are allowed presently, is not also fit to consider pure program applications. *See supra* note 14 and accompanying text.

102. *See infra* note 104. If a patent holder lies on the application, the patent is invalid and unenforceable. *See generally* Patent Law, *supra* note 1, art. 48; Patent Regulations, *supra* note 1, rules 54(2), 66.

103. For a description of the lengthy application process, see *infra* notes 104-07 and accompanying text.

104. A complete patent application for an invention consists of three documents: a request, a description and its abstract, and claims. Patent Law, *supra* note 1, art. 26. The Patent Regulations specify the content of each of these documents and identify other supporting material. *Supra* note 1, rules 16-37.

105. Patent Law, *supra* note 1, art. 34.

106. *Id.* art. 35.

107. *Id.* art. 46; Patent Regulations, *supra* note 1, rules 87, 88.

may prevent a flood of applications to patent uncopyrighted features of computer programs from overburdening the administration. Faced with high application costs and inevitable delays, programmers are unlikely to seek protection for any and all computer program features. The possibilities of trivial and of frivolous applications are decreased, and the PRC would learn valuable technology from the application disclosures.[108]

D. The Politics of Computer Program Patents

The concept of private intellectual property is a limited one in a socialist society.[109] Furthermore, self-reliance and mass mobilization have always been part of the traditional Chinese Communist Party rhetoric.[110] The PRC has dealt with these political dilemmas by concentrating on economic realities and the need to adopt technology to socialist modernization. The Patent Law is consistent with current official views, and patenting computer programs should not create policy contradictions for the communist regime.

Consonant with the theme of adopting technology for economic development, the Patent Law requires patent holders to exploit the new technology.[111] If the patentee fails to exploit the patent within three years, a qualified entity may request a compulsory license from the Patent Office.[112] A compulsory license is also available to the holder of an improvement patent.[113] This framework assures that a failure to license the patented subject matter will not unduly delay implementation of new technology and progress. With respect to the functional features of computer programs, the Patent Law thus prevents the patentee from sitting on an invention, and minimizes the danger of not using available benevolent technology.[114] Although this scheme limits

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108. The high costs of applying for a patent and the considerable time available to examine an application decrease the possibility that unworthy program features will be patented. Compared with copyrighting functional features of computer programs, patents may better balance public interests and private rights. *See supra* notes 54-58 and accompanying text.

109. *See supra* note 18.

110. The self-reliance and mass mobilization themes were central to the disastrous Great Leap Forward period of 1958-1960, when both agricultural and industrial production dropped. *See* VOLTI, *supra* note 7, at 36-41.

111. *See* Patent Law, *supra* note 1, arts. 51-53.

112. *Id.* art. 52.

113. *Id.* art. 53.

114. To be sure, a person who seeks and obtains a Chinese patent presumably intends to use the invention and wants protection before its use. Thus, the most likely scenario for mandatory exploitation is if Chinese authorities view the use as insufficient under article 51 and

patent rights, patentees can find consolation in the reasonable fees paid for mandatory exploitation.[115]

In furthering the self-reliance ideal, the Patent Law explicitly excludes experimentation from infringement.[116] Computer program patents thus will not prevent indigenous development efforts.[117] Since any resulting patented improvement may enjoy a compulsory license,[118] this may lead to gradual reduction of computer program imports as Chinese technology advances and the work force becomes more skilled. The Patent Law strikes a balance between the self-reliance ideal and dangerously unfettered dependence on imports. Patents which permit native improvements should still attract foreign transfers, while also allowing concurrent local efforts in order to prevent perpetual dependence on foreign technology. Again, the patentee will be compensated for any patent exploitation.[119]

It is noteworthy that a detailed patent application gives the PRC valuable information it cannot not otherwise obtain.[120] The Patent Regulations call for an application that will "enable a person having ordinary skill in the art to carry it out."[121] To satisfy this mandate,

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force more use than the patentee had originally intended. The language of article 51 makes this reading a possible trap for the unwary.

115. Patent Law, *supra* note 1, art. 57. *See also* Patent Law, *id.* arts. 12, 14. The fee requirement reassures potential foreign transferors of computer programs that the government will not confiscate their creations. On foreign doubts concerning the PRC's respect for technological property rights, see *supra* note 64.

116. Patent Law, *supra* note 1, art. 62(5).

117. Development, as distinguished from outright piracy, does not involve direct commercial exploitation of a program. Future developments and improvements based on patented technology are implicit in the concept, inherent in any patent law, of full disclosure to help advance technology. The enabling requirement in rule 18(5) partly reflects the implication that others will use protected subject matter to further development efforts. Patent Regulations, *supra* note 1. The development expectation is not peculiar to the PRC and is part of the patent concept. There should be minimal patentee complaints and dissatisfaction with this feature of the Chinese Patent Law.

118. Patent Law, *supra* note 1, art. 53.

119. *Id.* arts. 12, 14, 57. In the case of a compulsory license to an improvement, the prior patentee also has the reciprocal right to require a cross license from the subsequent patentee to exploit the improvement. *Id.* art. 53. The earlier patentee enjoys a preferred status under the Patent Law to compete with the later patentee, which is additional economic compensation for the compulsory license to the improvement.

120. *Id.* art. 26; Patent Regulations, *supra* note 1, rules 17-24. The patent disclosure requirements allow the PRC to learn new technology which may not be disclosed under a copyright system. *See supra* note 6. *See also supra* note 26. Economic modernization relies on that knowledge. The broad disclosure also allows the government to fully evaluate whether a limited monopoly is the appropriate exchange for the innovation, increasing the possibility of a balance between public interests and individual rights. These factors further highlight the inadequacies of the Copyright Law.

121. Patent Regulations, *supra* note 1, rule 18(5).

valuable know-how or technical knowledge not within the scope of the patented invention may have to be disclosed. Once disclosed, the PRC is free to use such information. The disclosure requirements also generally conform to foreign procedures.[122] Foreign computer program owners will know what to expect. Thus, bringing the functional features of computer programs within the Patent Law should facilitate foreign transfers.

E. The International Aspect

During the Eighth Session of the Standing Committee of the Sixth National People's Congress on November 14, 1984, the PRC became a signatory state to the Paris Convention for the Protection of Industrial Property (Paris Convention).[123] The Paris Convention establishes uniform procedures in member states, but it does not alter their substantive laws. In other words, computer program features are patentable in a member nation only if the nation's patent law recognizes program features as proper subject matter. Given the principle of reciprocity expressed in article 18 of the Patent Law, the PRC will not be at a disadvantage relative to other nations.[124] The PRC only has to grant patent privileges on computer program-related inventions to a foreigner if the foreign person's country recognizes similar rights for PRC patent applicants. China's accession to the Paris Convention encourages foreign program owners to apply for patents.[125] The uniform procedures also benefit Chinese patent applica-

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122. For the disclosure required in the United States, see Patent Act, 35 U.S.C. § 112 (1952).

123. International (Paris) Convention for the Protection of Industrial Property, March 20, 1883, *as revised* July 14, 1967, *reprinted in* BAXTER & SINNOTT, *supra* note 69, at App 3-22. However, the Chinese government stipulated that it will not adhere to Provision 28 of the Paris Convention, which gives the International Court of Justice jurisdiction over disputes between member states. Frankie Leung, *New Patent Legislation of the People's Republic of China*, 129 SOLICITOR'S J. 764 (1985).

124. *See supra* notes 73-74 and accompanying text.

125. One advantage that foreign applicants may enjoy is the earlier filing date provided by article 29 of the Patent Law. Specifically, if an inventor from a member state of the Paris Convention files a patent application in the PRC within twelve months of the first application filed in a foreign country, then the filing date in that country will be treated as the filing date in the PRC. Since the PRC follows a first to file system (whoever files an application first enjoys priority over an applicant who files later, regardless of the date of invention), this dating procedure is extremely important. *See* Patent Law, *supra* note 1, arts. 9, 29.

tions in other member states.[126]

While it is true that most other countries protect computer programs with copyrights,[127] China's peculiar position—trying both to industrialize and to adhere to socialist principles—warrants patent protection. PRC policy should not blindly follow that of other nations, but must take account of its own special needs. Moreover, the U.S. approach to computer programs demonstrates that the patent and copyright concepts are not mutually exclusive.[128] The two schemes can exist side by side, with the expressive aspects of computer programs subject to the Copyright Law and the functional features subject to the Patent Law.

V. CONCLUSION

To successfully modernize its economy, China must encourage innovation, just reward for creative efforts, public disclosure of new achievements, and increased foreign technology transfers. Although tension among these elements exists, on balance, the protection of computer programs best accommodates competing considerations. Once the issue of why protect programs is settled, the next question is how. Computer software is a relatively new technological development which comprises many distinct features. It is unrealistic to expect that a single existing legal construct can adequately protect software. But *sui generis* legislation is not necessarily the solution at this time. Some features of computer programs, such as the literal source code and expressive display screens, are susceptible to copyright protection. This note proposes that China offer patent protection for other features, including the overall design, algorithms, functionalities, and process embodied in a computer program. Generally speaking, program features would be copyrighted if expressive and patented if functional. This distinction may involve difficult fact-based judgments, but they would not be inherently different from other administrative decisions.

The combination of copyrights and patents under the legal reform proposed here still leaves unprotected the functional features of programs that do not meet the relatively strict standards for a patent.

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126. Chinese patent applicants enjoy the one year Paris Convention priority filing date in member states discussed in *supra* note 125. The benefit of the priority could be realized only if the foreign state otherwise recognizes functional features of computer programs as proper subject matter. Thus, the priority date is important in Japan, the United States, and most developing nations, but is irrelevant in Western Europe. *See supra* notes 68-72 and accompanying text.

127. *See, e.g.*, DAVIS, *supra* note 38.

128. *See supra* notes 43, 70.

However, China should not grant a limited monopoly without ensuring that society receives significant benefits. The unpatentability of certain functional features only means that they are not worth a limited monopoly, not that they are worthless. The creator of an unpatented program can make explicit contract arrangements for compensation, which may involve a valuation easier than for patentable software. Moreover, the requisite lump-sum payments are not likely to overburden the user. Since most of these unpatented programs should be relatively simple, it is reasonable to assume that their owners would not expect formal patent protection and would be satisfied with single payments.

In any event, the Software Regulations currently copyright the source and object codes of a program regardless of whether the functional features are patentable. For run-of-the-mill computer programs, the expressive aspects may actually be the more valuable parts of a program. A program's unpatentability may indicate that it belongs to a crowded field. Even if patent protection were granted, it would be limited in scope. Thus, the additional rights to the functional features of a program would be modest.

Patents increase costs by requiring licenses and reduce the availability of and access to computer programs, factors which dictate against program patents. But, comprehensive protection would encourage people to invest their energies in creative efforts and foreign transfers of technology. Computer program copyrights are especially inadequate in the PRC. Presumably, the government would actively encourage the public to adapt functional program features to meet the needs of modernizing a large country, while minimizing licensing fees. As the underlying research and development costs may require substantial investments, program creators stand much to lose. Making patent protection available for the functional features of computer programs would close the present copyright loopholes, which lead to incomplete protection, and should reduce uneasiness among both domestic and foreign program developers. The patent system also results in comprehensive disclosure in applications, aiding future development and creating a balance between public and private rights which may be absent in an exclusively copyright scheme. By recognizing computer program patents outright, the fine distinction between software and software integrated into hardware need not be made, so program patents should improve the administration of the patent system. Patenting computer programs should also help the PRC in implementing its plans for systematic growth. The proposed approach is generally consonant with the country's foreign investment

and self-reliance needs.

The Patent Law presents an existing framework that can be expanded to solve the computer program protection problem. Only administrative practices need be changed. Novelty, inventiveness, and practical applicability would be required of patentable computer programs. China's Patent Law should not be stagnant; it should be dynamic and adjust with the changing needs of the Chinese society. Both the nature and relative weights of the factors that go into the policy balance will change, so the PRC may decide to stop patenting functional program features when the balance shifts. It is fundamental, however, that China should enforce its patent laws, including software patents. Consistent enforcement generates confidence in law. The copyright/patent solution proposed here, if adequately enforced, will contribute to China's modernization efforts.

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