Trade-related aspects of intellectual property rights: The case of software and India

R. Narasimhan

One of the consequences of globalizing our economy is that we would be affected by the issues of science and technology as they affect other countries. Here I discuss in some detail the software patenting and copyright issues that are currently being debated in the US and the way the resolution of these issues there is likely to affect us through our agreeing to the Dunkel Draft—the GATT treaty—that we are being coerced to endorse. Independent thinking to arrive at measures for software protection is the alternative that merits urgent attention by developing countries like India.

Patent protection of software: professional divisiveness in the US

One of the consequences of globalizing our economy is that we cannot afford to be insular in our sensitivities to issues of science and technology as they affect other countries. Dunkel, in his draft report says:

> Subject to provisions of paragraphs (2) and (3) below, patents shall be available for any inventions, whether products or processes, in all fields of technology, provided they are new, involve an inventive step, and are capable of industrial application. .. Patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology, and whether products are imported or locally produced.[1]

He further adds:

> A patent shall confer on its owner the following rights: .. where the subject matter of a patent is a process, to prevent third parties not having his consent from the act of using the process, from the acts of using, offering for sale, selling, or importing for these purposes atleast the product obtained directly by that process.[2]

If India decides to sign the Dunkel draft, then, with respect to software practices, it would be necessarily bound by software rights and regulations that other countries might stipulate. What US courts decide would affect us also whether we agree with the specific principles of judgement or not. In a very tangible sense, by accepting the Dunkel draft, we shall be signing away our rights to independent opinions with reference to legal practices in this country concerning software.

Thus it becomes a matter of life and death for software practice in this country whether software is patentable or not in the USA. If the Dunkel draft is accepted by us, it would no longer be a matter of mere academic interest whether software patents in the USA automatically include IPR protection on the algorithmic content of the software that is patented.

Section 101 of the US Patent Act states that whoever invents or discovers any new and useful (1) process, (2) machine, (3) manufacture, or (4) composition of matter, or any new improvement thereof, may obtain a patent, on his invention or discovery. If an invention or discovery fits any of these categories, it is considered a 'useful' art[3].

Does software fit into the category 'process' as defined by the Patent Act and, hence, is patentable? If a piece of software is patented, does it necessarily confer exclusive rights to the inventor (of the software) of all the specific algorithms which make up the software? Patenting an invention is a time-consuming affair. In the US, patent applications are kept secret till a decision is made, often two or three years later. During that time, another software writer may 'invent' the same algorithm for a similar use. Once the original patent has been granted, the latter might find out that he has infringed somebody else's patent rights and is liable to be sued!

The League for Programming Freedom[4] is a private organization in the US that takes the extreme position that all software should be in the public domain. The principal argument of the League is that software, by its very nature, is incrementally developed and all so-called inventions always ride piggy-back on prior ideas[5]. It is not always easy to find out by the Patent Office whether an alleged invention is really new or builds on others' ideas. Not all programming techniques are published because the innovator might take his ideas to be too obvious and not worth publishing. Often programming innovations diffuse by word of mouth or through actual demonstrations in conferences or such gatherings.

Programming algorithms are like mathematical formulae. They are abstractions and are of the nature of ideas or mental contents. Hence, they are not patentable. This was the view of the US Supreme Court also till very recently. However, in the recent past, software that are subparts of larger processes have been allowed to be patented[6], thus, opening the door widely for the patenting of algorithms. For example, AT&T has been assigned a patent for industrial uses of the Karmarkar algorithm.

This view, that algorithmic processes incorporated in software innovations are not mere mental processes, but that they have enough technological value, seems to have been first argued by Chisum[7], a professor of patent law. On the other hand, cognitive scientists[8]

This article is the text of the Platinum Jubilee lecture in the Section of Physics delivered at the 80th Indian Science Congress, Goa.

hold that all mental processes are of the nature of algorithmic processes and, thus, the two are coequivalent. However, the courts seem to hold the view that technological processes involving the explicit use of a computer are, in *principle, patentable. An algorithm* residing in a ROM renders it patentable![9]

If one now holds that the patentor has the right of 'ownership' of all sub-processes of the process assigned a patent, this would seem to include elementary arithmetical processes such as addition, multiplication, etc. These would remain, thus, unusable by others. In principle, this approach would lead to absurd results. On the other hand, increasingly, microelectronics technology would seem to favour the control of processes by software (i.e., a program in a ROM, etc.). This trend is not only cost-effective, but a hard-wired control may be unrealizable in most situations. We seem to end up in a dilemma unless we argue that patenting confers 'ownership' of a task-specific process (which maybe partly realized in terms of hardware and partly in terms of software). Ownership is not conferred on *sub-units, per se, but on these subunits* put to that task-specific use.

For example, assume that I invent a specific construction of a dictionary of symbols, D. Using this I realize a particular voice-generator. Assume that the total voice generator unit has been assigned a patent. This would prevent other people copying my technique with D to realize a voice generator. But it should not prevent somebody else from using D for some other purpose; for example, for realizing a kind of translation of words. Such a conclusion would seem to be in keeping with the spirit of assigning patent protection to an innovator of a particular task-specific invention.

The League for Programming Freedom[10] argues that patent protection is really not needed to encourage innovation in software. Various innovations have, in fact, taken place in software *without such protection. Also, patent* protection is likely to favour larger corporations against smaller entrepreneurs. However, the US Congress, that actually legislates in this field, may take the view that whatever might have been *the situation in the early days,* software development is becoming so expensive now, that to encourage adequate investments to promote innovation, patent incentives are needed.

The professionals, in the computer science field, themselves, are very confused and undecided if one were to *assess the situation from the discussions* on this topic in professional journals[11]. The Dunkel draft, on the other hand, seems to have pre-empted the view that software is patentable. In fact, it requires all the signatories to endorse this view actively. As *The Economist*[12] cautions: 'International Cooperation in IPR is needed. But America would do better to lower the expectations of its innovators, instead of trying to export its own over-ambitious principles.

Copyright protection of software: a matter of interpretation

Akio Morita, in his autobiography *Made in Japan*, discussing the differences between Japanese and American ways of life, states: 'The lawyer has become, in my mind, a major symbol both of the difference between American and Japanese business and management styles and a weakness in the American system.[13] While researching for a talk on 'The role of lawyers in handicapping the entrepreneurial efforts in the United States', he says: 'I was once told by an American friend that in some cases lawyers step in when there is a traffic accident and sometimes take 65% of the insurance money or court awards, leaving the victim only 35%!'[14] He continues: 'there are over 500,000 lawyers in the US and I understand every year 39,000 people pass the bar examination... If you have so many lawyers, they have to find business, which sometimes they have to create.' 'Sometimes nonsensical law suits are generated by lawyers. In this country (i.e. the US) everybody sues everybody.'[15]

Copyright protection of software in the US is one such field where the lawyer thrives. By a congressional Act, software is considered an original work *of authorship and is copyright protected* by definition. Copyrighting an original piece of authorship is an automatic process and, in principle, does not require any registration formalities, although for purposes of litigation, *registration is recommended. Copyright* protection extends for the life-time of an author and 50 years beyond. Thus, copyright is an attractive approach to gaining protection of software for the innovator. However, the protection is for the 'expression' only and does not extend to the underlying 'idea, procedure, process, system, method of operation, concepts, principles, or discovery'.[16]

Thus, if a piece of software, that is automatically copyright protected, can now be 'interpreted' cleverly, the copyright protection may be extended to 'ideas' as if it were a patent protection. This 'creative' interpretation, thus, fetches the innovator the best of both worlds. One can easily see the role of lawyers in such 'creative' interpretations.

It is somewhat amusing that Robert Hart[17], discussing the software protection policies of the UK and Europe, chooses to deliberately distance himself in this regard. He writes: 'I believe in the US attempts are being made to *distort the copyright system to provide* the type of protection that a patent system can provide more readily... There is no certainty that a UK court would come to the same conclusion.'[18]

'Look and Feel' is a phrase invented by two lawyers named Jack Russo and Doug Derwin who wrote an article in 1985 in a computer law journal about aspects of software user interfaces that the authors thought might be protected by copyright[19]. 'Because there is no legal definition of "Look and Feel", and because it is inherently a vague accusation, a copyright infringement law suit based on "Look and Feel" may be hard to fight.'

There are many major software houses locked in litigations in the US based on infringement of 'Look and Feel' rights. One such organization that has sued because its 'Look and Feel' rights have been infringed (viz. Apple with reference to its Macintosh user interface) itself borrowed its user interface ideas from earlier work by Xerox PARC. Similarly, another corporation (viz. LOTUS), in fact, adapted its interface from another original spread-sheet program by VisiCalc. It was just that these earlier innovators did not choose to prosecute Apple and LOTUS at the initial stages.

'User Interfaces' are not the kinds of innovations for whose protection copyright laws are intended. They are more *naturally protected by patent* laws because they really form part of a

machine and are integral to its operation. As Samuelson[20] writes, 'when Congress passed the law admitting computer software to the copyright system in 1980, it did not understand that it was extending protection to a technology. Rather, congress thought of software only as a literary work.'

The lesson to draw from this, of course, is that as technology advances and multiplies, legislation has to become equally sensitive and sophisticated. This is all the more true of the situation in India. If globalization of our economy demands our industries to be based on the Science and Technology of the 21st century, our legislators, judges and lawyers, cannot afford to remain in the 18th and 19th centuries.

Trade-related armtwisting of developing countries

According to a recent newspaper item

> An international campaign against exploiting the 'blood and sweat' of three lakh child weavers by the highly export-intensive carpet industry (in India) has harmed the industry to a great extent[21]

This is, by no means, an isolated instance. Increasingly, international trade is sought to be confused, with motivation, with morality. Quite often, the indignation stems from industries which are immediately affected by competition from the Developing Countries (DCs).

In fact, the US Congress mandatorily requires its President to rank order its trade partners on the basis of their human rights records. Restrictive trade practices are, then, dictated by this rank ordering. A very laudable objective, of course, in theory. But, in practice, the separating frontier between trade practices and human rights practices is not so easy to arrive at. In any case, human rights should be of national concern and, in general, the national public of a country should be concerned with safeguarding the human rights of its citizens. For example, the same news item goes on to quote a spokesman from the Carpet Export Promotion Council: 'The ultimate sufferers will be the children and their families if the carpet units find no outlets abroad.'

It is easy enough to set oneself up to pass moral judgement on other countries —especially, the poorer ones. International institutions, often, thrive on rank-ordering other countries on their human rights record. But 'human rights' is a nebulous enough term to lend itself readily to convenient interpretations. A prestigious international weekly claims: 'America's *30 million blacks* earn less, learn less, live worse, and die sooner than the rest of its citizens'[22]. It goes on to elaborate:

> Nearly a third of all blacks, as against 10% of the whites, live below what is officially reckoned as the poverty-line, among them 45% of all black children, as against 15% of the white ones. A new-born black baby is *twice as likely to die before its first birthday* as a white one....[23]

And so on and on. The self-appointed evaluators of human rights violation hardly ever raise an accusing finger at such states of affairs. Social problems, such as these, hardly ever figure in international trade relations.

The same Weekly castigates the multinational tobacco companies by pointing out that, 'as their traditional markets [in their own countries] grow tougher [because of anti-smoking lobbies], [they] are looking for new markets elsewhere [often in DCs]'[24]

> In 1985, American trade negotiators began a systematic campaign to open tobacco markets in Japan, South Korea, Taiwan and Thailand.

In each case, the US used Section 301 of its 1979 Trade Act to threaten retaliatory tariffs on these countries' exports if markets were not opened for its tobacco firms. Apart from demanding free-trade, they also demanded advertisement rights often denied to their own national enterprises.

> Senator Jesse Helms wrote to Japan's Prime Minister in 1986: 'Your friends in congress *will have a better chance to stem the tide* of anti-Japanese sentiments if and when they can cite tangible examples of your doors being opened to American products.' For American cigarettes, he wrote, 'May I suggest a goal of 20% (market share) within the next 18 months?[25]

According to the same Weekly, Senators Helms and Mitchell McConnel elaborated to the Taiwanese Prime Minister what they wanted done with respect to American cigarettes. They wrote:

> As you know in July the Bush Administration signalled its willingness to work with the other GATT members to resolve in a favourable manner the issues relating to Taiwan's application to join. This change was triggered, in a large part, by bipartisan congressional pressure. However, the actions of your Government relative to changes in the treatment of imported tobacco could well *impede further progress*....[26]

The Weekly says that 'one estimate suggests that by 2025 around 7 million people a year will be dying there of smoking-related ailments.'

The prestigious international Weekly is the *The Economist*, the source of the above two stories and hardly one to be counted as an America-basher! Where do free-market rights end and human rights violations begin? When multinational fora such as the GATT are used to armtwist DCs and beat down 'unfair' competition in trade, what should the DCs do to protect their own rights and their home markets?

The Dunkel draft in its Article 7 (objective) of Annexure III affirms: 'The protection and enforcement of IPR should be to contribute to the promotion of technology, to the mutual advantage of the producers and users of technology, and *in a manner conducive to social and economic welfare and to a balance of rights and obligations* (emphasis added)'.

If these words are intended as more than mere pious statements of objectives, the DCs must make sure that in agreeing to multilaterally covered IPR, they do not end up in a situation where they render themselves vulnerable to politically motivated trade-related armtwisting bilaterally.

Some lessons to learn: software and India

In a recent talk in Washington DC on 'Global Dimensions of Intellectual Property Rights in Science and Technology', Deepak Nayyar, while advocating the Indian Patent Act as a model for other DCs to adopt, is reported to have said:

> Technical progress has always been labour-saving. What is new about recent developments is that informatics and robotics are displacing not only the muscles but also the brains embodied in labour. This is likely to have profound impact on output, employment and trade in world economy. Most of these developments are concentrated in a few developed countries and, within these countries in a few corporate entities. The degree

to which the national interests of the industrialized countries coincide with the corporate interests of transnational firms is uncertain. The national interests of DCs, however, are very different in view of the far-reaching implications for the development process[27].

The Dunkel draft, on the other hand, is weighted primarily in favour of the trading rights of the industrial countries of the west. But we have seen that the opinions in the West as regards proprietary rights on software are still very divided. Even in the US, the desirability of patenting algorithms is by no means settled. *The Economist*[28] sums up the present state of affairs succinctly: 'Although America has succeeded in building an international consensus behind the concept that IPR should be enforced worldwide, nobody yet agrees what these rights should be'.

In view of our global commitments to copyright protection laws relating to books, records, films, etc. it would be better to delink software protection from such well-established copyright regulations. This would enable us, then, to negotiate our own copyright protection regulations for software with other countries to suit our national requirements.

The argument that *other countries* club software together with literary and artistic production is not a valid argument. *In international relations, the attitude to take is that everything should be done to further one's country's private interests.* The fact that *The Economist*, not ordinarily given to America-bashing, has been sounding warnings[29] (including writing editorials[30]) against the US in this context should make us sit up and take serious notice. India should think on its own and arrive at a *modus operandi* with regard to software protection that best suits its own interests. The primary lesson to learn is not to short change the long-term future of the country for short-term benefits, however pressing the immediate problems are.

InFAST[31] is a software protection organization that has been recently formed in India. It advocated copyrighting of software for its legal protection but it believed that software writing was so specialized an art form that more confusion than illumination resulted if the writing of software was equated with writing of books for copyright purposes. InFAST, therefore, advocated a specialized copyright regime for software in India, restricted to 15 years. It explained its stand as follows:

> Our main reason for excluding software from the definition of a literary work is that, given the present situation in India, if we want to effectively stop software piracy, we need a very different cause for legal action: *the possession of illegally copied software.*

With literary works, illegal copying of, or trading in, copyright-protected works is an offence. But *ownership* of such illegally produced copies is not. Copying software is so easy that InFAST believed that illegal possession of copyrighted software must be considered a legal offence leading to mandatory punishment. It wanted 'search, seize, and punish' authorization to InFAST members along with the police. But I understand that InFAST has failed to convince the government of the need for a separate copyright regime for software. Copyright protection would be provided to software along with books, art works, and other objects. Illegal possession of software for *gain* would be considered a mandatory offence[32].

However rational the thinking may be that mere possession of illegal software is a punishable offence, punitive measures of protection are likely to be counterproductive in the short-term, as well as in the long-term. Because software can be copied on a floppy, the very absence of bulk is likely to lead to abuse of 'search and seize' regulation. Except in the cases of large corporations, government agencies or business houses, 'search and seize' is an inherently flawed measure and is not easy to enforce so far as individuals are concerned.

Ultimately software protection has to depend on the realization on the part of individuals that illegal copying of software is 'unfair' both to the producer of the software and its consumer. Ours is not the only society given to clandestine copying. A recent news item in the *Financial Times (London)*[33] states that in the European community the copying rate is about double of what it is in North America. In the US itself illegal editions of software exceed 40% and in the UK, 50%. In Portugal, close to 90% of the software in use is claimed to be illegally copied.

Several technological solutions exist for software protection[34]. But these are not always attractive to software producers since the more 'fool-proof' a technological fix is, the more trouble users have to go through to access the package for use. What is gained in protection through technology is lost in the shrinking market for that package.

It is so important to make software readily available within India and to assist the growth of local software capability, that a case can be made to differentially promote domestic industry as against the impact of ready-made imported packages. It would, thus, seem to be valid to make copyright protection available exclusively to software that is locally *produced*. To quote InFAST,

> *Developing* software independently even though it imitates some other software, wholly or partly, in respect of idea

should not constitute a legal infringement. *Direct copying of an existing piece of software whether imported or locally produced should be the only legally prohibited act.* Thus, 'Reverse Engineering' of nonlocally made software should be explicitly encouraged if a producer is ready to invest in such an activity and compete in terms of quality and piece.

Such an action is only meaningful, of course, for patent-protected software where the originator of a piece of software has 'ownership' rights on algorithms he has used. There is every reason to believe that US software (especially packaged software for the PCs and Workstations) would get routinely patented before too long.

The central thrust of the argument of this paper may be summed up as follows:

1. Increasingly, there is an aggressive tendency to patent-protection of software in the USA.
2. Lawyers, as interested middlemen, are promoting such a move[35].
3. Once software becomes a patent-protected product, the Dunkel Draft, and GATT commitments, would be used to require other countries (especially the DCs) to fall in line.
4. Failure to do so would increasingly attract trade-related armtwisting *bilaterally*.

As Porter emphasizes, and as InFAST

quotes with endorsement,

The more competition becomes global, ironically, the more important the home-base becomes[36].

Notes

1 *Dunkel Draft* (in the text and in the Notes by this name we refer to '*Draft Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations*'): Annexure III, Article 27.
2. *Dunkel Draft*: Annexure III, Article 28.
3. See Lautsch, J. C., (1985) for very readable and exhaustive accounts of the US Patent Act and of the US Copyright Protection Laws.
4. The position of the League for Programming Freedom with respect to software is stated in extenso by R. Stallman and S. Garfinkle in Viewpoint in the *Comm. A C.M.* January 1992, pp. 17-22, 121. Their statement of their position has attracted reactions of various kinds; see *Comm. A.C.M.*, June 1992, pp. 13–16. Paul Heckel has an angry rejoinder in the same issue, pp. 121–140. He seems to miss the essential points of the League and manages to politicize the debate by bringing in irrelevant details.
5. This is true of science, in general, see in this connection the well-known remarks of Newton, 'If I have seen further it is by standing on the shoulders of giants'.
6. The often quoted illustration is a specific process of curing rubber where a piece of program computes the terminal conditions for terminating the curing process.
7. See Chisum, D., 1986.
8. See Newell, A., 1986.
9. See Samuelson, P., 1990.
10. See note 4, above.
11. 'Legally speaking' and similar columns regularly appear in journals such as *Comm. A.C.M.*, *IEEE Micro*, etc.
12. *The Economist*, August 22, 1992, p. 15.
13. Morita, A., 1986, p 171.
14. Morita, A., 1986, p. 172.
15. Morita, A., 1986, pp. 174–175. According to *The Economist* (October 10, 1992) 'Until 1970 the number of lawyers per 100,000 Americans had remained at a fairly constant 120 or so. That number has since more than doubled, to over 300. Moreover, the number of federal lawsuits have roughly tripled in the past three decades' (p 21).
16. See note 3 above.
17. Hart, R., 1989
18. Hart, R., 1989, p. 183.
19. The quotations in this para are taken from Samuelson, P., 1989.
20. See Note 19, above.
21. *The Economic Times*, Bangalore, September 14, 1992.
22. *The Economist*, March 3, 1992, p. 17.
23. See Note 22, above.
24. *The Economist*, May 16, 1992, p. 21.
25. Reference in Note 24, above, p. 24.
26. Reference in Note 24, above, p. 24.
27. Excerpted in *The Economic Times*, Bangalore.
28. *The Economist*, August 22, 1992, p. 56.
29. *The Economist*, August 22, 1992 cautions: 'America's zeal for extending the rights to intellectual property is causing confusion at home and abroad. Worse, it may be stifling rather than encouraging innovation.' p. 55.
30. *The Economist*, August 22, 1992: see 'The harm of patents', p. 15.
31. Personal communication dated September 5, 1991, from Mr. Shirish B. Patel. All quotations regarding InFAST are from this communication.
32. Personal Communication: Mr Shirish Patel's letter of November 2, 1992.
33. *The Financial Times*, London; December 10, 1991.
34. See J. Phipps, 1989.
35. See for instance Chisum's assertion (reference in Note 7): 'Policy considerations indicate that patent protection is appropriate for mathematical algorithms that are useful in computer programming as for other technological innovations', p. 120. In an appendix to his paper, he describes over 25 patents that have been already issued to software ideas and methods, pp. 1021–1022.
36. See Porter, M. E., 1990, p. 614.

References

1. Chisum, D., *Univ. of Pittsburgh Law Rev.*, 1986, **47**, 959.
2. Gopinath, K., *Economic and Political Weekly*, August 29, 1992, pp. 101–104
3. Grover, D., (ed.), *The Protection of Computer Software: Its Technology and Applications*; Cambridge Univ. Press, 1989.
4. Hart, R., "Legal Protection: Patents, Copyright and Trade Marks"; in (3), 1989, pp. 177–229.
5. Lautsch, J. C., *American Standard Handbook of Software Business Law*, Reston Publishing Co., Reston, Virginia, 1985.
6 Morita, A., *Made in Japan*, E. P. Dutton, New York, 1986.
7. Newell, A., *Univ. of Pittsburgh Law Rev.*, 1986, **47**, 1023.
8. Phipps, J., "Physical Protection Devices , in (3), 1989, pp. 58–78.
9. Porter, M. E., *The Comparative Advantage of Nations*, Macmillan, New York, 1990.
10. Samuelson, P., *Comm. A.C.M.*, 1989, **32**, 563–572.
11. Samuelson, P., *Comm. A C.M.*, 1990, **33**, 23–27.

Acknowledgements. I would like to acknowledge the assistance of Mr R. Chandrasekar of NCST and Ms. T. Jacobson in accessing the relevant literature. I would also like to thank those who took the trouble to comment on an earlier draft of this paper.

Received 29 October 1992; revised accepted 11 November 1992

R. Narasimhan is in CMC Limited, Mitra Towers, 10/3, Kasturba Road, Bangalore 560 001, India

Extra-mural funding of research: results from the work of the Inter-Agency Committee

V. Siddhartha

The Inter-Agency Committee on the management of R&D funding [extra-mural] was set-up by the Department of Science and Technology (DST) in December, 1989 with a term of two years. Its term was subsequently extended till end-June, 1992. It had eighteen members drawn from various funding agencies and some individual members from the academic sector. The committee was serviced by DST and chaired by (since retired) P. J. Lavakare. The committee held ten meetings at which, in pleasant contrast to attendance in other such large committees, there was high attendance reflecting both the eagerness and concern of the members for the work of the committee.