

# COMPARING THE VIEWS OF LAWYERS AND USER INTERFACE DESIGNERS ON THE SOFTWARE COPYRIGHT "LOOK AND FEEL" LAWSUITS

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## ABSTRACT

*This article reports the results of a survey of the user interface field's perspectives on copyright protection of computer software, conducted at the sixth Association of the Computing Machinery Conference on Computer-Human Interaction. The survey focuses specifically on the effects of protection of "look and feel" of user interfaces. The most significant finding is that 79 percent of respondents with an opinion opposed "look and feel" protection. These and other results are then compared with the views of intellectual property scholars expressed in the consensus statement reported at the outset of this issue. The article concludes that the views of the user interface design community provide strong support for the conclusions drawn in the consensus statement.*

It is rare for those with a deep grounding in intellectual property law to learn what those with a deep grounding in a field governed by this law think about the extent of intellectual property protection that would promote innova-

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tion, creativity, and progress in that field. This article aims to bridge the gap between what lawyers and practitioners think about intellectual property protection issues affecting computer software, particularly as to user interface design. It reports on a survey of the user interface field's perspective on copyright protection which was conducted at the sixth Association of Computing Machinery (ACM) Conference on Computer-Human Interaction (CHI '89) held in Austin, Texas, on May 2, 1989.<sup>1</sup> Because the "look and feel" lawsuits were part of the impetus for convening the LaST Frontier Conference on Copyright Protection of Computer Software,<sup>2</sup> this article compares the findings of the CHI survey with the LaST Frontier Conference Report. The article finds the user interface field's views and the views of the intellectual property scholars who issued the Conference Report to be, in large measure, consistent with each other.

In brief, this article reports the following conclusions: The CHI survey (which had 667 respondents) demonstrates an overwhelming opinion that the "look and feel" of user interfaces should not be given protection by copyright law. Protection of "look and feel" of user interfaces by copyright was also not supported in the Conference Report. The CHI survey shows that those in the field regard the kind of strong copyright protection being sought in the current lawsuits as likely to have a negative effect on their own work and on the user interface design community/industry. The Conference Report, although not attempting to judge what impact any particular interpretation of copyright might have on the software or user interface fields, makes clear that copyright protection not be construed more broadly than traditional doctrines limiting the scope of copyright would suggest is appropriate for computer programs.

In addition, the CHI survey shows that though they opposed protection of user interface "look and feel," those in the user interface field accepted the need for copyright protection for the source and object code of computer programs. In a similar vein, the Conference Report reflects agreement that at a

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<sup>1</sup>ACM, founded in 1947 as "the society of the computing community," has over 70,000 members worldwide and thirty-two special-interest groups or SIGs. The SIG for Computer-Human Interaction, SIGCHI, was formed in 1983, and is the fastest growing SIG in the ACM community with nearly 4,000 members. Dr. Bill Curtis, who was an expert presenter at the Last Frontier Copyright Conference, was one of the founders of SIGCHI and the conference chair for its 1989 sixth annual conference called CHI '89. See Curtis, *Engineering Computer "Look and Feel": User Interface Technology and Human Factor Engineering*, 30 JURIMETRICS J. 48 (1989).

The annual CHI conference is generally considered the most important technical meeting in the user interface research and development community, and this year CHI '89 was attended by approximately 1600 people. See *infra* note 8 and accompanying text for a profile of the CHI survey respondents.

The current round of "look and feel" copyright infringement lawsuits includes those by Apple Computer against Microsoft and Hewlett-Packard, by Lotus Development Corp. against Paperback Software and Mosaic Software, and by Ashton-Tate against Fox Software. As will be evident from reading this survey report, the user interface research and design community is very concerned about these lawsuits.

<sup>2</sup>See *LaST Frontier Conference Report on Copyright Protection of Computer Software*, 30 JURIMETRICS J. 13 (1989) [hereinafter cited as *Conference Report*].

minimum, the legislative judgment to protect computer programs by copyright should be interpreted to protect source and object code from exact duplication (except as the statute or traditional doctrines limiting the scope of copyright might permit).

The CHI survey also found that those in the user interface field opposed strong protection for user interfaces because they thought it would adversely affect the climate of open exchange and discussion of research and design innovations that has brought progress to the field. Because it is among the principal purposes of copyright law to promote the free exchange of ideas in order to promote innovation, the Conference Report also underscores that copyright law, as applied to computer programs, should be interpreted to permit exchange and use of software ideas, both for research and subsequent development efforts.<sup>3</sup>

Section I of this article will discuss the context in which the CHI survey was conducted and the characteristics of the survey respondents. Section II will discuss in greater detail respects in which the survey findings and the Conference Report are in harmony. Section III will discuss respects in which the survey findings are in harmony with views expressed by some conferees on issues where the group was not able to reach consensus.

## I. BACKGROUND CONTEXT OF SURVEY OF USER INTERFACE FIELD

### A. The CHI Legal Debate

To make the user interface design community more aware of the legal issues involved in the current round of "look and feel" lawsuits, the first author (Samuelson) organized and moderated a legal debate on copyright protection for user interfaces as a plenary session at CHI '89.<sup>4</sup> The debate featured Jack

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<sup>3</sup>See *Conference Report*, *supra* note 2, at 8-11. Although the Conference Report only offers guidelines for program development in connection with its discussion of copyright protection for structural features of computer programs, the principles of copyright that permit free use and exchange of ideas is one that applies to user interfaces as well.

<sup>4</sup>To help the technical community to become more aware of the legal issues affecting their field, the first author (Samuelson) has published two articles in technical journals in the past year. In one, Samuelson argued that under traditional principles of copyright law, it is inappropriate to claim copyright protection for the "look and feel" of software user interfaces. See Samuelson, *Why the Look and Feel of Software User Interfaces Should Not Be Protected by Copyright Law*, 32 COMM. ACM 563 (May 1989) [hereinafter cited as *Samuelson-CACM*]. This article did not appear until after the CHI conference, so Samuelson's views on the "look and feel" question were not known to the audience at the time the CHI survey was conducted. In the other article, Samuelson argued that copyright should not be construed to provide protection for structural abstractions of the underlying software. Samuelson, *Is Copyright Law Steering the Right Course?* 5 IEEE SOFTWARE 78 (Sept. 1988) (hereafter cited as *Samuelson-IEEE*). In brief, Samuelson argued that since copyright law does not protect functional works (such as a machine) or functional aspects of works

Brown, the chief lawyer for Apple Computer in the Apple-Microsoft litigation, and Thomas Hemnes, a former defense lawyer in the Lotus case, debating the pros and cons of protecting the "look and feel" of software user interfaces through copyright law.

To prepare the conference attendees for the debate, Samuelson wrote an article for the conference proceedings that presented both a "maximalist" and a "minimalist" interpretation of copyright law as applied to software user interfaces.<sup>5</sup> In that paper Samuelson showed that different legal arguments, both drawing from different parts of traditional copyright doctrine, could be made in support of, or in opposition to, protecting software user interfaces.

At the debate, after a brief introduction to copyright principles by Samuelson, the lawyers spoke for just under half an hour each. Mr. Brown emphasized the significant amount of creative work that went into the design of a user interface and the role of copyright in protecting those whose intellectual labor had produced a valuable product from those who found it easier to imitate a creative work than to do something creative themselves. Mr. Hemnes argued that not every valuable intellectual product was protectable by copyright law. He argued that copyright law would and should not protect certain aspects of intellectual works if nonprotection would further progress in a field. An article on the debate published in the *New York Times* reported that Brown and Hemnes made "equally persuasive" arguments.<sup>6</sup>

## B. Survey Administration

The authors realized that the CHI legal debate would provide a unique and efficient opportunity to survey a large sample of the user interface field about the legal issues. The survey was not distributed until after the lawyers had their say, so that the audience was educated about the terms of the legal controversy and had heard each side. As the debate drew to a close, Samuelson informed the audience about the survey that was being distributed to them and said that although the judges in the pending "look and feel" lawsuits would make the final rulings, this was a chance for them, as representatives of the user interface design community, to "vote" on the legal issues. Six hundred sixty-seven members of the audience filled out the survey before they left the auditorium.<sup>7</sup> The following is a profile of their pertinent characteristics.

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with both functional and nonfunctional aspects, this law should not be construed to protect the "look and feel" of user interfaces because of their largely functional character; nor should it protect the structure of the underlying program insofar as it reflects the functional design of the program.

<sup>5</sup>Samuelson, *Protecting User Interfaces Through Copyright: The Debate*, PROCEEDINGS OF CHI '89 CONFERENCE 97 (1989).

<sup>6</sup>Lewis, *Legal Constraints on Sharing Ideas*, N.Y. Times, May 7, 1989, at F10.

<sup>7</sup>The text of the survey form is attached as Appendix I.

### C. A Profile of the Survey Respondents

The survey posed several questions about the respondents and their firms so that it would be possible to analyze whether characteristics of the respondents or their firms might predict their views on the "look and feel" lawsuits and related issues. For example, respondents were asked to select from a list of job functions the one or two descriptions that best fit. "User interface designer" was selected by 44 percent of the respondents, "researcher" by 32 percent, "software engineer" by 29 percent, and "human factors engineer" and "manager" tied with 15 percent.<sup>8</sup> They were also asked to identify the one best description of the organization or company for which they work. "Computer manufacturer" led with 26 percent, followed by "R and D organization" with 23 percent, "university" with 20 percent, and "software vendor" with 14 percent.

The survey asked whether the respondents or their firms had developed software for commercial purposes: Seventy-nine percent said they had; 16 percent said they hadn't; and 5 percent didn't know. Fifty-five percent reported that either they or their firms had used copyrights to protect software, 16 percent said no, and 29 percent said they didn't know. Forty-one percent reported using patents to protect software, 25 percent said no, and 34 percent didn't know.

The survey did not ask respondents to identify the organization or firm for which they worked, but since the respondents made up 42 percent of the total conference registration, the registration information provides a reasonable substitute without compromising the identity of particular respondents. The ten organizations with the most attendees at CHI '89 were, in order of decreasing attendance: IBM, Hewlett-Packard, Apple, MCC (the host organization in Austin), AT&T, Texas Instruments, Xerox, Bell Communications Research, the University of Michigan, and Carnegie-Mellon University. In addition to "look and feel" litigants Hewlett-Packard and Apple (in positions two and three), the litigants Ashton-Tate, Lotus, and Microsoft had several representatives each in attendance at the conference.

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<sup>8</sup>Because respondents were given the opportunity to check more than one job function, the percentages for this question exceed 100 percent. Other job function categories were represented as follows: faculty (8 percent), programmers (7 percent), consultants (6 percent), students (6 percent), technical writers (2 percent), lawyers (1 percent), and other (4 percent). On average, each respondent selected 1.68 job functions. The most common pairs of job functions were: "user interface designer" and "software engineer," selected by 13 percent of the respondents; "user interface designer" and "researcher," 9 percent; "user interface designer" and "human factors engineer," 6 percent.

The authors recognize that because venture capitalists and chief executive officers of computer and software firms do not typically attend conferences such as CHI, the survey does not reflect the views of this segment of the community about the extent of intellectual property protection they think is needed for software. Nevertheless, fifteen percent of the survey respondents identified themselves as managers, and their responses to the survey did not differ in a statistically significant way from the responses of the respondent group as a whole. *See infra* note 20.

Another measure of the sizes and kinds of firms from which the respondents came (and even perhaps of their sensitivity to intellectual property concerns) was the number of respondents whose firms have in-house lawyers who handle legal protection issues. While 26 percent said they didn't know, 59 percent identified themselves as being from firms with at least one in-house lawyer. Forty-two percent worked at firms with three or more in-house lawyers.

None of the respondent characteristics were found to predict statistically significant differences in the answers to the survey's core questions. In view of the support the survey gives to the "minimalist" interpretation of the appropriate reach of copyright law as applied to software, it is worth noting that the respondents are among the leading designers and researchers in their field, responsible for creating many of the most commercially valuable user interfaces in the software industry. They typically work for commercial firms that rely on copyright to protect their software products.

## II. SURVEY FINDINGS IN HARMONY WITH CONSENSUS POSITIONS IN THE CONFERENCE REPORT

### A. "Look and Feel" Protection

One of the principal findings<sup>9</sup> of the survey is that the user interface field thinks that the "look and feel" of user interfaces should not be given protection by copyright or patent law.<sup>10</sup> Seventy-seven percent of the respondents with an opinion felt that "look and feel" should not be given protection by either copyright or patent law.<sup>11</sup> Only 18 percent thought that copyright law should protect "look and feel" of user interfaces.<sup>12</sup>

Quite a few of the survey respondents explained their reasons for opposing legal protection for "look and feel" of user interfaces. Some did so because

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<sup>9</sup>The results of the survey presented as "findings" in this article are statistically reliable according to standard conservative statistical analysis methods. The surveys were analyzed by the second author (Glushko), who holds a Ph.D. in experimental psychology (as well as an M.S. in software engineering) and who has previously taught statistics.

<sup>10</sup>"Look and feel" was one of eleven aspects of computer software about which the survey inquired as to the appropriateness of copyright, patent, both or neither forms of protection. Table 3 presenting the results of this part of the survey can be found in Appendix II. A complete report of the survey results is available from the authors.

<sup>11</sup>This is an overwhelming majority from a statistical standpoint (chi-square (1)=173.85,  $p < .0001$ ). As discussed *infra* notes 38-40 and accompanying text, equally strong or stronger opposition was registered by the respondents to legal protection of commands, screen sequences, and user interface functionalities, shown in Appendix II, Table 1. Since these features may overlap significantly with "look and feel," it is not surprising that the respondents considered them in much the same light.

<sup>12</sup>As Table 3 in Appendix II indicates, 15 percent of the respondents checked "copyright," 5 percent checked "patent," and 3 percent checked both. Support for copyright shown in the text is the sum of the "copyright" and "both" responses.

they weren't sure what "look and feel" meant.<sup>13</sup> Some were unclear how similar interfaces could be in "look and feel" before infringement might be found.<sup>14</sup> Others thought that "look and feel" related largely to functionalities of the interface which copyright should not protect.<sup>15</sup> Still others expressed concern for the effect on the industry if the current "look and feel" lawsuits established strong copyright protection for user interfaces.<sup>16</sup>

Indeed, another major quantitative finding of the survey is that respondents regarded the kind of strong copyright protection being sought in the "look and feel" lawsuits as likely to have a clear negative effect both on their own work and on the industry/community. In response to a survey question about the effect such protection would have "on your own work",<sup>17</sup> the average rating was 2.049 on a five-point scale ranging from "1" for "significant negative effect" to "5" for "significant positive effect." This demonstrates a clear expectation overall of a negative effect.<sup>18</sup> It was not just a minority of respondents with "significant negative" votes who swayed the average. Seventy-two percent of the respondents expected a negative impact on their own work (ratings of "1" or "2") if the current lawsuits established strong copyright protection, and only nine percent expected the effect on their work to be positive (ratings of "4" or "5").<sup>19</sup>

The predicted effect "on the user interface design industry/community"

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<sup>13</sup>A representative comment was: "Are we talking about copyrighting exact pixel-by-pixel images, or portions of images, or the general idea behind a given image, or series of images? I have no quarrel with protecting specific visual elements of a user interface, but what in God's name is 'look and feel?'"

<sup>14</sup>"[The] [w]orst immediate effect of copyright protection will be the chilling effect of uncertainty of what's OK and what will get me sued."

<sup>15</sup>One respondent said: "The current cases involving 'look and feel' of highly functional elements should not be protected. A computer book, videogame, or interactive video is another matter." Said another: "It is important to make the point to the legal community that user interface is an aspect of the function of the system—that it affects the user's ability to perform their tasks, and it's accomplishment of these tasks, not the user interface, that is the ultimate goal of our products."

Some respondents expressed confidence in distinguishing which interface elements might be copyright-protectable, and those that would not: "It seems to me that functional aspects of an interface can clearly be differentiated from artistic or stylistic aspects. Protect only those aspects that can be changed without changing the functionality." Said another: "Copyright law is appropriate (in UI cases) only to an extremely similar copy of an artistic element that does not provide useful function. The most valuable element of the UI is not, however, the graphic rendering, but the behavior, process and functionality." Yet another respondent commented: "Graphic interfaces are not due to artistic impulses, but based on sound scientific principles resulting from basic psychological research." See also note 44.

<sup>16</sup>For example: "People have to be able to build upon the work of others." "Copyrighting is necessary but restriction to what is copyright-protected must be made so that the field can progress." "We should share for everyone's good. We all benefit from the growth of the industry." "If granting protection must promote advancement of the art, then protection [of user interfaces] should not be granted. This is because user interfaces and their design are cumulative and evolutionary."

<sup>17</sup>See Appendix I, question 9.

<sup>18</sup>This negative rating differs reliably in statistical terms from "No effect" ( $t(646) = 23.73$ ,  $p < .0001$ ).

<sup>19</sup>See Table 2 in Appendix II for fuller details.

(as opposed to the effect on the respondent's own work) was even more strongly negative, with an average rating of 1.646 on the same five-point scale.<sup>20</sup> Indeed, eighty-six percent of the respondents expected the kind of strong copyright protection for user interfaces being sought in the "look and feel" lawsuits to have a negative impact on the industry, while only ten percent viewed it as a positive development.<sup>21</sup>

When we compared the answers respondents gave concerning their predictions of effect on their own work with their predictions about the industry effect, we noted that while there was some shifting in both directions, people who gave different ratings on the two questions were 3.5 times more likely to move in a more negative direction when predicting the industry effect.<sup>22</sup> Particularly striking was the finding that of the nineteen percent of respondents who expected to be unaffected in their own work if the current lawsuits establish strong copyright for user interfaces, sixty-nine percent nonetheless expected a negative effect for the field.<sup>23</sup>

The LaST Frontier conferees also did not support the idea of copyright protection for the "look and feel" of computer program user interfaces, saying that use of this term "obscures rather than assists in the application of copyright principles to software interfaces."<sup>24</sup> The Report aims to articulate with some precision the conferees' views about the application of traditional principles of copyright law to the protection of various aspects of user interfaces to aid those who engage in software development in understanding the law.<sup>25</sup> The conferees

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<sup>20</sup>This too is statistically significant ( $t(625) = -31.83, p < .0001$ ). It is worth noting here that those who identified themselves as managers (15 percent of the respondent population) did not have statistically significant different response to this question than the respondent group as a whole; even so, it is still interesting to compare the average predicted industry effect among the managers (1.74) with the averages closest to the manager predictions, which were among faculty (1.76), students (1.73) and user interface designers (1.72). All were still well on the side of a 2.0 rating, which itself was a negative rating. It is also noteworthy that not a single category of respondents measured by job function predicted even a neutral, let alone a positive, effect on the industry if the "look and feel" lawsuits established the kind of copyright protection being sought.

<sup>21</sup>See Table 2 in Appendix II for details. It is clear that this issue matters intensely and is somewhat polarizing in the user interface field, since only one respondent in twenty-five expected that strong protection would have no net effect.

The negative predictions about the effect of strong copyright protection on the user interface field reported here do not significantly vary according to where respondents work. See *supra* note 8 and accompanying text.

<sup>22</sup>The significant negative shift of three-tenths of a point on a five-point scale from an individual to an industry effect resulted because forty-four percent of the respondents gave different ratings on the two questions (mean rating shift =  $-.309, t(620) = 9.017, p < .0001$ ).

<sup>23</sup>Indeed, the survey respondents felt strongly enough about the predicted harm to their industry that 63 percent of those who expressed an opinion wanted SIGCHI to take an official position on the legal issues based on the results of this survey. Many who voted "no" on question 13 said they did so because they thought the entire SIGCHI membership should be polled before SIGCHI took an official position.

<sup>24</sup>*Conference Report, supra* note 2, at 25.

<sup>25</sup>*Id.* at 25-30. The Conference Report also offers some guidelines for computer program developers concerning the right to use program logic and other program "ideas" in developing subsequent programs, and to make a limited number of copies of a protected program for the purpose of studying the ideas embedded in the program. *Id.* at 21-24.



also recognized that software user interfaces may be highly functional and to this extent that copyright protection is not available.<sup>26</sup> In addition, the conferees, like the user interface survey respondents, recognized that copyright protection may be constrained by technological considerations that limit the range of viable user interface “expressions.”<sup>27</sup>

Although the Conference Report does not attempt to make a prediction about the effect the “look and feel” lawsuits might have on the industry, the conferees understood that they were being convened as a group to aid in the clarification of copyright principles as applied to computer programs because uncertainty in the case law was leaving the software industry without adequate guidance about the law.<sup>28</sup> The Conference Report finds in traditional principles of copyright law an affirmation of the right to study and take unprotected elements from copyrighted programs and reimplement them in other products and it accepts that intellectual property protection for computer programs should balance the needs of innovators and competitors so as to promote the health of industries such as that for software. Nevertheless, the conferees regarded their aim to be a limited one of articulating how traditional copyright principles might be applied to computer programs, not to offer their judgment about whether the larger goal of intellectual property law can best be served by use of copyright law to protect computer programs.<sup>29</sup>

## B. Copyright for Source and Object Code

The strong opposition to “look and feel” protection for user interfaces among the survey respondents was not part of a wholesale rejection of intellectual property protection for software. The respondents overwhelmingly supported intellectual property (mainly copyright) protection for source and object code. Fully 93 percent of those with an opinion supported intellectual property protection, either through copyright or patent, for source code.<sup>30</sup> The 85 percent support for object code protection was nearly as strong.

<sup>26</sup>*Id.* at 25-26.

<sup>27</sup>*Id.* at 25-26. The survey respondents too commented about technological constraints imposed on user interface design: “Given the very limited bandwidth of a computer display (e.g., 350 × 640 × 16), there are only a few (if more than one) optimum ways to render an arrow or clock, etc.” “There seem to be only a limited number of meaningful variations as far as function is concerned. Contrast this with artistic expression in general which is almost limitless. The user interface, to some degree, is device dependent.”

<sup>28</sup>*Conference Report, supra* note 2, at 10.

<sup>29</sup>*Id.* at 15-16, 18-24.

<sup>30</sup>This is a statistically significant result (chi-square(1) = 458.76,  $p < .0001$ ), as is that for object code (chi-square(1) = 284.01,  $p < .0001$ ). Although 7 percent of the respondents would not have protected source code through patent or copyright, and 15 percent selected a “neither” response as to object code, it should be noted in fairness to the “neither” votes shown in Table 3 that this survey may somewhat underestimate support among the respondents for legal protection of some aspects of software. Respondents, after all, were given choices only among copyright, patent, both, neither, or no opinion. Some may have checked “neither” because they favor a new law for protecting software. A small number of comments suggested this solution to the current copyright controversy. *See infra* note 33.

Although no other aspect of software enjoyed statistically significant majority support for protection, there was still noteworthy support for protecting pseudocode (roughly equivalent to the instruction-by-instruction sequence of the code), with 52 percent of those with an opinion supporting either patent or copyright protection for it.<sup>31</sup> Copyright, however, enjoyed majority support from the respondents only as to source and object code.<sup>32</sup> Like the Conference

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Among the comments recognizing the need for legal protection of source and object code was this: "Copying source or object code is stealing." This respondent, however, thought that because reimplementing software on one's own took a lot of effort and originality, it should be treated differently than copying someone's code. Said another: "There should be copyright protection for original code or any sequence of words like a song. But you can't copyright the English language or any subset thereof, such as a command language." Yet another commented: "I would like to see very narrow interpretation of copyright which would only prevent intentional rip-offs, and not cumulative growth of knowledge of consistent behavior."

A few respondents emphasized the need to protect small firms: "I agree that user interfaces should not be a matter for copyright. However, I passionately feel it is wrong that a large monolithic non-creative company should have free access to interface technology as soon as it is proven by a risk-taking, innovative small company." "With rapidly improving user interface management systems and implementation tools, the time to imitate is rapidly declining. We could reach a stage in which well-funded, well-equipped large corporations could get new designs into distribution more quickly than smaller entities that originated them. Thus, the lead time advantage of originality is vanishing, and original design will have no financial incentive."

<sup>31</sup>See Table 3 in Appendix II for more details. The next most strongly supported feature of software for intellectual property protection was algorithms, with 47 percent of the respondents supporting the idea of some intellectual property protection for this aspect of software.

For all other aspects of software in the survey, a statistically significant majority of the respondents felt that neither copyright nor patent protection should apply.

<sup>32</sup>Copyright was selected as the form of protection for source and object code by, respectively, 71 percent and 65 percent of the survey respondents. Another 12 percent thought source should be protectable by both patent and copyright, and 11 percent selected the "both" option for object code.

Patent protection alone for source and object code was supported by 10 percent of the respondent group. Thirty-nine percent of those with opinions thought pseudocode should be protected by copyright; 7 percent thought it should be protected by patent; and 6 percent thought both patent and copyright ought to protect it.

Respondents were also asked to differentiate as between copyright and patent in responding to questions about which aspects of software should receive intellectual property protection. See Table 3 in Appendix II for the results of this part of the survey. Patents were not significantly supported as a means of protecting any aspect of software, although a substantial minority thought that patents should be used to protect algorithms (39 percent of those with opinions answered "patent" or "both").

One interesting result of the survey was the extent of differentiation revealed for the roles for patent and copyright as regards protection of various aspects of software, as reflected in Table 3. Samuelson has argued that each law should have its own domain in the protection of different aspects of software, but not overlap. See Samuelson-CACM, *supra* note 4. This view seems consistent with the views of practitioners, for very few of the respondents perceived any overlap in protection. On average for the eleven aspects of software that were tested, only 5 percent of the respondents thought that both copyright and patent protection should apply. Only for source code (12 percent) and object code (11 percent) was the overlap greater than 10 percent.

A recent survey of intellectual property lawyers suggests that at present there is substantially more confusion among lawyers about the roles of copyright and patent law in the protection of various aspects of software, and, as might be expected, the lawyers are much more inclined than software practitioners to be protectionistic about various aspects of software. See Samuelson, *Survey on the Patent/Copyright Interface for Computer Programs*, 17 AIPLA Q. J. \_\_\_\_\_ (Forthcoming 1989).

Report, the survey did not attempt to address the question of whether a new law for computer programs might be desirable. Nevertheless, a few respondents suggested such an approach in the comment section of the survey.<sup>33</sup>

The LaST Frontier Conference Report also accepts the legislative judgment that both the source and object code versions of computer programs are copyrightable.<sup>34</sup> Some of the LaST Frontier conferees, like some of the CHI survey respondents, thought that a new law may be needed for the protection of computer programs, but for now at least, copyright is an important law for protecting programs.<sup>35</sup> Like a majority of the survey respondents, the LaST Frontier conferees regarded the slavish copying of the instruction-by-instruction sequence of a program from one programming language to another in a related class of languages (roughly equivalent to pseudocode) to be unlawful.<sup>36</sup>

### III. SURVEY FINDINGS IN HARMONY WITH VIEWS EXPRESSED IN THE CONFERENCE REPORT ON ISSUES AS TO WHICH NO CONSENSUS WAS REACHED

Although the Conference Report reflects consensus on a considerable number of issues of importance to software design and development,<sup>37</sup> the conferees were unable to reach consensus on a number of issues, some related to the application of copyright law to user interfaces of computer programs, and some related to application of copyright to the structure of programs. This section will discuss some respects in which the user interface field survey supports views expressed in the Conference Report as to which consensus was not achieved.

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<sup>33</sup>Two representative comments are: "I believe copyright vs. no copyright vs. patent vs. no patent is not the issue. Computer software (and hardware) needs its own type of protection. That way things such as 'is an interface a piece of art or an idea?' etc. are not addressed, but the REAL software issues (such as what protection is appropriate) are addressed." "Interface 'look and feel' is only part of the software protection problem. What protection should programs have? Are programs of any significant worth if the underlying algorithms are not protected? But aren't algorithms abstract ideas?" It is worth noting that the survey did not ask a question about the desirability of a new law.

<sup>34</sup>*Conference Report*, *supra* note 2, at 14-15.

<sup>35</sup>*Id.* at 13-14.

<sup>36</sup>*Id.* at 17-18.

<sup>37</sup>Many of the important issues on which the conferees reached consensus, such as the implications of section 102(b) of the copyright statute for computer program cases and the appropriate analytic procedure for determining copyright infringement, were, because they concerned the application of traditional copyright doctrine to computer programs, not the sorts of issues which a survey of the user interface field would address.

Even as to issues which both the survey and the Conference Report addressed, there were significant differences in perspective in the way each group approached its assessment of copyright. The conferees took as their starting point the doctrines of copyright law, and worked to apply them to computer programs, whereas the user interface field respondents worked from the starting point of what would be good for their field, and worked toward applying the law to accomplish this end.

## A. User Interface Issues

In addition to asking survey respondents to indicate whether they thought the “look and feel” of software user interfaces should be protected by copyright law, the survey asked for expression of views about legal protection of five other aspects of user interfaces, all of which (either explicitly or implicitly) are at issue in the current round of “look and feel” cases.<sup>38</sup> A statistically significant majority opposed either copyright or patent protection for these aspects, with 88 percent opposing protection of commands, 83 percent opposing protection of user interface functionality, 79 percent opposing protection of screen sequence, 69 percent opposing protection of screen layouts, and 57 percent opposing protection of icons.<sup>39</sup> The percentages are somewhat higher if measuring opposition to copyright in particular as a form of legal protection of these features. Ninety-two percent opposed copyright for commands, 95 percent opposed copyright for functionalities, 85 percent for screen sequence, 73 percent for screen layout, and 60 percent for icons.<sup>40</sup>

Because many of these features overlap significantly with the kind of “look and feel” sought to be protected in the lawsuits, it is not surprising that the respondents viewed protection of these aspects of interfaces in much the same way as they viewed protection of “look and feel.” The respondents’ high degree of opposition to protection of these other aspects of user interfaces reflects not just opposition to the vagueness of “look and feel,” but to protection of aspects of user interfaces about which litigation is occurring and which are intertwined with what “look and feel” means to those in the field.

The survey also inquired about the extent of restriction the respondents currently felt about the use they could make of the latest research and design innovations which they discover at conferences such as CHI. Thirty-one percent of respondents reported feeling “no restrictions” on use of innovations seen at CHI. Just under half of the respondents (49 percent) felt only “some restriction.” Only

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<sup>38</sup>The lawsuit by Lotus Development Corp. against Paperback Software and Mosaic Software for infringement of the Lotus 1-2-3 spreadsheet program copyright, like the lawsuit by Ashton-Tate against Fox Software for infringement of the dBase program copyright, focuses on similarities in commands, arrangements of commands, screen layouts, screen sequences, and “look and feel” as the basis of the infringement claim. The Apple Computer lawsuit against Microsoft and Hewlett-Packard, although not explicitly mentioning “look and feel,” seeks protection for the highly distinctive visual display aspects of the Macintosh interface, including some related to Apple icons. See Samuelson-CACM, *supra* note 4, at 563-64.

It is worth pointing out that the CHI survey did not attempt to address all legal issues affecting program user interface. It did not, for example, ask about the respondents’ views about legal protection for videogame graphics, written text displayed on a screen, or the organization of commands on a menu screen, all of which the Conference Report addresses. The first two issues are not in issue in the lawsuits about which the user interface field is concerned. The third is, but may be encompassed in part in the screen layout question.

<sup>39</sup>All percentages were calculated based on those who had an opinion on protection of the aspect. See Table 1 in Appendix II. As noted above at notes 11-12 and accompanying text, 77 percent opposed legal protection of “look and feel.”

<sup>40</sup>These figures combine the “copyright” and “both copyright and patent” percentages. See Table 3 in Appendix II.

one in five respondents reported feeling “significantly” (19 percent) or “totally” (1 percent) restricted in their use of design innovations seen at CHI. Not surprisingly, the fewer restrictions that people currently felt, the more likely they were to expect a negative effect on their own work if strong copyright protection was established by the current lawsuits about user interface issues.<sup>41</sup>

The LaST Frontier conferees, while in agreement with the user interface survey respondents that individual commands or even groups of commands should not be protected by copyright, were not able to reach consensus on whether a less-than-functionally-optimal arrangement of commands (or icons) in a user interface would be protectable by copyright. Some conferees thought that the benefits to users that would flow from standardization of such things as command names and command groupings in software user interfaces, as well as functional reasons that might exist for grouping certain kinds of commands together, made it inappropriate, in general, for copyright protection to attach to arrangements of commands; other conferees thought that in view of the protection copyright law had traditionally afforded to compilations, the organization of a set of commands from one program, if original, might be protected from exact duplication in a competing program.<sup>42</sup>

The CHI survey respondents would seem to support the more “minimalist” view of copyright protection for commands, screen sequence, and screen layout. Numerous comments focused on the negative effect on users if user interface features could not be standardized.<sup>43</sup> Those in the user interface field also seem to find it easier than the lawyers did to accept “human factors analy-

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<sup>41</sup>The survey findings on this issue were statistically significant ( $F(2,618) = 8.171$ ,  $p < .0001$ ). Even respondents who reported that they now feel “significant restrictions” predicted negative consequences for their work if the plaintiffs won the “look and feel” cases, with an average rating of 2.303 ( $t(118) = -6.636$ ,  $p < .0001$ ).

A similar pattern holds for predicted effects on the user interface industry/community if strong copyright protection for user interfaces were to be established. Again, the fewer restrictions currently perceived, the more dire was the respondents’ prediction of the effect on the industry ( $F(2,597) = 16.878$ ,  $p < .0001$ ). The “no restriction” respondents rated the average industry effect as 1.464, significantly worse than even the 1.700 of the “some restriction” group ( $F(1,597) = 4.656$ ,  $p < .05$ ).

<sup>42</sup>See *Conference Report*, *supra* note 2, at 28–30. Again, it may be worth noting that the LaST Frontier conferees were attempting to apply traditional copyright principles to user interfaces, not to address the public policy issue of whether such features of programs should be protected, and if so, under what circumstances, or the like.

<sup>43</sup>Because the survey respondents were not economists, they did not use the term “network externalities” to explain why they regarded the benefits of nonprotection of many user interfaces features to outweigh the need for protection, see Farrell, *Standardization and Intellectual Property*, 30 *JURIMETRICS J.* 32 (1989), but if one reads their comments, it is clear that this is what they were talking about: “My comment on ‘look and feel’ is that if it’s strongly protected, it hurts the end user, because they could get attached to one particular type of look and feel. Then when they have to change platforms, they have to relearn and get used to it. It’s like reversing the brake and accelerator controls on a car.” Said another: “Copyright law interpretations which cause user interface designers to distort interfaces to avoid similarity risk setting the stage for increased human error. Instances will occur by which these errors will result in increased failures including those resulting in loss of property and life. A middle ground needs to be found which avoids this adverse consequence, while still encouraging innovators.” Yet another said: “There are certain technological problems which need to be the concern of the whole society. Usability of computing systems is

sis” as a science whose principles constrain the design of user interfaces in a way that should limit the scope of copyright protection for them.<sup>44</sup>

The LaST Frontier conferees were in agreement with the user interface field about some issues related to the protection of icons—that “adoption of a functional general purpose metaphor might limit the range of copyrightable expression” and that where “the choice of icons is logically based upon the choice of an overarching metaphor (such as a desktop) or the icon itself has no fanciful characteristics, application of traditional principles would preclude copyright protection for the particular representation of the icon.” However, the conferees thought that traditional principles of copyright law might provide protection for some pictorial representation of icons. The CHI survey respondents, however, did not support copyright protection for icons.<sup>45</sup>

## B. Structural Abstractions of Software

A substantial number of survey respondents identified themselves as software engineers or programmers, but even those who did not so identify themselves tended to have, by virtue of the field in which they work, considerable

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such a problem requiring all the efforts improving it. Hence any good idea should be public domain. Competition has still other areas to distinguish: e.g., price, quality, service, customer treatment, etc.”

Some respondents expressed concern about the effect of strong copyright on efforts to standardize user interfaces. One representative comment was this: “The maximalist view appears to me to run counter to trends in the industry today. The creation of OSF [Open Software Foundation] and growing strength of standards organizations come about largely because computer companies are recognizing increasing dissatisfaction in customers with lack of consistency and standards.” One respondent took a different view, however: “People often confuse two issues, protection of creative work and standardization. Copyright does not foster standardization, but that is not the intent of copyright law. Copyright law is needed to protect individual rights, and industry cooperation is required to achieve standardization for users’ benefit.”

<sup>44</sup>The conferees were unable to reach consensus on the effect of “human factors analysis” on the scope of copyright protection for program user interfaces. *Conference Report, supra* note 2, at 24–25. For discussion of “human factors analysis” as it bears on design of user interfaces, *see* Curtis, *supra* note 1, at 68.

Among the survey respondent comments expressing concern about being able to use the results of human factors research in user interface design were these: “Knowledge of user interface effectiveness is pointless unless that knowledge can be used to improve designs. Advances in HCI are ‘for science.’ Let’s eliminate these barriers.” Said another: “Since much of the advancements in interface are due to added knowledge from research and use published in scientific works, does this use of interactive scientific knowledge make [use of] this knowledge a copyright infringement or use of public domain information?”

<sup>45</sup>Only 40 percent of the CHI survey respondents supported copyright protection for icons. *See* Table 3 in Appendix II. *See Conference Report, supra* note 2, at 27, for its discussion of icons. Concerning human factors analysis of icon designs, *see generally* Curtis, *supra* note 1, at 68.

Several CHI survey respondents made comments such as this: “The best analogy (for legal precedents) to icons is the actual, physical objects (such as buttons, switches, actual trash cans). Can real trash cans be copyrighted? Can on/off switches be copyrighted?”

One reason for this difference of views on icons may be that those in the user interface field tend to regard icons as being chosen for nonfanciful, logical reasons as symbols for functions. *See* Curtis, *supra* note 1, at 68. Another reason may be that the conferees were trying to apply traditional principles of copyright to the icon issue, not to decide what optimally the law ought to be.

familiarity with software design and development.<sup>46</sup> Hence, they had as a group a strong base from which to judge what aspects of computer programs, apart from source and object code, that copyright might appropriately protect. As a group, they strongly supported copyright protection for source and object code, but they did not support copyright protection for pseudocode. Nor did they support copyright protection for modular design. Least of all did they support copyright protection for algorithms, which are the organizing principles for software design.<sup>47</sup>

Like the survey respondents, one LaST Frontier conferee with a strong technical background in software has advocated restricting the scope of copyright in computer programs to source and object code only.<sup>48</sup> Other conferees have expressed similar, although not quite so restricted, views of the reach of copyright as applied to computer programs.<sup>49</sup> Although the conferees were able to reach consensus that computer programs are, in general, functional works whose design may be constrained by a variety of technological considerations, and that as a consequence, the scope of copyright in them was “thinner” than would be the case as to artistic works, the conferees were not able to reach consensus on whether copyright might appropriately attach to structural abstractions above the instruction-by-instruction sequence of programs. Some conferees would have limited copyright protection to only very low level structure, such as the instruction-by-instruction sequence; others thought that in appropriate circumstances, higher levels of structural abstractions might be protected under traditional principles of copyright.<sup>50</sup>

The user interface field’s views about the application of copyright to computer programs most closely coincides with the minimalist views of a minority of the LaST Frontier conferees, for only source and object code enjoy majority support for copyright protection, and pseudocode enjoys majority support only if support for patent protection is added. It is particularly notable that the survey respondents strongly rejected the idea of protecting the “structure, sequence, and organization” of computer programs through copyright law, in view of the now clearly unwarranted accusations of some maximal protection-

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<sup>46</sup>For a discussion of what software is and how it is constructed, see Spector, [*Software, Interface, and Implementation*], 30 JURIMETRICS J. 79 (1989). Twenty-nine percent of the survey respondents identified themselves as software engineers, and 7 percent as programmers. See *supra* note 8 and accompanying text for the profile of the survey respondent population. Thirteen percent of the respondents classified themselves as both “user interface designers” and “software engineers.”

<sup>47</sup>Forty-three percent of the respondents favored copyright protection for pseudocode; only 24 percent supported copyright protection for modular design; and 15 percent supported copyright for algorithms. See Table 3 in Appendix II.

<sup>48</sup>Karjala, *Copyright, Computer Software, and the New Protectionism*, 28 JURIMETRICS J. 33 (1987).

<sup>49</sup>See, e.g., Menell, *An Analysis of the Scope of Copyright Protection for Application Programs*, 41 STAN. L. REV. 1045 (1989); Reichman, *Computer Programs as Applied Scientific Know-how: Implications of Copyright for Commercialized University Research*, 42 VAND. L. REV. 639 (1989); Samuelson-IEEE, *supra* note 4; and Goldstein, *Infringement of Copyright in Computer Programs*, 47 U. PITT. L. REV. 1119 (1986).

<sup>50</sup>See *Conference Report*, *supra* note 2, at 15-19.

ists that those who favor more minimal copyright protection are “technophobes.”<sup>51</sup>

### C. Shift in Respondents’ Views

People came to the CHI legal debate, in general, with some familiarity with the legal issues involved in the “look and feel” cases. Sixty-four percent of the respondents rated themselves as “moderately familiar” with the legal issues before the legal debate, and another nine percent reported being “very familiar” with the issues. Considering the amount of press attention the “look and feel” lawsuits have received, and considering how important this community feels the legal issues are to the health of their field, this result in itself is not surprising.

What was surprising was how people reacted to copyright protection for user interfaces after they had heard the legal debate. Half of the respondents indicated that attending the debate had caused them to change their opinion on copyright protection, but ten times as many of those who changed their minds felt that copyright protection should be weaker rather than stronger.<sup>52</sup> It was not the case that Mr. Brown argued less persuasively than Mr. Hemnes, for a reporter attending the debate found both sides of the legal debate to be equally persuasive,<sup>53</sup> and a number of respondents praised Mr. Brown’s skill in argumentation.

What then explains the strong shift toward thinking copyright protection should be weaker? The authors believe that the CHI audience was not so much persuaded to one legal position or the other, but awakened to the nature of the legal debate and its implications for how they worked and for the field in which they worked. The comment of one survey respondent expresses well the authors’ interpretation of the outcome of the legal debate: “The arguments and session made me very nervous because the arguments against strong protection were so compelling based on my knowledge of the field, but they may not be anywhere near as obvious to non-practitioners—and the courts are generally non-practitioners.”

Our data suggests that the user interface field has developed because people in the field come to conferences such as CHI to share their new user interface design ideas with others. When attendees see good design ideas and the research that stands behind them, they feel they can incorporate these designs into new products of their own. They do not consider themselves thieves, plagiarists, or copyright infringers when they do so, but rather they consider themselves scientists and engineers who are innovating on top of others’ ideas

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<sup>51</sup>Clapes, Lynch, & Steinberg, *Silicon Epics and Binary Bards: Determining the Proper Scope of Copyright Protection for Computer Programs*, 34 UCLA L. REV. 1493, 1499–1501, 1576 (1987).

<sup>52</sup>This is a very strong finding (chi-square(1) = 212.28, p < .0001).

<sup>53</sup>See *supra* note 6.



in the kind of evolutionary fashion which has exemplified development in this field.

This evolutionary development seems to have brought about a considerable amount of innovation, improved designs which have made computers and software more accessible and usable by those with minimal or no technical training, and more competition on performance, enhanced features, and price. If each software firm must develop a different style of user interface than all the others to comply with copyright law, there is concern that copyright might impede how those in the user interface field do their work, might harm the health of the industry, and might make more difficult the achievement of the goal of making computers usable by ordinary people.

## CONCLUSION

It is oft-stated, but nonetheless true, that a fundamental purpose of the intellectual property laws is to provide protection for innovations in order to give incentives for people to be creative, thereby promoting progress in various fields of endeavor. From this, it follows that legal protection is not needed where it does not promote innovation in a particular field. Thus, it must surely be the case that where intellectual property protection would have a detrimental effect on innovation in a field, it should be withheld, especially in an era where the law does not yet dictate the protection that is being sought.

In the case of user interfaces, this survey clearly demonstrates that a significant segment of the leading designers and researchers in the user interface field are overwhelmingly opposed to strong copyright protection for user interfaces (and for various aspects of interfaces). They regard such protection as very likely to be harmful to the field, rather than helpful to it. These are the very people whom the copyright law is supposed to be encouraging to be creative. Given that copyright law has, as yet, not formed a firm position on protection of various aspects of user interfaces discussed in this article, and can be construed to support either side in the legal debate, judges in the current round of copyright "look and feel" cases should be receptive to considering the effect strong protection would have on the industry.

That the views of the technical community are largely consistent with views expressed in the Conference Report as to the application of copyright law to computer programs suggests that judges in "look and feel" kinds of cases can find an adequate basis in copyright doctrine to do what the user interface field thinks would be in the field's best interest.

# APPENDIX I

## SURVEY OF CHI '89 ATTENDEES: LEGAL PROTECTION FOR SOFTWARE USER INTERFACES

1. My major job functions are (check one or two that best fit):

- |  |  |
|--|--|
| <input type="checkbox"/> User interface designer       | <input type="checkbox"/> Manager               |
| <input type="checkbox"/> Software engineer             | <input type="checkbox"/> Consultant            |
| <input type="checkbox"/> Human factors engineer        | <input type="checkbox"/> Researcher            |
| <input type="checkbox"/> Programmer                    | <input type="checkbox"/> Faculty               |
| <input type="checkbox"/> Technical Writing/<br>Editing | <input type="checkbox"/> Student               |
| <input type="checkbox"/> Lawyer                        | <input type="checkbox"/> Other (specify) _____ |

2. My organization/company is (check the one that fits best):

- |  |   |
|--|---|
| <input type="checkbox"/> software vendor       | <input type="checkbox"/> government agency/installation |
| <input type="checkbox"/> computer manufacturer | <input type="checkbox"/> consulting firm                |
| <input type="checkbox"/> R&D organization      | <input type="checkbox"/> law firm                       |
| <input type="checkbox"/> university            | <input type="checkbox"/> Other (specify) _____          |

3. How many lawyers does your organization/company have on staff or in-house to handle software legal protection issues?

- 0  
 1-2  
 3 or more  
 Don't know

4. Have you or your organization ever developed software for commercial purposes?

- Yes  
 No  
 Don't know

5. Have you or your organization ever used copyrights to obtain legal protection for software?

- Yes  
 No  
 Don't know

6. Have you or your organization ever used patents to obtain legal protection for software?

- Yes  
 No  
 Don't know

7. The current legal controversy concerns the extent of legal protection available for various features of computer programs. What kind of protection should be available for the following features? Please check one in each row.

	<i>Copyright</i>	<i>Patent</i>	<i>Both</i>	<i>Neither</i>	<i>No opinion</i>
a. source code	_____	_____	_____	_____	_____
b. object code	_____	_____	_____	_____	_____
c. pseudocode	_____	_____	_____	_____	_____
d. module design	_____	_____	_____	_____	_____
e. algorithms	_____	_____	_____	_____	_____
f. user interface commands	_____	_____	_____	_____	_____
g. user interface icons	_____	_____	_____	_____	_____
h. user interface screen layout	_____	_____	_____	_____	_____
i. user interface screen sequence	_____	_____	_____	_____	_____

- j. user interface "look and feel" \_\_\_\_\_
- k. user interface functionality \_\_\_\_\_

8. CHI Conferences are known for presentation and discussion of the latest research and design innovations in user interfaces. Select the one statement that best describes the amount of current restriction you feel about making use of anything you learn or see at CHI.

- \_\_\_\_\_ No restrictions: I can freely use anything I learn about or see.
- \_\_\_\_\_ Some restrictions: I can't copy exactly, but I am allowed to reimplement or reverse engineer any interesting designs.
- \_\_\_\_\_ Significant restrictions: I can copy only general concepts or things at the research stage.
- \_\_\_\_\_ Total restriction: Once I see it at CHI, I know I can't copy it in any user interface design of my own.

On the next two questions, circle the number on the 5-point scale that corresponds best to your opinion. Please leave the question blank if you have no opinion.

9. If the current lawsuits establish strong legal protection of user interfaces via copyright, what will be the effect on your own work?

- |                                |   |              |   |                                |
|--------------------------------|---|--------------|---|--------------------------------|
| 1                              | 2 | 3            | 4 | 5                              |
| Significant<br>negative effect |   | No<br>effect |   | Significant<br>positive effect |

10. If the current lawsuits establish strong legal protection of user interfaces via copyright, what will be the effect on the user interface design industry/community?

- |                                |   |              |   |                                |
|--------------------------------|---|--------------|---|--------------------------------|
| 1                              | 2 | 3            | 4 | 5                              |
| Significant<br>negative effect |   | No<br>effect |   | Significant<br>positive effect |

11. Before attending the CHI debate on legal protection using copyright, how familiar were you with the legal issues?

\_\_\_\_\_ Not familiar

\_\_\_\_\_ Moderately familiar

\_\_\_\_\_ Highly familiar

\_\_\_\_\_ Didn't attend debate

12. As a result of attending the CHI debate on legal protection using copyright, how did your opinion change?

\_\_\_\_\_ My opinion didn't change

\_\_\_\_\_ Copyright protection should be stronger

\_\_\_\_\_ Copyright protection should be weaker

\_\_\_\_\_ Didn't attend debate

13. Should SIGCHI use the results of this survey to take an official position on any aspects of the legal issues of software user interface problems?

\_\_\_\_\_ Yes

\_\_\_\_\_ No

\_\_\_\_\_ No opinion

14. Comments on this survey or on any of the legal issues it addresses:

## APPENDIX II

### TABLES REFLECTING THE SURVEY FINDINGS

**Table 1**  
**Support for Protection of User Interface Features**

<i>aspect</i>	<i>For protection</i>	<i>against</i>
commands	12%	88%
functionality	17%	83%
screen sequence	22%	79%
look and feel	23%	77%
screen layout	31%	69%
icons	43%	57%

**Table 2**  
**Predicted Effect of Strong Copyright for Interfaces**

<i>effect</i>	-	+			5
	1	2	3	4	5
own work	35%	36%	19%	7%	2%
ind/comm	57%	29%	4%	7%	3%

**Table 3**  
**Support for Copyright &/or Patent for Software Aspects**

<i>aspect</i>	<i>cop.</i>	<i>pat.</i>	<i>both</i>	<i>neither</i>
source code	71%	10%	12%	7%
object code	65%	10%	11%	15%
pseudocode	39%	7%	6%	48%
module design	18%	16%	6%	60%
algorithms	8%	32%	7%	53%
commands	6%	4%	2%	88%
icons	37%	3%	3%	57%
scr. layout	25%	4%	2%	69%
scr. sequence	13%	6%	2%	79%
look & feel	15%	5%	3%	77%
UI funct'ity	4%	12%	2%	83%