

judge, as definitive. Says an attorney with a major biotech firm: "People view the system as 1000 patent offices, because the standards can vary from examiner to examiner. You can have cases going on for years that you think are better than others that fly through the patent office."

Working conditions for the examiners don't help the situation, either. The biotech attorney, who asked to remain anonymous, says: "There's still a quota system and [the patent examiners] have to move cases—under pressure—sometimes without really understanding" them. And this makes it harder to recruit and retain an adequate technical staff. PTO loses staff rapidly to the private sector, where salaries and perks are more generous. Even a newly minted patent attorney can make \$100,000 a year starting

out, says one university official.

John Doll, a supervisor in PTO's group 180, which handles biotech applications, concedes that staff turnover is an ongoing problem. Doll ticks off the number of "attrits" recently—18 in fiscal year 1989 and 31 in 1990, out of a total of slightly more than 100. He estimates that one-third of the group today has spent less than a year at PTO. But, says Doll, the rate of departures is slowing, and he assumes that because of the recession, "things are not as good on the outside this year."

Making the system better

Criticized for the slow pace and uneven quality of examinations, PTO has made improvements in the past few years. Doll says the number of examiners in the biotech group

increased from 43 in 1986 to 91 in 1988 and then to 140 today. Even outside critics, like Lisa Raines, executive director of the Industrial Biotechnology Association (IBA), say they have detected a quickening tempo. IBA has helped the patent office set up a Biotechnology Institute to educate the staff and improve the quality of examinations. The institute brings academic and industry researchers in to describe the latest technology. But Raines sees no earthshaking change. The number of pending biotech applications is still high, hovering around 18,600—higher than at the end of fiscal 1990. And because PTO's budget is pinched, plans to expand group 180 are on hold.

Elsewhere in the system, patent officials are trying to stimulate reform, though whether they can make any headway against inertia

Can Electronic Property Be Protected?

Like many biotechnology products, software is difficult to define and even harder to protect as intellectual property. Many programmers rely on copyright law—originally intended to stop plagiarism and art fraud—to prevent illicit copying of their work. But they have also attempted to get patents for software "inventions," which range from small program subroutines to full-scale operating systems. Neither approach has worked very well, according to a recent report by the National Research Council (NRC),* and some knowledgeable observers are deeply concerned about the possible implications of dragging intellectual property lawyers further into the digital world. Says Jerome Reichman, a Vanderbilt University law professor and a participant in two NRC forums: "If we continue to stretch [patent and copyright law] too far...I'm afraid we are going to have a breakdown and a lot more problems than we think we are solving."

One of the worries Reichman and others cite is that the courts may have gone overboard in using copyright laws to protect the rights of software designers. Historically, courts have awarded narrower protection to literary works with "functional" aspects—that is, with practical uses—than to those with artistic purposes. (Narrow protection means that someone must copy a work almost exactly before infringing a copyright.) Software programs, which are clearly functional, should receive narrow protection under that principle. But a 1985 federal district court decision known as *Whelan* expanded the copyright protection software to include its "structure, sequence, and organization," thereby protecting program aspects such as file and data structures or sequences of screen displays as if they were art forms.

This decision opened the door to a number of well-publicized lawsuits, including one filed against Microsoft Corp. by Apple Computer, which claimed that Microsoft's popular "Windows" system infringed the "look and feel" of the desktop environment originally created by Apple for the Macintosh system. University of Pittsburgh law professor Patricia Samuelson, another NRC forum participant, is one of many who think the suit is just the kind of undesirable consequence one would expect

from *Whelan*, which she terms a "radical step" based on a flawed analogy between software and literary works. She believes the decision could inhibit software innovation by extending copyright protection too far. "Judges have been blind to the fact...that progress in the field of technological arts may more easily be impeded by strong copyright protection than...in the field of the literary arts," she says.

This view opens the door to a different group of intellectual property experts who believe that patents offer a better way to protect the functional aspects of programs. A patent conveys 17 years of ownership rights in a "nonobvious, novel, and useful" invention in exchange for full disclosure of the working details, and many program writers are now seeking these rights. According to a recent estimate prepared for the State Bar of Texas, the Patent and Trademark Office now issues about 200 software patents each year.

But this avenue is not without its own pitfalls. Many legal experts say that courts are inconsistent in applying the law, making it difficult to predict whether a given program infringes on a patent or not. For instance, while patents are not awarded for algorithms, which are considered "laws of nature," the Patent Office draws a fine distinction between "computer algorithms" (which are patentable) and "mathematical algorithms" (which are not). Furthermore, a proliferation of software patents—which are frequently obtained for "conventional, or even obvious processes," according to Brian Kahin, an adjunct research fellow at Harvard—further hinders the progress of software development by forcing innovators either to risk litigation or to engage in lengthy and expensive research to ensure that they have not independently created a patented design.

To biotechnologists—and perhaps inventors generally—these complaints will sound all too familiar. But if the history of intellectual property litigation is any guide, many of the legal issues are likely to be settled by the courts in a piecemeal fashion that clarifies what the NRC report describes as an "ambiguous" legal environment, even though it pleases no one. In the absence of proposals for intellectual property reform—which can only be enacted through Congress—such a resolution may be the best anyone can hope for. ■ DAVID P. HAMILTON

*"Intellectual Property Issues in Software," National Research Council, May 1991.