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MEMORANDUM

PATENTING SOFTWARE:
ARRHYTHMIA RESEARCH TECHNOLOGY V. CORAZONIX CORPORATION

Patentability of software has been a source of controversy and litigation from the beginning of the Computer Era. Starting in the 1960's, concern that granting patents on mathematical algorithms would slow the progress of software technology has been reflected in persistent refusals by the Patent and Trademark Office (PTO) to grant patents on inventions it perceives to be algorithms. During the same period, the federal appellate courts generally have taken a less restrictive view and, in a number of cases, have reversed the PTO. The United States Supreme Court, in three decisions delivered over a thirty-year span, has moved from a restrictive to a more open attitude in analyzing the nature of inventions that involve use of algorithms. Now, an opinion of the Federal Circuit Court of Appeal Federal Circuit (the federal appellate court for patent cases) in a case of importance to anyone interested in intellectual property protection of software, has issued an opinion limiting the exclusion of inventions from process or apparatus patent protection merely because they incorporate mathematical algorithms in the process or apparatus.

The decision, still subject to the possibility of an en banc review by the Federal Circuit Court or the granting of certiorari by the Supreme Court, will require reevaluation of intellectual property strategies aimed at software protection.

1. Background: Benson to Arrhythmia Research

Twenty years ago, in Gottschalk v. Benson, 409 U.S. 63, 175 U.S.P.Q 673 (1972), the Court held that a patent claim that "wholly pre-empts" a mathematical formula used in a general purpose digital computer is directed solely to a mathematical algorithm, " . . . and therefore does not define statutory subject matter . . . ." Since mathematical algorithms are an integral part of computer programs, commentators believed that patent protection for computer programs had been eliminated.

In Parker v. Flook, 437 U.S. 584, 198 U.S.P.Q. 193 (1976), the Court explained that the criterion for patentability of a claim that requires the use of mathematical procedures is not simply whether the claim "wholly pre-empts" a mathematical algorithm, but whether the claim is directed to a new and useful process, independent of whether the mathematical algorithm required for its performance is novel. Applying these criteria, the Court held nonstatutory a method claim for computer calculating "alarm limits" for use in a catalytic conversion process, on the basis that once the algorithm is assumed to be within the prior art, the application, considered as a whole, contains no patentable invention.

In Diamond v. Diehr, 450 U.S. 303, 206 U.S.P.Q. 193 (1980), the Court, in a 5-4 decision, upheld claims to a process for curing synthetic rubber that included use of a mathematical computer process. The involvement of a mathematical algorithm in the claimed "process" was held not to preclude patentability of the process. At the same time, the Court limited its Benson decision, epitomizing its holding:

> ...claims directed solely to an abstract mathematical formula or equation, including the mathematical expression of scientific truth or a law of nature, whether directly or indirectly stated, are nonstatutory under Section 101; whereas claims to a specific process or apparatus that is implemented in accordance with a mathematical algorithm will generally satisfy section 101.

2. The Case: Arrhythmia Research

Arrhythmia Research, Inc. claimed a patentable invention in the process of analyzing electrocardiograph signals to determine certain characteristics of heart function, as well as in the apparatus used in computer-performed operations that transform a particular input signal into a different output signal, in accordance with the internal structure of the computer as configured by electronic instructions.

Contrary to its earlier pattern, the PTO granted the patent, and the United States District Court for the Northern District of Texas declared it invalid for failure to claim statutory subject matter under section 101. The Federal Circuit Court of Appeals, unanimous in the result but with a concurring opinion from one of a three-judge panel arguing for a broader result and thus a further limiting of Benson, concluded that the claimed subject matter is statutory in terms of section 101.

3. The Claimed Invention

As described by the main opinion, the claimed invention relates to problems arising in the hours immediately after a heart attack, when the victim is

particularly vulnerable to an acute type of arrhythmia known as ventricular tachycardia. This situation leads quickly to ventricular fibrillation, in which the heart ceases effectively to pump blood through the body. It was known that in patients subject to ventricular tachycardia certain anomalous waves having very low amplitude and high frequency appear toward the end of a segment of the electrocardiographic signal, that is, late in the ventricular contraction cycle.

The invention, in general terms, analyzes the electrocardiograph results of the heart attack victim, through, in part, use of a digital computer, to determine whether the patient is subject to ventricular tachycardia. The patent specification sets forth the mathematical formulae that are used to configure (program) the computer.

4. The Decision

The main opinion reviewed the Benson, Flook and Diehr decisions, concluding that the Court has " . . . placed the patentability of computer-aided inventions in the mainstream of the law." It then proceeded to analyze the process and the apparatus claims. First, the court found the process claim to comprise statutory subject matter because in looking at what the claimed process steps do, independent of how they are implemented, the court found that the steps of the claimed method include " . . . an otherwise statutory process whose mathematical procedures are applied to physical process steps." The opinion then goes on to invoke Diehr, noting that in that case (as in this one) the patent claimed is appropriately limited: "The applicants 'do not seek to patent a mathematical formula . . . they seek only to foreclose from others the

use of that equation in conjunction with all of the other steps in their claimed process.'"

Moving to the apparatus claim, the court first described the manner in which computers and other devices are used to produce the end product. Citing In re Iwahashi, 888 F.2d 1370, 1375, 12 U.S.P.Q.2d 1908, 1911 (Fed. Cir. 1989), the court stated: "The use of mathematical formulae or relationships to describe the electronic structure and operation of all apparatus does not make it nonstatutory."

Corazonix had argued that a claim is nonstatutory when the end product is a number. The court did not agree, stating that the end product in this situation is not merely a mathematical abstraction, but an indication of the risk of ventricular tachycardia. The main opinion stated:

> . . . the number obtained is not a mathematical abstraction; it is a measure in microvolts of a specified heart activity, an indicator of the risk of ventricular tachycardia. That the product is numerical is not a criterion of whether the claim is directed to statutory subject matter.

Accordingly, the court ruled that both the process and apparatus claims are statutory, reversed the district court's judgment and remanded the case.

The concurring opinion agreed with the result reached by the main opinion, but went further in arguing for a simplification of the necessary analysis, abandoning the various tests developed in other decisions, and relying upon substantial limitation of Benson by the Diehr decision to

three classes of unpatentable subject matter -- "laws of nature, natural phenomena, and abstract ideas." Employing that analysis, the concurring opinion states:

> The . . . invention manipulates electrocardiogram readings to render a useful result. While many steps in the . . . process involve the mathematical manipulation of data, the claims do not describe a law of nature or a natural phenomenon. Furthermore, the claims do not disclose mere abstract ideas, but a practical and potentially lifesaving process. Regardless of whether performed by a computer, these steps comprise a "process" within the meaning of section 101.

5. Implications

Arrhythmia Research makes clear that virtually any computer-based or computer-implemented technology constitutes patentable subject matter, whether claimed as a process or as an apparatus. At most, abstractly described mathematical algorithms will be excluded. The concurring opinion questions even that exclusion, arguing that only "laws of nature" and "abstractions" are excluded -- algorithms being neither of the above. However, prudence dictates that descriptions of processes in claims should be drawn to avoid sole reliance on abstract mathematic algorithms, in deference to description of a specific process or apparatus that is implemented in accordance with a mathematical algorithm.

Readers with an interest in intellectual property protection for software should be alert to further developments. As noted above, there is the possibility of review by the Federal Circuit sitting en banc or by the

Supreme Court, and it is possible that Congress will take action, since certain subcommittees and the Office of Technology Assessment have shown interest in intellectual property protection of software. We will be monitoring any such developments.

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