

The Responsibility and Role of Chemical  
Information Scientists in Solving Today's  
Crises<sup>1</sup>

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When I spoke before the American Institute of Chemists in Houston last year, I described "Modern Methods of Dissemination and Retrieval of Chemical Information."<sup>2</sup> I asserted that no professional scientist or chemist could escape the impact of the information revolution. Today I hope to convince you that the spread of these modern methods of retrieving information is not a disease-like process but rather a force that makes it possible for the scientist to become society's eyes and ears—its overt intelligence service.

The impact of information science upon chemistry is even more evident in that the American Chemical Society now has two separate divisions devoted to information science. One is the Division of Chemical Literature. It publishes the *Journal of Chemical Documentation*. The other is the new Division of Computer Chemistry.

The all-pervading role of the computer in our lives is evident in chemical information handling. Clearly this is big business. When *Chemical Abstracts* started in 1907 did they imagine a \$40 million yearly budget seventy years later? By the year 2,000 this current figure may then exceed \$200,000,000! And that is only a fraction of a large information industry that already sports a Washington-based trade association. The Information Industry Asso-

ciation's member firms employ thousands of scientists and hundreds of chemists. They also deal with industrial and academic information organizations that employ thousands more.

Information technology has become so much a part of the chemist's life that it is too often taken for granted. It is also too often ignored, or too little taken advantage of by the professional chemist. This is especially true of the government and academic scientist.

It has been fashionable during the past decade (indeed for the past century) for many scientists to claim that it is impossible to keep up with the literature. This is really an excuse for an unwillingness to define what one needs to know. It wasn't possible to read the entire literature before Gutenberg invented the press, and it will never be possible. It is frustrating to realize that there is all sorts of interesting literature around that one *could* read given enough time. Perhaps there is some mechanism in heaven whereby reading time is compressed or reading speed is accelerated until one eventually gets into a state of blissful equilibrium with the rate of publication here on earth. Is this a kind of research or bibliognomic nirvana we all dream of but know is impossible in reality?

Indeed, if the professional chemist

cannot or will not cope with the information revolution, who will need or want him? In the near future the opinions of professional consultants will be more frequently challenged by non-scientists such as lawyers and public interest advocates who will have access to the same data banks as scientists. Those traditional chemists not trained in the use of these data banks could face a serious credibility problem if they are not as conversant with them as their antagonists.

Malpractice insurance, once thought to be an occupational burden only for physicians, is being seriously proposed for chemists and is currently offered by the National Society of Professional Engineers.<sup>3</sup> Central to many malpractice cases is the issue of whether the professional has maintained his currency, and whether his treatment or his prescription is appropriate in the light of current knowledge. A large percentage of malpractice cases involves this issue. Today any intelligent or educated patient or client can do a literature search better than his doctor or consultant. While the chemist's self interest is important, even more important is client expectation. The client has a right to expect that a consultant is aware, is up-to-date, and knows how to find information. The client assumes that the professional chemist, like a professional lawyer, knows where to find the most pertinent and up-to-date information on whatever problem he is considering. But, you may argue, this is fine for the lawyer but unreasonable for the chemist because the literature continues to grow at an exponential rate.

This is an excuse, not a justification. The only way to stay ahead of the literature is to stay on top of it! And there are a number of ways of doing this. It is of secondary importance that these methods be described here, since they were in fact the subject of my talk in Houston.

Incidentally, the ability of information retrieval systems to say with some confidence that there is little or no information on a subject is one of the most *undervalued* aspects of its potential benefits to science and society. As I once said in a paper on "The Illogical Calculus of Information Retrieval",<sup>4</sup> there may be no brighter smile than that of the scientist who has learned that there is *no* information in the literature on his most cherished idea. And there is no sadder expression than that of the scientist who has learned too late that there was plenty.

It is, therefore, the primary responsibility of the chemist today, no matter what his age, to investigate and utilize the new information systems and technologies. Once he has done this, it is reasonable to ask what his role can be in solving today's crises.

The first thing a scientist can do to help with a crisis is to head it off. In short, the scientific community must become the intelligence branch of the body politic. It is our job as responsible scientists to utilize the information that is available to us to alert the scientific and public communities to crises that *may* develop. I believe that the scientific literature can and must be used for this purpose. ISI<sup>®</sup>'s research programs are related to this aspiration.

Once problems have been identified, it is also possible to use the literature in dealing with them efficiently.

Even at the very least, effective use of stored information can answer the eternal question, "Is there too little or too much information available on a given problem?" If too little, then we

are in a position to recommend new research programs with confidence. If too much, then we know that our problems are imprecisely defined. In short, we must try to relate the unanswered questions of science to the unfilled needs of society.<sup>5</sup>

1. Presented at the Annual Meeting of the American Institute of Chemists, Washington, D.C., 15-17 May 1974
2. Garfield, E. "Modern Methods of Dissemination and Retrieval of Chemical Information." Paper presented at the Annual Meeting of American Institute of Chemists, Houston, Texas, 17 May 1973.
3. Anonymous Malpractice insurance: do chemists need it? *Chemical & Engineering News* 52(18):30-32, 6 May 1974.
4. Garfield, E. "The Illogical Calculus of Information Retrieval". Paper presented at First Annual Symposium on Biomathematics and Computer Science in the Life Sciences, University of Texas Postgraduate School of Medicine, Houston, Texas, 28-30, March 1963.
5. -----, The unanswered questions of science (TUQOS). *Current Contents*® No. 23, 5 June 1974, p. 5-6.