THE COMPUTER AS RORSCHACH: Implications for Management and User Acceptance

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Abstract

Different views of the computer held by different participants in a medical computing project make it difficult to gain wide acceptance of an application. Researchers', programmers', and clinicians' views illustrate how users project their views onto the computer. Effects of these different views on user acceptance and implications for the management of computer projects are presented.

Introduction

The computer has had attributed to it a combination of godly and demonic characteristics; it has been seen as the ultimate benefactor, and as the great dehumanizer. Such differences of perception indicate more about differences in the perceiver than they do about inherent characteristics of the computer. Thus the computer functions as a Rorschach.[1,2]

What gives the computer such power as a focus for philosophies is its protean and irreducible nature: it cannot be defined in terms of more familiar objects or functions. No easy analogies explain it, except analogies with humans.[2] A further characteristic that makes the computer a projective device is its nature as a universal machine: it can be changed from one machine to another by changing its program. The computer running a program is bounded only by the limitations of the programmer's imagination.[3]

In medical computing, clinicians and programmers project their world-views into the computer and respond to medical computer projects according to personal and professional conceptions of medicine and computing. Researchers', programmers', and clinicians' views have been discussed to some extent, but little attention has been paid to the medical computer researchers who have conceived and developed many medical computer applications. Examples of researchers', programmers', and clinicians' views illustrate the applicability of the idea of the computer as Rorschach in medical computing.

Medical Computer Researchers*

Since the 1950s, there have been shifts in the perception of computers by researchers in medical computing. Initially viewed as research tools capable of producing or analyzing vast quantities of data needed by practicing physicians, computers later came to be seen as direct aids in patient care. The perception then shifted to computers as a means of rationalizing the health care delivery system. These shifts cannot be explained solely in terms of changes in either computer technology or the intrinsic nature of medicine. Rather, these changes have reflected shifting perceptions of medical and health care needs.

The Early Years: Diagnosis and Records Research

Initially, computers were seen as tools capable of producing or analyzing vast quantities of data needed by practicing physicians. There was an early and enthusiastic interest in the use of computers for basic research, and for diagnosis and decision-making. It was thought that the computer could aid aspects of diagnosis by compiling statistics and evaluating medical record information. Researchers thought that diagnostic and therapeutic processes could be improved, more solidly based on scientific study, and taught to others by using computers to compile medical knowledge, and to model and study diagnosis and therapy. Consequently, researchers undertook to automate medical record information in order to meet the "urgent need to quantify if possible the complex phenomena emerging out of the changeable nature and variability of disease processes"[4] and make this information available to the physician.

The opportunity the computer offered for studying patterns of individual diseases and for correlating and classifying these in new ways was thought to be ushering in an "industrial revolution" in medicine.[5] Such work was expected to "provide part of the answer to many of the complex and challenging problems in medicine."[6]

*This section is based on the author's Ph.D. dissertation.
However, the perception of what problems needed solving subsequently changed. During this period, interest grew in examining the source of medical information, the medical record. By the mid-1960s, computers came to be seen as direct aids in patient care, in part through better communication of medical record information within an institution. Medical information systems (MIS) were developed not only as aids to patient care and hospital administration, but also as a means of administration and of cost reduction. The MIS at the University of Missouri, for example, could assist in patient care by also being an administrative and diagnostic consultant, and by taking over patient care and administrative tasks previously performed by physicians and nurses, administrators and clerks. [7] The Technicon MIS was designed to store and send patient data, but system objectives included "more efficient hospital operations, improved patient care, and reduction or containment of hospital costs." [8] The purpose of COSTAR was "to replace the traditional document-based patient medical record with a comprehensive, centralized, and integrated information system that meets both the medical care and financial/administrative needs of either a fee-for-service or a prepaid group practice." [9]

Technicon, COSTAR, and other projects in medical information systems thus addressed the major problems seen in medicine at the time: providing improved patient care to increasing numbers of individuals at decreased cost.

The Early 1970s: Rationalization

Research interests in the 1970s increasingly emphasized cost containment and the study of past projects' failures to rationalize medicine. The Committee on Technology and Health Care, for example, along with other critics, decried the "overdiffusion" of computing technologies such as patient monitoring and CT scanning, and recommended increased funding for and development of the use of computers as "coordinative" and preventive technologies to rationalize the health care system. [10]

Computers were expected to serve another rationalizing function as well, by providing the means to allocate medical services better. Researchers at Kaiser-Permanente envisioned "lasting changes to the delivery of health care," [11] and felt that "the great promise of computers for medicine lies in making an entirely new medical care system possible." [12]

Clinicians

Clinicians, however, have not shared these research aims, and have seen different potentials in the computer. Unlike researchers, clinicians are primarily concerned with treating individual patients. Clinicians have favored medical computer applications that have been perceived to improve patient care by reducing risk, substituting for less pleasant procedures, by improving patient outcomes, or by providing scientific information on which medical decisions are based. Clinicians have accepted applications such as CT, patient monitoring, and clinical laboratory automation because they have been seen as clinical aids which enhance the physician's role. [13,14]

However, where the computer has been seen as a physician's replacement, or as interfering with the physician's role as diagnostician and architect of patient management, it has not been enthusiastically embraced by clinicians. Many research projects have violated physicians' beliefs concerning the art of medicine, professional autonomy, and the doctor-patient relationship. [13,14]

Researchers saw in these projects ways of improving medicine; clinicians saw in them interferences with their work and violations of medical values.

Programmers

Many programmers consider programming a form of self-expression, and see the purpose of the computer as a means to design software systems. They value the elegance and rationality of systems they design more than they value their practical uses. In more extreme cases, a program represents to the programmer a self-contained, completely logical world which the programmer could completely control if it were not for imposed and resented) concerns with users and practicality. [15,16,17]

Weizenbaum provides a graphic portrait of the compulsive programmer, who is interested mainly in large, ambitious systems with grandiose but imprecisely stated goals, systems that seem to require no knowledge except technical expertise. The programmer builds these systems by adding features until the system stops functioning correctly. Although frenzied attempts to fix the malfunction can destroy weeks of work, success shows the computer that the programmer is boss. [3]

Turkle has identified two types of programmers. One, like Weizenbaum's compulsive programmer, is sympathetic to large, "almost out of control" projects, such as those in artificial intelligence. Reliable systems, such as business systems, or medical computer applications used in hospitals, are considered "ugly" and seen as restraints on both computer and programmer. [2]

The other type gains a sense of power from well-defined projects over which the programmer has complete control. Professional programmers who are also hobbyists are an example. Many own computers because they believe that having complete technical mastery over a piece of the future will give them some control over that future. To them, personal computers symbolize a better, simpler life in which decentralized technology will mean that individuals will be able to assert greater control over their jobs, schools, information resources, and local governments. [2]
It is likely that a similar pattern applies in medical computing. A personal computer programmed by its physician-owner gives that physician a degree of control impossible to obtain in a hospital computing facility. This may be why physicians devote themselves to developing "new" applications that have already been developed by others, and why they work on applications that they had previously rejected when these were proposed in the hospital.

Implications

Three themes are evident in these examples of the computer as Rorschach:

1. the necessarily limited view of the computer held by any individual, embodied in any computer program, promoted in any educational effort, or underlying any project;

2. the political, social, professional, and personal components of how the computer is viewed; and

3. the importance of these views to project acceptance.

Because of these differences in how the computer is viewed, managers are faced with the responsibility of recognizing and resolving conflicts between them. Moreover, user reactions may also stem from concerns outside the computer project. [2] For example, if medicine is thought to be dehumanized, maligning a computer project may provide a safe way of decrying inhumane medical care and treatment; or dissatisfied workers may use automation as a focus for their dissatisfaction. These kinds of problems may need to be addressed before the computer project can succeed.

These three themes also indicate two complementary aspects of the computer as Rorschach. The computer symbolizes different aspects of reality to different people, and computer programs necessarily embody models of reality. [3,18] The need for understanding the views that can be embodied in or projected onto the computer provides strong reason for involving a change agent and users in a project. How a project is promoted can also affect reactions to it. Implications of the computer as Rorschach for project acceptance make it all the more important to understand and be sensitive to the symbolic potency of the computer.

Models of Reality

No computer system can hope to capture all the complexities of medicine or of hospital life, because, as Covvey and McAlister point out, "computers require the quantizing and simplification of reality into discrete parameters that can be measured, stored, retrieved, and processed." [19] One danger in simplifications and abstractions is the potential for mistaking them for reality. Furthermore, researchers, clinicians, and other users have different views from those that may be embodied in a medical computer program. Rockart advises that a key factor in acceptance is the extent to which the model embodied in a computer system is shared by its users. [18] Compatibility with users' views, goals, and values has been found to be an important determinant of project acceptance. [13-15]

However, it is possible for a computer system to capture what is believed to be an accurate description of system needs and still to be inadequate. Craig et al. have described how basing a medical computer application on a formal record-keeping system would have ignored or interfered with the more important informal system really used. [20,21] Kaplan and Nobel have described how a laboratory system that met manifest system needs was not well accepted until changed to meet latent requirements as well. [22]

There are also times when it is wiser not to fit the system to the users. Even such eloquent advocates of humane systems design as Covvey and McAlister remind us that "the computer system cannot do all the adapting... People's fears, concerns, and even foolish prejudices must be faced and rationalized." [23] Some of these fears, concerns, and prejudices are evidenced in the images people project onto the computer.

Change Agent

The computer as a Rorschach implies the need for an interpreter of Rorschach results. This takes someone whose role is to determine and understand views of different users and participants, and explain them to project planners. This person would also explain project philosophies and goals to users. Such a person functions much as a change agent: one who bridges the gap between promoter and user. [15,24]

User Involvement

In addition to assigning the change-agent role to someone on the project team, it is also important to have user involvement in project design and evaluation. Opportunities and feedback channels for finding out how users think about the project should also be provided. Moreover, because views can change both with the realities of the project and with increasing familiarity with the system, assessment and evaluation should be undertaken at different stages of project life.

Promoting the Project

The way a project is promoted includes (sometimes hidden) assumptions; it may be based on views of the computer or of medicine that are not shared by those who will be affected by it. Success is more likely if the project is sold in terms that address the users' views, emphasizing aspects users would find positive and taking pains to address ones they might view negatively.
Conclusions

Perhaps the most important implication of the computer as a Rorschach concerns responsibility and choice in computing. Medical computer projects are undertaken to fulfill particular goals; they reflect particular values, and have political and social implications. Because there are always more projects than resources to do them, it is necessary to evaluate and select from potential projects those that are worth pursuing. Serious thought should be given to questions of what kinds of projects ought to be accepted, by what means, and by whom. Understanding and identifying values, by looking at how the computer is used to focus and reflect them, enables us to make choices on a more informed and explicit basis.

References