

## *Editor's Comments*

# **Information Technology in the 21st Century Enterprise**

This is the last issue during my tenure as senior editor of the *MIS Quarterly*. I will take this opportunity to make some observations about the 21st century enterprise, secure in the knowledge that no one is too likely to hold me accountable for faulty prophecies.

The easiest—and most practiced—prediction is that the technological advances of the past will continue throughout this decade. We can be quite certain that inexpensive workstations will be widely available with the power of current-day mainframes. For most design tradeoffs, raw computation power will be considered essentially costless. Furthermore, advances in distributed architectures and open system standards will have advanced to the point that it becomes fairly straightforward for almost any organization to put together a system that takes advantage of low-cost forms of computing.

Storage technology will progress along a broad front. Aided by sophisticated data management software able to provide seamless integration among a hierarchy of physical storage devices, the organization will have at its disposal cost-effective means to store almost unlimited amounts of information in a readily accessible form. Little thought will need to be given to retaining transaction-level data permanently at some level of the storage hierarchy.

Data transmission will likewise continue to make rapid strides. Worldwide interconnection will become thoroughly commonplace for data and voice communications. Subsecond transmission of high-resolution fixed images, such as engineering drawings or x-ray pictures, will become routine. Even high-quality moving images will become increasingly feasible as available bandwidth expands explosively and communication costs fall precipitously.

Software development will no doubt persist into the next century as the most serious technical barrier to exploiting information technology. With such advances as integrated CASE tools and object-oriented programming languages, however, it is quite reasonable to aspire to an order-of-magnitude improvement over the remaining decade. Further lowering the software hurdle, increasingly powerful and friendly programming tools will allow a larger fraction of the development burden to be shifted to end users.

These technical advances are rapidly moving us to the position of having a magic genie capable of satisfying almost any logically feasible information need (ruling out clairvoyance and omniscience). Any information that can conceivably be collected can then be transmitted, stored, selectively retrieved, transformed, and displayed anywhere throughout the enterprise more or less instantaneously.

Does this mean that we have solved the problems of implementing effective management information systems? Far from it. By giving us the power to implement any specifiable system, advances in technology expose the really difficult part: deciding what we wish to get from the information system. This task has heretofore been largely obscured by implementation problems. When we overcome many of the technical problems, managers must get far more involved in policy matters than they have ever done before.

Consider the problem of implementing an effective transaction processing system. As these systems become thoroughly embedded in the fabric of the organization, it becomes all the more critical that they properly reflect the way management wants the organization to behave. Customers and suppliers will increasingly gain their principal impressions of the organization through their treatment by the transaction processing system. How do we want to deal with a supplier who ships us the wrong material? How

do we want to deal with a valued customer who is late in making a payment or has a grievance with our products? How do we allocate products among customers when a shortage occurs?

These problems have in the past been handled by relatively informal means outside of the transaction processing system. As we move increasingly to "intelligent" transaction systems that handle most of these matters automatically—untouched by human hand, as it were—then we must make it as certain as possible that the system behaves in a way consistent with management's intentions. That has nothing to do with technology; it has everything to do with the excruciatingly difficult task of specifying explicit organizational policies.

Take another task that the new technology raises to new prominence: determining how performance should be measured and reported. Most current performance information tends to be based on simplistic measures that grew up through tradition, the limitations of old systems to deal with complex variables, or simply the whim of a systems analyst. As a result, it is not uncommon to see those being measured to behave in dysfunctional ways in order to make the reported figures look good. In reporting schedule performance, for example, a plant manager might be held accountable for percent of jobs shipped on time—with the result that a job already late is apt to receive a low priority because nothing the manager can do at that point will improve the fraction of on-time jobs.

Any measure of performance sends a message to those being judged about what management expects of them. Management must therefore be sure that the message received is the one intended. This is likely to require the use of much more sophisticated and insightful measures—a composite measure of schedule performance, say, weighted by such factors as the length of the delay, the importance of the customer, contractual penalties, and the value of funds tied up in a delayed shipment. As organizations become more automated, almost no operational matter of significance will escape notice by the information system. Management will thus have the technical capacity to compute whatever measures it wants, but making the choices is far from trivial.

Much of the attention to the measurement issue has focused on monitoring clerical employees, such as airline reservation clerks and order entry personnel. It can be argued, on the one hand, that a company has a legitimate right to monitor an employee's performance and provide feedback as a means of making continual process improvements. On the other hand, some evidence exists that close monitoring can actually reduce productivity, to say nothing of creating problems due to increased work stress. What will management do with this new-found capability? How can we use the technology in benign ways while avoiding the dysfunctional effects?

Middle and even senior managers are not immune to scrutiny by a pervasive information system. A manager entering decisions in the decision support system, or communications worldwide through electronic mail, can be monitored quite as readily as an order entry clerk. Will the apparent trend toward greater decentralization be subverted by top management's technical ability to maintain microscopic surveillance of decentralized decisions? For that matter, what does decentralization even mean in the face of technology that provides the ability to second-guess any decision made throughout the organization?

I don't mean to suggest that organizations are likely to run amuck in their exploitation of information technology. The possibility for abuse certainly exists, however, and so we need to give very careful attention to how we use our genie. W.W. Jacobs, in his short story *The Monkey's Paw*, reminds us that unleashing powerful forces that we don't fully understand can have unexpected and undesired side effects. We would do well to remember this as technology presents us with ever more powerful choices.

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While looking forward to the 21st century, it might also be useful to look back at my three years as senior editor. I would like to think that my successor, Blake Ives, is inheriting a journal that continues to earn its good standing in the eyes of IS professionals and academicians. Several worthwhile changes have been made. One of the important ones, I think, was building a strong international representation on our editorial board. At the time of my first issue, in March 1989, we had no one on the board outside

of the United States; with the latest appointments (see below), we will have eight members from other countries. Although there were some concerns about adding extra delays to the review process, in fact it has proved not to be a real problem in this age of electronic mail and fax machines. The new members have brought a valuable new perspective to our editorial activities.

We have also made good progress in reducing the time to process manuscripts. In most cases we come to an initial decision in a little over four months—probably not good enough yet, but still moving very much in the right direction. We have been working diligently to install a new computer-based system that has as one of its primary objectives the further reduction in reviewing time. With the increased recognition in our profession of time-based competition, it is quite appropriate that we wring out whatever unnecessary time we can from the reviewing process.

As one of my final acts as senior editor, it is a pleasure to announce two new additions to the editorial board: Prof. Sirkka Jarvenpaa from the University of Texas at Austin, and Prof. Tadao Miyakawa from Hitotsubashi University in Tokyo. I welcome them and thank them for their willingness to contribute the considerable time that board membership entails.

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Finally, I would like to express great appreciation to my associates at the *Quarterly* for their support and hard work. Michael Ginzberg, senior editor for theory and research, has managed with commendable competence the review process for all of the theory and research papers. My job would have been nearly impossible without his help. I am grateful, too, for the associate editors, who deal with the reviews of individual papers and recommend whether a paper should be accepted, revised, or (alas) rejected. As members of our editorial board, they also contribute to setting editorial policies for the journal. Managing Editor Susan Scanlan and Assistant Managing Editor Mark Saarinen handle the substantial administrative load connected with the review and publication process. My life would have been very much more difficult without their able assistance and "corporate memory." James Wetherbe and Detmar Straub, both at the MIS Research Center at the University of Minnesota, have provided unfailing support when it has been needed. I am in great debt to all of them, for which I thank them most sincerely.

**James C. Emery**