

The University in the Digital Age

By Joel Seligman

In 1455, printing effectively began in the West with the Gutenberg Bible produced by movable type, some 400 years after movable type earlier had been developed by Pi Sheng in China.

It took until 1621 for the first newspaper to be published in England and until 1702 for the first daily newspaper to be published there.

If one takes the first telegraph in 1844 as a consequential date, nearly 400 years transpired between the time Johann Gutenberg modified a wine press into the first Western printing press and Samuel Morse commercialized the telegraph, making possible near simultaneous news delivery on a regional and national basis.

Contrast the past 100 years, in which we have seen a communications revolution, including the popularization of photography, the telephone, radio, the motion picture, television, the fax machine, the mainframe computer, a myriad of personal communications devices, and the Internet.

We now are predisposed to rapid change. It took 35 years, for example, for telephone landlines to reach 25 percent of our population; 16 years for the personal computer to do so; 8 years for the World Wide Web.

We also are increasingly predisposed to rapid obsolescence. In the age of cell phones and iPhones, how much longer will any of us use landlines?

At the University, the digital age already is having a profound impact:

- The Medical Center has begun a \$49 million project to create an inpatient electronic medical record (EMR), which by 2011 is scheduled to be employed by 7,500 faculty and staff at Strong Memorial Hospital and later employed at Highland Hospital.
- Our Communications Office has taken the lead, along with Duke and Stanford, in directing Futurity.org, an online research news magazine that currently involves 54 research universities in the United States, Canada, and the United Kingdom.
- Guided by Provost Ralph Kuncel and with University IT leaders, we launched the Center for Research Computing in 2008.



Our challenge will be to combine the highest quality education with more global and powerful systems of information technology.

Since then the computing power of our system has grown from 1 teraflop (about 1 trillion operations a second) to 23 teraflops. What does the power of 23 teraflops mean to a Rochester scientist? It means our faculty can explore planetary nebulae to understand how stars and planets form or analyze the genetics of disease by predicting how the structure of RNA changes over time.

These and many other initiatives substantially amplify access and use of information. But technology also is changing the nature of the University itself. Information is no longer limited to a notebook, a lab, or an office, but is available universally. Collaboration operates not just on a floor of an academic building, but across continents.

Rochester English Professor Morris Eaves, for example, has jointly worked with colleagues from the universities of North Carolina at Chapel Hill and California

at Riverside to create the William Blake Archive, an international online public resource devoted to the work of the 18th-century poet, painter, and printmaker. Drawing on the collections of 27 institutions, including the Tate Collection in London, the British Museum, the Louvre in Paris, the New York Public Library, the National Gallery of Art in Washington, and the U.S. Library of Congress, the archive's editors are restoring a unified picture of Blake. Scholars can study electronic copies of all of Blake's 19 illuminated works—with fully searchable and continually updated bibliographic information—an achievement that would have required a scholar to conduct years of travel just a decade ago.

Our challenge in the 21st century will be to combine the highest quality education and research for our students and faculty, which often involves one-on-one relationships, with progressively more global and powerful systems of information technology. Three key themes in our strategic plans are likely to be pivotal in our ability to achieve the most effective balance:

- Partnerships led by the government, industry, and research universities will often be necessary to take on projects of ever greater scale, such as those in the domains of energy or the recent support for the medical school's Clinical and Translational Science initiative.
- Interdisciplinary research spanning basic research in the life sciences and medicine, applied research in fields such as engineering, professional fields such as business and education, and creative fields such as music and other creative and performing arts.
- Academic excellence, academic freedom, and diversity and inclusiveness, which I believe will be vital to attract and retain the finest faculty, students, and staff.

History is littered with examples of those who confidently and inaccurately predicted the future. The research university, in contrast, has proven to be society's most resilient recent social institution in part because of the freedom it allows for faculty and students to think, invent, and create without direct command. **R**