asynchronous interaction, through e-mail, voice-mail, and the web, is the most inexpensive and convenient but the least direct. Thus a major task of office and project management, today, is to choose and provide the most effective and economical combination of these capabilities.

As the effective bandwidth of everyday digital telecommunication grows, the balance among these capabilities will shift. Remote, synchronous communication will become better and cheaper. In particular, Webcasting and videoconferencing will become increasingly commonplace, and it will migrate from specialized conferencing facilities to individual laptop and desktop devices. "Virtual conference rooms," which combine good, inexpensive videoconferencing with concurrent, remote access to CAD files, etc., will become an increasingly crucial part of everyday design practice and teaching.

CONCLUSION

In general, the closely

In general, the closely interrelated fields of architecture, landscape architecture, urban design, and interior design were fairly slow to move from paper-based to computer-based techniques for recording, editing, managing, and distributing information. This was largely a consequence of the fragmented, labor-intensive character of the industry, which made it difficult to invest in new technology on the necessary scale.

The personal computer revolution of the 1980s dramatically changed the conditions of practice, however. CAD and visual simulation systems became everyday practice tools. Design firms quickly found that they could not compete without them, and students began to realize that fluency with CAD was now an essential career skill.

Now, the Internet revolution has irreversibly and dramatically altered the conditions of design practice once again. In the twenty-first century, interior design firms will find themselves increasingly reliant upon three-dimensional digital modeling, rapid-prototyping, CAD/CAM construction, advanced analysis and simulation techniques, on-line management of design data, electronic commerce techniques for product selection and procurement, and 24-hour, globally distributed work processes.

Bibliography

Mitchell, William J., and Malcolm McCullough. *Digital Design Media* (Second Edition). New York: Van Nostrand Reinhold, 1995.

Mitchell, William J. *Roll Over Euclid: How Frank Gehry Designs and Builds*. Frank Gehry, Architect. Editor, J. Fiona Ragheb, Published by the Solomon R. Guggenheim Museum, distributed by Harry N. Abrams, Inc., 2001.

Mitchell, William J. *Vitruvius Redux, Formal Engineering Design Synthesis*. Editors, E. K. Antonsson and J. Cagan. Cambridge, UK: Cambridge University Press (2001, in press).

Pinto Duarte, José, João Bento, and William J. Mitchell. *The Lisbon Charrette: Remote Collaborative Design*. Lisbon, Portugal: IST Press, 1999.