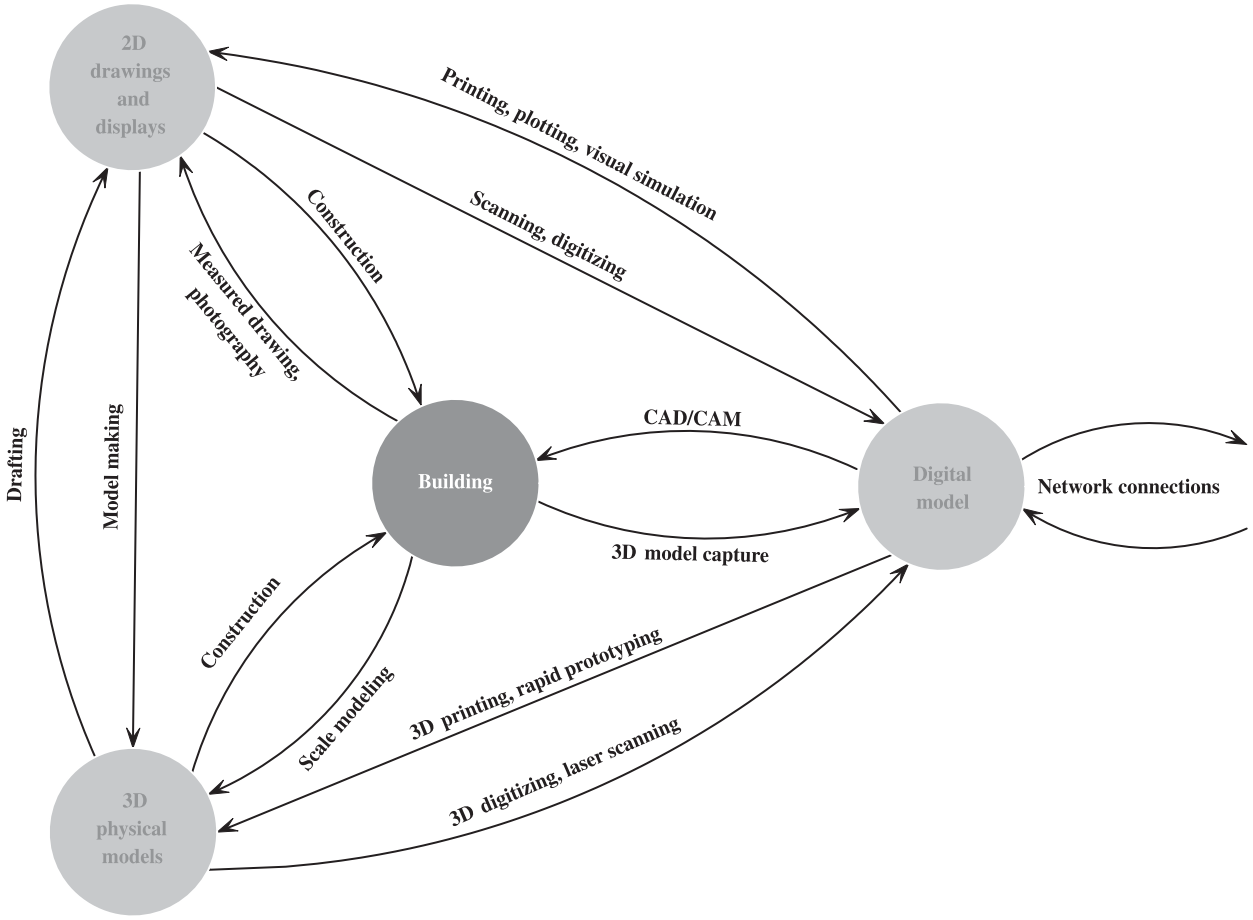

FIGURE 14-2
Different types of representations of a building and translation paths among them.

allow designers to go in the opposite direction. Since the development of relatively inexpensive, high-quality, large-format color printers, production of prints from digital files has become the standard means of preparing architectural and interior design presentation materials.

On-screen displays are also, of course, visual renditions of information contained in a stored digital model and provide a way to edit that model; unlike printing, plotting, and scanning, which are batch processes, they establish a highly interactive relationship between digital and graphic representations. As CAD technology has developed, and as more computer power has

become available to support sophisticated interfaces, graphical interaction with CAD systems has gradually become smoother and more fluid.

The translation paths between digital and physical models are a newer development, and as yet, much less familiar to most designers. Various types of three-dimensional digitizers and scanners can now be used to convert the geometric information represented by a physical model into digital form (Figure 14-3). And rapid-prototyping machines–in essence, the three-dimensional equivalents of laser printers–can be used to "build back" physical models from digital ones (Figure 14-4). Many rapid-prototyping technologies are currently in use: laser-cutters quickly and accurately produce cardboard, wood, or plastic cutouts that can later be assembled by hand; deposition printers deposit small particles of plastic or ceramic in layers; stereolithography machines employ computer-controlled laser beams to selectively solidify polymer solution; multi-axis milling machines carve three-dimensional forms out of solid blocks; and yet other types of devices produce layered models by utilizing lasers to cut and fuse sheets of resin-impregnated paper. The more advanced three-dimensional digitizing, scanning, and rapid-prototyping devices are still scarce and expensive, but their availability will grow and their costs will drop over time.

In principle, it is possible to make these translations as highly interactive as those between a digital model and screen display in a typical CAD system. The necessary technology is still mostly at the research stage, but it will eventually become commonplace in design studios. One approach is represented

FIGURE 14-3
3-D Laser Scanner.