# Specs and BIMs: An Electronic Future That's Here

Remember blueprints? Blueprints disappeared from the jobsite decades ago, followed by blue line drawings, and then black line plots of CAD drawings. Technology infrastructure has brought more powerful computers, bigger data lines and wireless channels, and (most important) computer users to the jobsite. Drawings are becoming just temporary means of moving information from the computerized building design model accessed back in the job trailer to the layout foreman on the footing crew. Increasingly, the trench for that footing is dug using equipment linked to global positioning satellite (GPS) data that's part of the electronic building information model, or BIM.

So what's a BIM? First, picture a traditional CAD data file. It's a description of lines and other geometric shapes. When those lines and other shapes are displayed or printed, they form a drawing that represents elements of a building. Now picture a BIM data file. It's a description of actual building elements: walls, roof assemblies, doors, HVAC ducts, building controls, which together enclose space and make up a functioning building. A wall is a three-dimensional object, with length, width, and height. Its materials are identified. Its properties, such as fire-resistance, also reside in the BIM. Doors and windows, as defined objects, reside in openings in the wall. In the BIM, you build a virtual 3-dimensional building much more closely akin to the eventual real thing.

The US Army Corps of Engineers (ACOE) is looking at $30 billion in constructed facilities in the next 5 years  The US Coast Guard (USCGS) is managing 6,000 properties, and the US General Services Administration (GSA) are handling over 200 upcoming projects in their design pipeline  The question of how building data is structured as it is developed by their design teams and executed by contractors is hardly casual. These big facility owners have taken over driving the process of developing a national standard for BIM, because they have to manage these facilities for the next 50 years: maintain, upgrade, and reuse them as missions evolve and technologies change.

Every contractor has experienced the challenges of getting electronic building information to work. You've downloaded architect's CAD files that can't be opened by your older software version. Drawing layers get misplaced because someone didn't use up-to-date standards. Construction proceeding based on the wrong version of files transferred by mistake. The National Institute of Science and Technology study on the costs resulting from this lack of building information interoperability ( http://www.bfrl.nist.gov/oae/publications/gcrs/04867.pdf and CBA, October, 2004) confirms what many building owners already know: they're paying a lot for data and design, and getting less than they need.

We create so much useful information when we design and construct a building that owners are increasingly requesting that the information they've paid to develop be delivered to them in an accessible form that helps them manage their buildings throughout the facility's life cycle. How much space do they have? What are the walls made of? Where are the data access points? How many HVAC control zones are there? How much excess electrical power capacity is there? What kind of door security control device is located there? What changes were made to the campus steam lines? This information isn't easy to obtain after construction, when the drawings have been archived and the Operations Manuals misplaced. The Building Information Model (BIM) is the repository of this information. The choice of what data go into the model, how the model is structured, and how

information can be gleaned from it have become very large questions for very large building owners, and it will increasingly affect even smaller facility operations and the designers and builders who serve them.

As "drawings" give way to electronic models of buildings, where are specifications fitting in? How can we do without those phone-book-sized documents full of inscrutable references to industry standards few have ever read? What role will this information play in the future, and where will it reside?

We're already issuing our specification documents electronically. First we started sending specifications to the printer in portable document format (PDF) – sort of a snap shot of a paper document. [No more mountains of print-run copy as in the accompanying photo.] Specifiers are increasingly taking advantage of their ability to implant smart links to other documents and data, such as manufacturer product data or website links that make estimators and project manager's jobs much easier. Next is the marriage of specification data with "drawing" data within the BIM. Click on a door, and you'll get all the information you could ever want about that door: material, size, performance standards, hardware types, fire label, finish – all imbedded in the BIM along with the graphic "object" of the door.

This ability has been around for years, though it started out as awkward to input. An increasing number of projects are taking advantage of it. BIM drawing side software is maturing, data structures are moving beyond proprietary CAD products to industry-wide standards, and specification software is becoming more data-centered and less paper-centered. Decisions made by the designer while editing drawing files are more closely tied to specifications databases; we can know what materials and systems are in the project as it is developed. Increasingly, the text you read in printed specifications is generated by relational databases that the specifier has accessed through point-and-click editing. Smart links within these databases mean fewer references to materials that aren't in the project.

The great advantage to owners from this evolving integration of graphic and text software into the BIM will ultimately be the ability to answer their questions about their facilities over time. Electronic design and management of facilities was a concept 20 years ago; it's a reality now. Already, the USCG manages their facilities within a simplified BIM model. The GSA has told AEs and contractors that all future work will be done in BIM – starting now. CSI's *MasterFormat*™ has been redesigned to make the link between drawings and specifications happen within BIM software, and the software packages that can accommodate this are in beta testing now. We are learning how to use BIM, working out the bugs, helping upgrade it, and making a large leap in value delivery to our clients. If we're not involved now, we need to move onto the learning curve. Young people coming out of college are already familiar with BIM and those of us who are not need to support their development of BIM capabilities in our firms, if we want to stay competitive in the global design and construction marketplace.

For more information on Building Information Models, see the following:

ENR article on GSA and BIM:
http://enr.construction.com/news/informationTech/archives/050121.asp

Good review article from Lawrence Berkeley Laboratories:
http://repositories.cdlib.org/cgi/viewcontent.cgi?article=3083&context=lbnl

In-depth article on BIM successes and pitfalls from Jerry Laiserin:
http://www.laiserin.com/features/bim/newforma_bim.pdf

Successful project BIM use article from Bentley Systems, makers of Microstation Triforma:
http://www.bentley.com/en-US/Corporate/News/Quarter+2/Arup+Morphosis.htm

Compilation of BIM articles from AutoDesk, makers of Revit and Architectural Desktop:
http://usa.autodesk.com/adsk/servlet/item?format=print&id=4749500&siteID=123112

**********

**Philip W. Kabza, FCSI, CCS, AIA,** is a principal with SpecGuy®, a consulting group assisting architects, engineers, product manufacturers and industry groups with continuing education and specification programs, at www.SpecGuy.com. He has many years experience as an architect, specifier, instructor, and builder. He served as chair of the AIA MASTERSPEC® Architectural Review Committee and is a member of the Editorial Advisory Board of *The Construction Specifier* magazine. Phil is a Fellow of the Construction Specifications Institute. SpecGuy is an Authorized MASTERSPEC Trainer.