

# doors & hardware

OCTOBER 2011

ADVANCING LIFE SAFETY & SECURITY SOLUTIONS

**2011 DHI Conference Issue!**



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## THIS MONTH

*D&H* examines the growing use of universal design and the need for passive fire protection on college campuses. We also look at the future of BIM in this industry, revisit our 2011 economic forecast and meet the members of DHI's New York Host Committee! Whether you need sightseeing suggestions or a local's opinion on where to get a slice of NY-style pizza, these are the people to ask!



A PUBLICATION OF THE DOOR AND HARDWARE INSTITUTE

# BIM and the Architectural Openings Industry

By Paul Kirsch

**NEVER HAS A SINGLE TOPIC SO COMPLETELY** enthralled an industry like the emergence of BIM (Building Information Modeling) technologies for architectural, engineering and construction (AEC). Virtually every publication written for the construction field has been overwhelmingly focused on the discussion and exploration of BIM and its implications. Like many emerging technologies, however, the BIM phenomenon it is surrounded by as much confusion as excitement. Although nearly everyone who discusses the topic agrees that “it is the future” and “everyone should get ready for it,” very few are able to define exactly what that “it” is and how it will actually affect them.

The purpose of this article is to explore the implications and impacts of BIM technologies on the architectural openings industry and specifically the distributors of its products. In researching this article, it became quite apparent that everyone has a completely different idea of what exactly BIM is. As a software developer, having spent the last 15 years of my career in this industry, I had formed my own impressions and opinions of what BIM means to the industry that I serve. I quickly came to the conclusion that I needed to go to the source.

The BIM standard was developed by the *buildingSMART* Alliance in the United States, which is also responsible for its continuing maintenance and evolution. This seemed like a good place to start. Dana “Zeke” Smith is the Executive Director of *buildingSMART* and the

author of *Building Information Modeling: A Strategic Implementation Guide*. He very generously took the time to share his many insights into the topic of BIM and how it affects our industry. I also had the privilege of interviewing R. Allan Partridge, the Vice President of the Canada BIM Council and the Executive Director of Integrated Practice for Group2 Architecture Engineering, Ltd. Mr. Partridge very graciously offered a valuable perspective on BIM, from both an international perspective and from that of a leading architectural design firm.

Armed with these and several other key industry resources, I was ready to begin casting some light on this whole BIM phenomenon.

## The Back Story

BIM reached the height of its notoriety and support after U.S. President Bill Clinton issued Executive Orders 12906 for Spatial Data and 13327 for Read Property Asset Management. Both called for the implementation of a system of common information sharing that could accommodate geospatial information. BIM and its ability to handle 2D and 3D visualizations filled the bill nicely.

BIM is a system of data modeling that seeks to combine data from every individual aspect of the construction process. Instead of the traditional approach in which different plan documents exist for components of a building (structure, electrical, plumbing, etc.), a BIM model integrates all of



these into a single view. The benefits of such a merger are potentially astronomical, and it's easy to see why project managers and property owners are drooling at the possibilities for cost savings and overall management.

## The Promise

In order for something as ambitious as BIM to get off the ground, it must receive widespread acceptance from all of the parties and industries involved in the construction process. In order for that to happen, there must be benefits for all involved. Although it's easy to see why an architect or project manager would be anxious to develop a single model of a building in its entirety, what's less apparent is what's in it for all of the various individual industry members.

BIM has been described as a collaborative process. It's not simply a format for files that are to be dropped on some website or emailed between vendors. The single, all-encompassing database, containing all of the products in the building, is intended to be a shared resource for the benefit of all parties in the process. One of the great promises BIM makes is to help avoid errors and/or conflicts by allowing each vendor to be aware of what the other vendors are contributing to the project. One could also hope to be able to "recycle" work done by other parties and avoid having to re-enter information common to multiple components.

These are some very enticing promises, and it's far too early to tell whether they'll actually come to fruition. It is, however, possible to speculate.

## The Technology

The technology behind BIM can be even more confusing than its role. For those who are expecting to receive data wrapped up in convenient little ".bim" files, stop looking. They don't actually exist. There is no such thing as a BIM file *per se*. But there are many different types of files and formats that are used in the name of BIM.

Like all things in a construction project, it all begins with the architects. In the past, architects have traditionally used packages like Autodesk's AutoCAD exclusively to create their building designs. Today, they are able to make use of extremely powerful design and modelling packages, such as Autodesk Revit or Navisworks, to create and manage complex three-dimensional models for a given project. In addition to all of their revolutionary features, these packages also facilitate the management and sharing of information in accordance with the BIM specification.

The BIM specification is designed to accommodate the seamless exchange of data. It accomplishes this by defining an extensive dictionary of "attributes" that define and identify all of the individual pieces of information that make up a project. When data is carried within a file, it must be associated with one of these standard attributes so that the receiving application knows what that data refers to. They work much the same way that "field names" work in your favorite email application's contact list. When you export your contacts to another application, fields are labeled as "name," "phone 1," "address-city," etc. so that the intended recipient

can file the data in the correct fields. BIM data exchange works exactly the same way.

The obvious difference is in the extensiveness of the data being carried. The BIM specification contains an enormous lexicon of attributes that define complex sets of data. This lexicon is further arranged into groups of related data components, commonly referred to by software developers as "classes." These classes collectively comprise a data model referred to as the "Industry Foundation Classes," or IFC. IFC data is entered in or derived from the original modelling files in Revit, Navisworks or others.

## The Reality

If you're looking for a website from which to download and share these modelling files, again, you can stop looking. Unfortunately, the reality isn't nearly that simple. Due primarily to intellectual property and copyright concerns, architects and project managers are reluctant to make these files generally available. Quite frankly, architects don't want all or portions of their designs "recycled" for other projects. Although policies vary from person to person and design firm to design firm, a distributor shouldn't expect to get access to these files very often.

The answer to this dilemma is simple, however. Architectural modelling applications allow select BIM data to be exported separately from the rest of the file. The result of such an export is an IFC file that contains all of the BIM data along with its corresponding IFC attribute tags. These files can then be read by compatible IFC reader applications. It's worth mentioning that the actual

IFC files can exist in two major formats, and as such, the choice of IFC reader should match the specific file being read. Currently, the older of the two formats (IFC2x3) is the most popular. However, the newer (ifcXML2x3), which employs XML, is quickly gaining ground.

The people we spoke to from *buildingSMART* envisioned the creation of a centralized distribution

the “hole in the wall” to accommodate the opening. In addition, one can derive the direction of swing but not the “hanging,” as a door and hardware person would express it. The same shortcoming existed in an earlier incarnation of an AutoCAD add-on product called Architectural Desktop. That product also attempted to address the needs of the door and hardware industry by

members of various aspects of the construction industry attempting to create supplementary specification for files that essentially pick up where IFC leaves off. Because these initiatives are all relatively new, there are no absolutely definite standards. Use of federated files occurs at the mutual agreement of the parties involved in a project. In fact, it would be fair to say that at this point in its evolution, BIM as a whole is employed at the behest of project managers or as a result of an agreement made between the various parties involved in a given project. Everyone we spoke to characterized BIM as a “collaborative” process designed to facilitate the exchange of information between parties. This is largely why no standardized distribution mechanism has been established for IFC and related files within the construction industry.

This brings us to the single largest consideration with respect to the architectural openings industry: data entry. Even if a widely accepted standard for federated files were to emerge for Division 8 products, one large elephant remains in the room: *Who is going to enter all of this information?*

It’s certainly conceivable that the industry will agree on a file specification that will carry details with respect to the doors, frames and hardware. The question still remains as to who will be given the responsibility of entering and maintaining all of this information. Distributors we’ve spoken to all envision a future in which all or part of the take-off process can be automated by importing data from a BIM file of some sort. In theory, this is possible, but someone needs to enter this data initially.

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website at some point in the future. Such a site would allow architects and project managers to post their source files online and facilitate the automatic export and distribution of IFC data to interested parties. Such a site would specifically restrict access to the actual model files but still allow the download of the exported IFC files. Unfortunately, such a site does not exist today, and to the best knowledge of everyone we spoke to, nothing is in the works. As such, anyone interested in obtaining IFC files would need to communicate directly with the owners of the project’s model files and request an IFC export.

For the architectural openings and hardware industry, the bad news does not quite end there. Although the IFC attribute collection is extremely extensive, the data contained relates primarily to the geometric aspects of the building project. Walls and spaces are expressed with absolute and stunning accuracy, but details regarding doors and frames are not nearly so complete. Currently, the only information contained in a standard IFC file with respect to doors is the size of the opening, or more accurately,

offering openings schedules created from within the AutoCAD drawing. Unfortunately, both Architectural Desktop and IFC have the same limitation. Both only identify the direction of swing with respect to the wall. Neither speaks to the lock side of the opening, nor do they identify the active leaf in a pair of doors. As for all of the other aspects of the opening, their specifications do not exist in the IFC lexicon.

There is, however, a light at the end of the BIM tunnel. The designers of the BIM specification have recognized that there is considerable amount of industry-specific information in respect to every component of a building’s construct. In fact, there are far too many details and components for any one specification to ever hope to anticipate. Even beyond this, one must also consider the fact that new products (and hence new specifications) are being invented all the time. BIM’s answer to all of this is “federated” files. Simply put, federated files are supplementary files that are designed to complement and travel alongside the IFC.

There are numerous individual initiatives already launched by

It's not realistic to assume that architects will be providing any more data with respect to doors, frames and hardware than they are right now. The logical conclusion, therefore, is that the onus will fall to the spec writer to populate this aspect of the database when the hardware and/or openings schedules are created. In the alternative, the task could fall to the vendor/distributor to provide this supplementary information as part of the submittal package.

Traditionally, architects rely on specification writers (AHCs) to create a hardware schedule from their blueprints. In some cases, this task is performed by the hardware distributors, and at others times, the hardware manufacturers themselves undertake the task to ensure that their products are favored. In either case, it's highly unlikely that anyone would be anxious to provide a digital version of their spec to make their competitors' jobs easier. It's more likely that manufacturers would want to assist distributors of their products by providing a file that would simplify their bidding process. As an example, ASSA ABLOY Canada is already doing this by offering completed project take-offs and hardware specs in AVAproject format for its distributors. In this example, ASSA ABLOY has been able to offer an extremely powerful time-saver to its customers. Hardware and openings schedules are completed by its people, and the distributor need only make desired modifications and fill in bid amounts.

In practice, the greatest beneficiary of BIM and its standardized format is the project manager and building owner. The various feder-


ated files can be coordinated with the original 3D model to create a comprehensive representation of every component of a building project. The utility of this to building owners is obvious. Both they and those responsible for the ongoing maintenance of the building would have a comprehensive reference guide that details every nut and bolt that went into the building's construct. Imagine how helpful this would be when faced with maintenance or renovation tasks in the future!

This is so helpful, in fact, that it could actually become an unfortunate reality for the door and hardware distributor. When complex keying structures are employed in electrified hardware implementations, distributors often are required to provide computer-readable versions of those configurations. Several lock manufacturers provide or support keying software for the use of building maintenance personnel. In such cases, the configuration files for these keying systems are required "deliverables" for the project hardware vendor. BIM files are the natural evolution of this requirement. It is absolutely believable that architects or project managers may begin to demand that vendors provide product details and perhaps even product drawings as part of their submittals and/or deliverables.

Fortunately for the product vendors/distributors, the call for BIM-compliant drawings and renderings will most often be answered by the manufacturers themselves. In fact, many forward-thinking manufacturers have already made such files available on their websites for architects' and designers' use.

## The Bottom Line

Although BIM technologies are not really a part of the architectural openings distributor's life today, it is certainly conceivable that they will be in future. The adoption of BIM technologies by architects and project managers may result in new demands and responsibilities for product vendors. As for actual benefits, it seems apparent that the greatest beneficiary of them, in terms of the architectural openings industry, is definitely the project managers and building owners.

Since there are currently no definite specifications in place for doors and hardware, there is very little that the Division 8 vendor can do to prepare for BIM at this point. The best one can do is ensure that any software choices made today are coming from software developers that have made a commitment to supporting BIM and this industry as they evolve together. 

*AVAware Technologies has assembled a number of BIM-related web links, documents and utilities from which we created a small "BIM Resource Kit." We are happy to offer it for download from the AVAware website or on CD at the AVAware booth during the DHI show.*

*The author would like to thank Dana "Zeke" Smith of the buildingSMART Alliance in the United States and Allan Partridge of the Canada BIM Council for their generous assistance in the research of this article.*

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