



November 30 – December 3, 2004 ♦ Las Vegas, Nevada

Successful Autodesk® Revit® Implementation

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BD34-4 It's no mystery that Autodesk Revit is a great software tool. But how do you implement the software to take full advantage of all its power? Because no two firms are alike, we'll cover the seven factors of planning a Revit implementation along with the four keys to success. We will present real-world examples of what to do and what you need to avoid if you want to get started on the right foot.

Who Should Attend

CAD managers and users wanting to implement Autodesk Revit in their firms

Topics Covered

- Seven factors of Autodesk Revit implementation
- Four keys to success
- The transitional phase of implementation
- Real-world case studies of successful implementations in large and small firms
- Working with consultants

About the Speaker:

Jim Balding is a licensed architect with 17-plus years of experience integrating technology into the architectural field. He is currently employed with Wimberly Allison Tong & Goo (WATG) in Newport Beach. He has been a member of the Autodesk® Revit® Client Advisory Board since its inaugural meeting and is currently serving as the Revit Product Chair for AUGI®. He has developed a successful Autodesk Revit implementation strategy and has spent the past two years bringing the seven offices of WATG up to speed in its use.

Overview

- Why change
- The steps toward change
- The seven factors of implementation
- The four keys to success
- What has worked
- What to avoid

Why Change

There are many reasons to change to the Building Information Model (BIM). In the beginning the most compelling is the three dimensional aspect of designing and documenting a project. In addition to that, many find the coordination of the single model to be a compelling reason. If that doesn't convince you, the fact that firms are consistently providing better service and deliverables in less time or less staff and occasionally both, may sway you. The bottom line is that it has always been the "Holy Grail" of design and documentation and only recently have the hardware and software been able to deliver on "the promise".

The Steps Toward Change

There are as many processes or steps to go through as there are people going through them. The reason for outlining one such linear path is not to outline the process but to establish the position with in the process an individual or firm might be in for the purpose of this class. These linear steps might be; (1) hear about the change, (2) evaluate change, (3) decide to change, (4) plan the change, (5) implement the change, (6) Re-plan the change (7) implement new plan, (8) Reap the rewards of the change. For the purposes of this class it is assumed that the students are somewhere between steps 2 and 7.

The Seven Factors of Implmentation

While there are many different factors of implmentation most can be grouped into one of seven categories. The following list is in order of importance, GENERALLY speaking.

- Firm size
- Project sizes
- Architectural style
- Project types
- Scope of services
- Firm locations
- Firm culture and age

Firm Size

The size of the firm is the number one issue when it comes to implementing the Building Information Model. While there are many key factors that firm size will affect implementation the key factors are project size, technology, training/support/R&D, personnel, decision making, and standardization. Below are "**GENERAL**"

observations regarding firm size and the key firm size factors listed above. Each category has been labeled with advantage towards the larger or the smaller firms. This is by no means an absolute and the advantage could be great or a slight, use your own experience when considering these issues.

Project Size – Advantage Smaller Firms

Large firms generally have larger projects and when it comes to BIM that can be viewed as an obstacle with regards to implementation. If you consider that you are adding all of the building data to one file, that file can certainly grow and becomes exponentially larger than the single referenced files you may be presently using. BIM products have strategies to alleviate the issue of large projects; however, many firms feel that they need more time to get to a comfort level using full BIM implementation on such projects. It is important to note that this does not count out larger projects, they will simply require a little more planning and more experienced BIM users.

This is where the smaller firms tend to shine. They typically have smaller projects that are ideal for BIM. There is not as much information to be communicated in a smaller project which translates to smaller files and project teams.

One thing to keep in mind when selecting projects based on project size, It is advisable not to base the decision entirely on the floor plan area but the “spatial size”, the amount of mass and detail to be built. For example, designing and documenting a 750,000 s.f. warehouse using BIM can be far easier than a 20,000 s.f. gothic cathedral.

Technology – Advantage Larger Firms

Due to the fact that BIM models are larger and more complex than ordinary 2d drafting files, BIM software and models require fast machines with plenty of RAM and good video cards. When it comes to technology, the larger firms usually have the upper hand. They typically have the latest hardware, fast LAN's and WAN's, and perhaps a dedicated IS team to support the systems.

The small firm generally finds themselves behind the eight ball in this arena. They may have made a recent, significant investment in connectivity, hardware or software lately and can't afford to budget large ticket items such as these every year. A small firm with an investment in technology could find themselves in a very advantageous position when implementing BIM.

Firms of any size should pay close attention to the hardware requirements of BIM software as well as performance on typical firm project types. Maintaining up to date hardware and software often pays dividends not only speed of deliverables but pride of ownership, incentives to learn and maintain knowledge not to mention reinforcing a companies' commitment to technology.

Training/Support/R & D – Advantage Larger Firms

The larger the firm the larger the operating expenses. With this in mind the ability to create and maintain in-house expertise to provide training and support as well as perform research and development roles for firm specific tasks. This phenomenon often runs parallel with a firms CAD manager role, if the firm has a full time CAD manager, typically they will have a full time BIM manager; occasionally they are one in the same.

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The smaller firm will tend to have a part time CAD manager, often an architect that knows the ins and outs of computers better than the rest of the firm. Firms can expect additional overhead responsibilities when it comes to BIM; however the return on investment is proving to be much larger proportionately to two dimensional CAD.

Training and support are two of the keys to success, discussed later, and should be given serious thought when implementing BIM.

Personnel – Advantage Larger Firms

When planning the implementation of BIM one of the first things you need is a “champion”, the person responsible for heading up the change. However, one person can not do everything required to make the move to BIM, you will need talented people to carry out the plan and use the software to deliver the promise.

Because the larger firms subsequently have larger talent pools to select from they generally have the luxury of hand selecting the users that best suit the chosen tool. One thing to note, however, the proportion of talent and roles between the larger and smaller firms will tend to be about the same.

Decision Making – Advantage Smaller Firms

When it comes to making the decision to change it seems to be better to have a single entity make that decision rather than by committee. No where does the saying, “too many chefs spoil the broth” apply more than the issue in implementing change. Larger firms with multiple locations will have more challenges in the way of purchasing, planning and organizing an implementation plan.

Smaller firms, generally one location, have but one “chef” who makes the decision to implement and it is time to move on. When changes in the plan occur there is not another round of negotiations, planning etc.

Standardization – Advantage Smaller Firms

Here again, the larger firm will tend to have many “chefs”, from the top to the bottom. Somewhere in between might a local CAD manager with localized CAD standards and techniques. Throw in an occasional international firm and you have, potentially, different languages, building techniques, documentation techniques, cultures and infinitely more issues.

Once again the smaller firm will get the nod in this arena. With one location the standards can be established even voted on in one location perhaps at one time. When changes to the standard occur, communicating that change is simple and most will understand the reasoning as it undoubtedly has arisen from issues within the local firm.

Firm size - Conclusion

While there are many factors listed here there are many more that will be firm specific. As stated above, firm size is the number one consideration when deciding how to implement BIM at a firm. And while each subject has been titled with an advantage score the intention of this section is to make firms aware of the issues regarding firm size and to assist firms in their implementation process.

Firm Size Final Score: Larger firms – 3
Smaller firms – 3

Project Size

While project size is major factor in BIM implantation, it also is generally influenced by firm size, refer to “project size” under firm size above.

Architectural Style

When referring to architectural style and the implementation of BIM, the foundation of the distinction is the size, shape and the amount of the detail involved. BIM does not recognize the literal difference, for instance, between Romanesque, Renaissance and Post-Modern architecture.

Common sense, while not always common, does, in fact, make sense here. When it comes to modeling a building, straight, square forms are easier to model/build than the organic styles of Mr. Gehry. This is not to say that it is impossible to build, just more time and technique are required. If you can imagine the effort required to physically build the building, there is not a great difference to building it virtually using BIM. Simply put, more detail, shapes and mass equals more time to develop and build.

While modeling all of the components in a project has desirable effects, one thing to keep in mind, it is not always necessary. During the planning stages of a project it should be determined what will be modeled and what can be “represented” with CAD lines, arcs and circles or even hand drawings or sketches. A simple example, if you have raised wood paneling on a door, there is no harm in drawing lines on the surface of the door to represent the paneling and moving on with the project. Some might argue that it would not render properly or that there is a different material in the panel. The point is that there needs to be an understanding, on a per project basis, what is important enough to model and what isn't. Modeling in BIM is not an all or nothing proposition.

Project Types

Project types often affect different firms in different ways. Generally speaking, however, some project types are better suited for BIM while others are not. Again, this is not to say that it can not be done. Some of the aspects of project types that dictate the ease of implementation are repetitive elements, component driven, area driven, or those that make use of, and find great value in, the different visualization and/or scheduling advantages of BIM.

Below is a “**GENERAL**” outline of the advantages and or challenges typically presented by project type.

Entertainment/Retail

Some of the advantages of BIM in entertainment and retail might be the presentation value gained in color fills for area or room types or the coordination area calculations. Perhaps there is a need to schedule and color the tenant spaces by lease expiration, retail type or rent per foot. Bi-directional, live scheduling may also have advantages whether it is display racks, flooring or parking stalls.

Some of the challenges facing the entertainment/retail architect might be custom furniture and fixtures, project size and scale. It has also been noted that due to the nature of a retail mall, retailers often have architects of their own there are many different designs and ideas flying about at any given time.

Healthcare/Hospitality

Healthcare and hospitality designs, of course, are going to have significant gains using the repetitive, modular or component driven aspects of BIM. It could be argued that this is also the case with CAD drawings, where xrefs, blocks or cells are used, but BIM goes beyond that. When duplicating the data along with graphic representation of that data you have the benefit of scheduling, coordination and visualization. When a single change to one guest room sink and vanity can affect, the plans, interior elevations, sections, scheduling and specification information for 500 rooms there is great efficiency in place.

The healthcare and hospitality architects are faced with similar challenges. Generally their projects are large very complex designs with large project teams. Incorporating and coordinating that data set can become a significant burden. Planning a project of this nature is possible, but requires advanced planning and experienced BIM capable staff.

Residential

Residential gains major steps in the fact that it is generally smaller in size as discussed above. Beyond that there is the fact that residential clientele may not read or understand floor plans, sections and elevations, but certainly can understand a perspective or a rendering.

Challenges facing a residential architect might be the scale of the project as well. There is a tendency in residential work to be shown at a larger scale and therefore include more detailing in each drawing. This tendency can translate to the notion that all of the information must therefore be modeled. The residential architect would be wise to evaluate and plan the model.

Public/Religious

This is a very broad spectrum, projects large and small, simple and complex. What they have in common is that at that there is a large body of "critics" to please. Whether it is the congregation of a church or the citizens of a city, communication is the key ingredient. This brings the visualization aspect of BIM to the forefront. City councils can see the building within the proposed setting. The public understands the aesthetics and the color fill diagrams showing the location of the services to be provided.

Challenges that might face an architect specializing in these areas might include the fact that many of these building types might be rather large and ornate in nature, requiring additional time spent modeling. The need to provide many different presentation level images requires additional time be spent working out materials and computer rendering time.

Scope of Services

Due to the nature of BIM, building a virtual model of the project rather than representing one with lines, it has been noted that more of the effort is front loaded in the schematic design and design development phases. In other words, you are working out constructability issues earlier in the design process. This generally provides great gains in efficiency in the construction documentation phase. Architects need to be cognoscente of this

issue and perhaps make adjustments in the area. When the scope of services ends at what could be described as the traditional design development phase there is a greater level of information within the model. Architects are beginning to understand this and responding in many ways such as marketing additional services, adjusting fees (front loading) to maintain projects through their entirety and/or using it as a sales tool for current and future work.

Firm Locations

It may go with out saying, but the more office locations there are the more complex the implementation process gets. There are many things to consider as noted above training, support and standardization also become more important and slightly more difficult when there are multiple office locations. It is not impossible to do, it will, however, require a little more planning. The planning will need to take into account the different office cultures, personnel etc.

Firm Culture and Age

Firm culture and age may not seem important in the planning stages of implementation; however, it will become readily apparent during the implementation itself. Areas to consider are, how well does the firm(s) accept and anticipate change. Is it a corporate culture? How do the lines of communication operate and what is the management organization. Who will need to back and support the initiative?

When age is considered, generally speaking, younger firms are more open to change while the older firms might be more set in their ways and resist a change of this nature.

Four Keys to Success

Listed below are the four keys to success. It has been found that when focusing on these steps the potential for success increases greatly.

Plan
Communicate
Train
Support

Plan

The first stage of implementation is planning. Of course, each firm is as individual as the employees within the firm. Careful planning is the foundation to a successful implementation. Using the seven factors of implementation can supply a firm with guidelines but each firm should consider it's individuality in each instance. Planning the implementation of any strategy or technology should take into account all of the individuals and groups that the change will affect. It is advisable to discuss these issues with key individuals in these groups.

Communicate

Once the plan is in place it will become imperative that everyone knows what it is. It is very important to share the plan with the entire office. This does not mean inviting the office as a whole to a meeting to show them the latest tool. Given consideration that there are many different roles within the firm and that means that this new tool will affect them in different ways and therefore they will be interested in different aspects of the tool.

The principals or senior leadership will be interested in how it affects the bottom line, what is to be gained. They will also be interested in what kind of investment, capital and staff, will it require. This group will also be interested in why we would make the change from the process currently in place. Generally speaking what does this mean to the business of architecture?

The project managers will want to know how it affects them. Will it really allow them to get work out sooner or with less staff? The coordination of drawings, detail and grid bubbles is greatly appreciated. They are also interested in coordination between consultants and how a team might share the data. What does this mean to the process of architecture?

The architects and designers that will be using the tool are generally concerned with the user interface, tools sets and how long it will take to learn. They also will be asking questions about how to create specific detailed models. What does this mean to the design and documentation of architecture?

Train

When implementing a technology like BIM it is advisable to have dedicated training. While on the job training proves to be a great learning experience, it can also be detrimental. When there are deadlines and revisions flying about, trainees tend to want to jump back to their comfort zone, 2d CAD.

The training should be organized and tailored to cover firm's specific topics and issues. Having general training to cover the basics of the tool can be helpful initially, however, having an expert in the firm covering firm specific issues will pay dividends later.

All that being said, for those of you that wish to dive right in; one "on the job training approach" is the "Just-in-Time" training. Just-in-time training is a term that describes an on-going training process that lasts much of the length of the project. Typically there is a BIM expert that will give the required training just before the toolset is required. A simple example is at the beginning of a project, the first thing you will need to use is the wall tool. The trainer demonstrates all of the uses, tips and techniques required to use the wall tool. You would then go and layout your building, walls only of course. Once the walls are in place it would be time to learn about doors and windows. This process continues for several weeks until you have what you need to complete the current phase. It might go without mention, but this technique requires an "on-call" trainer that also serves to answer questions and support the users. This technique has proven successful on several occasions.

As pilot projects progress, evaluation data should be recorded, monitored and analyzed for post-mortem study. It often helps to have an outline of your firm's current processes to compare to the new BIM processes. It's easy to forget how you did something in the past when you are deeply involved in new tools.

Support

Once the plan is complete and communicated and when training is finished the implementation is not complete. Firms should plan on maintaining and updating information through ongoing support. It is advisable to have regular meetings to discuss issues anywhere from new techniques to changes in structure and beyond.

What Has Worked

- **Planning** – There is no substitute for good planning. Take the time to consider the issues within your firm and plan on addressing each and every one. Also, it is a good idea to plan on re-planning as firm specific issues will arise and need to be addressed.
- **Formal training** – While on the job training can be the best quality training for the real world, real deadlines, revisions, and owners can often frustrate a users and prompt them to want to give up and go back to good ol' CAD.
- **On the job training** – Occasionally, with the right personnel, project, schedule, team and support a user can get up to speed while working on an active project. Great care needs to be taken if this is the path you choose to take. *See Just-in-Time training above*
- **Baby steps** – It is advisable to take a few of the overall benefits of BIM and focus on those issues on a particular project and master those and take on a few more on the next project. Some firms use pilot projects to take these steps.
- **Partial projects** – “The Horizontal Approach” use BIM to design and document the plan view and scheduling while using CAD to document the vertical drawings like the sections and elevations and perhaps the details. This approach can work very well in the early stages of the project as the design is in constant flux. For instance, some firms will use the horizontal approach for schematic design phase and jump to full BIM modeling during the design development phase.
- **Small projects with experienced users** – It may seem obvious, but overloading the first few small projects with experienced users works well and serves purpose down the road. The theory here is that these users will gain real world experience and confidence. These users can then go on to work with others and spread the knowledge.
- **Management Buy In** – It will be important for the entire company to have the management and upper management understand the issues and lend support to the projects and users. Failure shouldn't be an option.
- **Rewards and recognition** – The early adopters of these technologies often have to endure the nay-sayers, critics and the frustration of learning a new software and design process. With rewards and recognition they will, at the very least, feel that it is worth the effort. Some firms reward the users by upgrading their computers first, preferred seating and recognition in newsletters and meetings.
- **On-going training** – Many firms, recognizing the value and the fact that trainees can not learn this overnight, organize and support weekly mini-training sessions. These sessions generally last one hour and will cover a single topic.
- **Exit Strategy** – On the occasion that the BIM is not working out on a particular project it may be necessary to exit to AutoCAD. It will be helpful if that exit is prepared ahead of time.

What to Avoid

- **Communication** – As noted above, users need to know, not only how the tools work, but the concepts of BIM and why the firm is going in this direction. Understanding what BIM is, how it is to be used and why can be just as important as how to use it. Lack of communication can be fatal.
- **On-the-job training without full support** – If it is impossible to get formalized, non-project related training; it will become essential that the new user have a support mechanism available as close to full time as possible. When it comes down to crunch time with new functionality and no one there to assist can be a breaking point in implementation. This could be an in house expert or a reseller/training center.
- **Attempting to hit a “Home Run”** – Some BIM software can be easier to learn than 2d CAD, it is, however, incredibly comprehensive. Take baby steps into the software. After all, most people did not learn CAD on the first project. Generally speaking, users become very comfortable and highly productive on the 2nd or 3rd project.
- **Isolating users** – This goes back to training and support, a user that is set free on a project without consistent support will tend to lose interest and get increasingly frustrated attempting to figure everything out themselves.
- **The over sell** – It is advisable to avoid selling all of the benefits of BIM prior to having a few projects under your belt. Be certain that the firm can deliver on the promise. Avoid repeating vendor marketing promises without in-house verification. Set up short-term, medium-term and long-term goals.

Wrap Up

This brief is, just that, a brief. There are any number of combinations and additional factors that could, and very well will, affect the implementation of BIM at any given firm. The intent of this brief and class is to give **GENERAL** guidance to those on the implementation path.