



## building information technology

Technology has created opportunities for the architectural profession to approach the processes of design and documentation of that design. This same technology allows both the client and the contractor to participate in the design process. The resulting collaboration then allows more effective construction processes, particularly in tracking time and materials. Each participant in the design and construction process can benefit greatly from using these new strategies. However, each participant must adjust their traditional involvement to achieve the maximum benefit. Each has a significant role to play to maximize the potential of this interactive process.

## exactly what is bim?

With the ability of computer aided design, buildings can be conceived and documented in three dimensions. This ability to create a "virtual building" means that all of the elements of a building are created much the same way the contractor traditionally built the building. Each element is created and fit together so that looking at the "virtual building" from any point, it would be as though you were standing in or around the actual building. You can walk through a door, look at a cabinet as it sits in the room and see how equipment will fit in space. You can also look at clearances between mechanical system elements and the structure. Virtually all elements of the building are modeled correctly before they are constructed. One significant element of BIM is that the "virtual building" is in actuality a graphic database. Therefore, it can track information about quantities, equipment specifications, time sequences and costing.

## how does bim work, really?

Each participant in the design and build process has their own role to play, though different from how they would have in the past. However, the most significant impacts are when groups are able to sit around a table and with real time projected images, look in detail at various elements of the design and make intelligent decisions by coming to agreement on the best solutions.

### how does bim help the architect?

The very beginning of the design process has changed because the design can be created in three dimensions from the beginning. Obviously, any three dimensional object can be viewed from overhead and appears as a plan. This means that the traditional two dimensional organization of space can be viewed and manipulated as it has over time. However, more complex buildings can also be viewed in three dimension the see a relationship between volumes as well.

The designer can design from within the building as well as from the exterior. Working with engineers, the ability to coordinate the location of systems or to utilize building systems as design elements is enhanced greatly. Understanding the scale of a space, the relative or specific values of colors and their impact, the character of materials and textures and the quality of lighting strategies are also benefits available.

With the level of detail established in the "virtual building" model, quantities of materials can be derived and cost projects developed. As the building envelope changes, quantities are automatically updated. Working with consultants and contractors using the 3D model, individual systems can be isolated or combined to help all understand the interface with the each element. This ability to have the engineer, contractor and even the subcontractor interacting in the early design phases allows the best design solution within reasonable construction constraints.

### how does bim help the contractor?

With their involvement early in the design process, the contractor has an intimate knowledge of both the intent of the design and the specifics of the building systems. Because they have the opportunity to provide input into the design of systems and materials, they can determine construction processes and sequences much more effectively. There is the potential to involve their major subcontractors in the design process as well so that coordination between trades can be established early, suggestions on materials, systems and optimization of construction sequencing can be provided and verification from engineers can be obtained prior to the completion of the design. More effective cost control, better coordination of subcontractors and more effective scheduling. Available to contractors are various programs that can effectively manage the construction processes utilizing the "virtual building" model.

### how does bim help the client?

For many people, clearly understanding two dimensional drawings is difficult. With the "virtual building" model, the client can actually see the building, from either the interior or the exterior, from the beginning of the design process. The ability to make value judgements when you can virtually be in the space or see it as others would as the approach or walk through, allows for more intelligent decision making. It also allows the client to understand the components and complexity of the building systems. They have a great deal more assurance that all elements are being considered and that the design is constructable and costs for unknown or contingency are minimized.

