

Driven by the need to improve the quality of buildings, and to reduce the costs of designing and maintaining them, building owners, design teams, contractors, and facility managers are seeking ways to collaborate and share information more effectively.

### 1. What is Building information modeling (BIM)?

Building information modeling is the creation and use of coordinated, consistent, computable information about a building project in design that yields reliable digital representations of the building—representations used for design decision-making, production of high-quality construction documents, performance predictions, cost-estimating and construction planning and eventually for managing and operating the facility.

This model is used to record programmatic data, define the building form and spaces, analyze costs and energy performance, and serve many other kinds of useful purposes. At the same time, the BIM software is able to produce conventional drawings, such as plans and 3D renderings, by automatically creating “views” of the model. In this way, the documents needed to communicate amongst the larger team, obtain permits, and many other uses, are always accurate and up-to-date as the design evolves.

### 2. How prevalent is BIM in India? Compare it with the prevalence in the developed countries. When and how did it originate?

BIM (Building information modeling) is relatively new to India. Its use is limited to projects that are collaborative efforts between international teams. Developed by Autodesk in the US, it is a tool that lets you build virtually before building physically.

In the US and other developed countries, this and similar tools have been used for some time. The use for BIM is primarily being driven by contractors who are executing these complex projects under strict time and cost deadlines. Architects are using this tool to push the design envelope and explore newer concepts and techniques in creating that unique monument. This then translates to the structural, services and other such consultants using it to design and build virtually.

### 3. What are the advantages of using BIM over the conventional methods?

Building Information Modeling or BIM is a platform for creating a 3D virtual model of a facility in which data from all disciplines (architectural, structural, services, etc) is incorporated. BIM also provides a better way for the design team to work. Beginning in schematic design, a single, multi-purpose, computer model is created to help make decisions and to understand their implications.

Benefits of BIM:

1. Create coordinated, digital design information and documentation

2. Use this information to accurately visualize, simulate and analyze performance, appearance and cost
3. Reliably deliver the project faster, more economically and with reduced execution delay due to design
4. Interference checking between disciplines at design stage reduces delays and cost overrun during execution
5. Work sharing helps improve coordination and thus remote working by different teams is possible
6. Use the model as a presentation and marketing tool
7. Cost estimates can be generated faster
8. Design change at any stage of the project is easier to incorporate and manage and track its implications.
9. On project completion the model can be used as a facilities management tool

New technology and working methods deliver:

1. Accelerated design and innovation
2. Enhanced efficiency in process
3. Embedded knowledge to make global change
4. Design exploration and optimization using digital project

#### 4. Narrate some project experiences in detail. Good or bad.

On a recent project, we build a BIM model for an eight storied residential building incorporating the architectural, structural and MEPF services data. The developer was driving the need for this BIM model. The structural elements to be incorporated into to the model had to show all the reinforcement. We modeled into the structural components all the reinforcement, generated the quantity, structural details and bending schedule. At the same time, we identified the structural clashes in the model. All this information was shared in 3D and 2D format with the developer and the structural consultant. Our aim in doing so was to resolve the clashes early on in the design phase.

All the work we did to reach this was proved to be worthless. Why? The developer and the consultants took note of the clashes and instructed us that we were highlighting issues that were known to them and that these would be resolved on site during execution.

The conclusion from this is that, the purpose of building the model needs to be identified clearly. Given the amount of detail built into the model, its potential was not realized. In this scenario the desired BIM output was provided by us to the developer and they did not utilize the benefits.

Let me share another experience with all of you. We were engaged by a developer to coordinate and generate a set of drawings for all the services for a five star hotel. Our scope was limited to coordination among MEPF services as the structural and architectural civil work was completed at site. As soon as we studied the available data and the result expected, we decided to execute this as a BIM project. The developer was not convinced of the need for using BIM and we decided to take this challenge up and prove to him the benefits of BIM.

We gathered the existing site data and built a basic model of the architectural and structural components. Our entire focus was on services coordination and for this we gathered data from the respective consultants and also shop

drawings from the contractors. We build a model for a portion of the building, identified clashes, resolved them in the model and then generated a set of coordinated drawings. All thru these stages we were coordinating with all the various design teams and also the developer. Identifying the clashes in a 3D model helped the entire team visualize better. This also resulted in faster response for clash resolution. At the end of this we were successful in converting the skeptical design team and the developed about the benefits of BIM.

**5. What are the costs involved? How expensive or cheap? With respect to the percentage of total costs involved for the entire project.**

Since the use of any BIM software is relatively new in India, cost data specific to India is very difficult to gather. Globally though the cost saving by using BIM as compared to the conventional way of working have been analyzed and below is a brief list of the economic benefits of using BIM.

1. 5X to 10X ROI on BIM investment
2. 80% reduction in time to generate estimates
3. 10% saving on construction costs thru clash detection
4. 20% saving thru construction process simulation
5. 7% saving in construction time
6. 40% elimination of unbudgeted changes
7. 60% reduction in RFI
8. 74% reduction in coordination issues at foundation stage
9. 47% reduction in coordination issues at steel erection stage

**6. What is the future of BIM in India? Will it pick up or will builders/architects prefer the conventional methods?**

BIM is waiting to take off on India. With the size, scale and complexity of projects changing the pace of execution needs to change. There needs to be cultural mind shift in the thinking of AEC industry personnel in India. The need to execute complex designs faster as a well coordinated project will drive the use of BIM in India.

Use of BIM in India will definitely pick up. This move will be driven by developers/contractors primarily and will be supported by Architects and other consultants. Change in the conventional design will mean change in the methods of building and this will mean adopting newer technology. BIM is the solution to the complex demands of modern day design.

**7. What is the scope?**

**8. Industry Challenges for adopting BIM**

1. Shortage of trained BIM personnel to fulfill the growing need
2. Awareness of the advantages of BIM
3. Slow adoption of technology for design, design management and project delivery
4. Project overruns are too commonplace and part of every project.(need to avoid this is slowly gaining importance)
5. Consultant performance issues are not highlighted (coordination, timelines, incomplete information)

## 9. What can we do?

1. Shorten the learning curve
2. Integrate international best practices
3. Collaborate with local firms who have the relevant experience
4. Knowledge transfer should be more transparent
5. Speed up the adoption of technology

Construction documents are a by product of the model. Any changes made in the model are followed thru into the construction documents. This reduces the possibilities of mistakes at execution.

Time delays due to design issues are eliminated.

Material quantities are part of the smart objects created and are updated with every change automatically

All disciplines can work collaboratively and see the design implications of change.

A 70 storied building constructed using traditional 2D drawings generated 1800+ RFI and a similar building constructed using BIM model generated 140 RFI

