

GLOBAL ILLUMINATION ALGORITHM USED IN COMPUTER AIDED ARCHITECTURAL DESIGN PRESENTATION



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1 CONTEMPORARY ARCHITECTURAL PRESENTATION APPROACHES

This poster presents a new, advanced approach to **architectural design sharing, collaboration and presentation** using a **global illumination (GI)** algorithm. At the early design stages the openings and the artificial lighting systems are not yet created in the building information model. **Without the GI engine the interior spaces would not be visible for viewers.** The GRAPHISOFT BIM Explorer (BIMx) is free, innovative, interactive, BIM viewer tool for architects setting new standards for design communication and presentation in the AEC industry.

BIMx not only presents the building design but also provides an intuitive and interactive way to explore it. The interactive models can be distributed using conventional file sharing methods, or can be published on the BIMx community portal as well as shared via the private cloud service. All stakeholders can benefit from the interactive BIMx models using the most popular desktop, tablet and smart phone operating systems.



BIMx model displayed on a smartphone

The **GRAPHISOFT BIMx** viewer applications are available **free of charge** for all the major software and hardware platforms. The free BIMx viewer helps architects to **communicate and share** their designs in an **interactive 3D** environment. Clients can **freely explore** the **design** in an **interactive** manner, fully **understand** all design aspects and also provide invaluable **feedback** for the designers.

BIM explorer provides viewers a **natural, game-like experience** to explore architectural projects at **any stage** of the design development process. Viewers can navigate in BIMx models using the common gestures used by applications on smartphones and tablet devices. It also provides an **interactive walk-through** and helps the interpretation and understanding of architectural projects of any complexity.

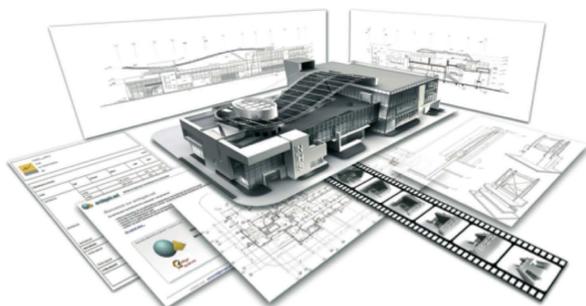
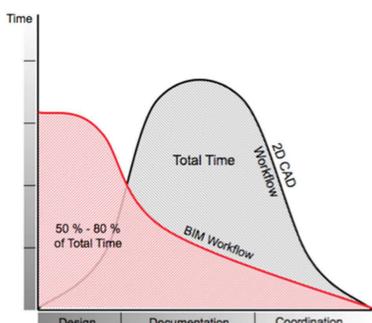


Common gestures are used for navigation on tablet devices

2 BUILDING INFORMATION MODELING

Architectural **design documentation, communication and presentation** are closely connected processes. The **technology** used throughout the various phases of the architectural design development and coordination processes greatly **affects the content, quality and efficiency** of the design presentation and communication.

Paper drawings created by pencil and ink and the so-called "blueprints" represent the **conventional** architectural documentation technique used for centuries. The development of computer hardware and software initiated major changes in the AEC industry. **BIM** (Building Information Modeling) applications **imitate the real building process**. Instead of creating drawings from 2D line-work, **buildings are virtually modeled** from virtual construction elements such as walls, windows and slabs. All data is stored in the **central** virtual building **model** and design **changes are automatically followed-up** on individual drawings generated from the model. Thanks to this integrated, virtual model approach, BIM not only offers significant **productivity** increase of design documentation, but also opens up **brand new possibilities** in the field of interdisciplinary design **collaboration** and client **presentation**.



2D CAD vs. BIM workflow, the BIM design concept (NHS Office, Architect: PAA Studio)

4 GLOBAL ILLUMINATION OF INTERIOR SPACES

The **global illumination algorithm** ensures that all internal spaces of any BIMx project models are **automatically illuminated** ensuring a **better viewing experience** when exploring the design. During the conceptual design phase the building volumes are formed, but the **openings have not yet been created, nor have the artificial lighting systems** either - these components will only be available later at the tender or construction documentation phases.

To be able to explore the interior spaces of the design, it is necessary to ensure a certain generic or global illumination for the interior spaces. BIMx uses a so-called global illumination algorithm to resolve this issue. In practice, this means that **all surfaces in the building interiors are illuminated regardless of the available openings and lighting fixtures**. This algorithm ensures a **realistic surface illumination**: the edges of surfaces and corners receive slightly less illumination than the other parts of the surfaces.



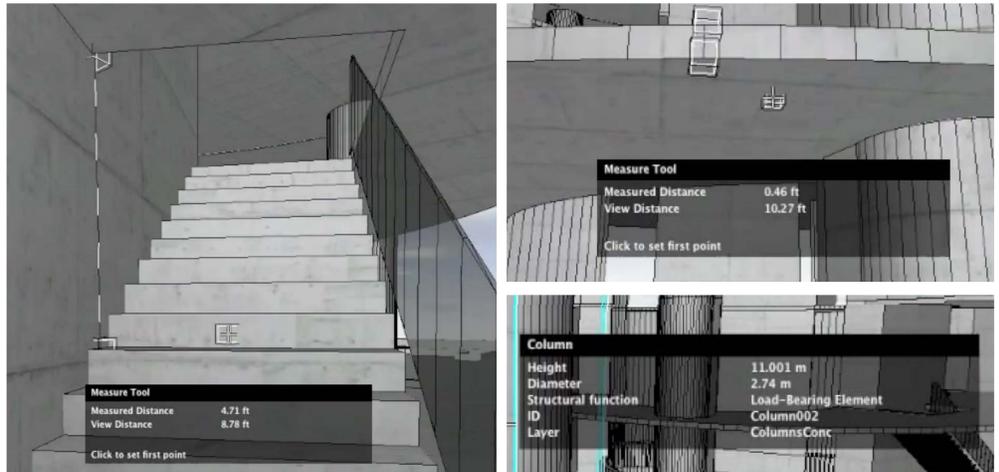
Global illumination in the BIMx model, displayed on a tablet device

4 DESIGN COLLABORATION WORKFLOWS

Here are **three typical workflow scenarios** for sharing and presenting the building design using GRAPHISOFT BIMx.

Sharing the initial design concept: in this scenario the architect shares the **initial design concept** with the property developer. Using BIMx, they are able to navigate through great quality models and share ideas about the proposal back and forth seamlessly using a smart phone.

Communication with the structural engineer: the architect shares the **load-bearing elements** of the model with the structural engineer who uses his desktop BIMx viewer, available free for downloading, to **check the initial building design for any conflicts or possible collisions**. The engineer is able to retrieve useful information and dimensions from the BIMx model. The model is shared securely through the BIMx premium cloud based service.



Measurements in the BIMx model

Property sales and development: in this scenario the **interior designer** sends a design proposal for one of the sample apartments, to the real estate agent. The agent can use a mobile tablet on-site to show future clients around the interior spaces and provide an overall idea of possible future use. The model is made public on the BIMx community portal so that the building is marketed to an even greater audience of possible clients.

For **more information** and for **sample projects** please visit the **BIMx community website!**

