

The first design drawings

Profession



The first design drawings can be dated as far back to the 16th and 17th centuries. Utilizing handmade tools to draw concepts and measurements. Of course, as mankind evolved, so did the tools, eventually developing drafting tables, drawing boards, T-squares, triangles, French curves, and advanced compasses. Up until the early 1950s, all technical drawings were done by hand using these tools. This timing consuming and skillful task required accuracy, a keen knowledge of measurement, and an understanding of geometry.

1960's The first major innovation in CAD technology can be traced to a program developed at MIT by Dr. Paul J Hanratty called Pronto (Program for Numerical Tooling Operations) in 1957 which could draw simple lines on a computer. Also at MIT in 1962, Ph. D. student Ivan Sutherland created 'Sketchpad', a GUI-based (Graphical User Interface) to generate x-y plots.

The organizational innovation utilized in Sketchpad pioneered the use of object oriented programming in modern CAD and CAE (Computer Aided Engineering) systems 1.

At the same time, extensive work was being done for 3D (3-dimensional) construction, and for NC (Numerically Controlled) machine programming and design in the aircraft, automotive, and electronics industries. The work performed relied on the development of mathematical expressions for polynomial curves and surfaces by Pierre Bezier, Paul de Casteljaou (Citroen automotive company), Coons (MIT, Ford Motor Company), James Ferguson (Boeing Aircraft Company), Carl de Boor, Birkhoff, Garabedian (GM Automobile Company) and others 2.

1975 In a paper titled " The Use of Computers Instead of Drawings In Building Design," architectural expert Charles Eastman described a system that is very much like modern BIM. He refers to joining together distinct geometric objects to create a single project, suggests the possibility of viewing a given model from many different angles, and also discusses the need for extensive databases for the components that would be used in projects. He went on to build this sort of system, calling it the " Building Description System" 4.

1980's Autodesk releases AutoCAD in 1983. At this point in time computers , now available at a larger scale, and are evolving alongside CAD and becoming increasingly more affordable for the design engineering profession. In 1987, 3D modeling came into the picture in the form of Pro/ENGINEER 4.

It is worth noting that the technologies behind BIM and CAD were conceived at roughly the same time. Because BIM requires much more processing power than CAD. Graphical user interfaces were still at infancy and required further R+D. Hence, BIM's availability in commercial software came much later as it had to wait for the necessary hardware and software to catch up.

What is BIM?

A plethora of definitions have been generated in industry and academia as to what constitutes BIM. It is currently an emerging definition that seems to carry confusion at three different levels:

For some, BIM is a software application. For others, it is a process for designing and documenting building information; and for others, it is a whole

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new approach to practise and advancing the profession which requires the implementation of new policies, contracts, and relationships amongst project stakeholders 5.

In the 'Adoption Dynamics' section of this paper, the ambiguous nature of the term BIM will be further analyzed as it constitutes the barriers to its adoption within the AEC (Architecture, Engineering, and Construction) industry. For the purposes of this paper, we will be adopting the BIM definition that complements the architectural domain.

The American General Contractors defines BIM as: Building Information Modeling is the development and use of a computer software model to simulate the construction and operation of a facility.

The resulting model, a Building Information Model, is a data-rich, object-oriented, intelligent and parametric digital representation of the facility, from which views and data appropriate to various users' needs can be extracted and analyzed to generate information that can be used to make decisions and improve the process of delivering the facility. The process of using BIM models to improve the planning, design and construction process is increasingly being referred to as Virtual Design and Construction 6.

CAD vs BIM

The shift from CAD to BIM is much more significant than the shift from hand drawing to CAD. Basically, when using CAD for building design, you focus on creating drawings. When using BIM, you focus on creating a building model

and then the drawings can be generated from the model. With CAD, one manually draws floor plans and then sections.

But with BIM, you create the elements in one view, and they appear in all views in which their visibility is turned on ⁷. BIM has moved the AEC industry from placing unintelligent lines on paper to placing intelligent building objects into a 3D space ⁸.

BIM is often wrongly perceived as the 3D model of a building. While conventional building design largely relies upon 2D drawings. Building information modeling extends this beyond 3D, augmenting the three primary spatial dimensions with time as the fourth dimension (4D) and cost as the fifth (5D). It covers spatial relationships, geographic information, light analysis, and quantities and properties of building components ⁹.

BIM can be viewed as a package of data which can involve all relevant information a building through its life cycle of: design, engineering, construction, management of building components, renovations, to its demolition. A major benefit of BIM is that it can be accessed by multiple users from a different location on the same document.