What is BIM?
An overview of building information modeling: use of the application in building technology

Arch. Lorenzo Polia
Typical Problems in Construction Industry

- 30% Of projects do not meet original program or budget
- 92% Of clients said that designers' drawings are not sufficient for construction
- 37% Of materials used in construction become waste
- 10% Of the cost of a project is typically due to change orders
- 38% Of carbon emissions are from buildings, not from cars

CMAA Owners survey, CMAA Industry Report, Economist Magazine
Top 10 Cost over run factors

01 Fluctuation in prices of raw materials
02 Unstable cost of manufactured materials
03 High cost of machineries
04 Lowest bidding procure method
05 Inefficient project management /Inefficient cost control
06 Long period between design and time of bidding
07 Conventional method of cost estimation
08 Excessive change orders
09 Inadequate project planning
10 Inappropriate government policies

NED University survey
What is BIM?
Jerry Laiserin widely uses the term in his US publications (2002).
Evolution of design process

Hand Dafting ➔ CAD ➔ BIM
History of Building Information Modelling

- **1962**: First conceptual idea by Douglas C. Englebart
- **1975**: First working prototype of BIM by Charles M. Eastman
- **1986**: First use of the term “Building Modeling”, in the sense of BIM by Robert Aish
- **1987**: First launch of Graphisoft’s "Virtual Building" concept of ARCHICAD
- **2000**: First developed of Revit, which utilized a parametric change engine
- **Future**: Development of BIM
The American Institute of Architects (AIA) defines BIM as "a model-based technology linked with a database of project"
THE TIP OF THE BIM ICEBERG

WHAT IS SEEN

- 3D VISUALIZATIONS
- BASIC QUANTITIES

WHAT IS HIDDEN

- THERMAL ANALYSIS
- STRUCTURAL ANALYSIS
- LIGHTNING ANALYSIS
- PREFabrication MANAGEMENT
- PHOTOGRAMMETRY
- GEOREFERENCE
- ADVANCED QUANTITIES

...
How BIM saves owners’ time and money throughout the building lifecycle

64%
One main target is to really bridge and integrate design and final building production.

64%
OPERATION & MANAGEMENT

34%
CONSTRUCTION

2%
DESIGN
BIM vs CAD: different workflows
A NEW WORK PHILOSOPHY

the way of **DRAWING** has changed with **CAD**…

…the way of **DESIGN** will change with **BIM**
COMMUNICATION & KNOWLEDGE EXCHANGE

Increase the ease of dialogue between all IT tools.

TRADITIONAL DESIGN PROCESS

BIM DESIGN PROCESS
The federated model is a model that contains all the models making up the entire building.

The models are linked and are shared between the parties operating in the job order.
BuildingSmart International was founded in 1995, and produces a new standard, the IFC format. The IFC defines a single "interoperable" model among all compliant applications: it is an open, public and independent data format from any software manufacturer.
BIM
Application & Advantages
1

UNIQUE MANAGEMENT OF PROJECT VIEWS

Every modification made to the drawing is automatically reported on each piece of the model, be it a drawing, an abacus or a calculation.
2
SIMPLE VISUALIZATION OF THE PROJECT

Facilitated communication through cloud services, smartphone or tablet applications, BIM viewers, virtual reality.
3. HIGH LEVEL OF CUSTOMIZATION

The parametric components are the basis of all building components designed in a BIM environment.

The parameters can be of all types: dimensional, thermophysical, material, structural, etc.
it is possible define a unique object and use it for the different representation scales and the different design phases.
5_

4D MODEL: TIME MODEL

Project phasing simulations.

The introduction of the time factor and the cost estimation factor within the project makes it possible to manage the building during its entire life cycle.
6__
5D MODEL: COST MODEL

ESTIMATING
- Real time conceptual modeling and cost planning
- Quantity extraction to support detailed cost estimates
- Trade verifications from models
- Value Engineering
7_
6D MODEL: ENERGY MODEL

SUSTAINABILITY
• Conceptual or Detailed energy analysis
• Life cycle energy performance building
• Lighting and daylighting analysis
• Sun & shadows studies
• Airflow Analysis and Climate Analysis
• Solar Radiation Analysis
7D MODEL: FACILITY MANAGEMENT

FACILITY MANAGEMENT APPLICATIONS
- Computerized building database for record renovation and maintenance
The real-time representation of the three-dimensional model allows to check the interferences between the single components. The two-dimensional representation only becomes a possible piece of work that can be extracted from the project management database.
10
NOT ONLY DRAWINGS

- Render
- Animations
- ...

Other ADVANTAGES

- Let repetitive work be done by the machine
- Draw more precisely
- Draw quicker
- Get rid of papers by electronic documents
- Let Automations functionality take care of certain tasks
- Faster Project delivery
- Continual Improvement
- Concentrate on the building instead of the drawing
Some BIM Software

Architecture | Structure | MEP | Computational Design | Managing | Coordination
BIM around the Globe

- US: 70% adoption
- India: 22% adoption
- Middle East: 26% adoption
- Australia: 51% adoption by various professionals
- Europe: 36% adoption
I never think of the future. It comes soon enough.

Albert Einstein