Lecture- 5
Building Information Modeling (BIM) : an overview

by

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BIM – Definition

Building information modeling is an innovative approach to building design, construction, and management that is characterized by the continuous availability of highly accurate, consistent and reliable building information.

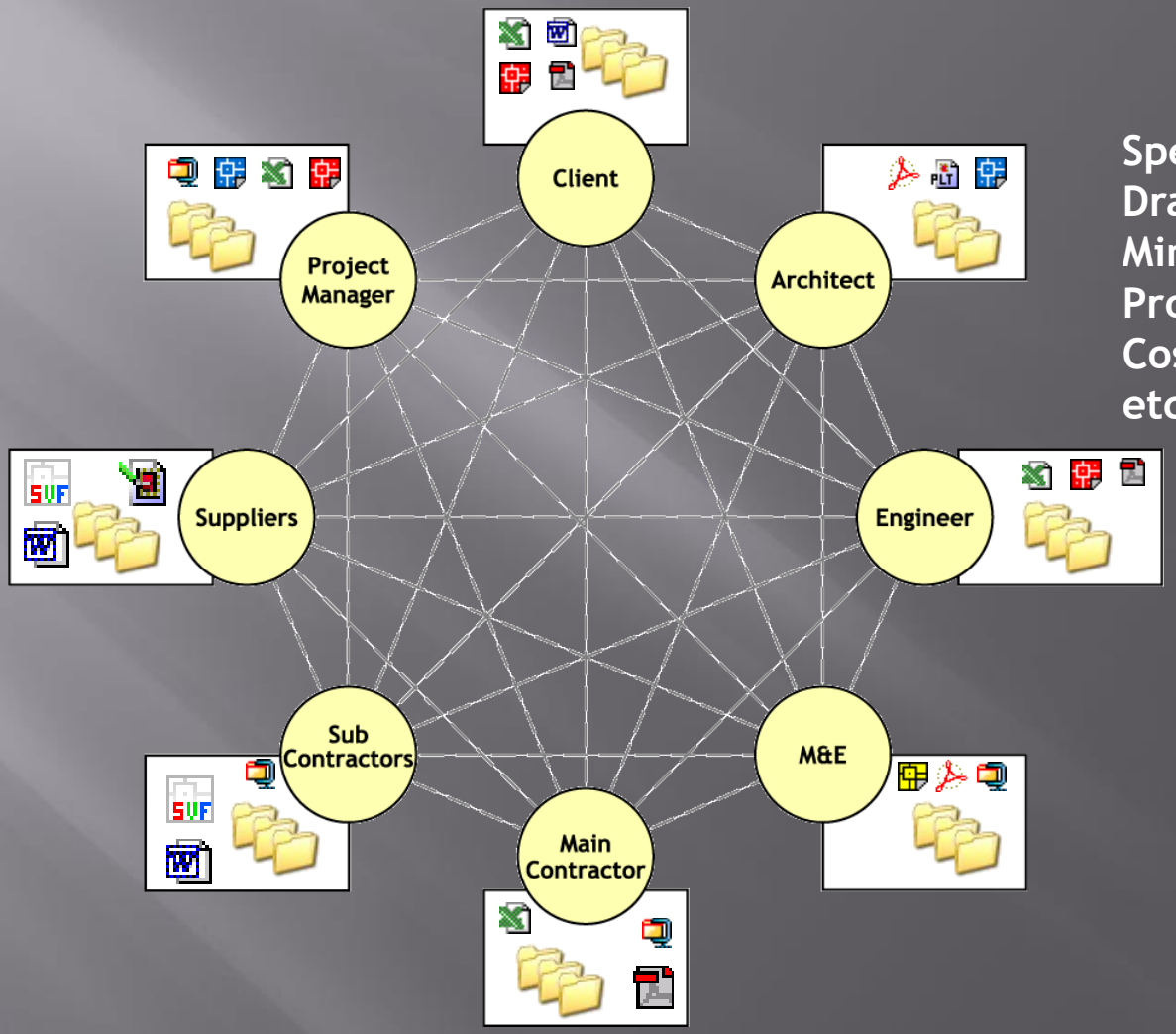
BIM allows the project team to visualize, simulate, and analyze a project before construction even begins using a three-dimensional model representing all of the physical and functional characteristics of a facility.

BIM Seamlessly Bridging Communication Throughout the Building Process

BIM – Definition

- The American Institute of Architects (AIA) defines BIM as "a model-based technology linked with a database of project information"
- Three-dimensional, virtual representation of a design project
- It adds 4th dimension of time and 5th dimension of cost to the 3D model
- "Cloud" allows different members of cross-functional team to work on the project
- It covers
  - Geometry
  - Spatial relationships
  - Geographic information
  - Quantities and
  - Properties of building components.

Traditional Collaboration in Construction(C. 1990s)

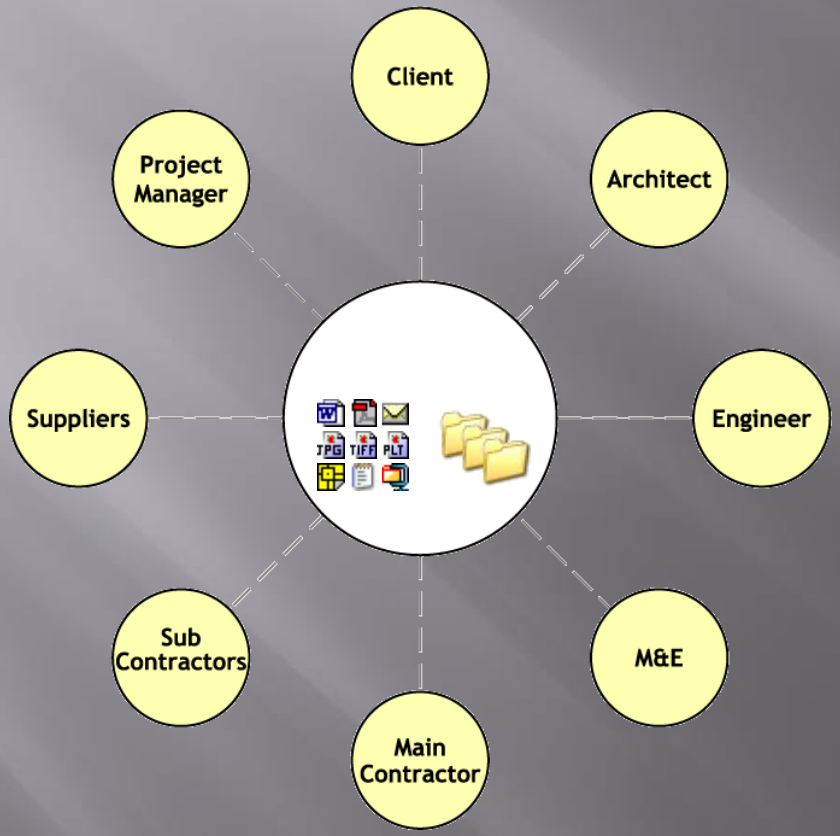


Specs
Drawings
Minutes
Programmes
Cost plans
etc

Email
Courier
Post
Fax

4

Online collaboration (c. 2000s)



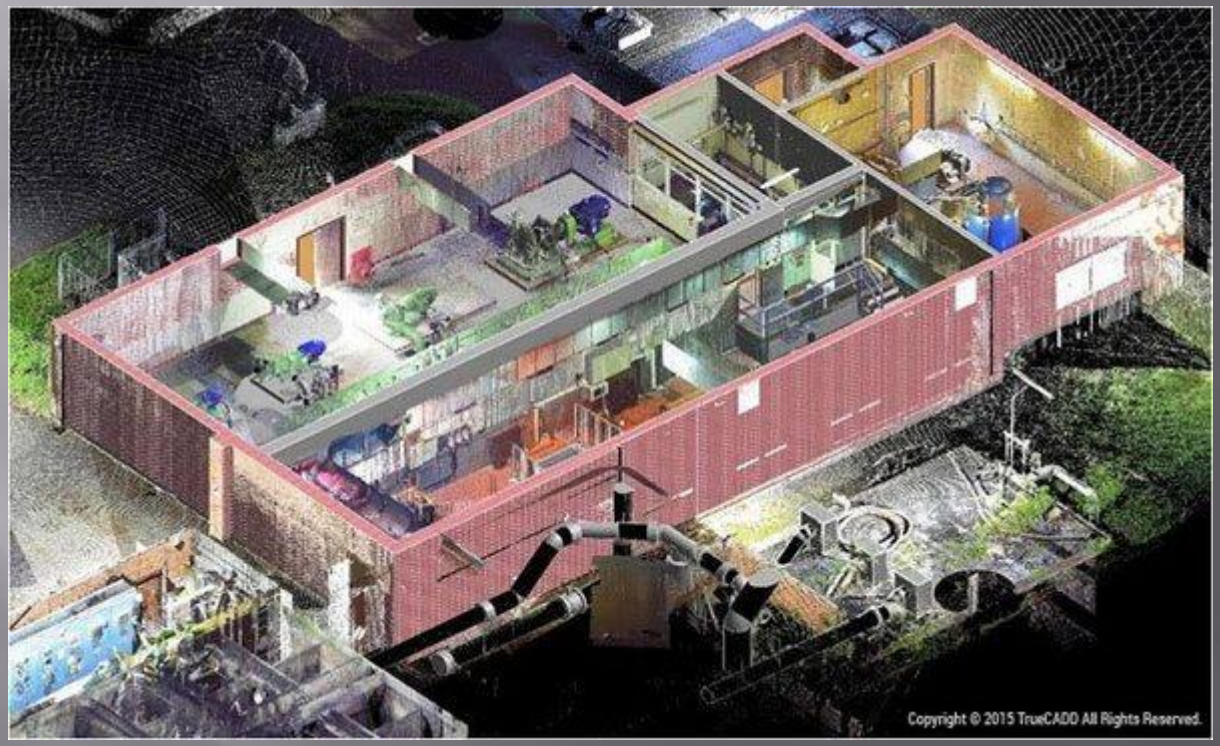
Online file management

- Single central repository
- Fewer interoperability issues
- Less paper
- Latest information
- Complete project record
- Full information audit trail
- Greater re-use of information

But ...

- nearly all still 2D
- email often used instead

5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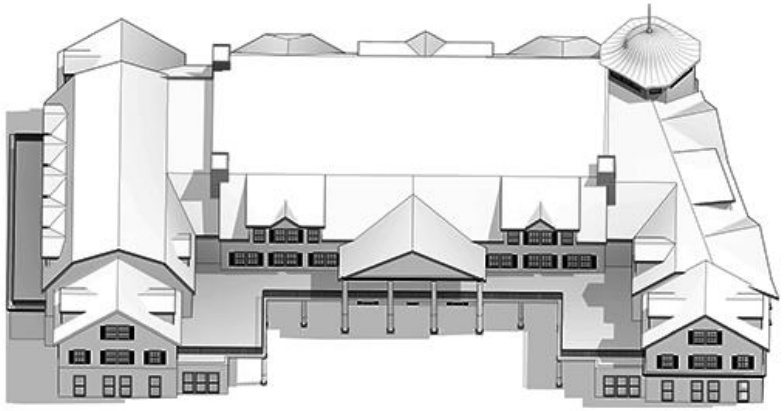
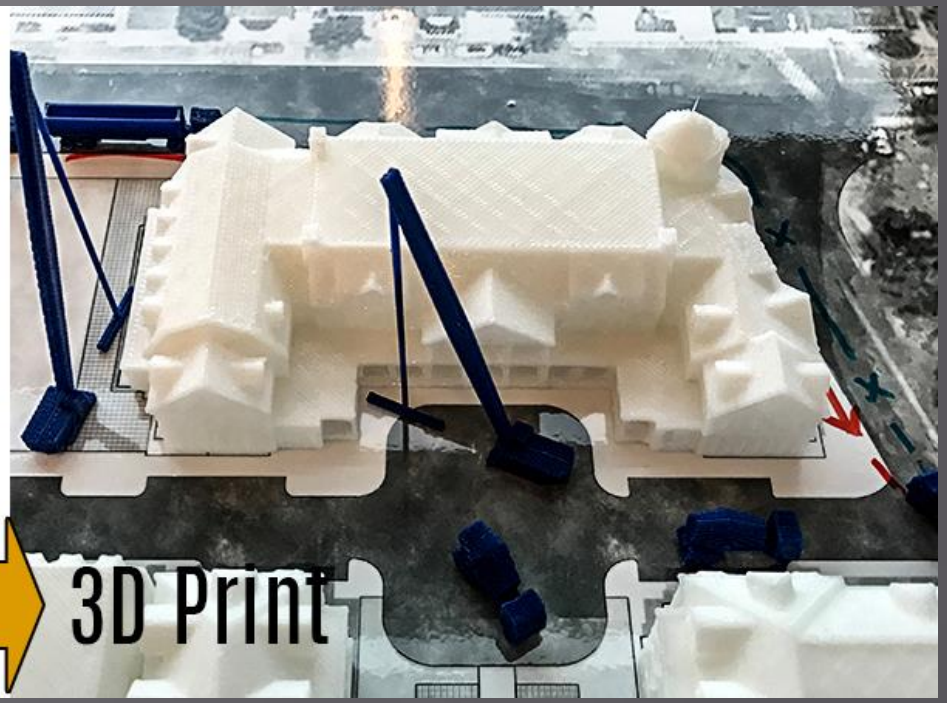
TheRevitKid.com!



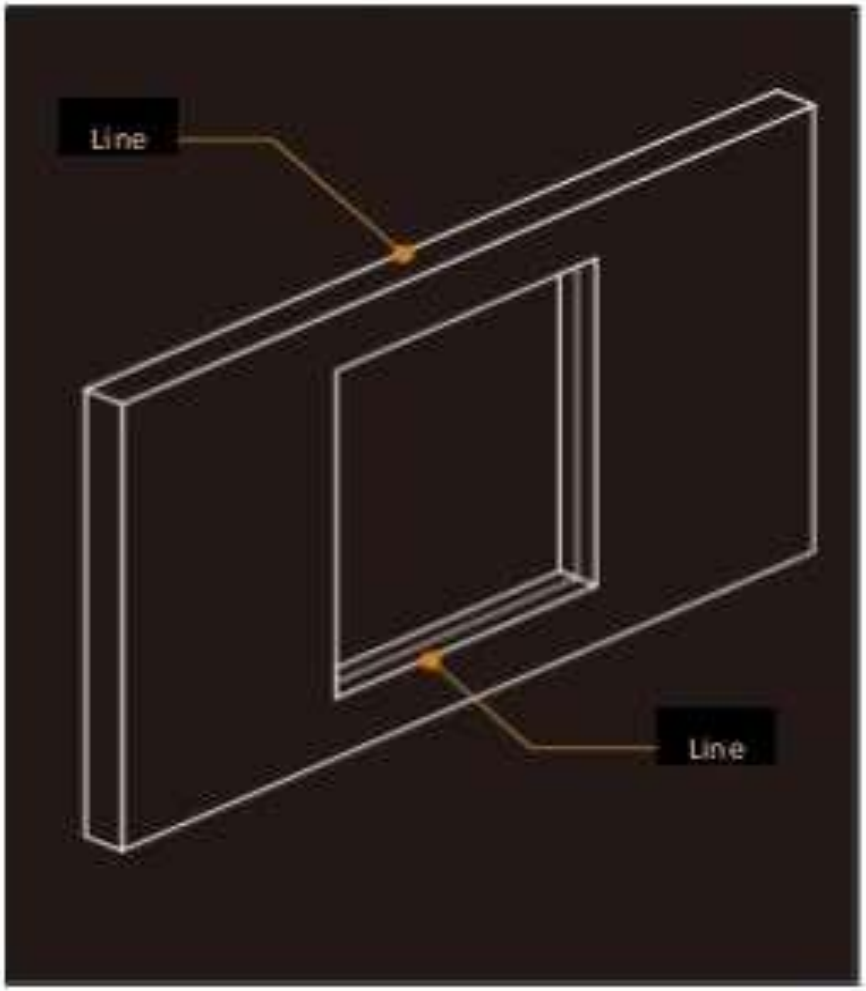
Revit → 3D Print



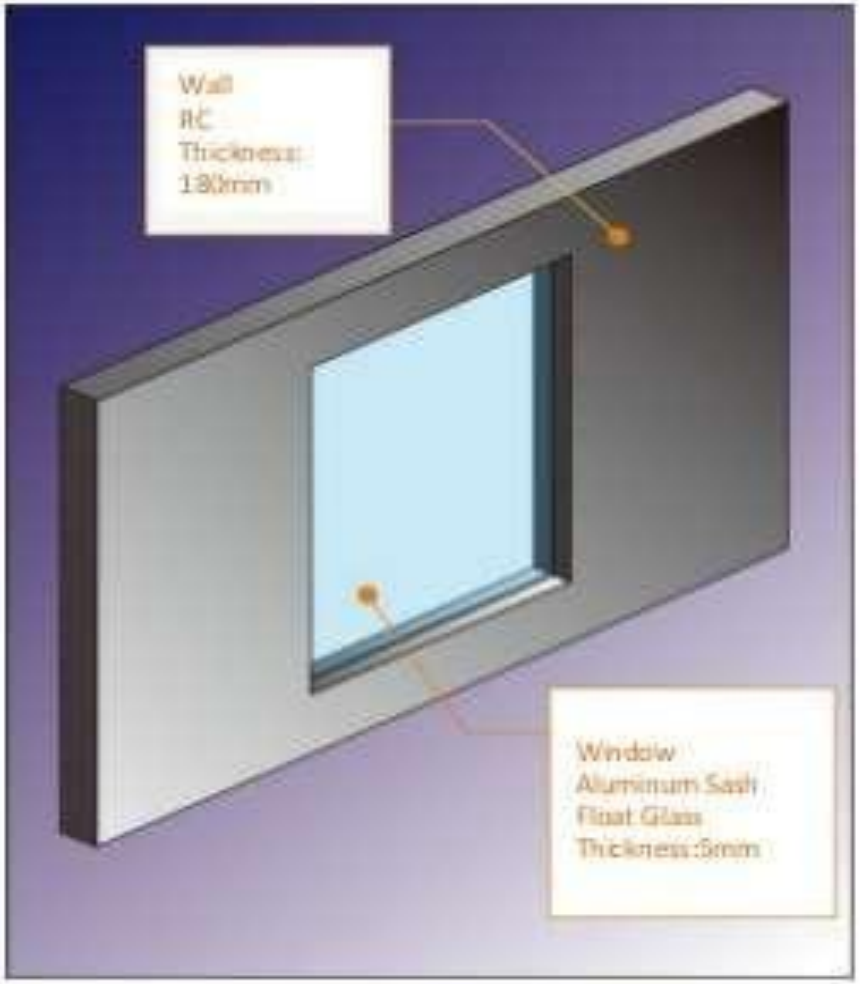
Some Key Terms:

- CAD
- 3D BIM
- 4D BIM
- 5D BIM

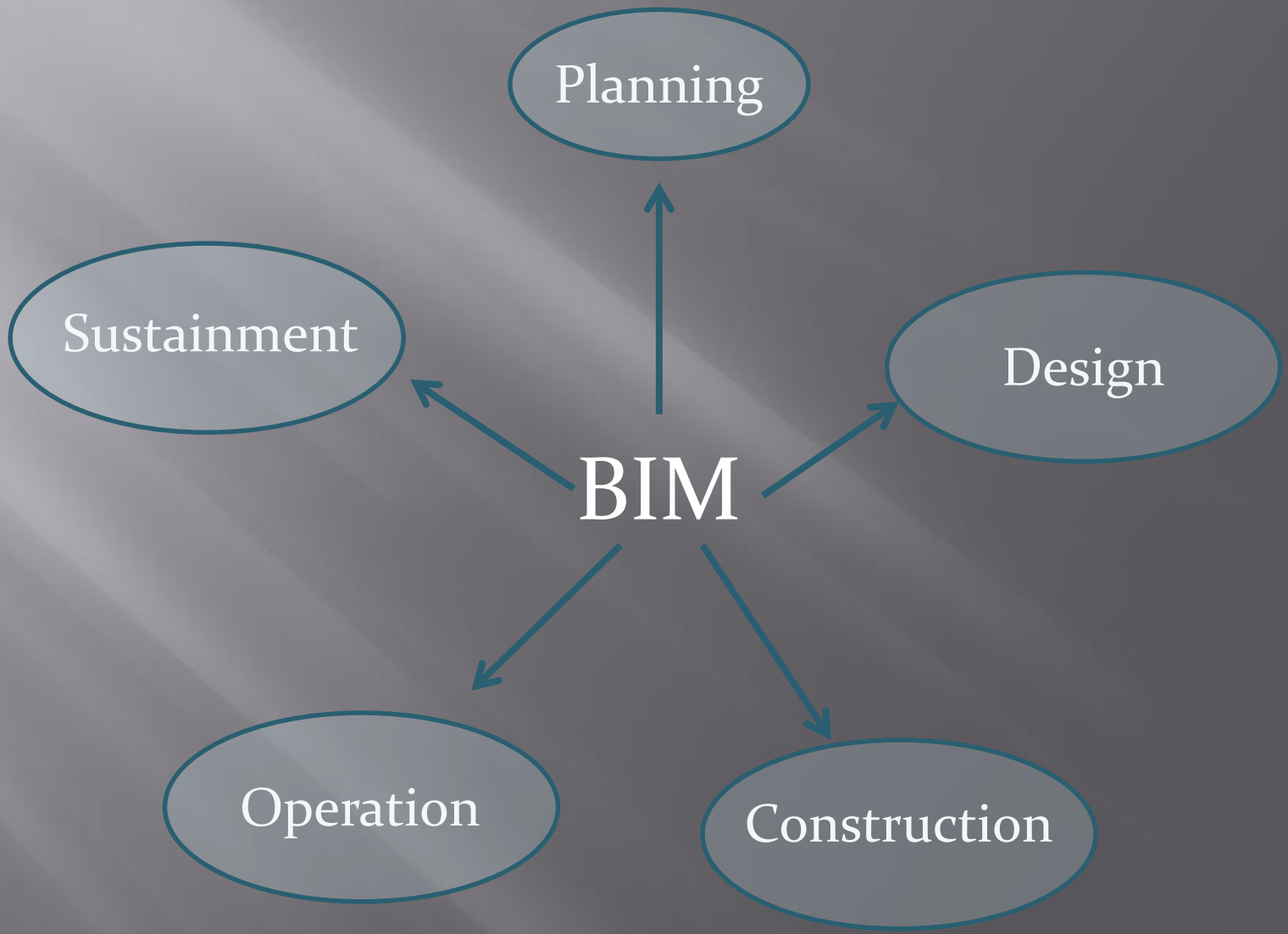
CAD


Line
Line

BIM


Wall
RC
Thickness:
180mm
Window
Aluminum Sash
Float Glass
Thickness:5mm

BIM used in various phases of a project



Advantages of using BIM

- Interoperability (the ability of computer systems or software to exchange and make use of information)
- Automation in construciton
- Lower the risk
- Improved visualization
- Improved productivity and quality
- Increased coordination of construction documents
- Embedding and linking of vital information such as vendors for specific materials, location of details and quantities required for estimation andtendering
- Increased speed of delivery
- Reduced costs

USES OF BIM

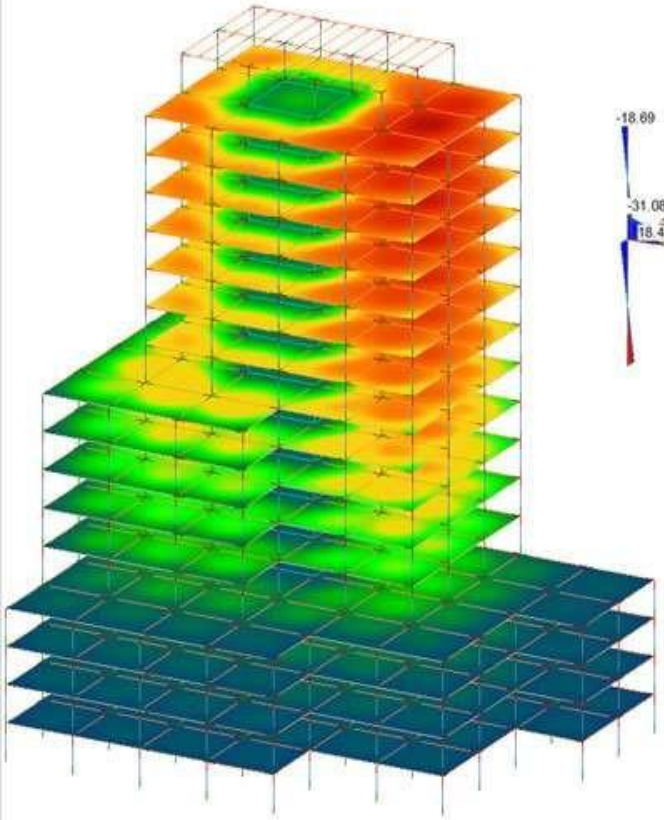
Collaboration and Access	Simulation	Visualization
• Clash detection and coordination • Conceptual design and feasibility evaluation • Field management • Time management • Cost estimation	• Mechanical simulation • Air and fluid flow • thermal comfort • Energy analysis • Structural analysis	• Design • Rendering

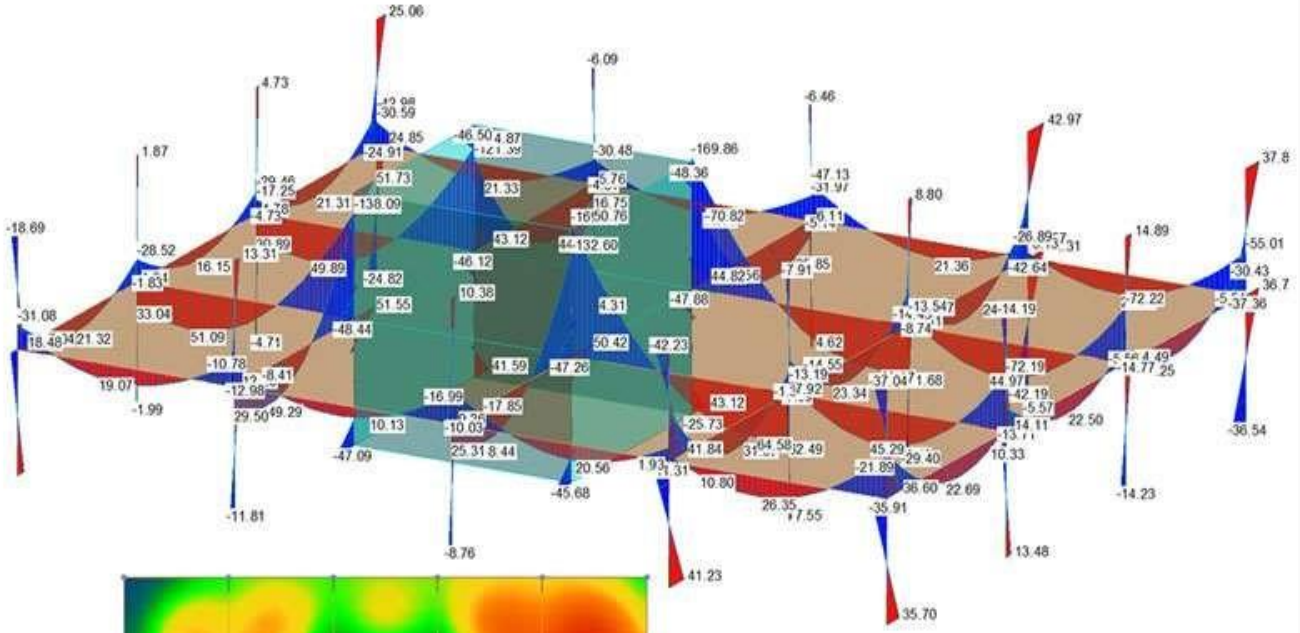
Illustration of Rendering

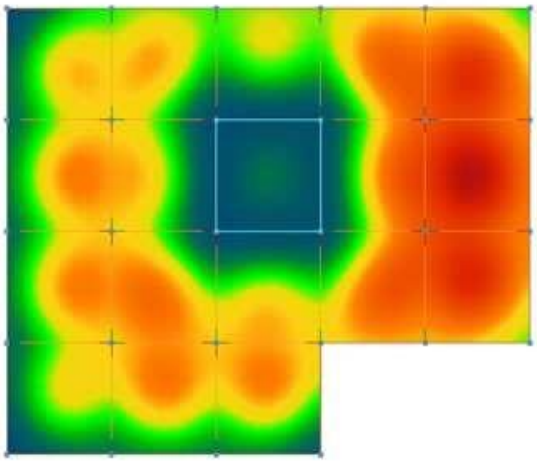
- Model Graphics Style

- Rendering

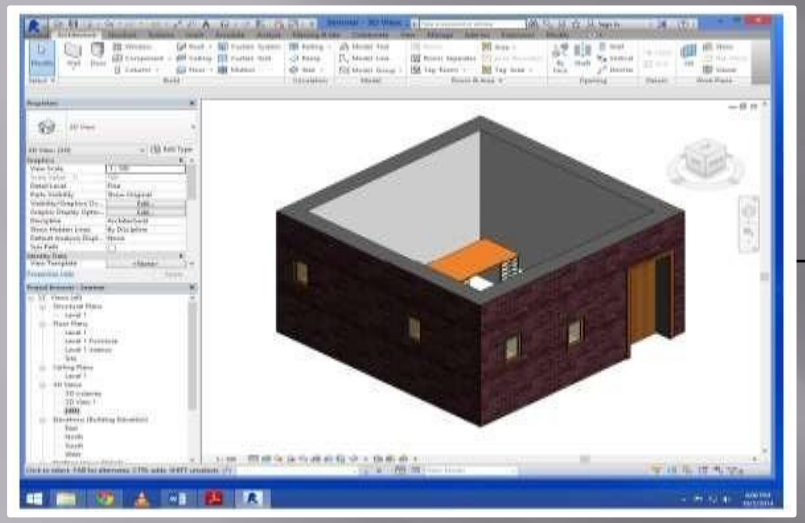
Structural analysis



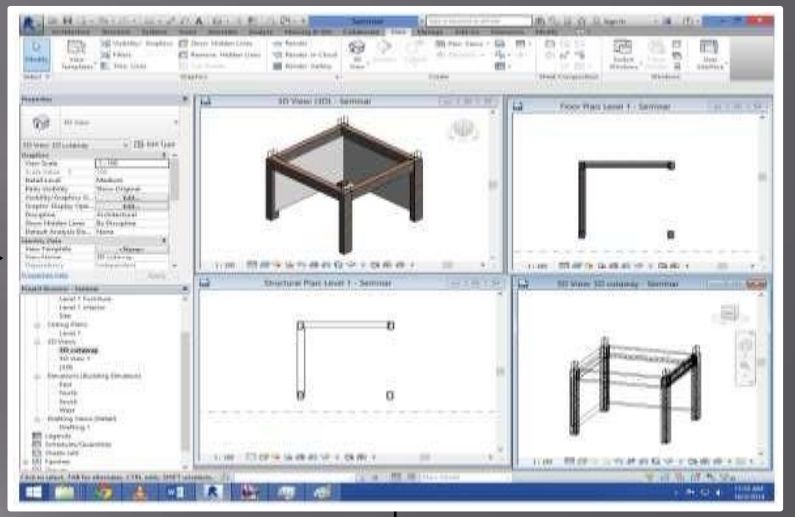




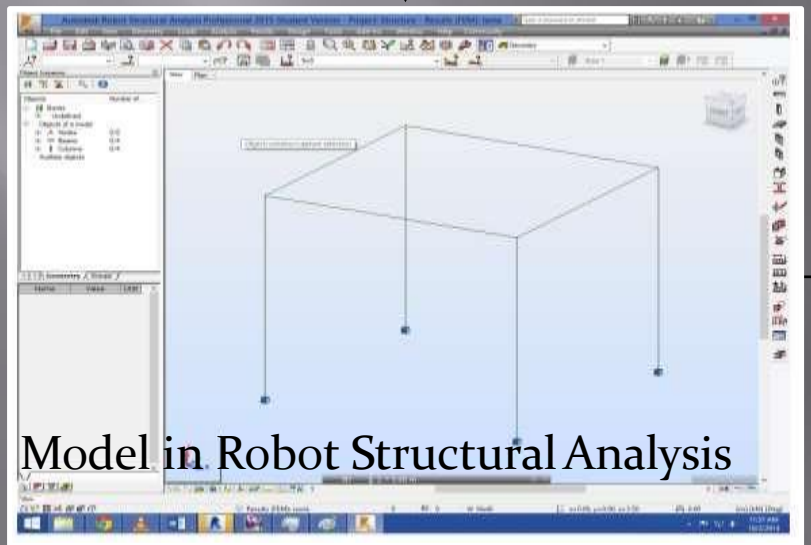
Application of BIM in Structural Engineering



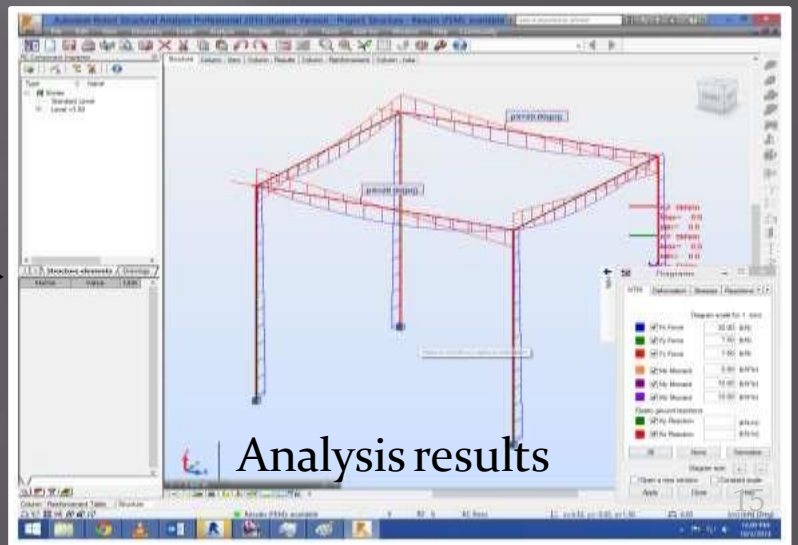
Model creation



Conversion for analysis



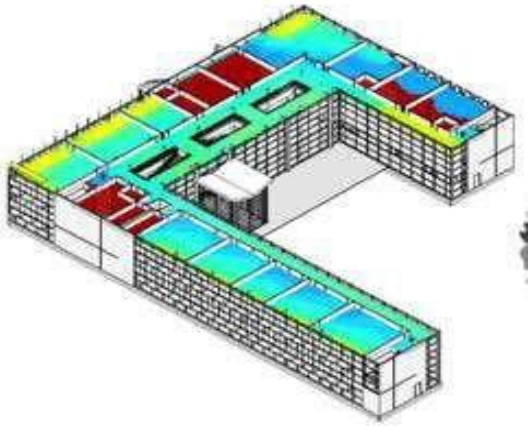
Model in Robot Structural Analysis



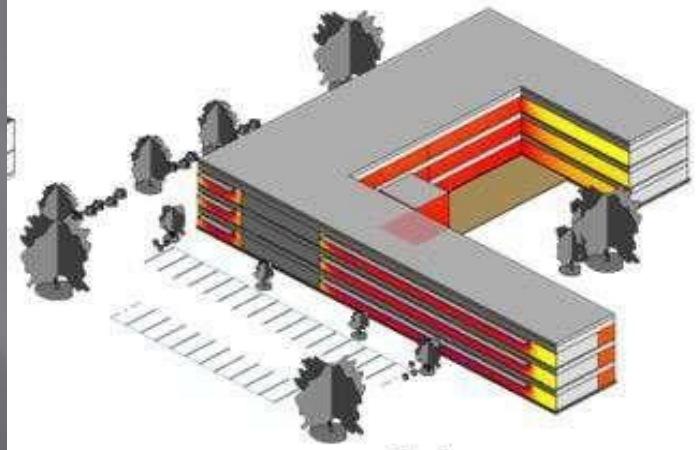
Analysis results

Simulation of light, solar and energy in model

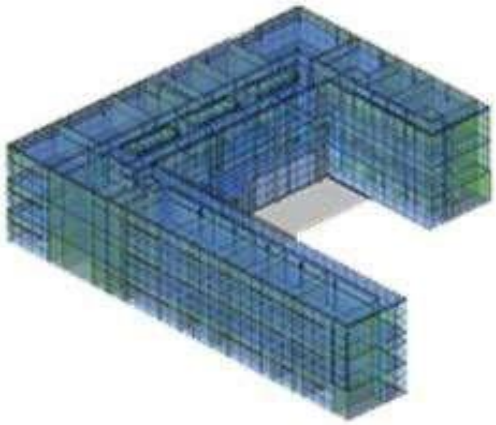
Architectural Model



Light



Solar



Energy

BIM in BPA

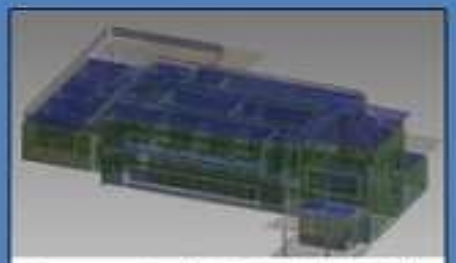
BIM
Building
Information
Modeling

- Visualization
- Structural analysis
- Cost
- Documentation
- Fabrication/ Construction
- Etc...

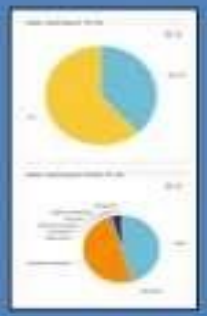
Building Performance Analysis (BPA)

Whole Building Energy Analysis

- Conceptual Models
- Detailed Models



Energy Analysis Model (EAM)



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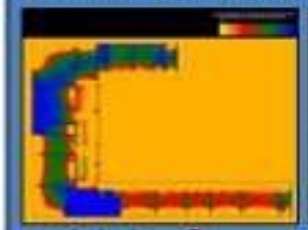
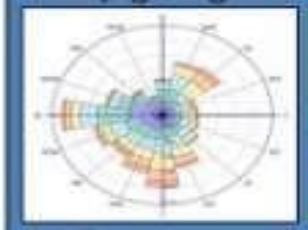
Other Performance Studies



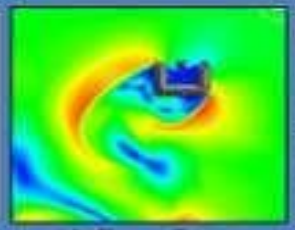
Lighting & Daylighting

Sun & Shadows

Solar Radiation



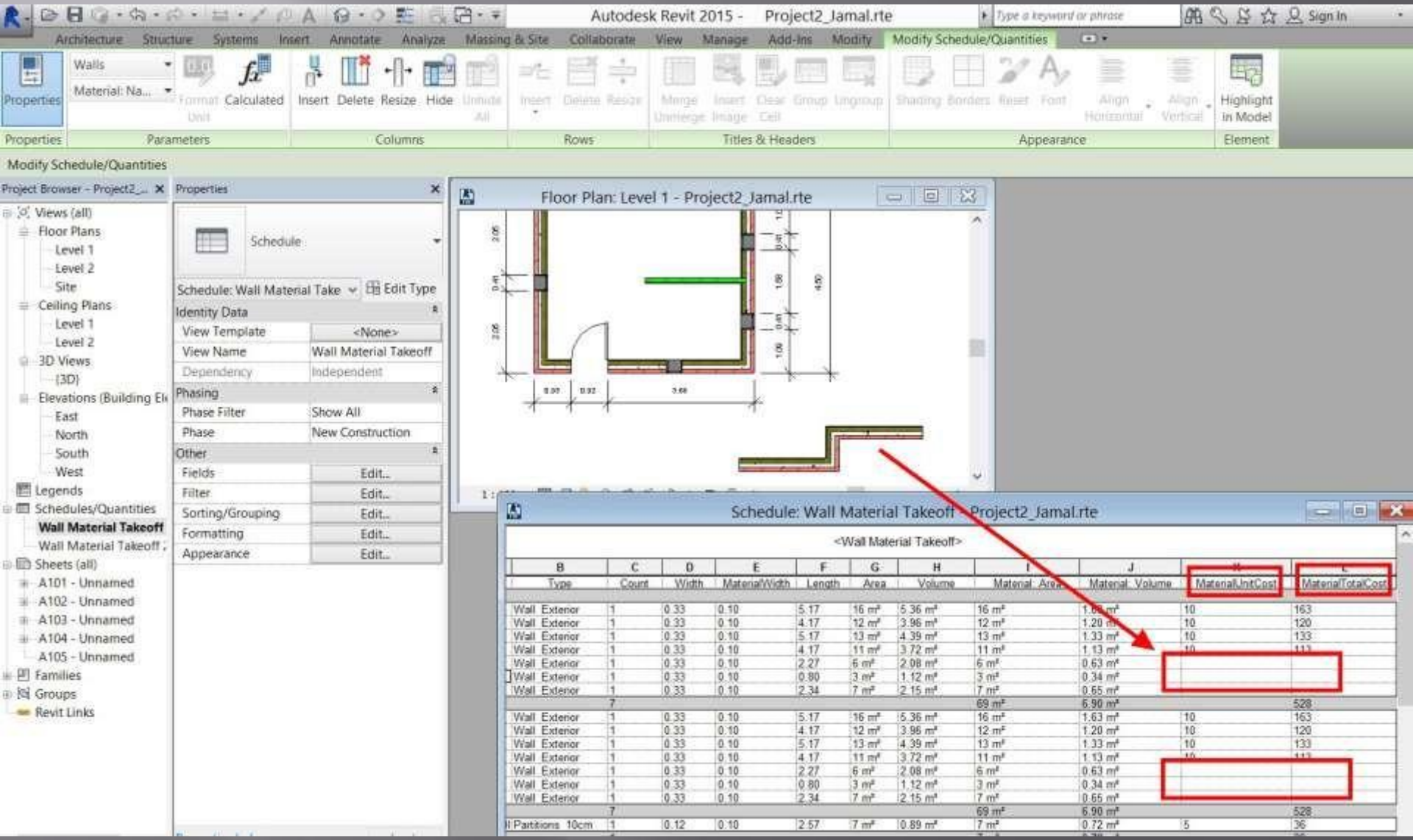
Climate Analysis

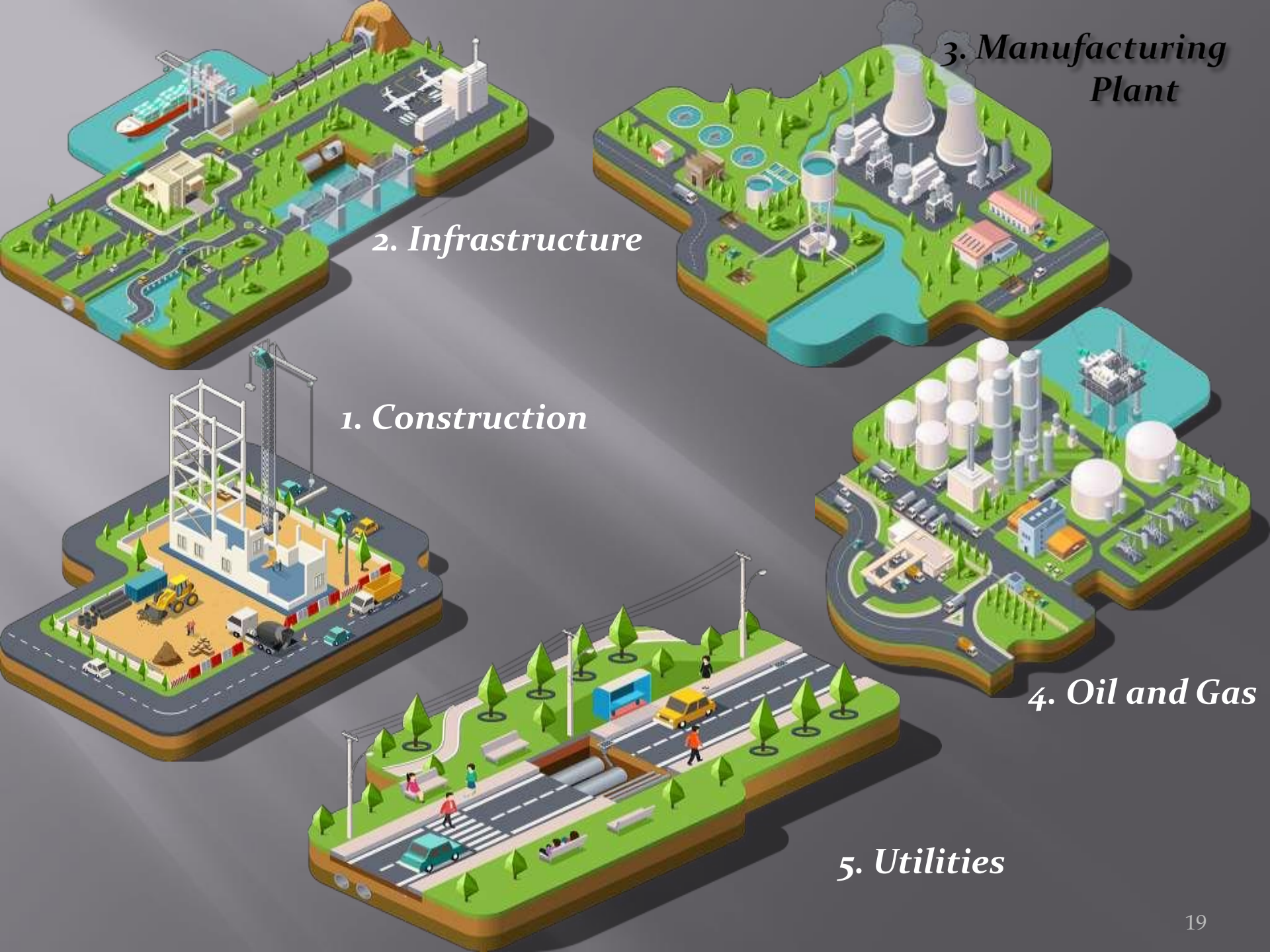


Airflow & Ventilation

Lifecycle Analysis

Scheduling and Estimation




3. Manufacturing Plant
2. Infrastructure
1. Construction
4. Oil and Gas
5. Utilities

Examples of BIM Software

- **Revit** by Autodesk
- **ArchiCAD** by Graphisoft
- **Microstation** by Bentley System
- **Tekla** by Trimble®

Conclusions

- BIM is an innovative way to virtually design and manage projects
- Predictability of building performance and operation is greatly improved
- BIM accelerates collaboration within project teams which will lead to
  - improved profitability
  - reduced costs
  - better time management and
  - improved customer–client relationships

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