BIM FOR TILT-UP ENGINEERS

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BIM: Building Information Modeling

- BIM is a next generation, parametric 3-D model driven technology, designed to make information on every aspect of a building available electronically.
- BIM, through the use of a single shared model, makes the transfer of information among project stakeholders easier.
- BIM will ultimately lead to fewer errors, reduced design time, and higher productivity.

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Who are the Project Stakeholders?

The project stakeholders share an interest in the successful completion of the job, and each add a contribution to the BIM model:

- Owners
- Building Designers/ Architects
- Engineers
- Contractors
- Suppliers

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BIM: Technical Requirements

There are several technical requirements needed to have a successful BIM project:

- 3-D CAD
- Parametric Modeling
- Data sharing
- Software Interoperability

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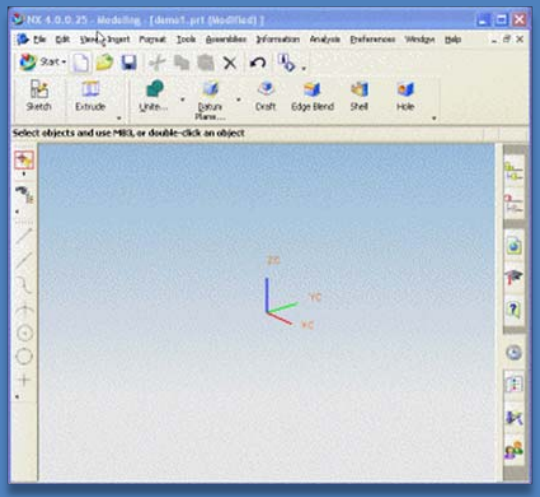
3-D CAD

- BIM Compatible 3-D CAD requirements:
  - Provides 3-Dimensional visual data
  - Provides object data
  - Layer hosting: Structural, Electrical, Mechanical, etc.



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Parametric modeling

- Parametric modeling is the use of the computer to design objects, by modeling their components with real-world behaviors and attributes.
- Parametric modeler software also provides tabular views of the components (parts list, door schedules, window schedule, etc.) and maintains their association with other views of the model

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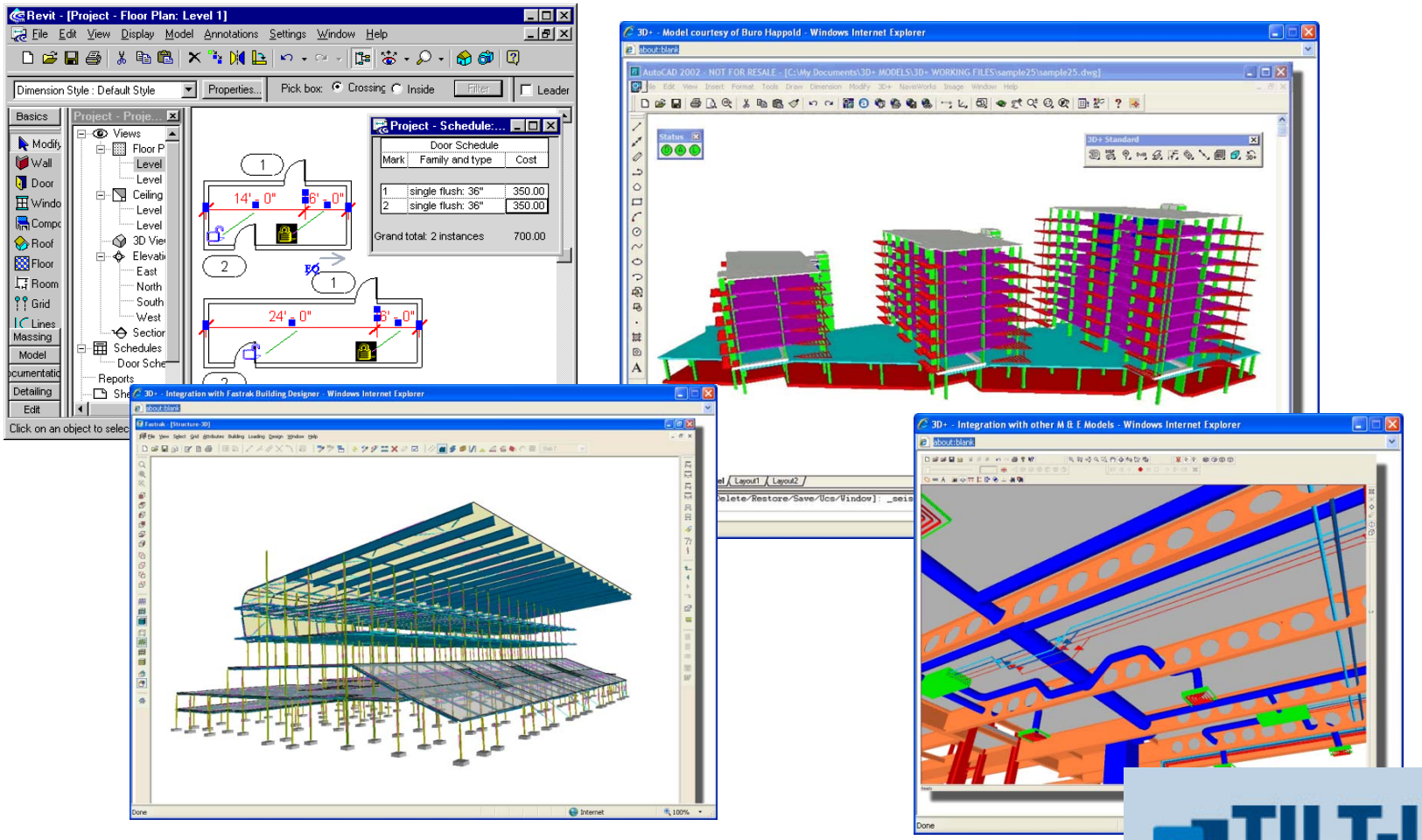
3D Parametric Modeling



Data Sharing

- Stakeholders have access to distinct layers of the project
- Other layers get updated automatically as changes are made
- Requires data compatibility

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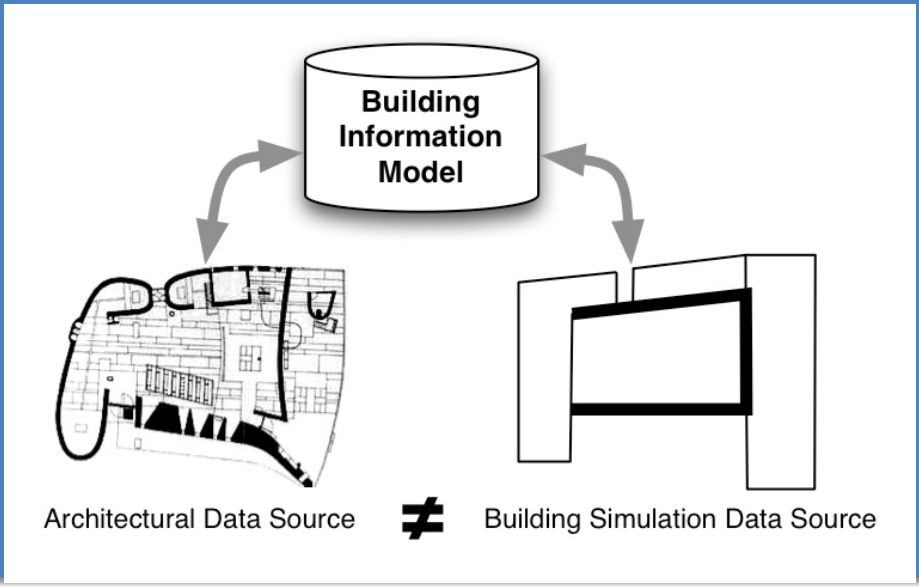
Software Interoperability

Ways to achieve software interoperability:

- Use of linked files
- Use of intermediate files
- Use of BIM International File Format



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BIM Models

- Minimal BIM- file sharing within local network
- Partial BIM- file sharing between stakeholders (e-mail, etc.)
- Full BIM- Internet usage to transport information.

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Benefits for Engineers

- Coordination with other disciplines
- Productivity
- Quality of Design
- Information Control

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Concerns for Engineers

- Initial cost of BIM compatible software
- Initial cost of hardware
- Training of employees
- Software quality
- Who hosts the model?
- Structural Analysis not integrated with BIM solution
- Liability Issues

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BIM and Prefabricated Components

- Model would need to show each prefabricated component (Tilt-Up panel, Truss, etc.) as an individual object.
- Each component would need to be designed and modeled separately for inclusion onto the overall building model.
- Reinforcement data, openings, connections, etc. would all need to entered by the designer to be part of the building model.

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BIM Parallel Model Derivation

- Building Designer furnishes 2-D Plans
- Specialty Engineer/ Contractor develops parallel building model
- Specialized BIM model can be integrated to overall building model

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BIM and Tilt-Up Construction

- Barriers to use of large scale BIM for Tilt-Up projects:
  - Software interoperability issues
  - Data sharing issues
  - Integration of Engineering design information into building model
  - Integration of industry specific objects into building model
  - BIM is most successful when using a single data source
  - Speed, Cost

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Tilt-Up BIM Solutions

- Ideal Tilt-Up BIM solution would incorporate:
  - 3-D Model
  - Single data source
  - Data shared among stakeholders using internet
  - Parametric modeling of Tilt-Up specific building components
  - Integrated Engineering solution
  - Affordable

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Benefits to Contractors

- Access to Tilt-Up Building Model would give the contractor the ability to:
  - Access material requirements from the model
  - Generate pricing information
  - Incorporate on-site changes into model
  - Speed-up project

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Benefits to Engineers

- A shared model for the Tilt-Up Project would give the Engineers instant feedback and communication with the Building Designer and Contractor
- Changes and Information requests from other project stakeholders would be simple
- Errors would be minimized
- Engineering analysis could be incorporated into building model

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Benefits to Material Suppliers

- Supplier products and related data could be part of the Tilt-Up building model
- Suppliers could get material take-offs prepared almost immediately
- Lifting/ Bracing requirements could be incorporated into model.

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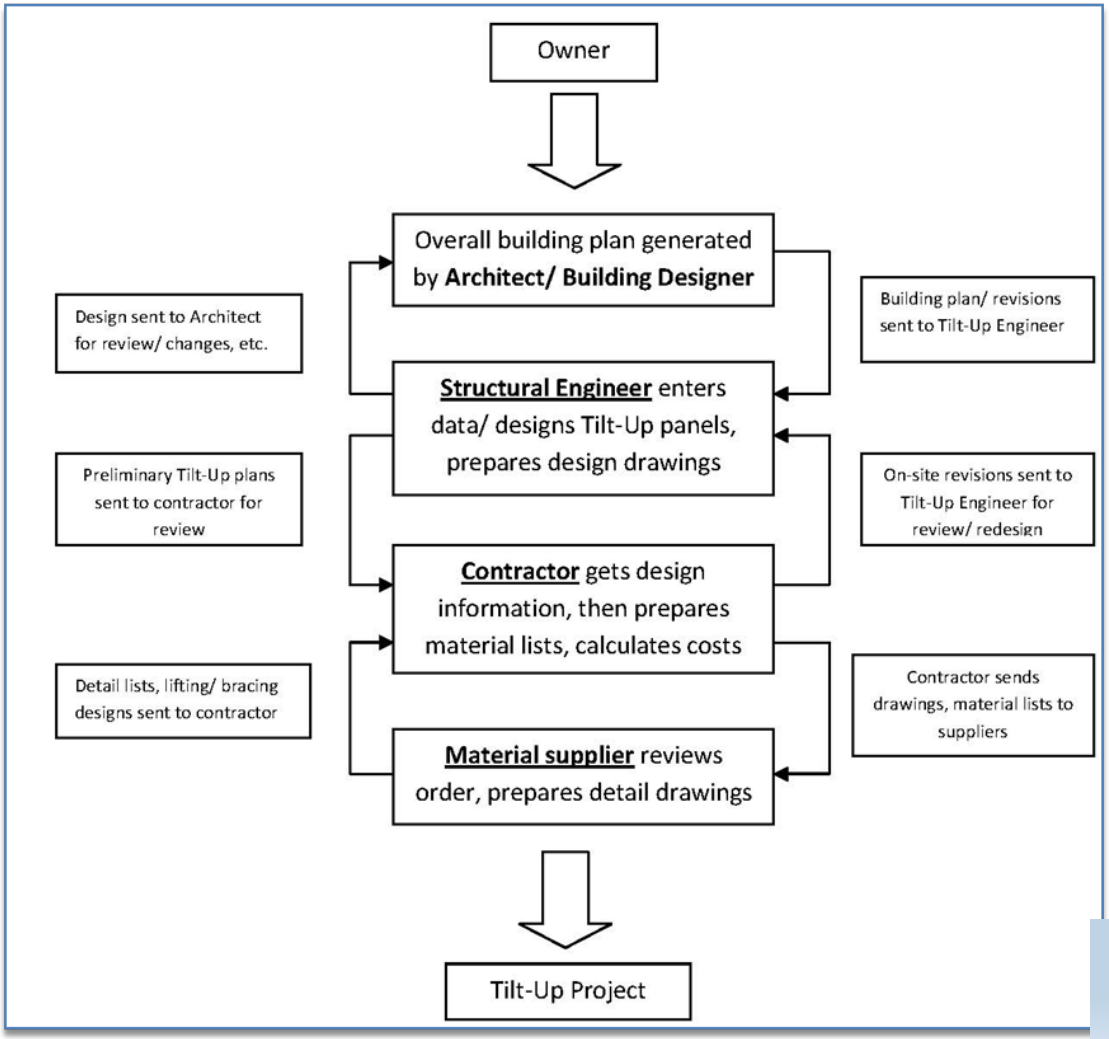
Standard Model for Tilt-Up Project



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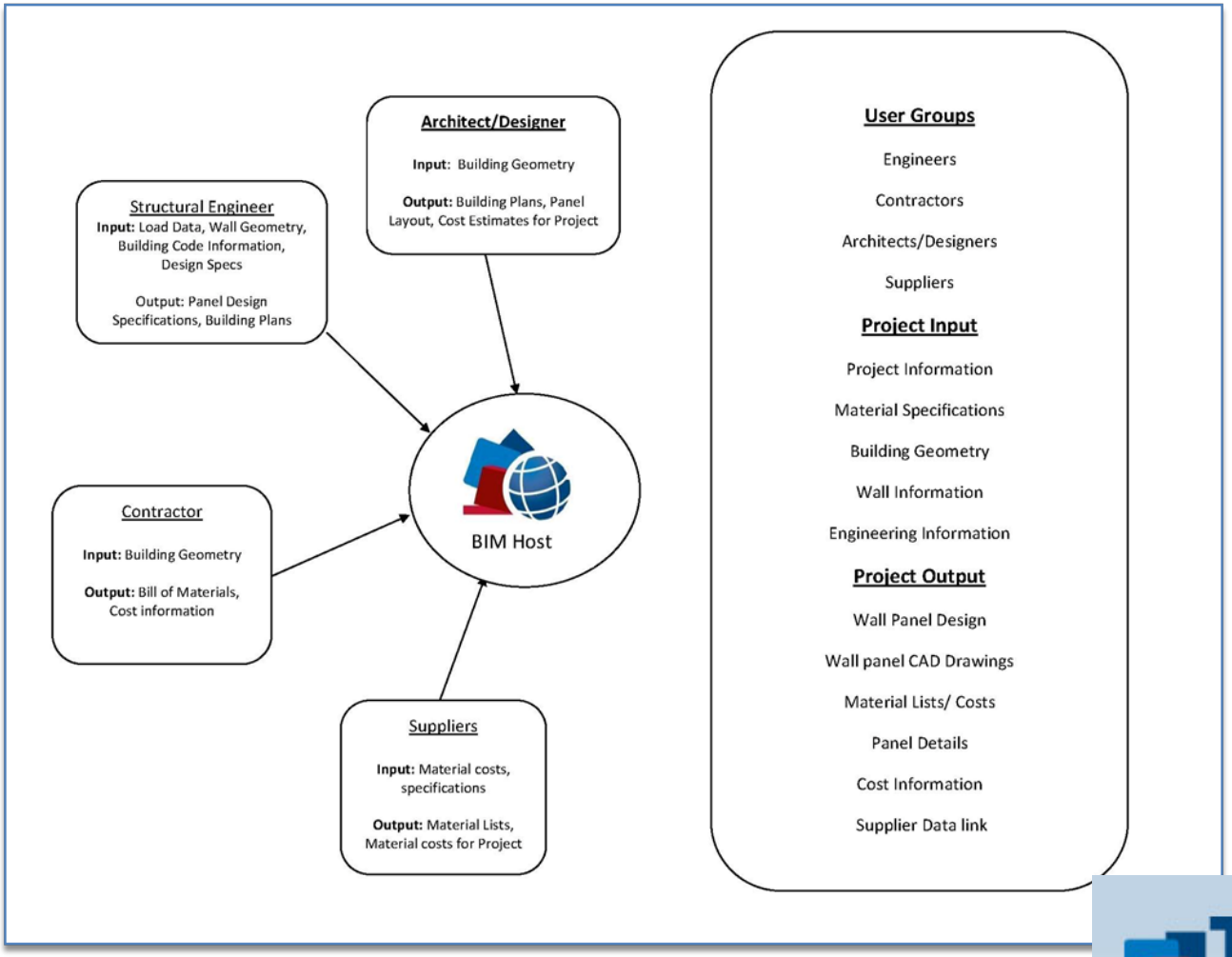
Stakeholder Roles- BIM model



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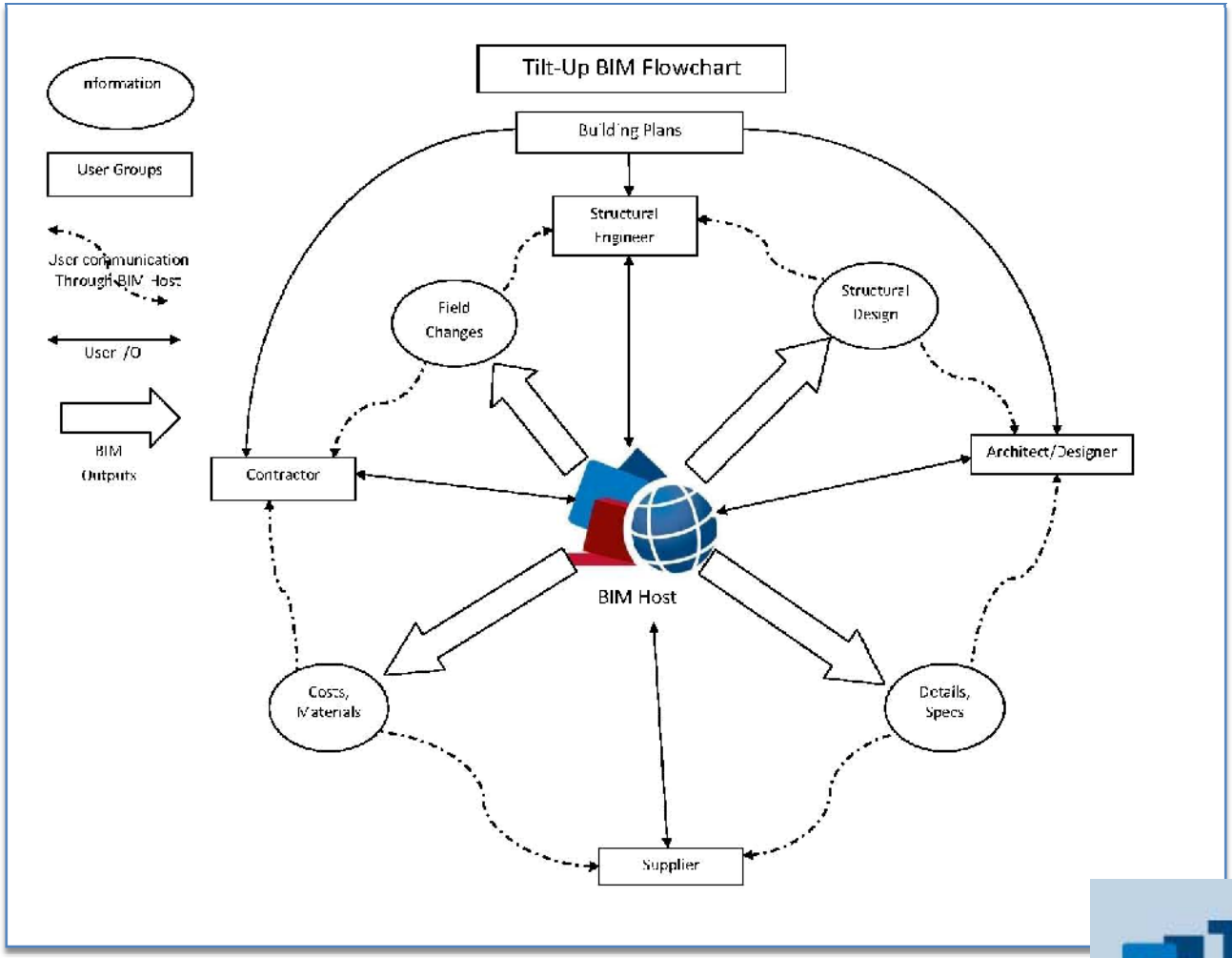
Tilt-Up BIM Flowchart



Tilt-Up Object Modeling

- Tilt-Up specific objects used in model
- Material suppliers object data integrated in project, including material costs
- All object data would be updated as project gets modified
- Engineering data would be updated as project is modified

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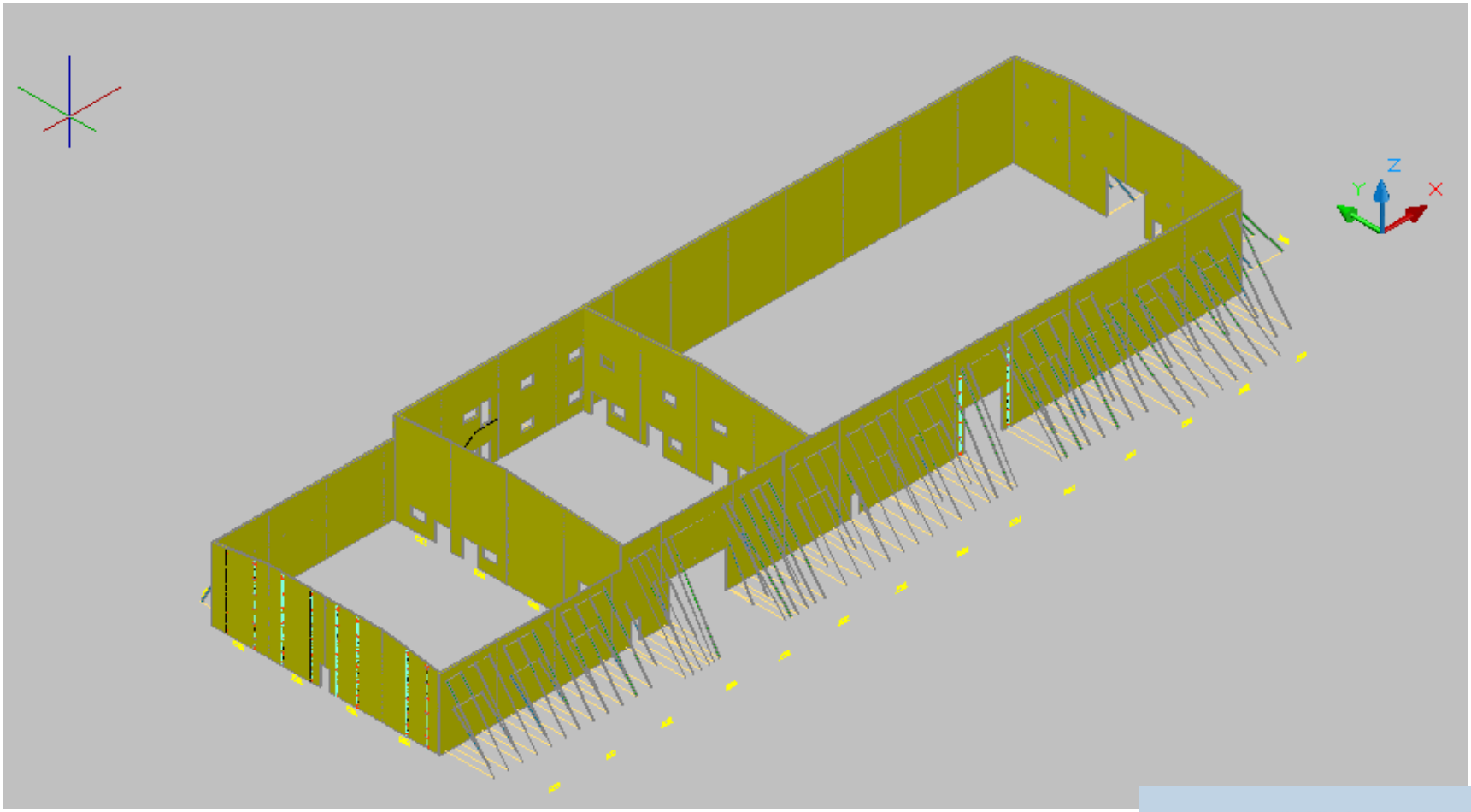
3-D Tilt-Up Model



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Integration into Building Model

- 3-D Output could be shared with Architect or Building Designer
- Object data may not be compatible for inclusion into overall BIM model
- Architectural changes made after Tilt-Up solution would require re-entry of data

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Conclusions

- Currently, a parallel model derivation is best suited for BIM in Tilt-Up construction
- Major benefits in accuracy and speed can be achieved through collaboration and data sharing
- Engineering design can be incorporated in Tilt-Up BIM to provide even greater increases in speed and efficiency

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