Development of a GUI for EnergyPlus

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EnergyPlus GUI Project

Goals

- Develop a free Graphical User Interface that enables EnergyPlus to be used more easily and effectively by building designers and other professionals

- Distribute as an “Open Platform” with well documented API’s to facilitate collaborative development and derivative works

Funded by: CEC, DOE and Infosys Technologies

Team: LBNL, Infosys, Digital Alchemy, Arup, GARD, Taylor Eng.

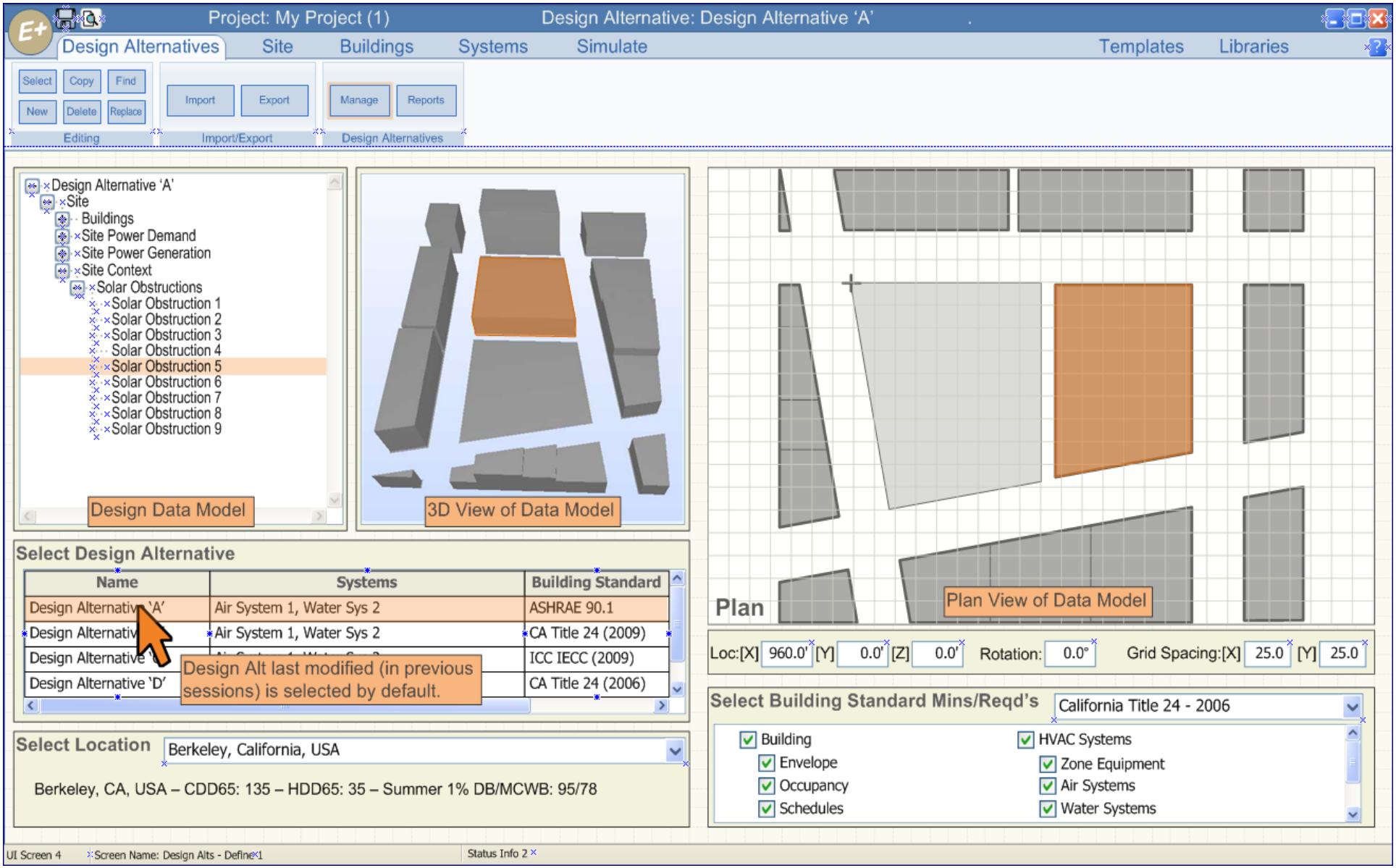
Project Overview

- Preparation Phase:
  - Definition of user requirements – workshops, office visits
  - Identification of the overall software architecture
- Software Development Phase:
  - Detailed functional specification
  - Coding
  - Internal and 3rd party testing
- Dissemination, Training, User Support and Code Maintenance Phase:
  - Identify business models for training and user support

GUI Overview

- General:
  - Manage design alternatives
  - Link to compliance toolkit components
  - Zone groups
  - Existing buildings
- Envelope:
  - Import from 3-D CAD / BIM - IFC
  - OpenStudio – based on Google SketchUp
  - Sketch floor-plate and extrude
- HVAC:
  - Drag and drop component level editor
  - Templates!

Site


Project: My Project (1)
Design Alternative: Design Alternative 'A'
Design Alternatives
Site
Buildings
Systems
Simulate
Templates
Libraries
Select
Copy
Find
New
Delete
Replace
Editing
Import
Export
Import/Export
Manage
Reports
Design Alternatives
Design Alternative 'A'
Site
Buildings
Site Power Demand
Site Power Generation
Site Context
Solar Obstructions
Solar Obstruction 1
Solar Obstruction 2
Solar Obstruction 3
Solar Obstruction 4
Solar Obstruction 5
Solar Obstruction 6
Solar Obstruction 7
Solar Obstruction 8
Solar Obstruction 9
Design Data Model
3D View of Data Model
Plan
Plan View of Data Model
Loc:[X] 960.0' [Y] 0.0' [Z] 0.0'
Rotation: 0.0°
Grid Spacing:[X] 25.0 [Y] 25.0
Select Design Alternative
Name
Systems
Building Standard
Design Alternative 'A'
Air System 1, Water Sys 2
ASHRAE 90.1
Design Alternative
Air System 1, Water Sys 2
CA Title 24 (2009)
Design Alternative
ICC IECC (2009)
Design Alternative 'D'
CA Title 24 (2006)
Design Alt last modified (in previous sessions) is selected by default.
Select Location
Berkeley, California, USA
Berkeley, CA, USA – CDD65: 135 – HDD65: 35 – Summer 1% DB/MCWB: 95/78
Select Building Standard Mins/Reqd's
California Title 24 - 2006
Building
Envelope
Occupancy
Schedules
HVAC Systems
Zone Equipment
Air Systems
Water Systems
UI Screen 4
Screen Name: Design Alts - Define
Status Info 2

Import from BIM

Project: My Project (1) Design Alternative: My Design 'A'

Design Alternatives | Site | Buildings | Systems | Simulate | Templates | Libraries

Copy Selection | Delete Selection | Save as new Alternative | Import Design Data | Export Design Data

Define Design Alternative | Import/Export Design Data

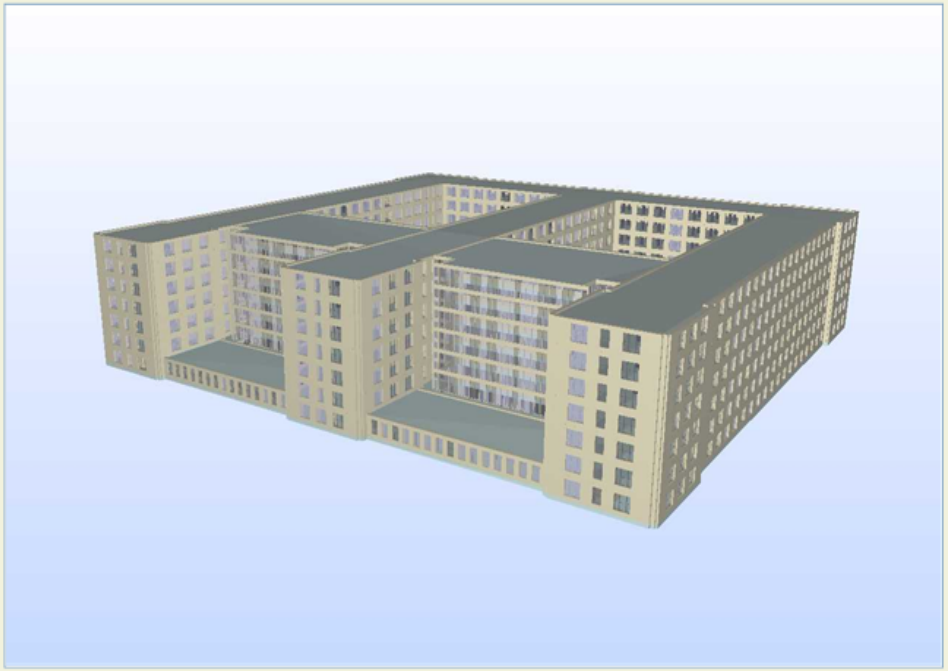
Locate File to Import

Browse | My_IFC_Project_A.ifc | Import Data

Select Data Types to be imported: Select All | Deselect All

- [x] Buildings
  - [x] Building Floors
  - [x] Walls
    - [x] Doors
    - [x] Windows
  - [x] Slabs
- [x] Material Assemblies
- [x] Zones
  - [x] Zone Equipment
  - [x] Schedules
- [x] Air Systems
  - [x] Schedules
- [ ] Water Systems
  - [ ] Schedules
- [x] Controls

3D View of Building Geometry



Data Validation

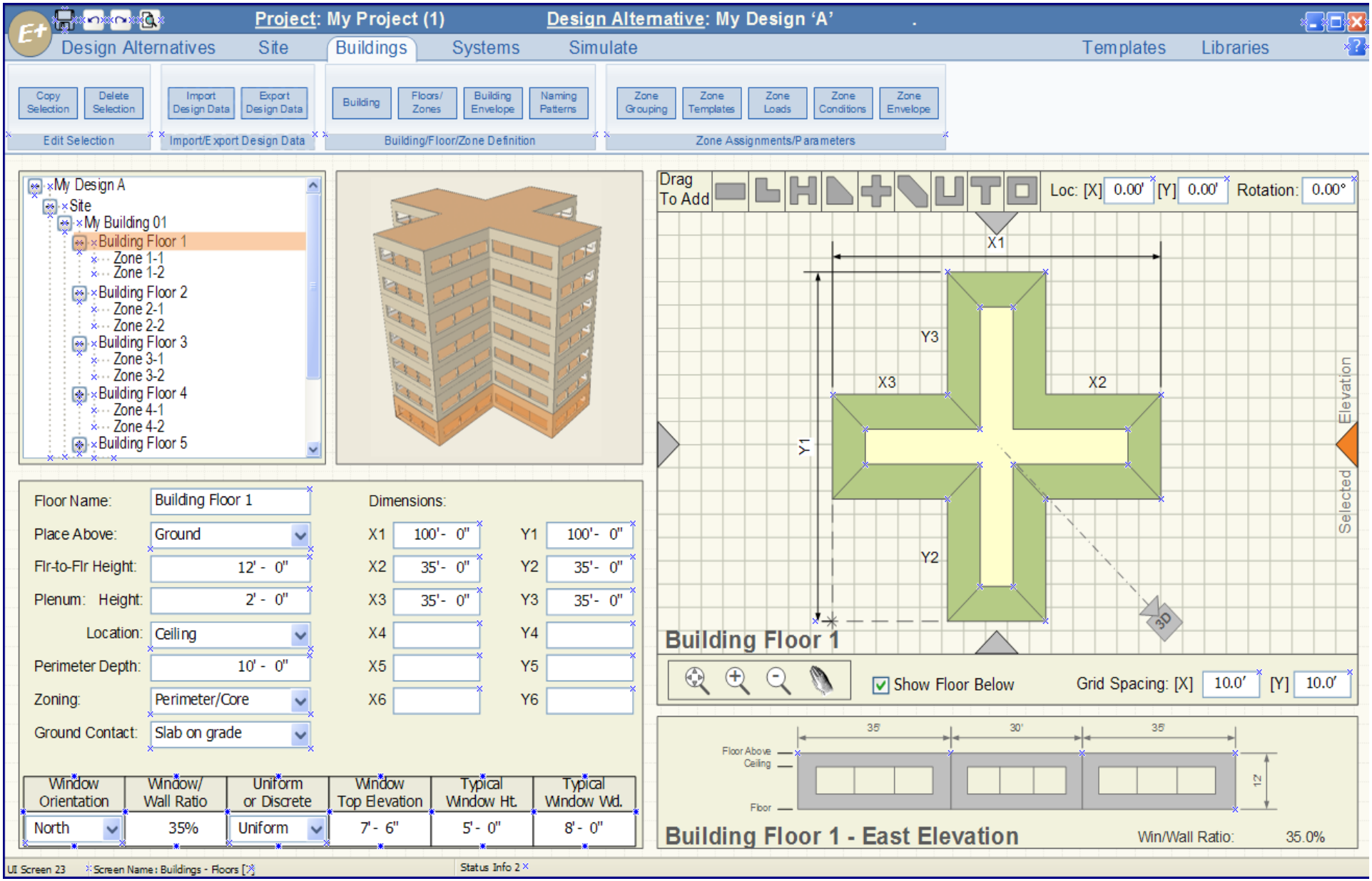
Data Type	Found in File	Validated	Invalid
Buildings	1	1	0
Building Floors	7	7	0
Zones	760	754	6
Walls	3114	3069	45
Doors	2047	2047	0
Windows	1736	1736	0
Slabs	29	28	1
Schedules	23	23	0
Zone Equipment	267	265	2
Air Systems	21	21	0
Water Systems	0	0	0
Controls	56	56	0

Summary Data

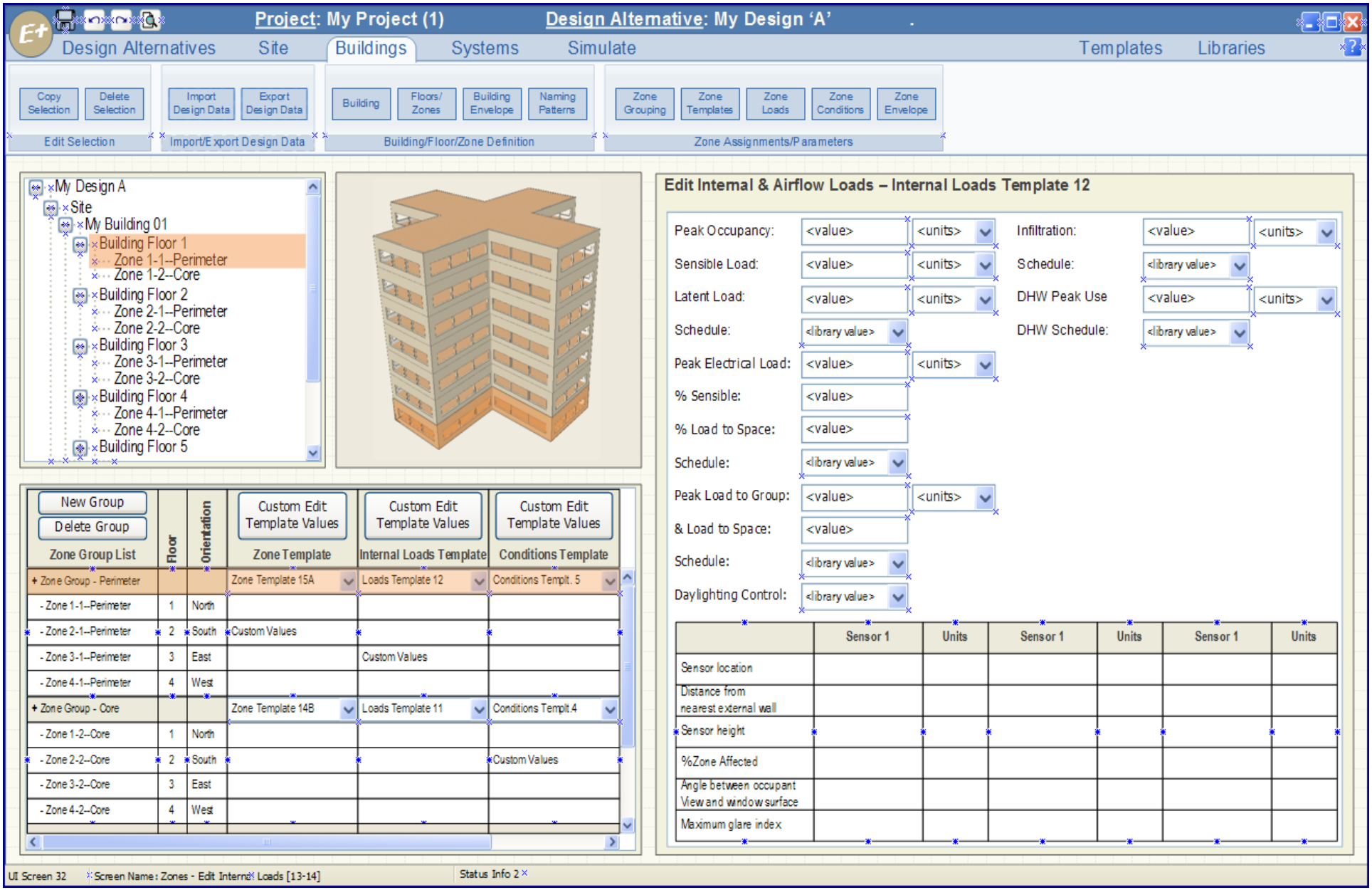
Avg. Area Per Floor:	580,000 sq ft	Total Win/Wall Ratio – North:	23%
Total Floor Area:	3,930,000 sq ft	Total Win/Wall Ratio – South:	20%
Total Win/Wall Ratio:	22%	Total Win/Wall Ratio – East:	22%
		Total Win/Wall Ratio – West:	22%

UI Screen 8 | Screen Name: Design Alts - Imp Data 4 [4] | Status Info 2

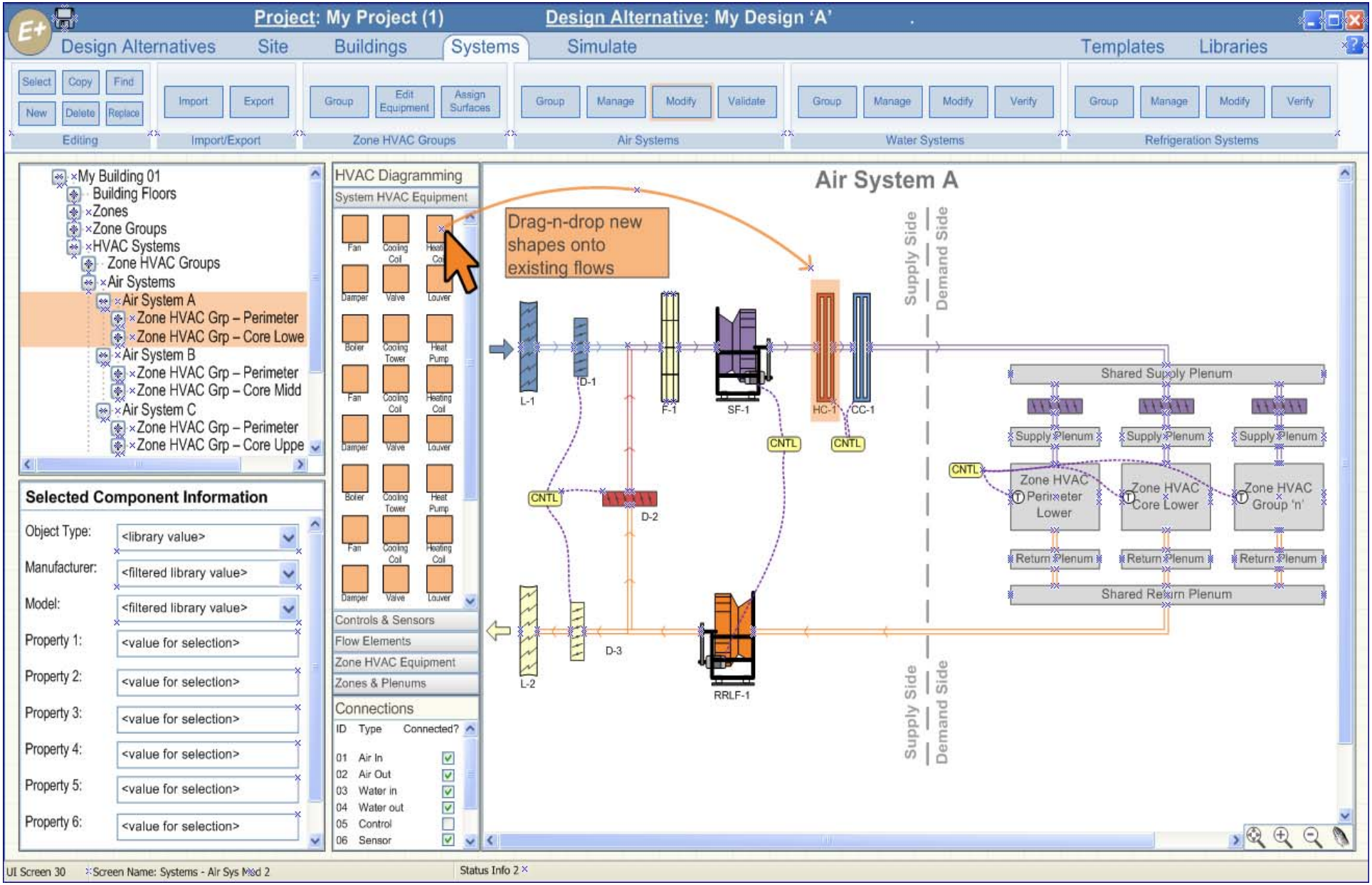
Internal Creation of Geometry



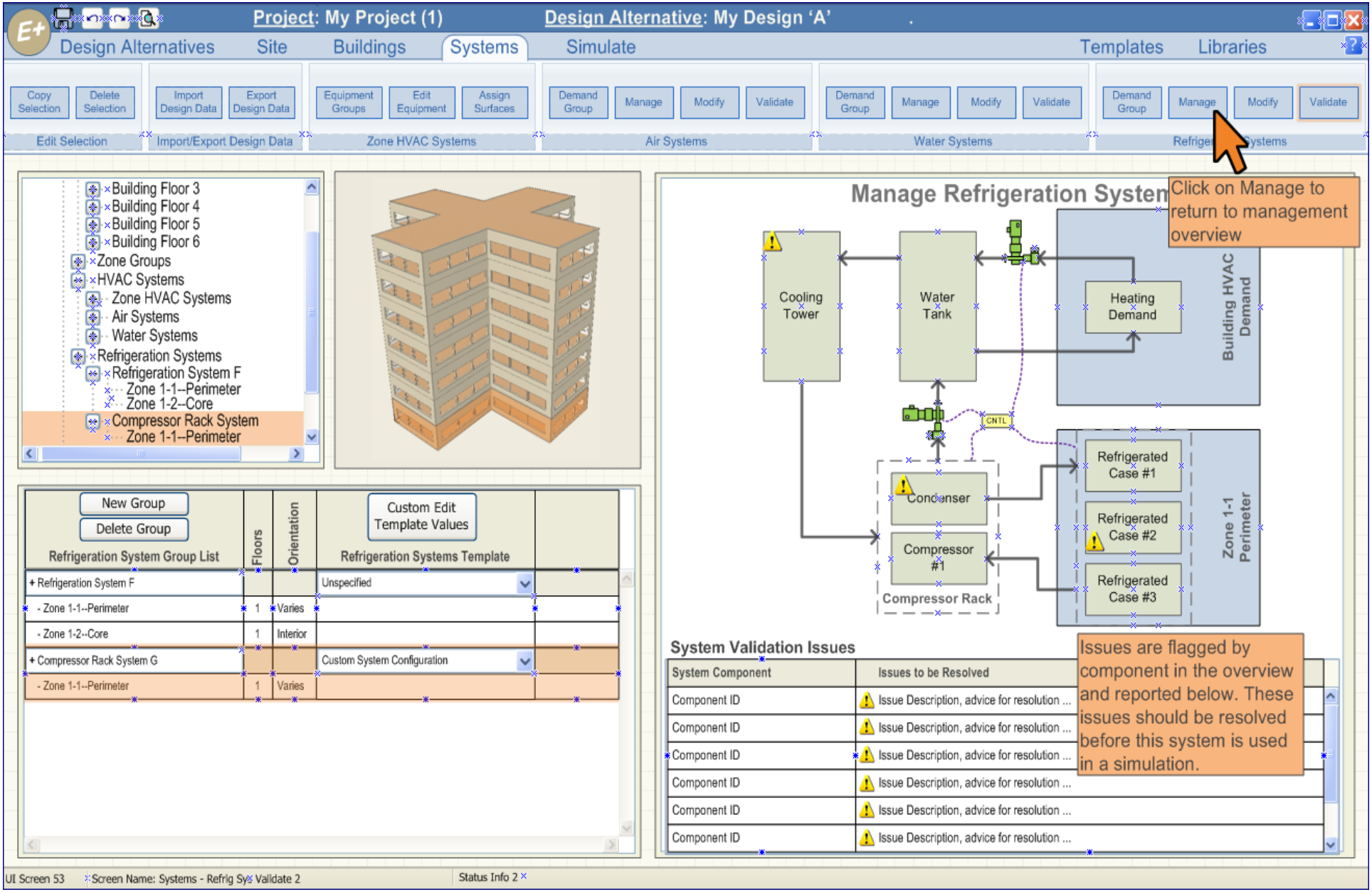
Zones – Internal Loads



HVAC Air Systems



Refrigeration Systems



Output Visualization

Status and Schedule

- Functional requirements specification: 90+% complete
- ‘Phase 1’ Proof-of-Concept (20%) functionality – 8/2010
- ‘Phase 2’ Product Preview (70%) functionality – 1/2011
- ‘Phase 3’ Version 1 - ~7/2011