THE INTEGRATED DATA MODEL
DESIGN, REFINE, BUILD

Jason Chen | Sebastian Claussnitzer
SKIDMORE, OWINGS & MERRILL
Utilize change as an opportunity
Embed design intent into the model rather than just representing it

Facilitate single sourced information
Utilize the master model to simplify data management

Use tools for what they are best at
Revit is a solid documentation tool; Grasshopper is intuitive when defining geometry

Ensure tight model integration
Rather than manually replicate data, establish robust data exchange routines
WHAT DOES PROJECT DATA LOOK LIKE?
THERE IS DATA EVERYWHERE

DATA COMMUNICATION

REPORTS

SPREADSHEETS

MODELS

ANALYSIS

SPECS

DRAWINGS
DATA NETWORK

- Reports
- Models
- Drawings
- Spreadsheets
- Analysis
- Specs
MIXED-USE PROJECT

SCRIPTING ENVIRONMENT
DESIGN INTENT
BIM SOLUTION
DOCUMENTATION
DATA MANAGEMENT
CONSULTANTS
ARCH
SES
Sustainable Engineering Studio

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INTEGRATED DATA MODEL
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INTEGRATED DESIGN INTENT

PARAMETRIC BUILDING MODEL WITH ENCODED DESIGN INTENT
INTEGRATED DATA MODEL
PROGRAM VALIDATION

PARAMETRIC BUILDING MODEL UNDERSTANDS PLANING CONSTRAINTS
INTEGRATED DATA MODEL
CODE CHECKING
INTEGRATED DATA MODEL
GENERATIVE FORM FINDING

RESIDENTIAL BUILDING

MAXIMUM VOLUME

PROJECT SITE

SUNPATH DECEMBER 21st
MIXED-USE PROJECT

- MEP
- STRUCTURE
- ARCH
- CONSULTANTS
- DATA MANAGEMENT
- BIM SOLUTION DOCUMENTATION
- Scripting Environment
- Design Intent

SES
Sustainable Engineering Studio
INTEGRATED DATA MODEL

INTEGRATED ENVIRONMENTAL ANALYSIS
INTEGRATED DATA MODEL

INTEGRATED ENVIRONMENTAL ANALYSIS

FORM FINDING

Rhinoceros
NURBS modeling for Windows

SOM
SOM Rhino Energy Analysis Tool

E+Rhino

Grasshopper

EnergyPlus

ANALYSIS
Occupants are likely to draw the blinds drawn 14% of the time.
Modeled design options

Modeling the solution space ~9,000 options

INTEGRATED DATA MODEL
PARAMETRIC ENERGY ANALYSIS

BIMForumED

BIMForumED
INTEGRATED DATA MODEL

DATA INTER-PLATFORM COLLABORATION

The parametric tower model
INTEGRATED DATA MODEL
DATA INTER-PLATFORM COLLABORATION

ENCLOSURE DESIGN

CORE DESIGN

SCRIPT

API

REVIT

DESIGN INTENT

DOCUMENTATION

DRAWINGS
INTEGRATED DATA MODEL

FAÇADE OPTIMIZATION

Multi-layered façade system

Sphere segment (repeating panels)

Ellipsoid segment (unique panels)
INTEGRATED DATA MODEL

DATA INTER-PLATFORM COLLABORATION

Rhinoceros

grasshopper

SWIM: Model Integration

DWG

TM

txt

Java

R

BIMForumED
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INTEGRATED DATA MODEL
STRUCTURAL DESIGN

- Parametric Model
- Structural Analysis
- Documentation

Architectural & MEP Analysis
INTEGRATED DATA MODEL
STRUCTURAL DESIGN

SIZE OF GREEN PLANTED PANEL (SQUARE METERS)

LENGTH OF MAXIMUM MULLION SPAN (METERS)

ANGLE OF EACH FACET (DEGREES)

SLOPE OF RIDGE/VALLEY CONDITIONS (DEGREES)
Member sizes were optimized based on horizontal and vertical facets leading to reduced quantities of steel (~20%).

Primary members
Secondary members

<table>
<thead>
<tr>
<th>Horizontal Facets</th>
<th>Vertical Facets</th>
</tr>
</thead>
<tbody>
<tr>
<td>500mm x 800mm</td>
<td>500mm x 700mm</td>
</tr>
<tr>
<td>300mm x 500mm</td>
<td>300mm x 300mm</td>
</tr>
<tr>
<td>Primary Members</td>
<td>Secondary Members</td>
</tr>
</tbody>
</table>
INTEGRATED DATA MODEL
STRUCTURAL DESIGN
BIM-generated node information, as transmitted to the Design Assist fabricator
Utilize change as an opportunity

Facilitate single sourced information

Use tools for what they are best at

Ensure tight model integration

The Integrated Data Model Facilitates:

- Reduced re-work efforts
- Simplified coordination
- Deeper analysis