



Autodesk and COBIE

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Autodesk

Agenda

- Autodesk Update
- Autodesk AEC Solutions Quick Overview
- Interoperability Efforts and Examples
- Applying COBIE to Autodesk BIM Solutions

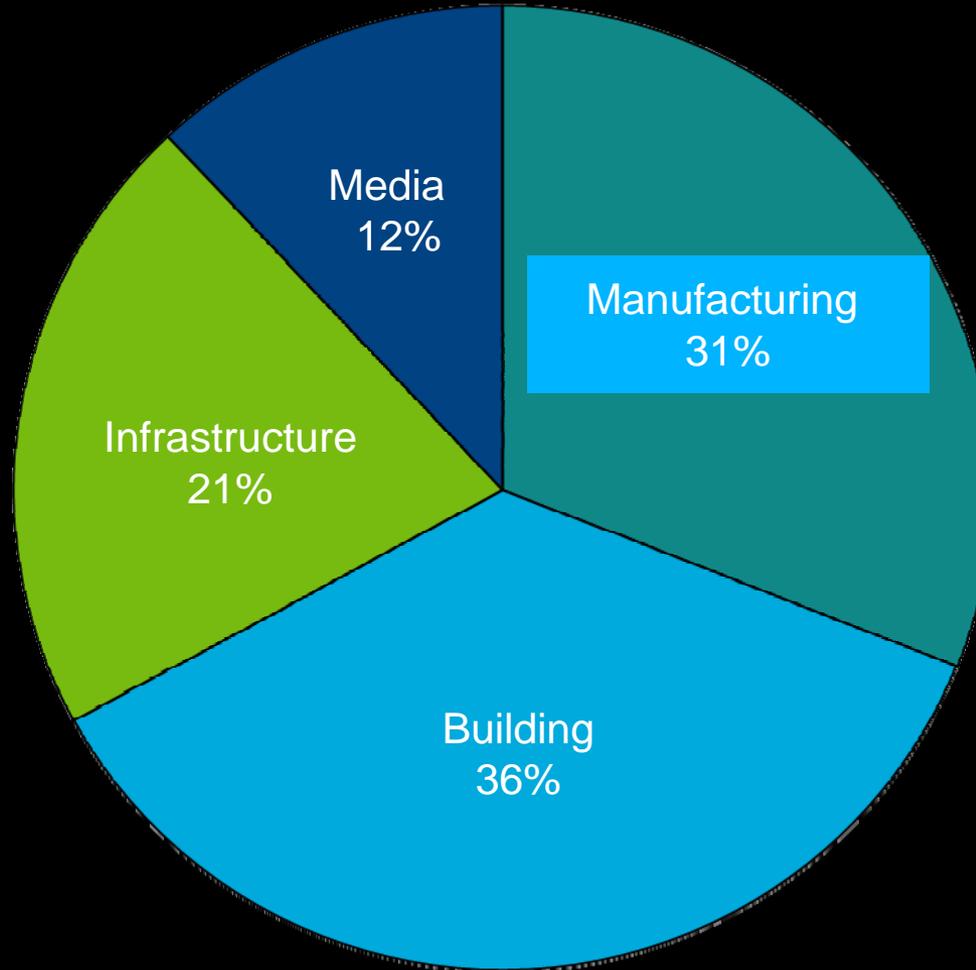


World's Leading 2D and 3D Design Software Company

Unparalleled Global Presence:

- Portfolio of markets and industries
- Geographically diversified revenue stream
- From small business to enterprise customers
- Over 8 million seats have been registered globally
- Unsurpassed Channel:
 - 1,700 Partners with 7,500 Feet on the Street
 - 4,500 Instructors
 - 2,700 Development Partners

Diversified Industry Revenues



Outstanding Financial Position

A 25-year history of financial success:

- Fiscal 2008 net revenue was \$2.172 billion
- \$7.25 billion market cap
- Cash and equivalents of \$958 million, as of 1/31/08
- No debt



Building Information Modeling

Design Authoring Tools

Analysis Tools



OWNERS

Autodesk
NavisWorks®

BUILDING
INFORMATION
MODELING



ARCHITECTS

GBS
IES

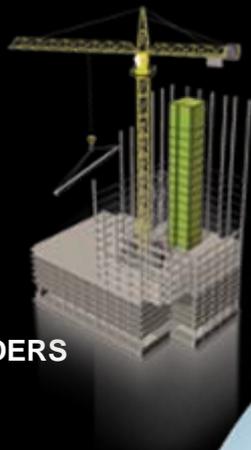
Revit®
Architecture



CIVIL
ENGINEERS

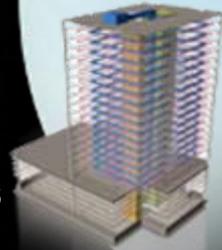
Intelisolve

AutoCAD®
Civil 3D®



BUILDERS

Autodesk
NavisWorks®



MEP SYSTEMS
ENGINEERS

Revit® MEP

Robobat



STRUCTURAL
ENGINEERS

Revit® Structure

Autodesk

Analysis + Prediction + Simulation + Validation

- Daylighting
- Carbon emissions
- Lifecycle analysis
- Energy
- Ecological footprint
- Electrical lighting
- Thermal comfort/HVAC (dry-side)
- Building water use (wet-side)
- Material takeoffs
- Bill of materials
- Consultant integration
- Structural/MEP/Interiors
- Clash detection
- Sequence of construction



The screenshot shows the Green Building Studio software interface. The main window displays a report titled "1.2 Building systems carbon dioxide summary". Below the title, it says "Carbon dioxide totals in lbCO₂". A table follows, showing monthly carbon dioxide emissions for various building systems from January to September.

Month	System (boilers, chillers, fans, pumps etc.)	Lights	Equip.
Jan	22835.6	6954.5	2003.7
Feb	19754.2	6281.5	1809.8
Mar	17454.9	6954.5	2003.7
Apr	11782.7	6730.2	1939.0
May	10493.3	6954.5	2003.7
Jun	13574.2	6730.2	1939.0
Jul	17822.1	6954.5	2003.7
Aug	15875.6	6954.5	2003.7
Sen	11654.3	6730.2	1939.0

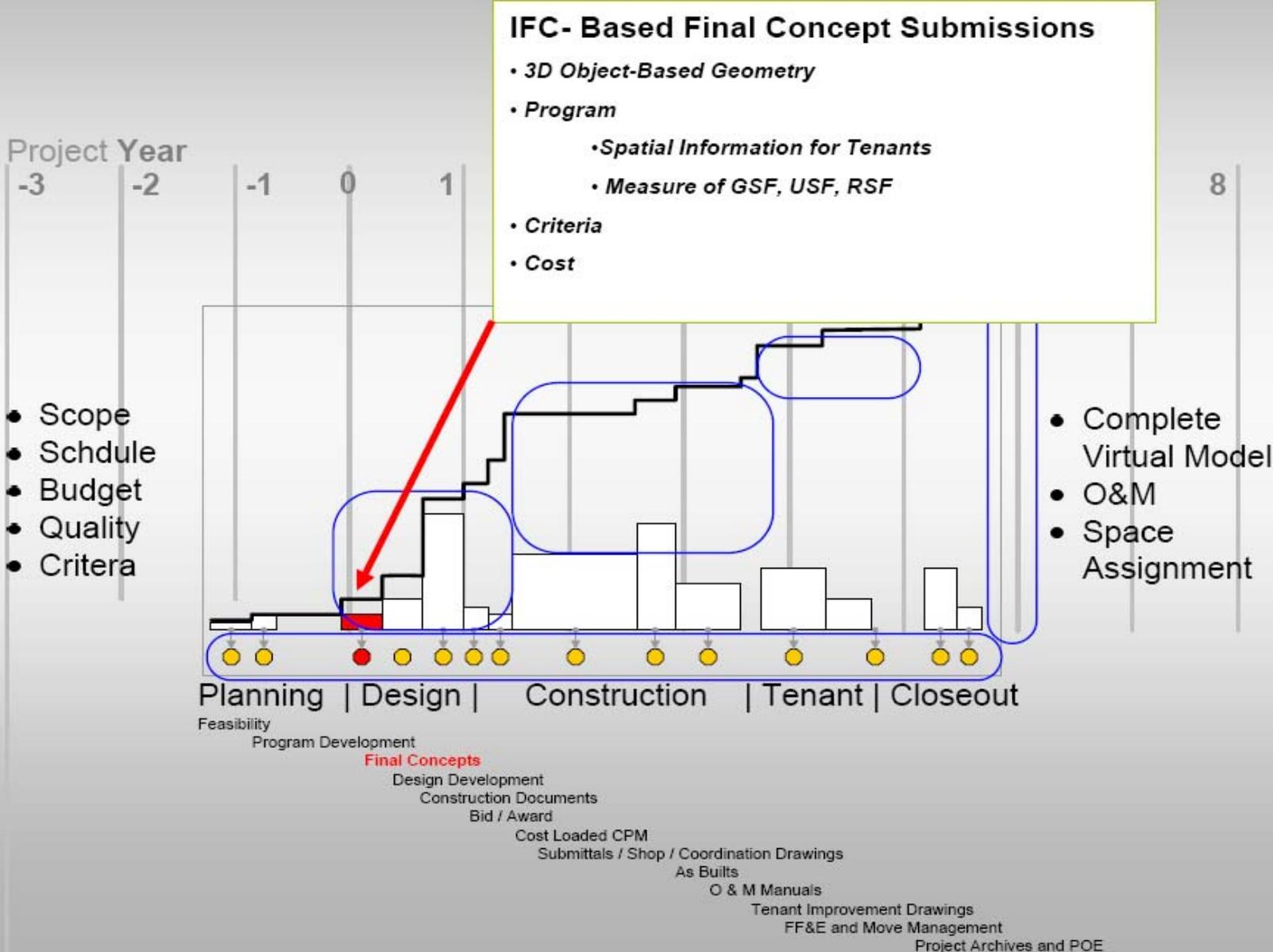
Interoperability ?

- API's
- CIS/2
- DGN
- DXF™
- DWF™
- DWG
- gbXML
- COBIE
- IFC
- ODBC
- OGC
- PDF
- SAT
- XLS
- XML

IFC Advantages

- Predictable 3D objects for exchanging data between application software(s)
- 3D object definitions facilitate interoperability discussions
- A vehicle to test interoperability concepts
- Efficient with “well documented business practices” – GSA Program

Focus of GSA BIM Initiative



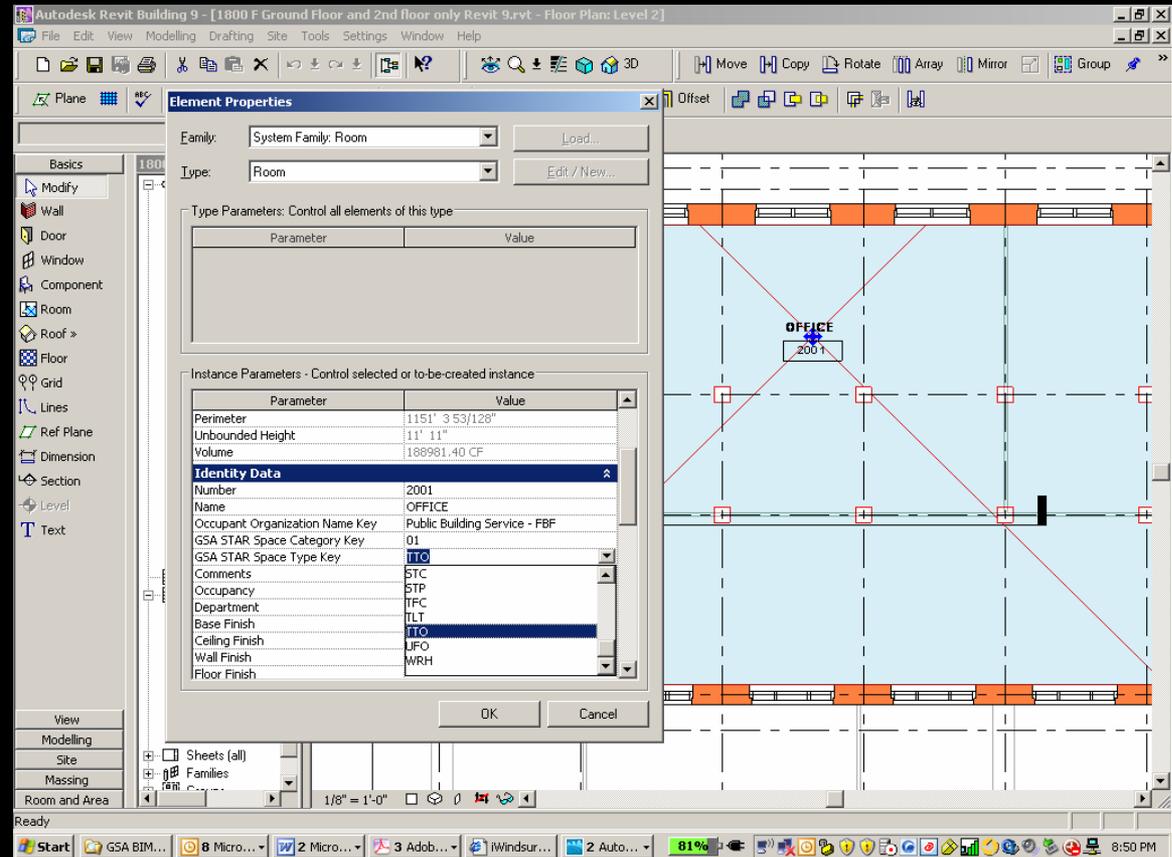
GSA Spatial Program BIM – Data Elements

GSA Requirements

- GSA Net Area
- Space Name
- Space Number
- Occupant Organization
- GSA Space Type

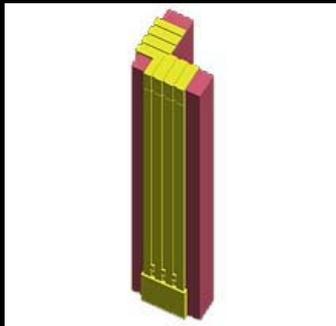
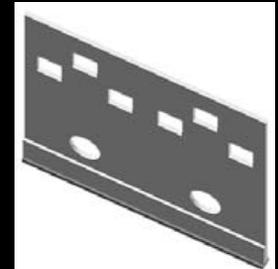
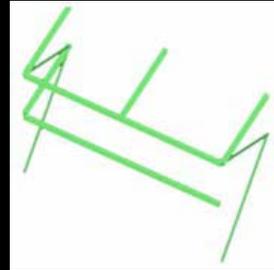
Model Elements

- Walls
- Doors
- Windows
- Columns
- Beams

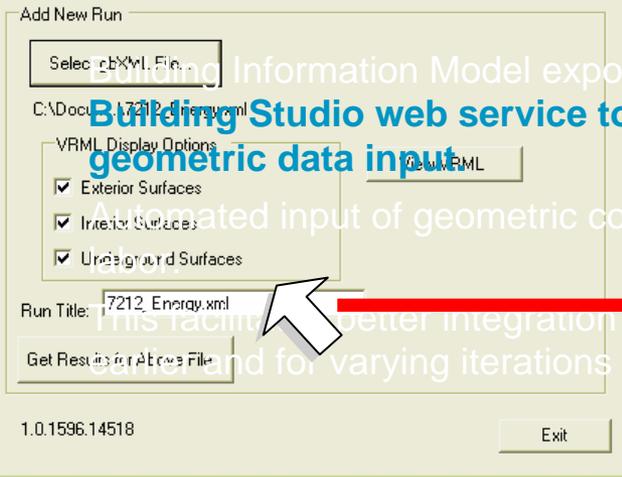
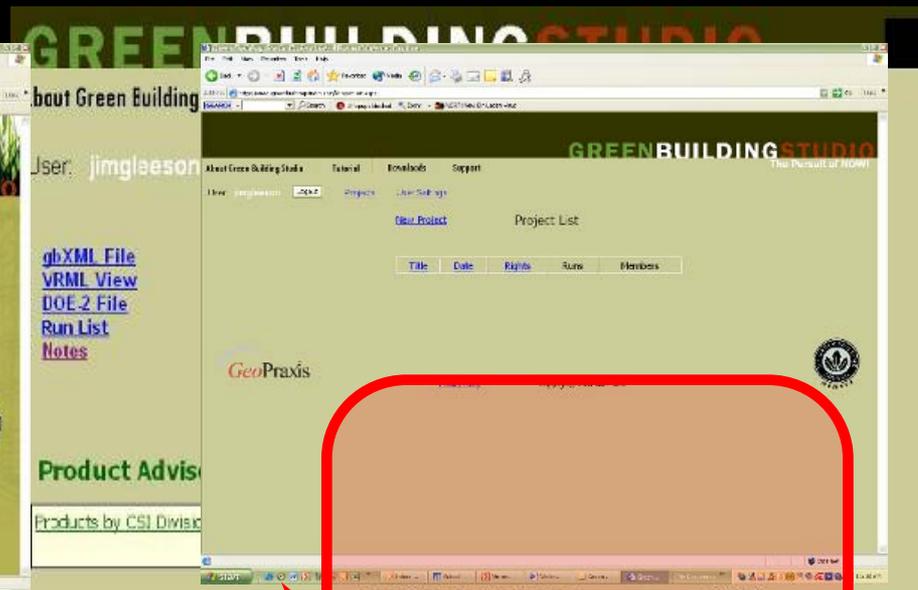
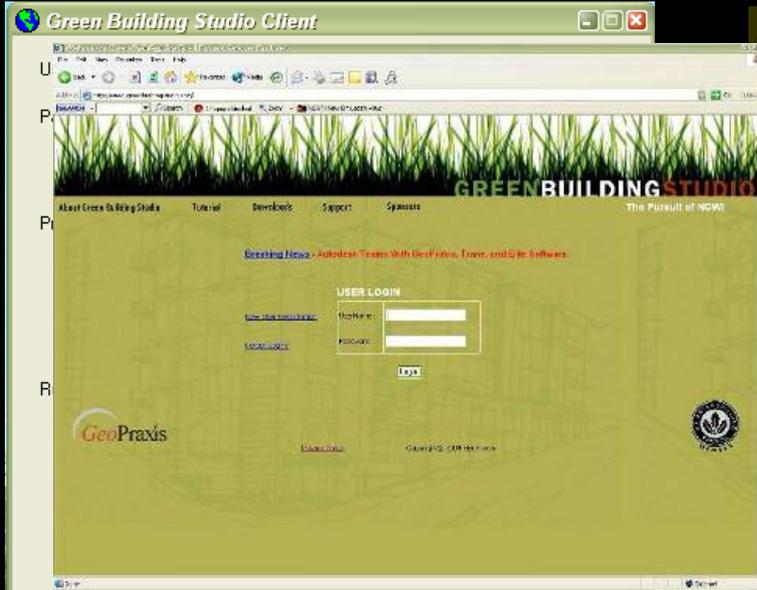


Pankow Precast Interoperability Pilot

- Modeled
- Documented
- Exported **IFC, SAT, DWG, DWF, RVT**
- Imported files back to Revit



Energy Analysis



Building Information Model exports to gbXML file which is converted in Green Building Studio web service to DOE2 or eQuest input file to eliminate manual geometric data input.

Automated input of geometric coordinates can save HUNDREDS of hours of manual data entry. This facilitates better integration of architecture/engineering allowing energy analysis earlier and for varying iterations and keeps the cost of sustainable design down.



Autodesk's Involvement with Standards Bodies

- Fiatech Member
- IAI (International Alliance for Interoperability)/BuildingSmart
- National BIM Standard (Under NIBS)
- AGC (Association of General Contractors)
- AIA
- US Green Building Council
- Open Geospatial Consortium
- Participating in ICC Smartcodes Project
- COBIE (Construction Operations Building Information Exchange)
- BIM to Facilities Management / O&M at LetterKenny Arsenal
- Various others (STEP, IGES)

Autodesk NavisWorks – Model Aggregation

Single, Unified Design & Construction Model

Problem

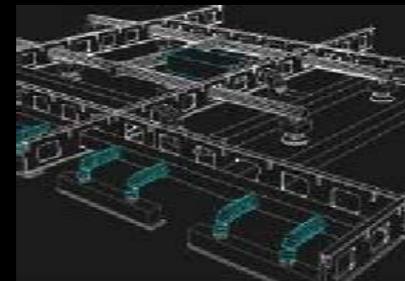
Architects, engineers and subcontractors use several modeling tools that do not easily work with each other (Revit, Civil 3D, ADT, ABS, Bentley, Nemetschek, Graphisoft, SolidWorks, QuickPen, CADPIPE etc.)

High definition laser scans (ex. Leica) are used for construction progress & QA (ex. Seattle library) and to capture as-built information, but need to be translated into design app to compare to model but data is not tied back to models

Solution

Create single, unified design model by aggregating models from multiple file formats in a easy to understand environment

Import point cloud data from laser scans into unified environment with the design model for comparison and interrogation



COBIE Demonstration & Discussion

COBIE Data in Revit Model for Demonstration

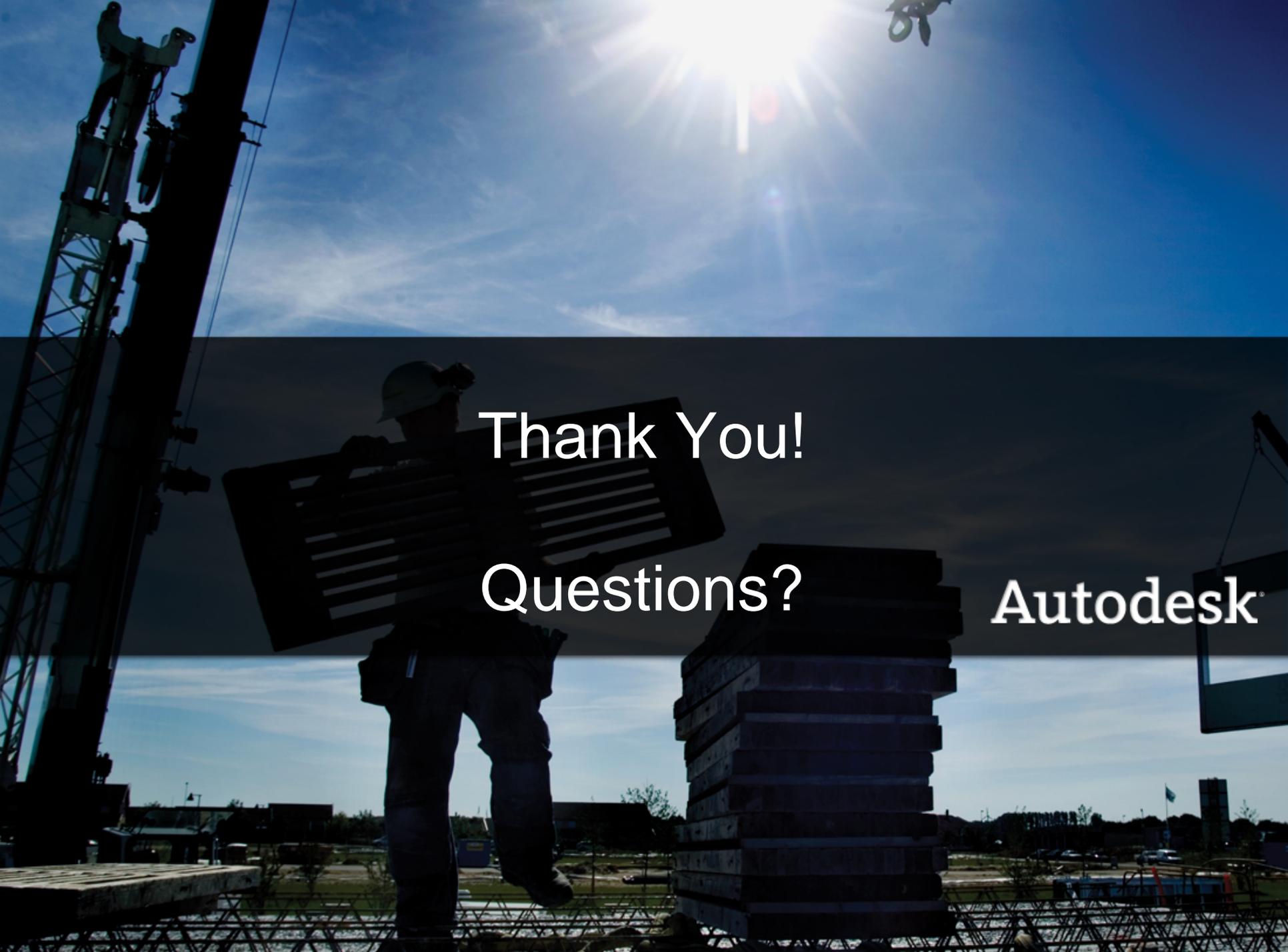
- Data Computed from BIM Model
- Manual Data entered as attributes attached to BIM Elements
- Methods for exporting this data for downstream use

Autodesk Vision for a more optimal work flow

- Move towards Integrated Project Delivery
- Large gaps between Design Intent Model and one useful for O&M
- Owners need to ask for “As-Built” BIM models

Rolling out COBIE requirement to A&Es and Contractors

- How do you get their buy in?
- How does this effort scale?
- Open questions?



Thank You!

Questions?

Autodesk®