CI10882 Workflow for BIM Infrastructure Projects

Fernando Oliveira, Lucy Kuhns, Nathan Moore, Reginald De Visscher

Autodesk Premium Support Specialists

Class summary

How to get all the **I**nformation from your **M**odel in a **B**uilding/Infrastructure Project.
Interoperability between applications that really work.
Improve your project with better collaboration.

Agenda

- Learning Objectives
- Introduction
- Infraworks
- Revit
- Dynamo
- Civil 3D
- Navisworks
- Live presentation of used workflow

Key learning objectives

At the end of this class, you will be able to:

- Learn how to use Infraworks for conceptual design
- Learn how to export Infraworks data to AutoCAD Civil 3D
- Learn how to create Revit content to use in Infraworks
- Learn how to aggregate all this data and review it in Navisworks

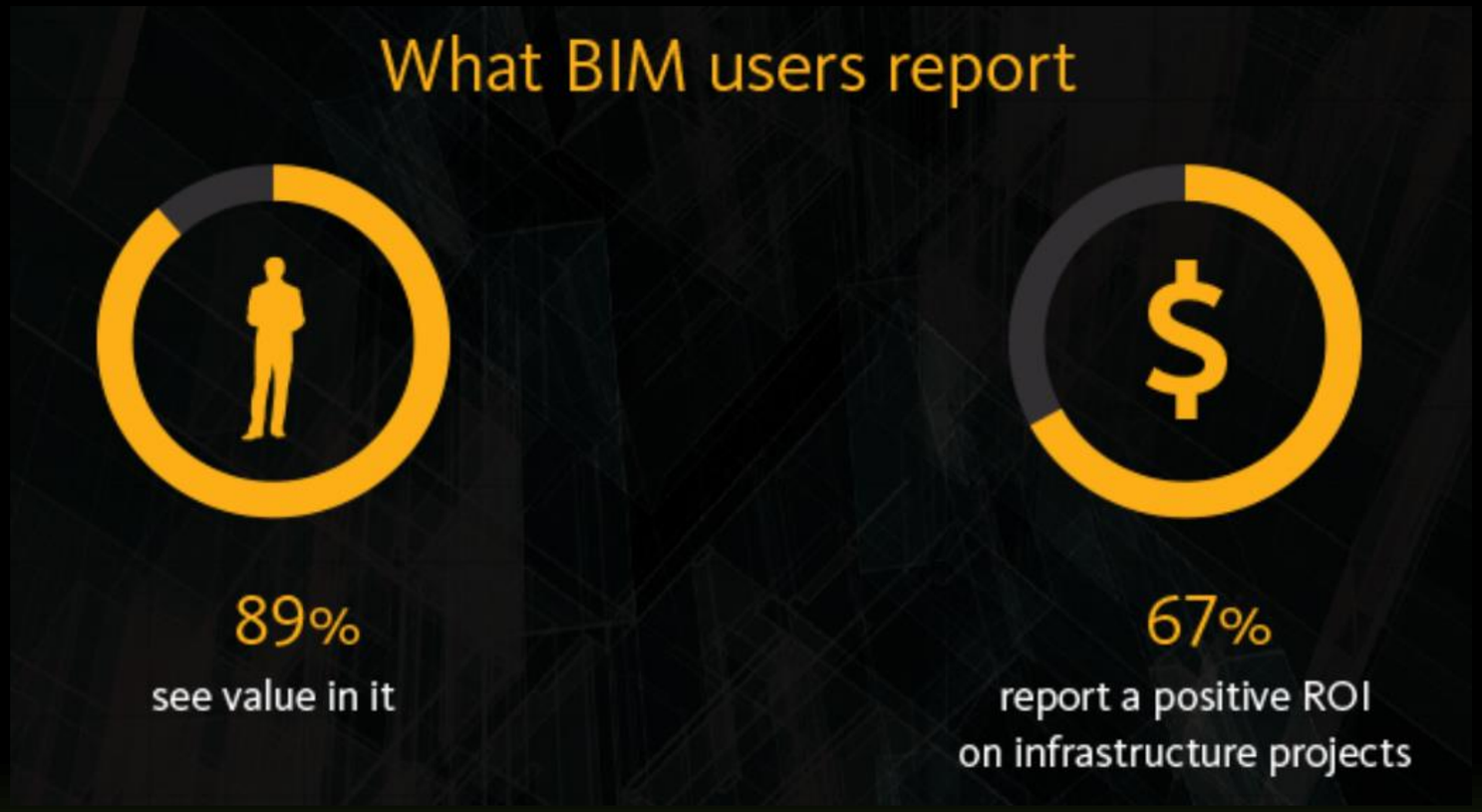
Introduction

Introduction

- BIM for infrastructure is a great topic, actually is probably the hottest in our Industry.
- More and more projects around the world are under this spotlight as owners are looking for better ways to do the old things.
- Roads and bridges basically are made the same way in the last 30 years.

Why is the industry changing?

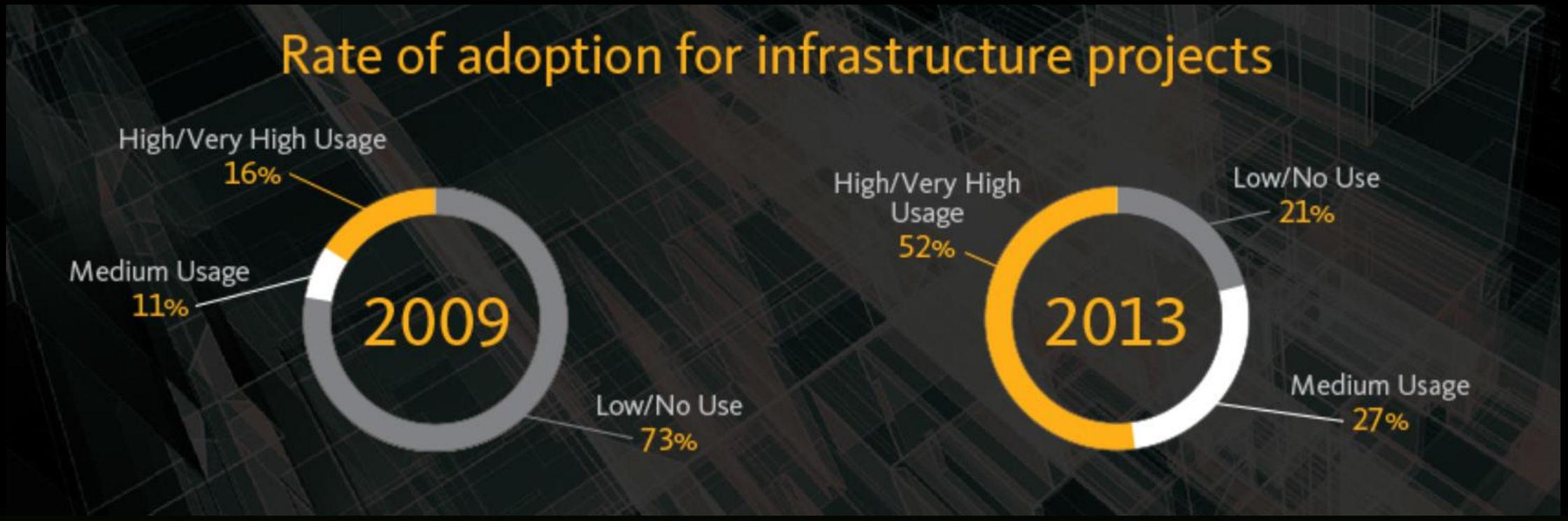
Introduction



Introduction

Introduction

Introduction



Introduction

www.autodesk.com/bim

Autodesk®

All statistics and case studies cited from *The Business Value of BIM for Infrastructure SmartMarket Report*
McGraw-Hill Construction, copyright 2012.

Introduction

This is why the industry is changing
But also because:

- Models are used for multiple analyses.
- Construction phasing is a need.
- Collaboration and in-time changes.
- Intelligent 3D models.

Analysis/Simulation
Time/ 4D
Standards/DWG/IFC/?
Data/ 5D

PROJECT: **Liverpool Water Treatment Works**

CUSTOMER: Atkins UK - Galliford Try, Costain, and Atkins (GCA)

AGENCY: United Utilities

The 3D model was at the core of the design process, representing a ‘single point of truth’. BIM has promoted a culture of collaboration and integration between our designers, constructors, process partners, supply chain, and client in a far more efficient way, leading to improved cost effective coordination, build ability, operability and maintainability.

—**Paul J. Heath**
CAD Manager
GCA

Excellence in Infrastructure 2013 – 3rd place

3D model of sequence batch reactor (SBR) and feed pumping station.
Image courtesy of GCA

BIM helps to deliver significant cost and safety benefits on development of new Wastewater Treatment facility keeping project on time and under budget.

PROJECT: **Denver International Airport Hotel and Transit Center**

CUSTOMER: HNTB (including Parsons, Gensler, MHS Tri-venture and Kewit)

AGENCY: Denver International Airport

One of the largest challenges to constructing the new Hotel and Transit Center at Denver International Airport was maintaining the aggressive program schedule within very limited space. BIM helped us identify and address potential obstacles early in the project and now (with established BIM workflows), we are able to run the project more efficiently, communicate better, and provide information more easily.

—**Stuart Williams**
STRP Manager, Department of Aviation
Denver International Airport

Excellence in Infrastructure 2013 – 1st place

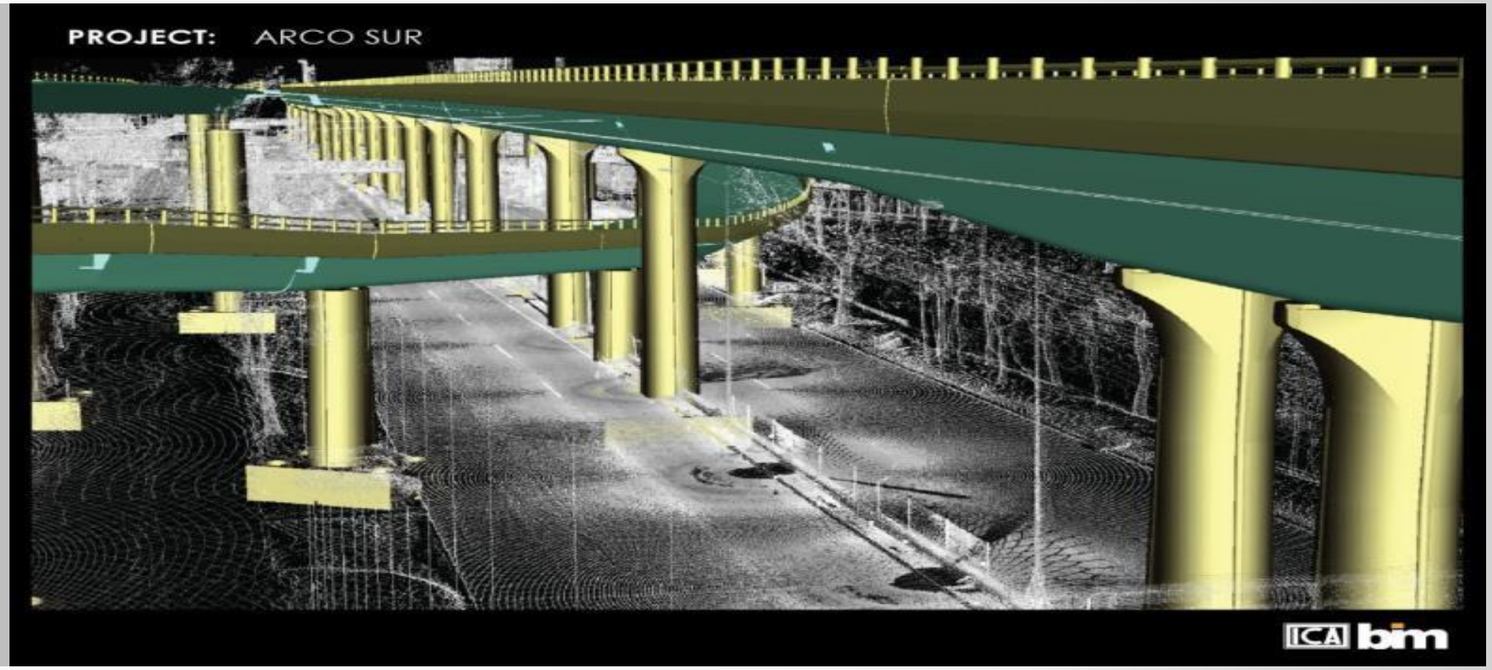
Rendering courtesy of DIA and Gensler

BIM helps the 5th busiest airport in the US with an exemplary virtual model of their new addition for spatial coordination, clash detection, structural analysis, review, collaboration and more.

PROJECT: **Autopista Urbana Sur (Urban Highway South) Elevated Highway**

CUSTOMER:: ICA bim

Integrated analysis provided a better design delivery trough discipline integration. Simulation provided opportune detection of deviations in schedule and cost. Visualization provided a better understanding of the project to gain supporters from government. All of this helped to reduce rework, avoid cost issues, and improve the project delivery.



Excellence in Infrastructure 2013

Image courtesy of ICA bim

BIM helps improve coordination and communication with all stakeholders on complex urban project.

PROJECT: **Room for the River Waal**

CUSTOMER:: iNFRANEA

AGENCY: City of Nijmegen

3D models are crucial for success on multidisciplinary projects especially when several architectural, engineering and construction disciplines are involved. Autodesk Navisworks help us to integrate, analyze and coordinate the designs from more than ten different disciplines. Our BIM engineer ensures all construction data is conflict-free, thus eliminating the risk for failure costs.

—**Johan Kuppens**
Managing Director
iNFRANEA

Excellence in Infrastructure 2013

Images courtesy of city of Nijmegen

Total cost of using BIM on River Waal project was recouped in just six months of construction operations with integrated project model that incorporates existing conditions and survey data, designs for waterworks, roads, bridges, and over 5 million cubic meters of earthworks – combining designs for over 10 different engineering disciplines.

PROJECT: **Gerald Desmond Bridge**

CUSTOMER: ARUP

PORT OF LONG BEACH AND CALTRANS

- 1 of 10 Caltrans Design Build Pilot Program Projects
- 2.4 mile Bridge replacement connects SR-710 to Terminal Island
- Connects America to our second largest port which traffics $140 billion in goods annually

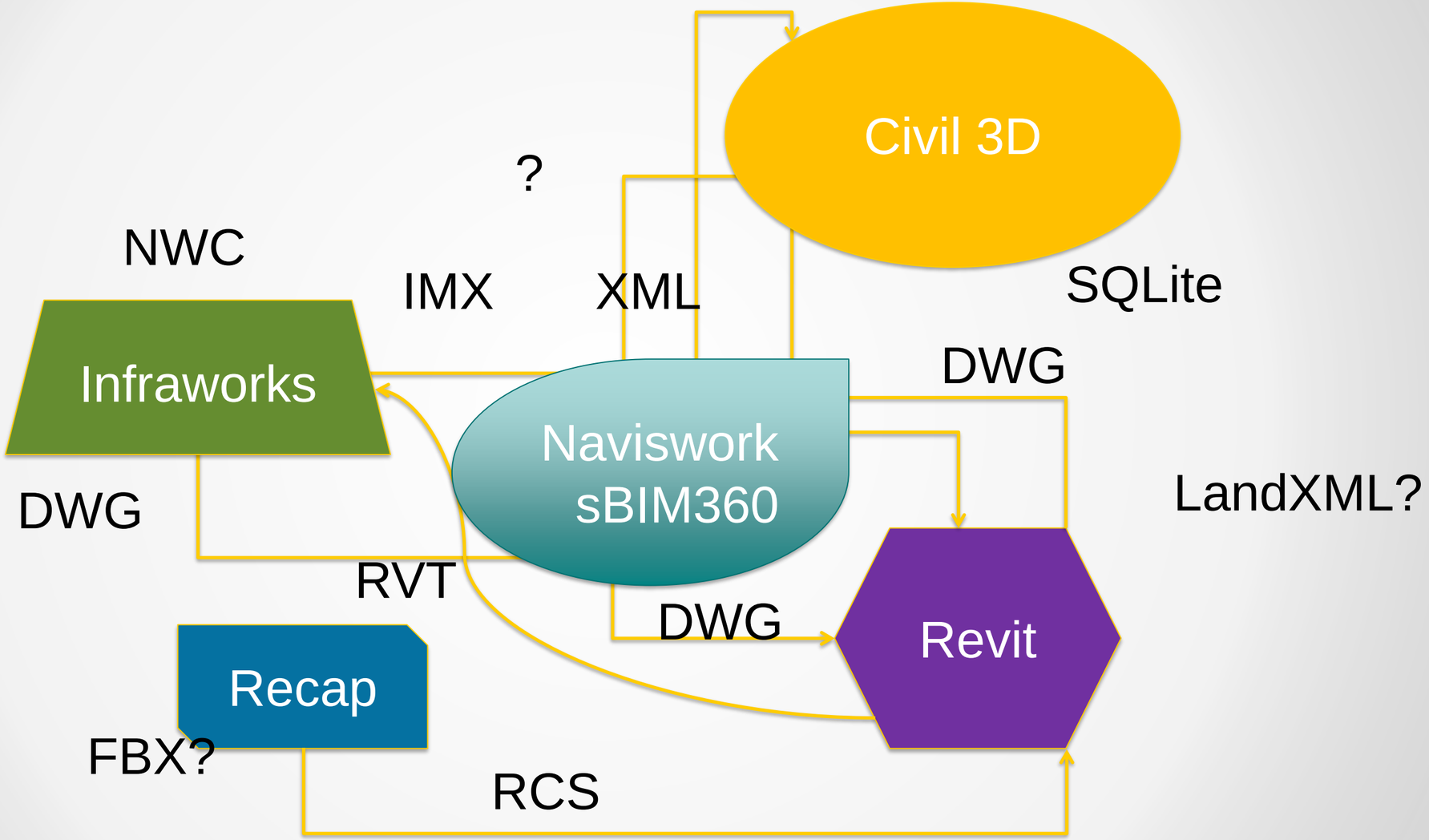
Excellence in Infrastructure 2013

Image courtesy of ARUP

ARUP provides simulation of traffic cameras on the bridge with Autodesk® InfraWorks software

view video

Workflow


Civil 3D
?
NWC
IMX
XML
SQLite
Infraworks
DWG
Naviswork
sBIM360
DWG
LandXML?
RVT
DWG
Revit
Recap
FBX?
RCS

Infraworks for conceptual design

Shrewsbury Infraworks
Modelbuilder refine
Proposals and export

Revit Model, import data from InfraWorks to generate site model.

IW 2 Revit

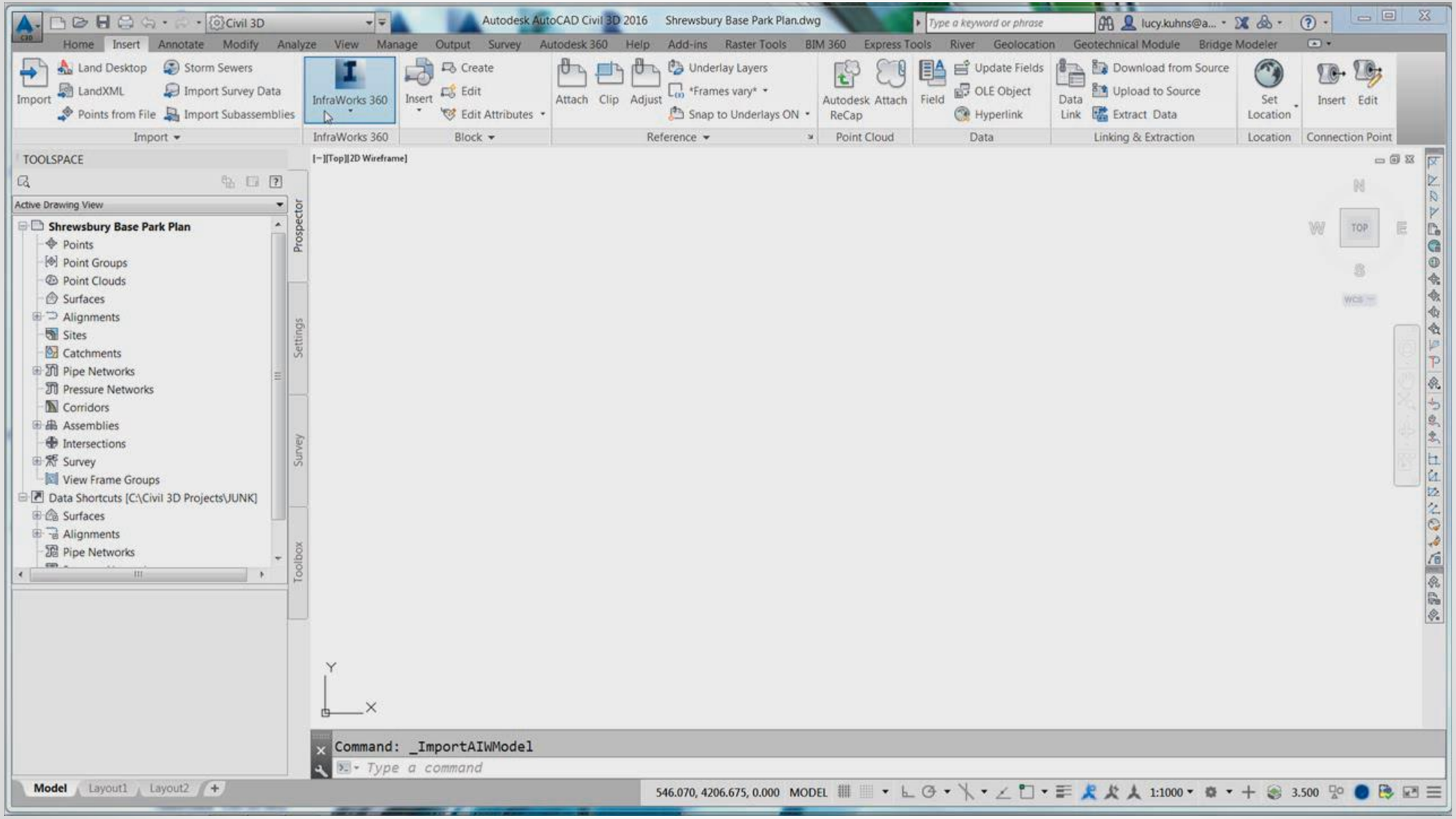
Revit, Import alignment, surface and other C3D elements

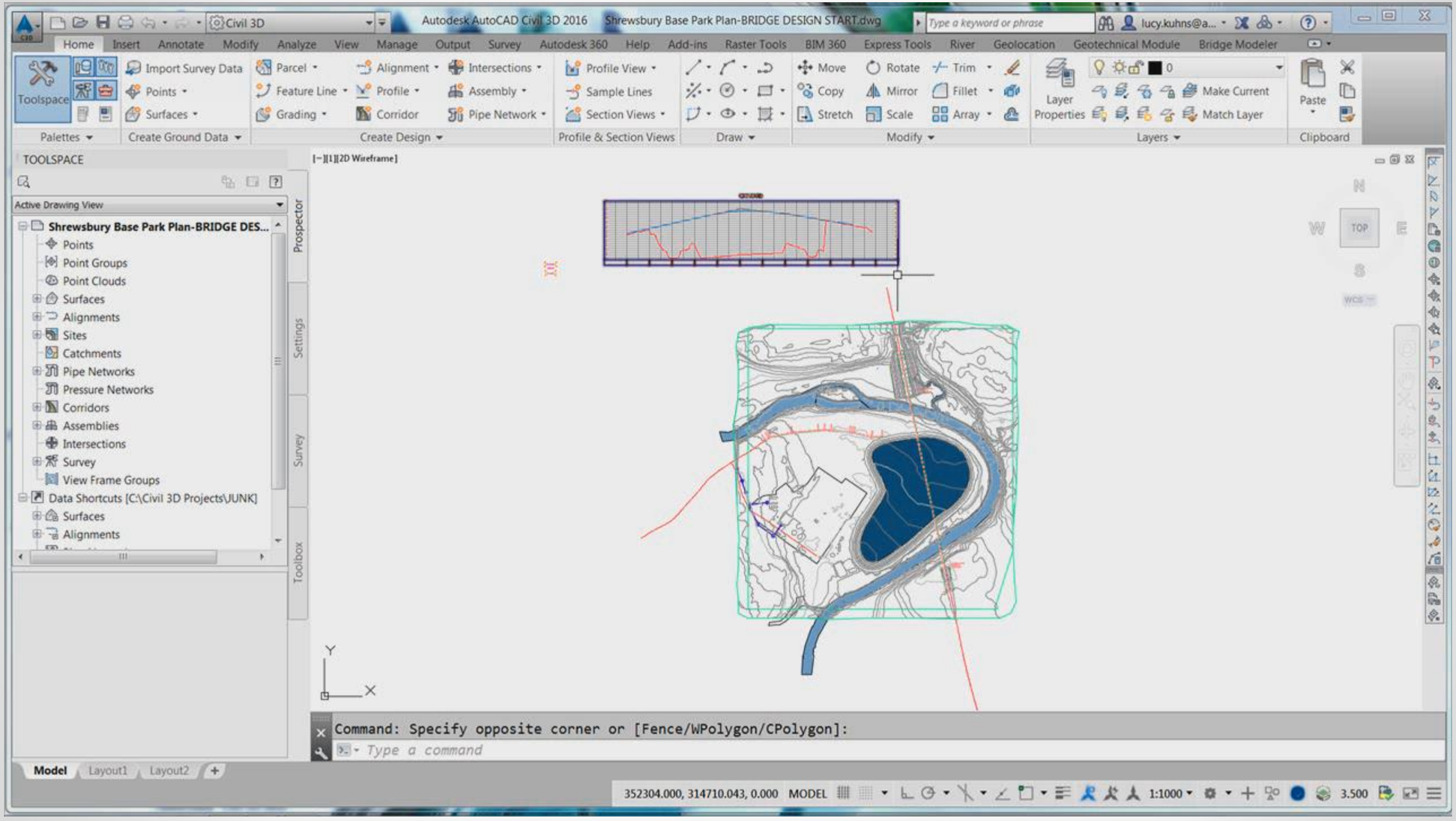
Civil 2 Revit tools
Load road profile
Bridge Editing

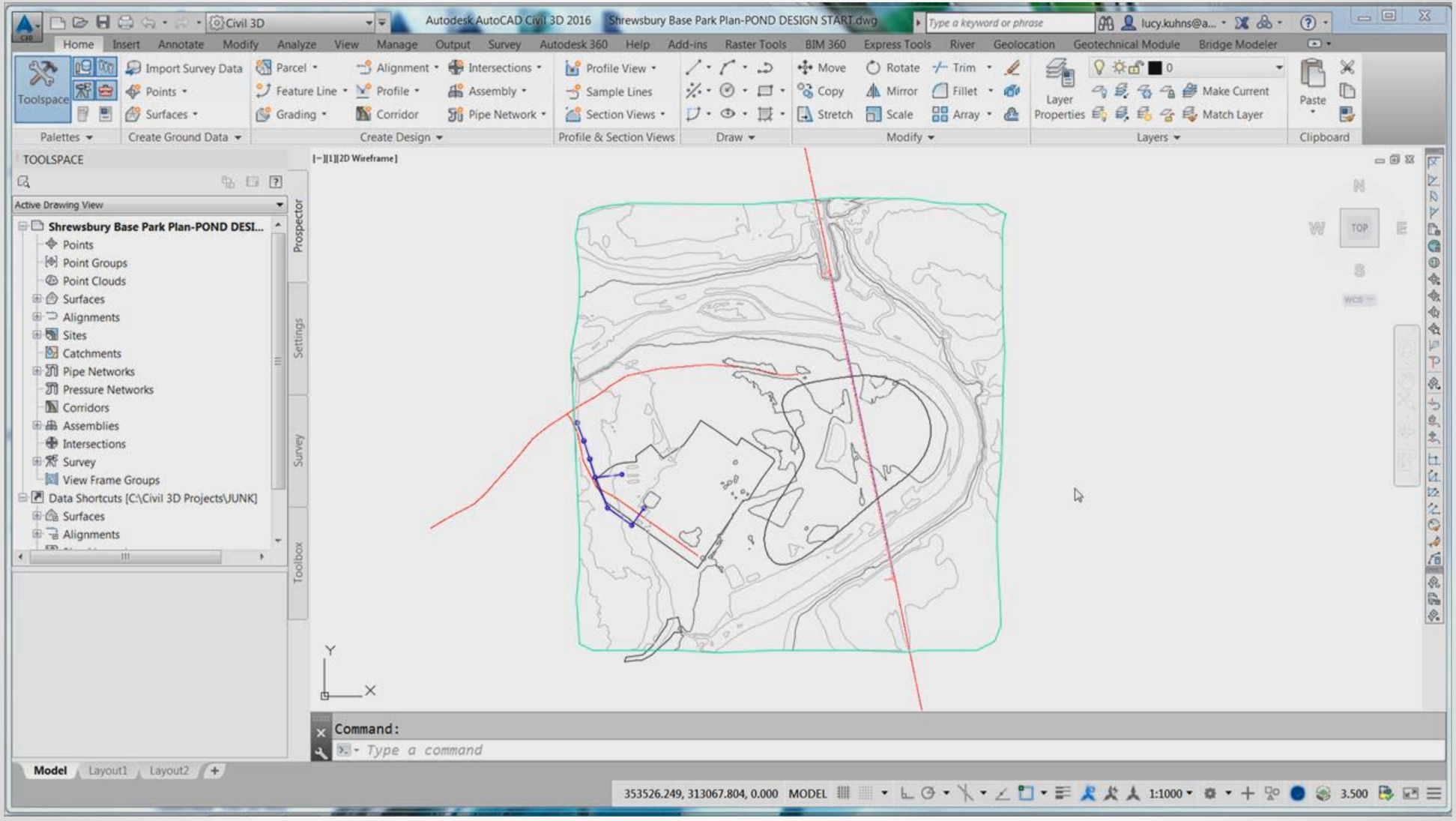
Dynamo, import more data from C3D to Revit

Points 2 Dynamo
Bridge Design

Building the Civil 3D model from InfraWorks Proposal


Civil 3D
Autodesk AutoCAD Civil 3D 2016
Shrewsbury Base Park Plan.dwg
Type a keyword or phrase
lucy.kuhns@a...
Home
Insert
Annotate
Modify
Analyze
View
Manage
Output
Survey
Autodesk 360
Help
Add-ins
Raster Tools
BIM 360
Express Tools
River
Geolocation
Geotechnical Module
Bridge Modeler
Import
Land Desktop
LandXML
Points from File
Storm Sewers
Import Survey Data
Import Subassemblies
InfraWorks 360
Insert
Create
Edit
Edit Attributes
Attach
Clip
Adjust
Underlay Layers
Frames vary
Snap to Underlays ON
Autodesk ReCap
Attach
Field
Update Fields
OLE Object
Hyperlink
Data Link
Download from Source
Upload to Source
Extract Data
Set Location
Insert
Edit
Import
InfraWorks 360
Block
Reference
Point Cloud
Data
Linking & Extraction
Location
Connection Point
TOOLSPACE
Active Drawing View
Shrewsbury Base Park Plan
Points
Point Groups
Point Clouds
Surfaces
Alignments
Sites
Catchments
Pipe Networks
Pressure Networks
Corridors
Assemblies
Intersections
Survey
View Frame Groups
Data Shortcuts [C:\Civil 3D Projects\JUNK]
Surfaces
Alignments
Pipe Networks
Prospector
Settings
Survey
Toolbox
[−][Top][2D Wireframe]
N
W
TOP
E
S
WCS
Y
X
Command: _ImportAIWModel
Type a command
Model
Layout1
Layout2
546.070, 4206.675, 0.000
MODEL
1:1000
3.500

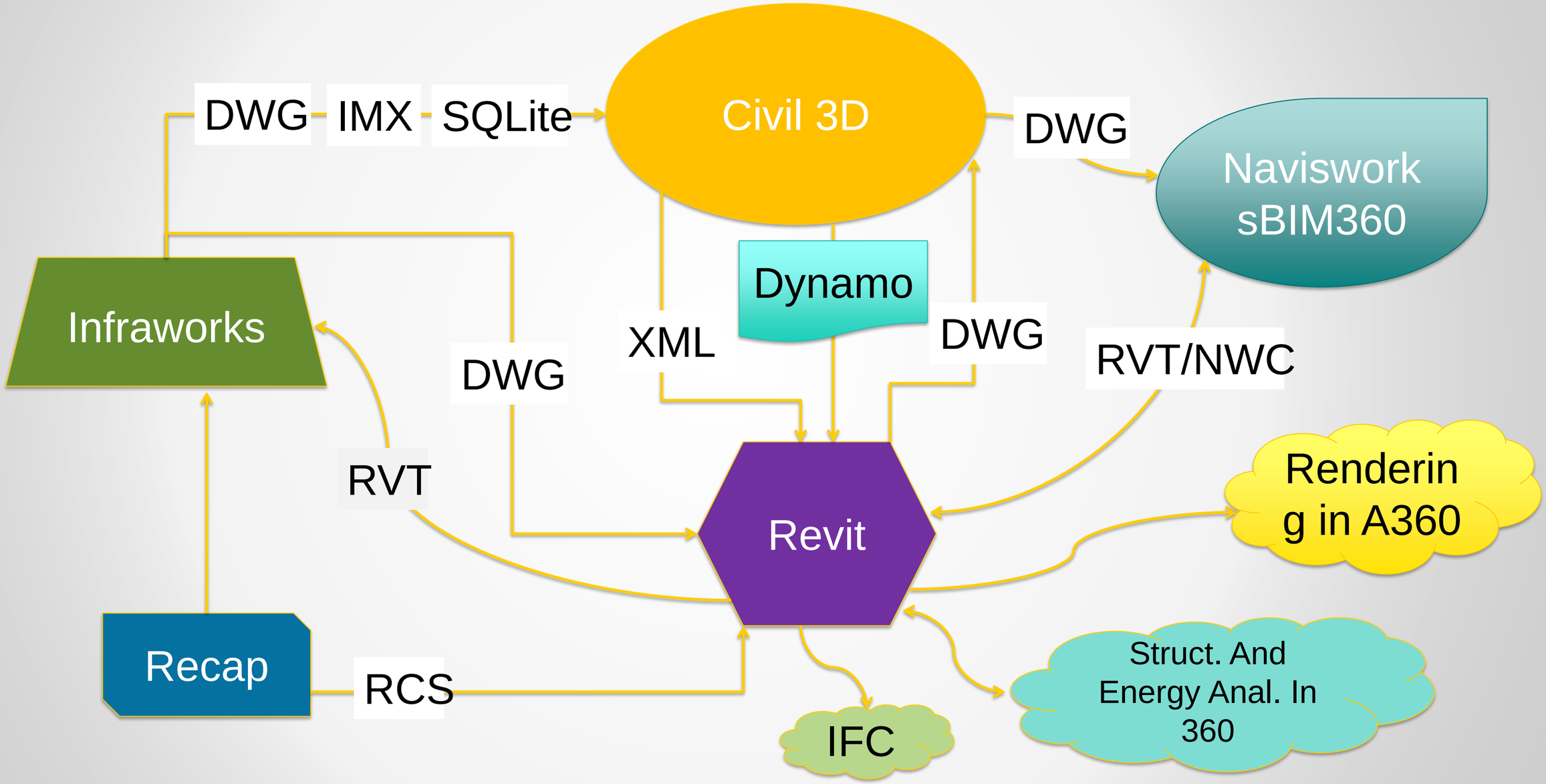

Civil 3D
Autodesk AutoCAD Civil 3D 2016
Shrewsbury Base Park Plan-BRIDGE DESIGN START.dwg
Home
Insert
Annotate
Modify
Analyze
View
Manage
Output
Survey
Autodesk 360
Help
Add-ins
Raster Tools
BIM 360
Express Tools
River
Geolocation
Geotechnical Module
Bridge Modeler
Toolspace
Import Survey Data
Points
Surfaces
Parcel
Feature Line
Grading
Alignment
Profile
Corridor
Intersections
Assembly
Pipe Network
Profile View
Sample Lines
Section Views
Move
Copy
Stretch
Rotate
Mirror
Scale
Trim
Fillet
Array
Layer Properties
Make Current
Match Layer
Paste
Palettes
Create Ground Data
Create Design
Profile & Section Views
Draw
Modify
Layers
Clipboard
TOOLSPACE
Active Drawing View
Shrewsbury Base Park Plan-BRIDGE DES...
Points
Point Groups
Point Clouds
Surfaces
Alignments
Sites
Catchments
Pipe Networks
Pressure Networks
Corridors
Assemblies
Intersections
Survey
View Frame Groups
Data Shortcuts [C:\Civil 3D Projects\JUNK]
Surfaces
Alignments
Prospector
Settings
Survey
Toolbox
[-][1][2D Wireframe]
TOP
Command: Specify opposite corner or [Fence/WPolygon/CPolygon]:
Type a command
Model
Layout1
Layout2
352304.000, 314710.043, 0.000
MODEL
1:1000
3.500


Civil 3D
Autodesk AutoCAD Civil 3D 2016
Shrewsbury Base Park Plan-POND DESIGN START.dwg
Home
Insert
Annotate
Modify
Analyze
View
Manage
Output
Survey
Autodesk 360
Help
Add-ins
Raster Tools
BIM 360
Express Tools
River
Geolocation
Geotechnical Module
Bridge Modeler
Toolspace
Import Survey Data
Points
Surfaces
Parcel
Feature Line
Grading
Alignment
Profile
Corridor
Intersections
Assembly
Pipe Network
Profile View
Sample Lines
Section Views
Move
Copy
Stretch
Rotate
Mirror
Scale
Trim
Fillet
Array
Layer Properties
Make Current
Match Layer
Paste
Palettes
Create Ground Data
Create Design
Profile & Section Views
Draw
Modify
Layers
Clipboard
TOOLSPACE
Active Drawing View
Shrewsbury Base Park Plan-POND DESI...
Points
Point Groups
Point Clouds
Surfaces
Alignments
Sites
Catchments
Pipe Networks
Pressure Networks
Corridors
Assemblies
Intersections
Survey
View Frame Groups
Data Shortcuts [C:\Civil 3D Projects\JUNK]
Surfaces
Alignments
Prospector
Settings
Survey
Toolbox
[-][1][2D Wireframe]
N
W
TOP
E
S
WCS
Y
X
Command:
Type a command
Model
Layout1
Layout2
353526.249, 313067.804, 0.000
MODEL
1:1000
3.500

Q&A

Conclusions

Workflow


DWG
IMX
SQLite
Civil 3D
DWG
Naviswork
sBIM360
Infraworks
Dynamo
XML
DWG
DWG
RVT/NWC
RVT
Revit
Renderin
g in A360
Recap
RCS
IFC
Struct. And
Energy Anal. In
360

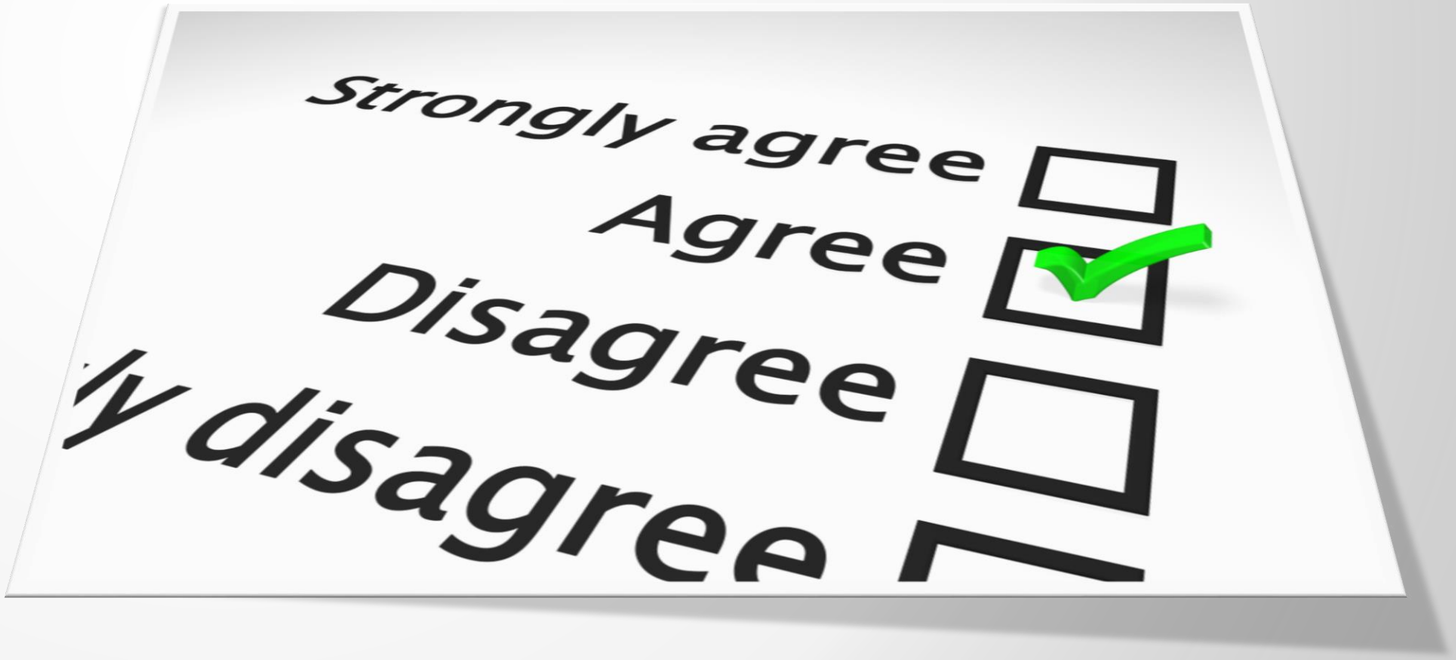
Thanks

- All Autodesk people that work with our customers on this implementations.

- Dieter Vermeulen and Marcello Sgambelluri for their amazing solutions in Dynamo and specially for the inspiration

Be heard! Provide AU session feedback.

- Via the Survey Stations, email or mobile device.
- AU 2016 passes awarded daily!
- Give your feedback after each session.
- Give instructors feedback in real-time.



Too many sessions, too little time?

After AU visit:

AutodeskUniversity.com

- Recorded sessions
- Presentations and handouts
- Key learnings

Don’t miss a second! Find hundreds of sessions waiting for you.