Dynamo in Civil 3D Introduction
Unlocking the mystery of scripting

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About the speakers

Jowenn S. Lua

- Over 16 years industry experience in design and construction
- B.S. Civil Engineering degree from De La Salle University
- MBA degree from Ateneo De Manila University
- Member Autodesk Expert Elite / Autodesk Gunslinger / Infrastructure Inside the Factory
About the speakers

Andrew Milford

- Over 26 years design experience in the Civil Infrastructure industry
- AutoCAD Civil 3D Certified Professional
- Develop processes through scripts, AutoLISP, .NET API (C# and VB) and Python
Learning Objectives

• Understand the basic uses of AutoCAD and Civil3D dynamo nodes
• Learn how to import / export data from Excel using dynamo
• Learn how to leverage basic nodes in automating your design changes
• Create reusable graphs to accelerate your design process
Basics of D4C3D
What is Dynamo for Civil 3D?

- Open-source
- Visual programming
- Geometry
- Data mining
- Automation
- Logical workflow

Sample – DynaShape by: Long Nguyen
Where to get D4C3D?

• Download & Install Civil 3D 2020
  o Manage.Autodesk.com
  o Autodesk Desktop Apps
• In Civil 3D…
Where do I start?
Dynamo Interface

1. MENU
2. TOOLBARS
3. LIBRARY
4. EXECUTION BAR
5. NAVIGATION
6. WORKSPACE
How to insert a Node?

1. Select Node
2. Search
3. Right Click Search
4. Double Click Mouse
Dynamo Nodes and Wires

1. Node name
2. Input ports
3. Output ports
4. Main body
5. Lacing options
6. Wire connector
Types of Nodes

- Create – Constructing something
Types of Nodes

- **Create** – Constructing something
- **Action** – Doing some action
Types of Nodes

- Create – Constructing something
- Action – Doing some action
- Query – Getting some value
Types of List

• List (Single Item) – A Mint
• List – Roll of Mints
• List of List – 5 Rolls of Mints
• List of List of List – Box of Mints
Design Graph Guidelines

• Color code your node blocks
• Add grouping with name and description
• Add notes to explain each process
• Rename nodes and add suffix
• Align nodes
• Save the graph as Manual
Design Graph Guidelines

Avoid
Design Graph Guidelines
Key Important Nodes

- AutoCAD > Document > Current

```
Document.Current
```

- AutoCAD > Document > ModelSpace

```
Document.ModelSpace
```

Get the current AutoCAD document.

**INPUT**
none

**OUTPUT**
Document

Get the model space block table record.

**INPUT**
document : Document

**OUTPUT**
Block
Key Important Nodes

- AutoCAD > Selection > Object Types

- AutoCAD > Selection > All Objects of Types
Key Important Nodes

• AutoCAD > Objects > Object > Geometry

• AutoCAD > Objects > Object > ByGeometry
Import and Export from Excel
Import data from Excel (Excel to Dynamo)

Read data from a Microsoft Excel spreadsheet. Data is read by row and returned in a series of lists by row. Rows and columns are zero-indexed;

**INPUT**

- file : var
- sheetName : string
- readAsString : bool
- showExcel : bool

**OUTPUT**

var[][]
Export data to Excel (Dynamo to Excel)

Write data to a Microsoft Excel spreadsheet. Data is written by row with sublists to be written in successive rows. Rows and columns are zero-indexed:

**INPUT**
- `filePath` : string
- `sheetName` : string
- `startRow` : int
- `startCol` : int
- `data` : var[][]
- `overWrite` : bool

**OUTPUT**
- var[][]

Dynamo to Excel Data Table:
- `filePath` -> data
- `sheetName`
- `startRow`
- `startCol`
- `data`
- `overWrite`
Sample Cases
Automating Design Changes
Object Placement with Excel
Object Placement with Excel
Object Placement with Excel

- Block Name
- Alignment
- Chainage
- Offset
- Side
Extract Solids from Corridor
Civil 3D Model Preparation
Civil 3D Model Preparation

Barrier BX

'Footing'
Dynamo Points, Links and Shapes

- PointsByLinkCodeAtNearestStation
- PointsByPointCodeAtNearestStation
- PointsByShapeCodeAtNearestStation
Reusable Graphs
Space Proofing and Clash Detection
Graph Optimisation
Dynamo to Civil 3D
Dynamo Geometry Colours

- Color.ByARGB
- Color.Color Palette
Sight Line Analysis
Number Ranges - Shortcuts

- **Start..End**: a range of numbers
- **Start..End..Step**: a range of number with step
- **Start..End..~Step**: a range with an approximate step
- **Start..End..#Items**: a range of a given number of items
- **Start..#Items..Step**: a sequence with a number of items and a step
Dynamo Abstract Geometry

- Coordinate System
- Plane
- Vector
Multiple Visual Analysis