CityEngine: An Introduction

Eric Wittner
3D Product Manager
“LegoScript”

parameterized instructions + Legos
Shapes = Scope and Geometry
Shape Operations

modify scope and geometry

<table>
<thead>
<tr>
<th><img src="image1.png" alt="Image" /></th>
<th><img src="image2.png" alt="Image" /></th>
<th><img src="image3.png" alt="Image" /></th>
<th><img src="image4.png" alt="Image" /></th>
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<tbody>
<tr>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
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</tbody>
</table>
Rule = Sequence of Shape Operations

```
Envelope -->
    case scope.sx*scope.sz > 6000:
        0.9 : Tower
        0.8,1,
        0.6,1,
        rand68 : T
        rand(0.5,1.5): s
        rand48 : Tower
        rand48 : Tower
    else: Tower
else: Tower
```

“Scripting for Shapes”
Procedural Model/Symbol
= Rules (CGA) + Assets on Shapes
Procedural Modeling Provides a Flexible 3D Design Environment Supporting a Rapid and Repeatable Process

Steps

- Author Rules (or use Library)
- Generate Multiple Design Scenarios
- Evaluate Alternatives

Particularly When Projects Require Many Iterations
Procedural Modeling is Intelligent Rule Based Database

- Interactive
- Multiple Views
  - Realistic Display
  - 3D Thematic Rendering
- Performance Reporting
  - Driven by Attributes
  - Visualized Dynamically
“Creating 3d faster, smarter, easier.”

“Enabling the rapid and interactive creation of 3D content, en masse or in situ, that is visually compelling, quantifiable, and sharable.”
New Capabilities in 2017

Scenario Management: Author, manage, and compare designs visually or through metrics represented in dashboards.

Local Edits: Allows editing of individual parts of a procedurally generated feature, creating a powerful hand modeling tool.

Interactive 3D Analytics: Live GPU based interactive analytics for viewshed, cumulative viewshed, line of sight, and cumulative shadows to guide design decisions.

Improved Features


Better setup/launch: CityWizard unified with GetMapData. Improved documentation, and better example projects.
Scenarios - Demo

GFA

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total GFA (sq ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>118,519</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>120,659</td>
</tr>
</tbody>
</table>

Energy Consumption

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total Consumption (MMBtu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>2,312 MMBtu</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>2,304 MMBtu</td>
</tr>
</tbody>
</table>

The more compact design of scenario 2 results in considerable lower heating costs.

Green Energy / Emissions

Carbon Emissions

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total Carbon Emissions (ton CO2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>3,142 ton CO2</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>3,219 ton CO2</td>
</tr>
</tbody>
</table>

Total Green Electricity

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total Green Electricity (MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>0.114 MWh</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>0.213 MWh</td>
</tr>
</tbody>
</table>

Neighboring Building Stock

<table>
<thead>
<tr>
<th>Variants</th>
<th>Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heritage Status</td>
<td>13 Buildings</td>
</tr>
<tr>
<td>Average Height</td>
<td>32.5 stories</td>
</tr>
</tbody>
</table>
Improved ease of use

- less buttons
  - e.g. move type visibility to 2nd level access
- modern icons
  - lets not look like Windows XP anymore
- DPI sensitive
  - + more spacing
- simpler tools
  - e.g. better UI for get map data
- better toolbar
  - toolbar in viewport as in scene viewer
- simpler 3D navigation
  - no more 'press-first-frame' to tumble
- feedback
  - Use status bar
- revised startup UX
  - First impression
Esri.lib: 3D Rule Library

• What are they?
  - Rules usable out of the box
  - For: Footprints, 3D models, streets
  - Built in support for OSM

• Additional rules as examples
  - Published per CityEngine Version
  - Wide range of domains and focuses
  - Downloadable through CityEngine
3D Model Library

- 3D models for use in visualization and publishing
  - Core urban environment: People, cars, street furniture, etc.
  - Multi-LOD version
  - Custom colors for parts of model

- Available as …
  - 3D styles in ArcGIS Pro
  - 3D symbology in webviewer
  - 3D Assets for CityEngine
Export to ArcGIS 360 VR

Scenario 1

Scenario 2

Later half of 2017

Web-Based Viewer
GearVR Controller Support
<table>
<thead>
<tr>
<th>Available</th>
<th>Later half of 2017</th>
<th>Beyond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario Management</td>
<td>Computer Generated Architecture enhancements for zoning</td>
<td>Named User Support</td>
</tr>
<tr>
<td>Dashboards</td>
<td>New interactive analytic tools</td>
<td>Extended Platform Support</td>
</tr>
<tr>
<td>Local Edits (Custom 3D models)</td>
<td>360 Photos Publishing for 360 VR</td>
<td>Additional interactive analytic tools</td>
</tr>
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</table>
3D Island
@ Esri Showcase
Please take our Survey
Your feedback allows us to help maintain high standards and to help presenters

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Answer survey questions and submit
Questions?

Eric Wittner, ewittner@esri.com, @EricWittner