Integrating CityEngine and Unity for Immersive Campus Simulations

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July 18, 2015
Outline

- ArcGIS 2D Campus Apps
  - Campus Data Conversion
  - iOS Routing App
  - Floorplan Web Editor
- Exterior Modelling
- Elevation Workflow
- Interior Modelling
- Campus Apps Workflow
- Unity Demo
- Planned Application and Tool Releases
- CityEngine and Unity Challenges
- Questions
Campus Data Conversion

1. Georeferenced approximately 200 building plans based on Community Maps basemap
2. Generated with Python script:
   - point feature class from nodes marked as rooms or points of interest
   - line feature classes from adjacency list specifying connected interior and exterior nodes
Data Cleanup

- Queried pathways that were greater than threshold
- Visualized paths in ArcScene to discover false positives
- Deleted invalid paths
University of Waterloo Outdoor Paths
University of Waterloo Hallway Centrelines
iOS Routing Application

- Developed in the Fall of 2012
- Calculates shortest indoor or outdoor route
- Adapted to work with the following schools’ spatial data:
  - McMaster University
  - Dalhousie University
  - University of Washington
Floorplan Web editor

• Features:
  • Drawing tools for tracing hallway centre lines, stairs, and rooms
  • Cut tool for splitting floorplan into rooms and hallways
  • Floorplan visibility toggling
Exterior Modelling

Stereo Imagery

CyberCity3D

3D Building Models
Modelling With SketchUp and CityEngine
Building Model LODs

LOD 0: 85 Polygons
LOD 1: 390 Polygons
LOD 2: 1071 Polygons
Elevation Update Workflow

Building Models

Floorplans

Adjust Floor Heights

Elevation Table

Python Script

Network Graph

Enterprise Geodatabase

Campus Floorplan Features with accurate elevations

Elevation (Contours)
Interior Modelling Workflow

1. Import floorplans (raster or vector) into the appropriate feature classes - ArcMap
2. Publish feature/scene/network services with layers - ArcGIS Server
3. Digitize buildings floors, walls, and hallway centrelines - Floorplan Web Editor
4. Execute tools to export the data to CityEngine - ArcMap
5. Adjust the floorplan heights based on terrain and building models - CityEngine
6. Execute script to update heights in the Enterprise Geodatabase - CityEngine
7. Execute script to export model to Unity - CityEngine
8. Update the Unity app to consume ArcGIS for Server Network Services - Unity
Campus Apps Workflow

With Release of the Runtime Quartz SDK and 4.0 JavaScript API

Floorplan and Network Graph Heights

Web app floorplan and routing editor

Feature Service

Map/Network Service

Enterprise Geodatabase

GP Models and Scripts

CityEngine Project

Unity Project

Unity Campus Apps

2D Runtime Campus Apps (iOS/Android)

3D Campus Apps
Unity Demo...
CityEngine and Unity Integration Challenges

- Terrain
- Building level of detail tradeoffs
- Future Work: Mobile Unity Apps
Planned Campus Model GitHub Releases

- ECCE GitHub Page: https://github.com/EsriCanada-CE
- CityEngine and Unity GeoNet Group: http://arcg.is/1f3gdjR

Available Now: iOS
August: KML
September: 2D Runtime Campus Apps
October: 3D Runtime Campus Apps
November: 2D Runtime Campus Apps (iOS/Android)

Available Now: August
September: September
October: October
November: November
Questions?

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