CityEngine: An Introduction

Gert van Maren

Product Management lead for 3D
3D GIS landing page
3D GIS Features

- Multiscale 3D Models
- 3D Geodesign
- ArcGIS for 3D Cities
- Share 3D scenes
- Native lidar support
- Surface modeling
- Integrated 3D
- 3D Analysis
CityEngine

Transform 2D GIS Data into Smart 3D City Models
CityEngine

Transforms 2D GIS Data into Smart 3D City Models

- 3D City Creation
  - 2D GIS data + rules

- 3D City Design
  - Interactive and rule driven design in 3D

Geometry + Attributes + Rules

Dynamic + Parametric editing
Procedural modeling

3D model creation using rules / algorithms

- Base geometry

![Base geometry](image)

**Iterative refinement**

iterateively refine a design by creating more and more detail
Procedural modeling vs. Manual modeling

Hand Crafted

Procedural Modeling

Time reduction / cost saving
2D GIS Data + Rules

Procedural city modeling

Geometry

Attributes

Rules
3D City Creation

Procedural city modeling

Rule based 3D cities
Demo - 3D City Creation

• Data Preparation

• 3D City generation
Aggregate As-built and Procedural Cities

As-built models
- Reality at time of data capture
- Sensor derived
- Exterior shells
- Static models

-> Visualization of existing city

Procedural models
- Approximation of reality
- Based on GIS data
- Rule driven
- Exteriors and interiors
- Dynamic models

-> City planning / design
3D City Design

3D procedural design

Parametric editing

Add a floor
Add a roof

Dynamic editing

Procedural reporting

Rule based design
Demo - 3D City Design

- Dynamic editing
- Simple urban design
- Inner city densification
3D City (Geo)design

Iterative analysis while designing

- Design
- Analyze
- Compare

- Mass modeling
- Visibility impact
- Shadow impact
- Façade design
- Detailed Façades
- Skyline Analysis
ArcGIS 10.2 & CityEngine 2013
Edit 3D City features

- Sketch new 3D buildings
- Edit existing 3D buildings
- Texture 3D buildings
- Easy-to-use (intuitive UX)
- Direct read/write to GDB
Design City in 3D

- Rule based feature construction
- Fast design iterations
- Compare multiple scenarios
- Integrated Reporting

3D Zoning shells
Density 3.1
Density 6.8
2D-to-3D / Create 3D City features

- Based on existing 2D GIS data
- Rule-based geometry creation
- Dynamic (updates possible)
- Different levels of detail supported
- Efficient 3D city model creation

Rule packages

Lidar derived GIS data  Schematic buildings  Realistic buildings
Share 3D Web Scenes

- 3D in the browser
- Easy-to-use (cloud solution)
- For Chrome, Firefox & Safari
- Modern GUI & graphics

Example: Side-by-side view to compare before/after
Example: Share analysis results (Swipe tool)
Share 3D Scenes
Store 3D City Model (ArcGIS)

- 3D Cities Information Model
  - Maps, apps, analytics

- Different Levels of Detail
  - Exterior
  - Interior

Building level  Floor level  Street level
**3D Cities Information Model: Common Data Themes**

*The 3DCIM simplifies the initial creation, maintenance and usage of 3D cities.*

**Built Environment**
- *Created and actively managed by people*
  - Structures, utilities, transportation networks, installations

**Legal Environment**
- *Defines restrictions on land use*
  - Land use zones, property ownership boundaries, regulations

**Natural Environment**
- *Naturally occurring features on, above, or below the earth’s surface*
  - Land cover, subsurface geology, atmosphere/climate/weather
Analyze 3D City Model (ArcGIS)

• Model based approach
• Iterative analysis
• Time aware
• Quantitative results

Soil Analysis  Visual impact  3D routing
Visualize 3D City Model (ArcGIS)

- Desktop / Web */ Mobile **
- Massive 3D city models
- View cities in larger contexts
- Semantic / realistic views
- Incorporate sensor data

Thematic city
Photo-realistic city
Sensor data
Demo - 3D City Visualization
Markets

*CityEngine*

- Urban Planning & Architectural Visualization
  - Foster & Partners, Grimshaw,…

- Local government
  - Singapore, Brisbane, …

- Simulation & Defense
  - Thales, CS, Raytheon,…

- Entertainment
  - Pixar, DreamWorks, Weta Digital,…

- Academia
  - MIT, ETH, Stanford,…
Master Planning in Iraq

Garsdale Design Limited
Urban Design: Masdar
Urban Design: Masdar
Urban Planning: Zoning Rules

Example Zurich (W2 Zone, Zürichberg)
Investment/Growth Potential

Example Zurich (Seefeld)

BZO Zurich: 49M m2 GFA
Currently used: 31M m2 GFA
Densification

Example Philadelphia (Logan Square)

FAR 2.6  FAR 3.1  FAR 4.0  FAR 6.8
Zurich 2050
3D Enablement of Auckland Unitary Plan
Simulation and Defense
Entertainment
CityEngine 2013

- Rule Package compiling & exchange platform
- Software Development Kit (CE Advanced)
- Many feature improvements e.g. streets
Useful links

- **CityEngine trial**

- **Resources**
  - Forum: [http://forums.arcgis.com](http://forums.arcgis.com)
  - Ideas: [http://ideas.arcgis.com](http://ideas.arcgis.com)

- **Support**
  - [http://support.esri.com](http://support.esri.com)

- **Training**
  - [http://training.esri.com](http://training.esri.com)
Thank you…

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