



CityEngine: An Introduction

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Product Management lead for 3D

Technical Workshop



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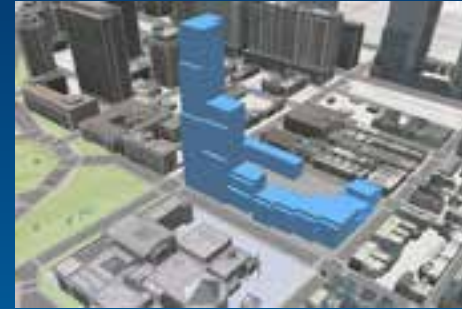
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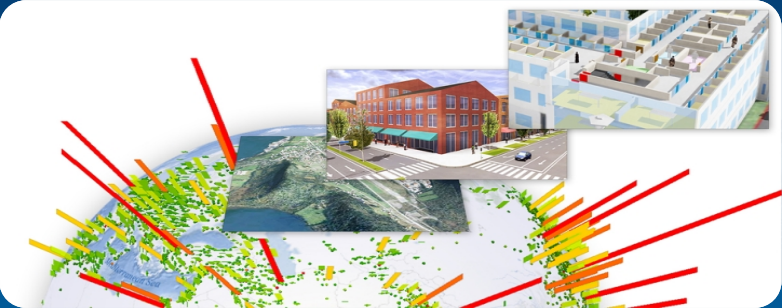
Why 3D GIS?

Because our world is 3D

- **Improve understanding**
3D is easy for everyone to understand
- **Better communication**
3D makes it easier to articulate ideas
- **Solve 3D problems**
Some spatial problems can only be solved in 3D
-



3D GIS Features



Multiscale 3D Models



3D Geodesign



ArcGIS for 3D Cities



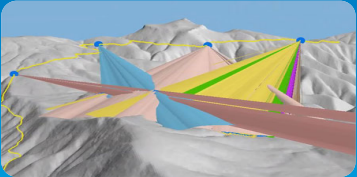
Share 3D scenes



Surface modeling



Native lidar support



3D Analysis



Integrated 3D

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



Geometry + Attributes + Rules

3D City Design

Interactive and rule driven
design in 3D

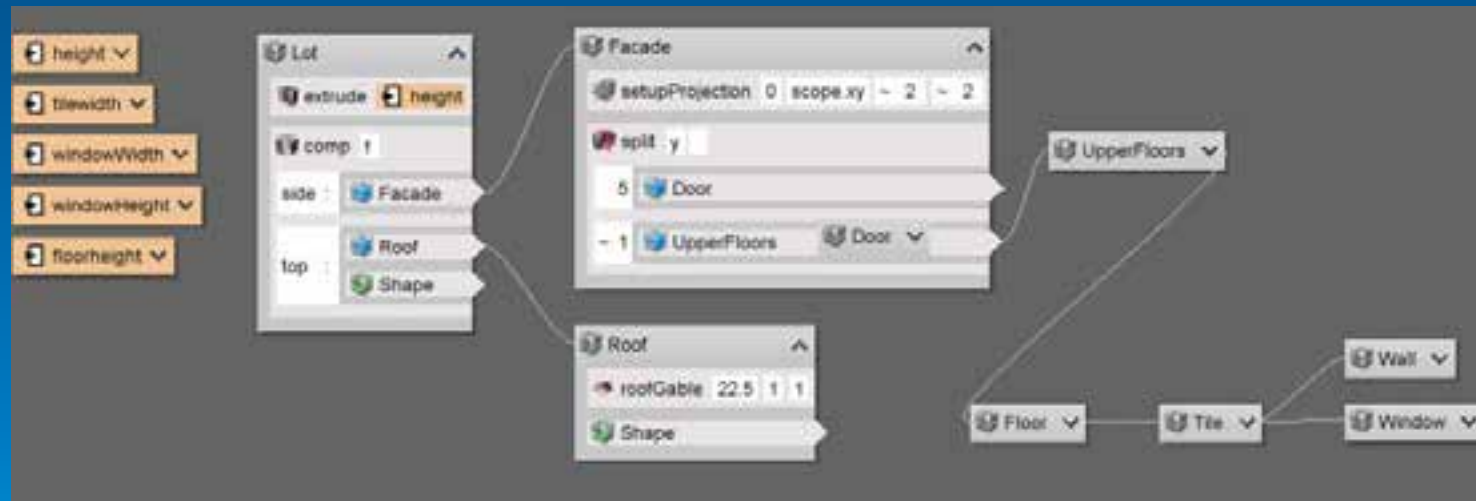
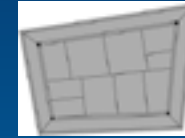
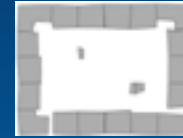


Dynamic + Parametric editing

Procedural modeling

3D model creation using rules / algorithms

- Base geometry



Base geometry

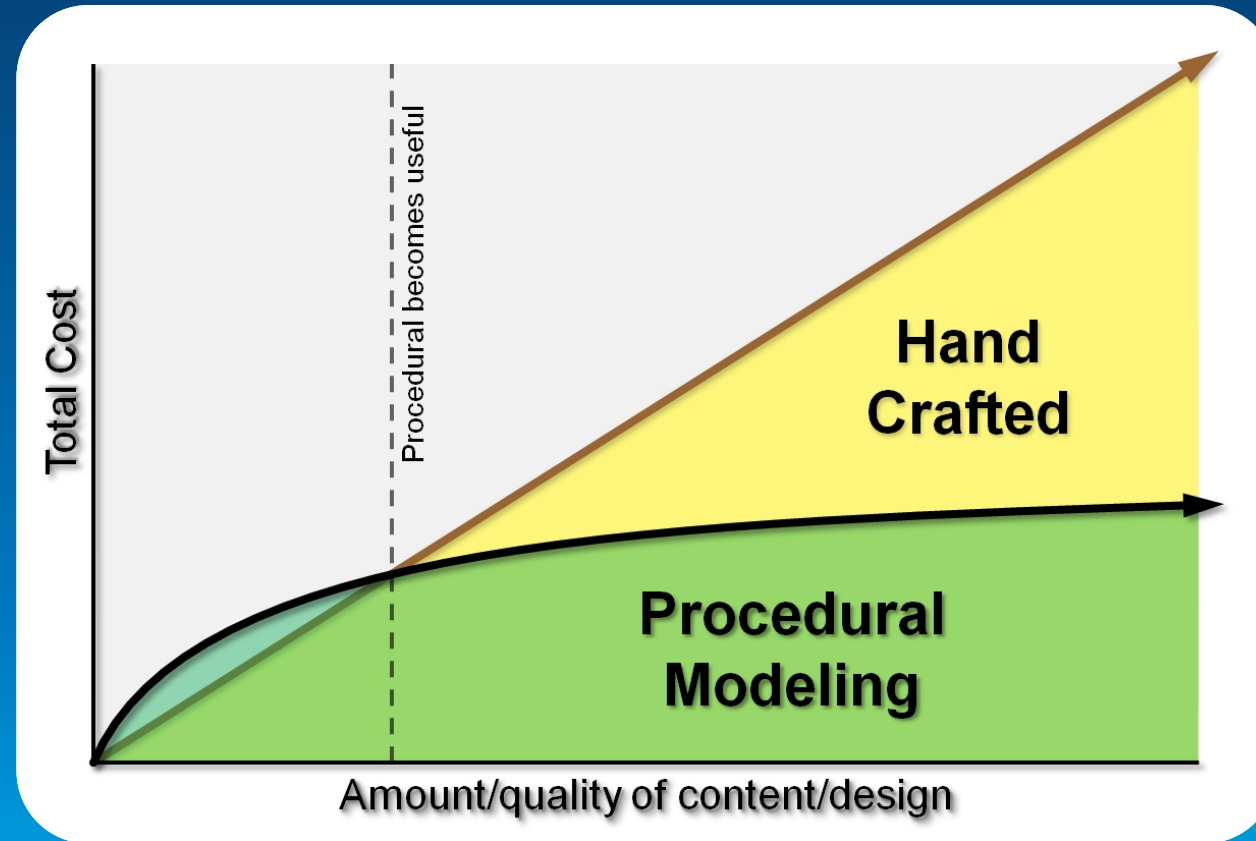


Iterative refinement

Final 3D model

iteratively refine a design by creating more and more detail

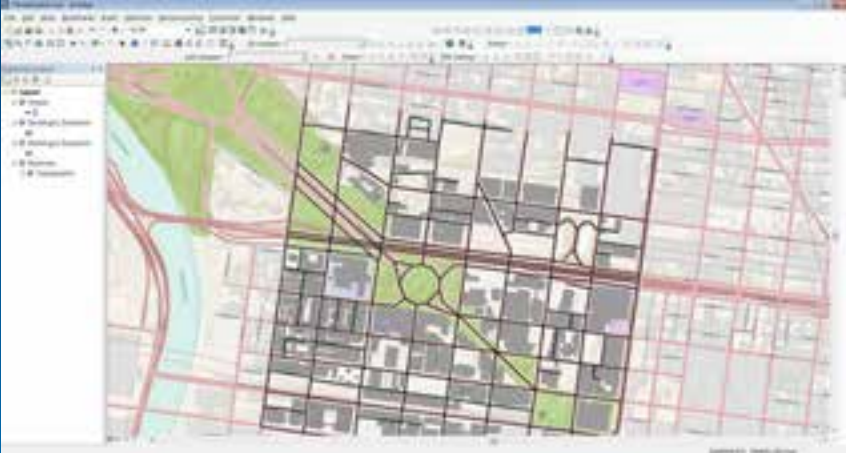
Procedural modeling vs. Manual modeling



Time reduction / cost saving

2D GIS Data + Rules

Procedural city modeling



Geometry

OBJECTID	FID	Shape	Area	Perim	Length	Area	Perim	Length	Area	Perim
1	25100	Rect	1000	1000	1000	1000	1000	1000	1000	1000
2	25101	Rect	1000	1000	1000	1000	1000	1000	1000	1000
3	25102	Rect	1000	1000	1000	1000	1000	1000	1000	1000
4	25103	Rect	1000	1000	1000	1000	1000	1000	1000	1000
5	25104	Rect	1000	1000	1000	1000	1000	1000	1000	1000
6	25105	Rect	1000	1000	1000	1000	1000	1000	1000	1000
7	25106	Rect	1000	1000	1000	1000	1000	1000	1000	1000
8	25107	Rect	1000	1000	1000	1000	1000	1000	1000	1000
9	25108	Rect	1000	1000	1000	1000	1000	1000	1000	1000
10	25109	Rect	1000	1000	1000	1000	1000	1000	1000	1000
11	25110	Rect	1000	1000	1000	1000	1000	1000	1000	1000
12	25111	Rect	1000	1000	1000	1000	1000	1000	1000	1000
13	25112	Rect	1000	1000	1000	1000	1000	1000	1000	1000
14	25113	Rect	1000	1000	1000	1000	1000	1000	1000	1000
15	25114	Rect	1000	1000	1000	1000	1000	1000	1000	1000
16	25115	Rect	1000	1000	1000	1000	1000	1000	1000	1000
17	25116	Rect	1000	1000	1000	1000	1000	1000	1000	1000
18	25117	Rect	1000	1000	1000	1000	1000	1000	1000	1000
19	25118	Rect	1000	1000	1000	1000	1000	1000	1000	1000
20	25119	Rect	1000	1000	1000	1000	1000	1000	1000	1000

Attributes



Rules



3D City Creation

Procedural city modeling



- Rule based 3D cities

Demo - 3D City Creation

- **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

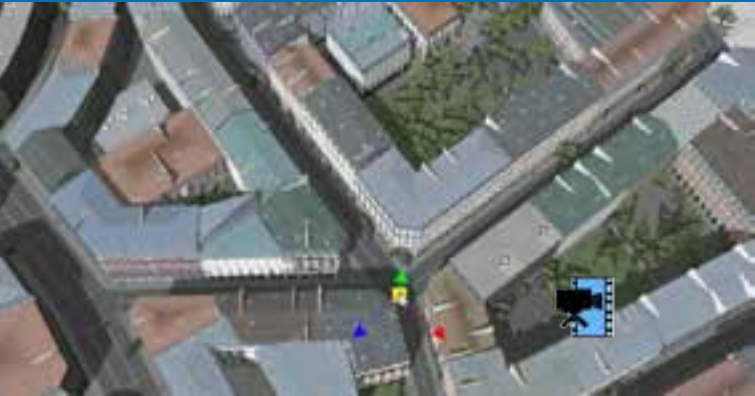
Parametric editing



Add a floor

Add a roof

Dynamic editing



Procedural reporting



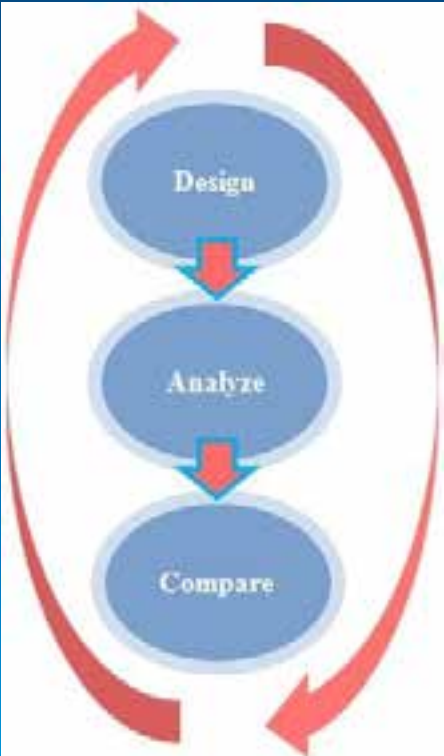
Rule based design

Demo - 3D City Design

- **Dynamic editing**
- **Manual editing**
- **Simple urban design**
- **Inner city densification**

3D City (Geo)design

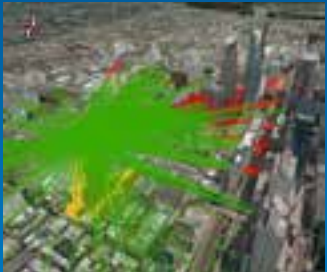
Iterative analysis while designing



Mass modeling



Façade design



Visibility impact



Detailed Façades



Shadow impact



Skyline Analysis



ArcGIS & CityEngine

Store
Analyze
Visualize
2D-to-3D
Share



2D-to-3D
Edit & Design
Share

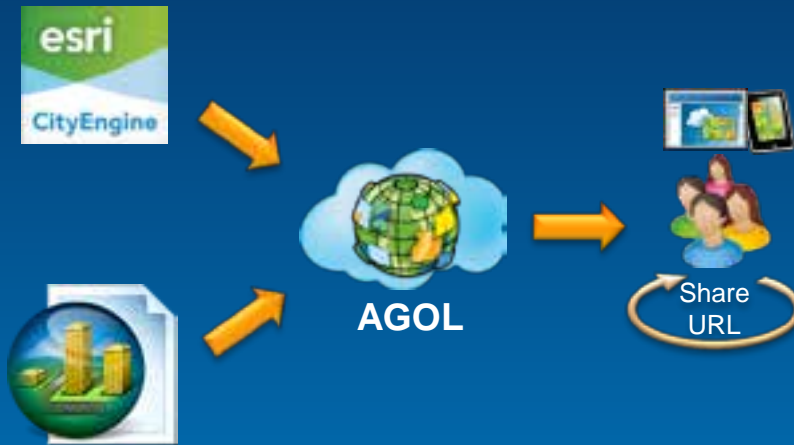
ArcGIS & CityEngine

Store
Analyze
Visualize
2D-to-3D
Share

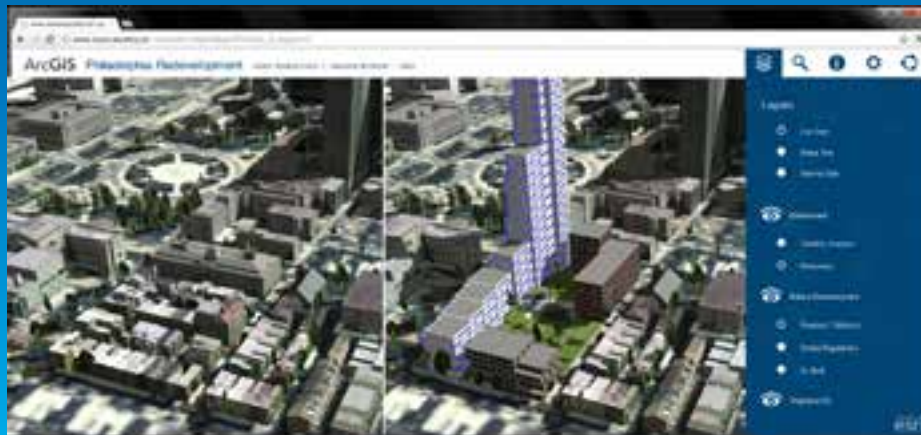


2D-to-3D
Edit & Design
Share

Share 3D Web Scenes



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

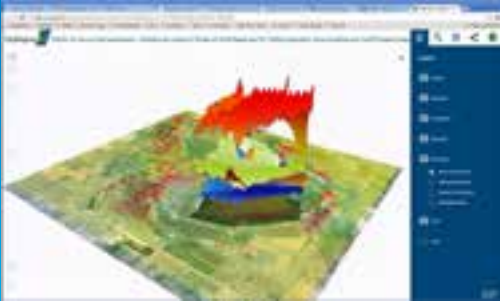
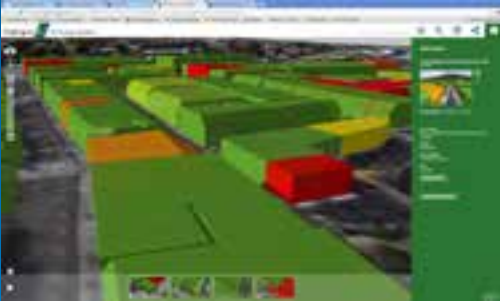
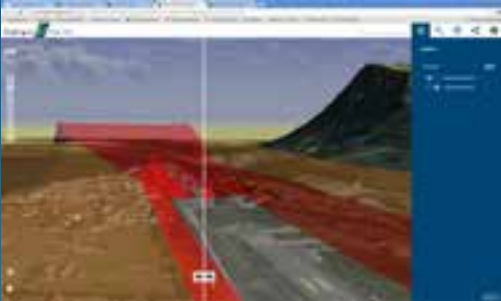
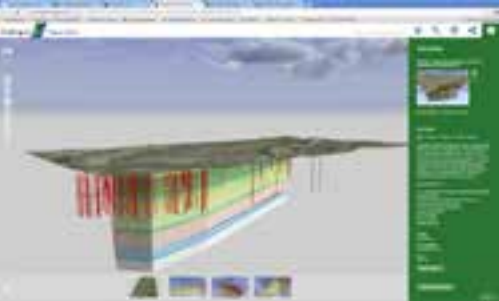


Example: Side-by-side view to compare before/after



Example: Share analysis results (Swipe tool)

Share 3D Scenes



CityEngin markets

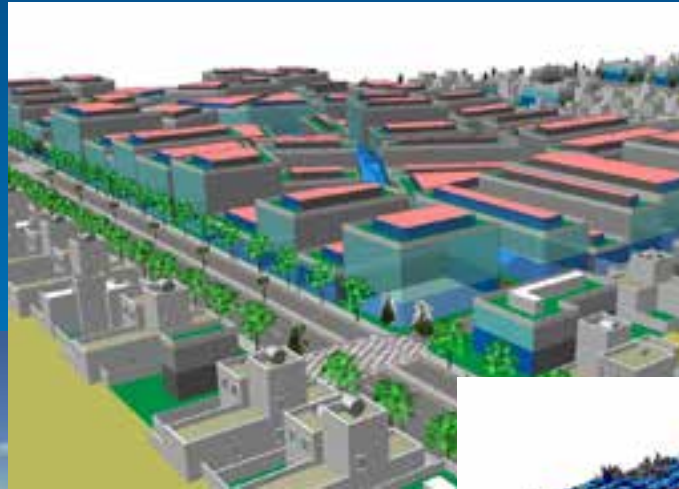
Garsdale Design Limited

- 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

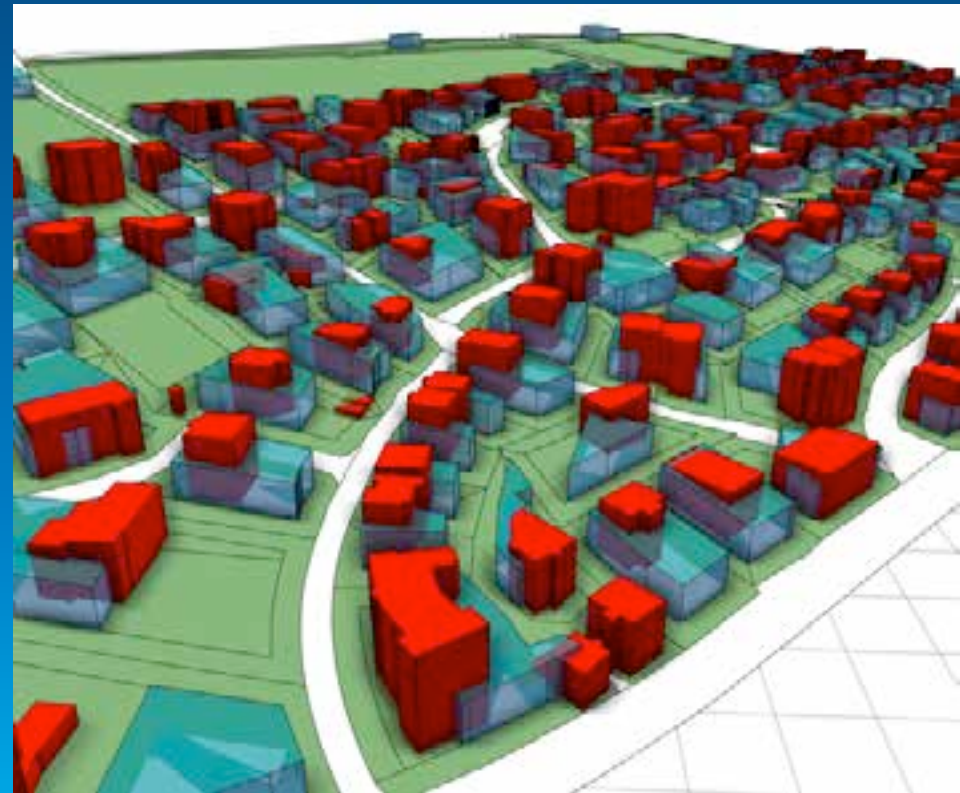


Swiss Village
In the heart of Masdar City

Foster + Partners

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



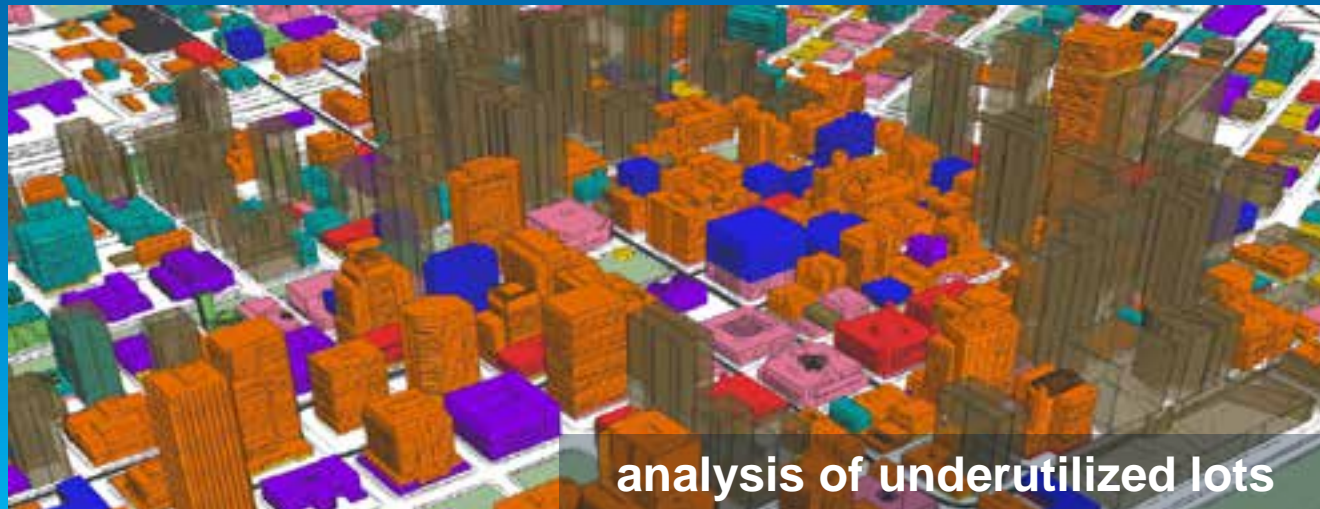
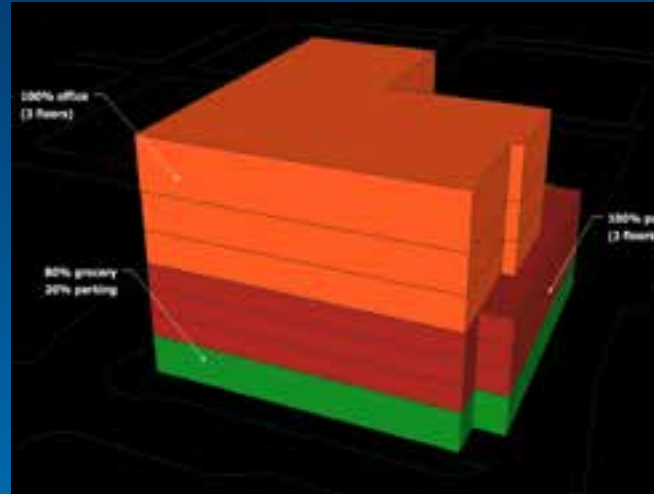
Zurich 2050



3D Enablement of Auckland Unitary Plan



Portland – 3D land use inventory



analysis of underutilized lots

Townsville - 3D city planning



Virtual Brisbane – modernizing city planning



Simulation and Defense

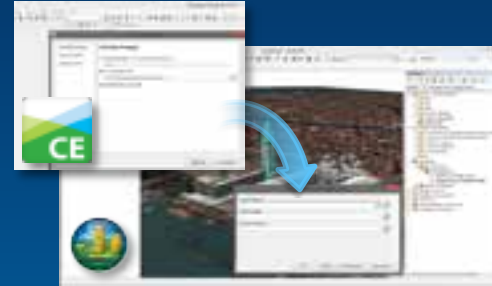


Entertainment



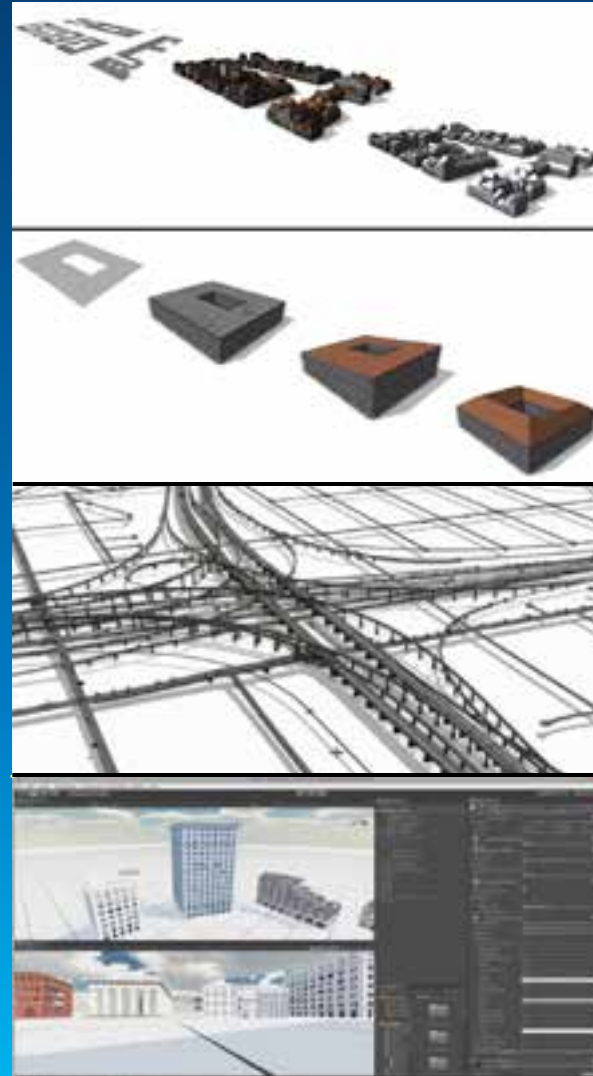
CityEngine 2013.1

- Rule packages
- SDK
- Improved Streets
- 3D plant library



CityEngine 2014.0

- Built-in Esri rule library
- Improved hole support
- Improved streets
- Unity example plugin



Demo - CityEngine 2014

- **Streets**
- **Esri rule library**

Share your 3D Scenes

3D models in the browser and on mobile devices

Share your ArcScene
Project as a Web Scene
“Clip and Share”

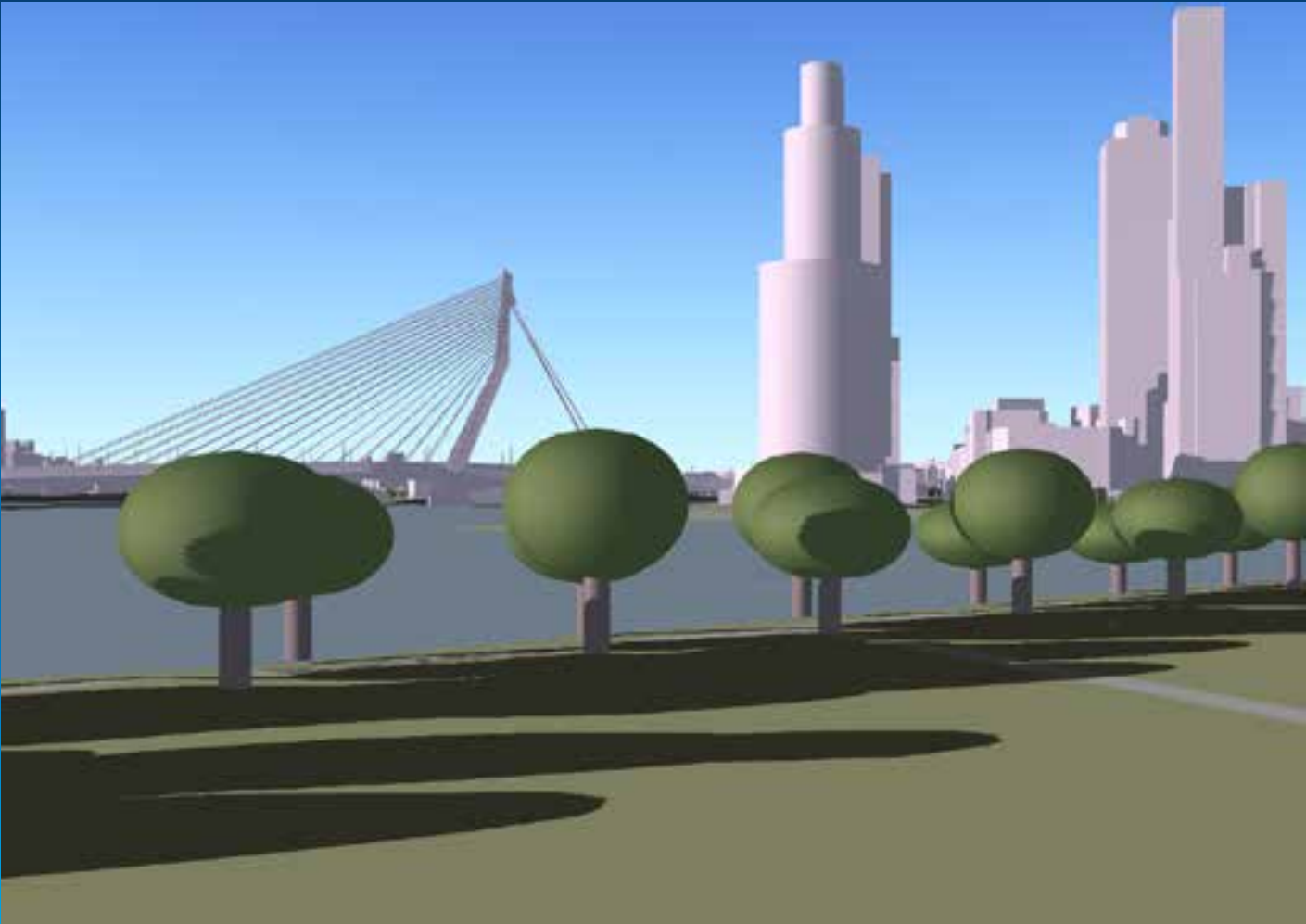


Stream 3D Scenes to
the Browser and Mobile
Devices



*Supporting Defense, Local Government, Scientists, Urban Planners,
Facilities Managers, Geologists, Architects, Landscape Planners...*

DEMO – Let's make a Web Scene...



Useful links

- **CityEngine trial**
 - <http://www.esri.com/software/cityengine>

- **Resources**
 - **Resource Center:**
<http://resources.arcgis.com/en/communities/city-engine/index.html>

 - **Forum:** <http://forums.arcgis.com>
 - **Ideas:** <http://ideas.arcgis.com>

- **Support**
 - <http://support.esri.com>

- **Training**
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Thank you...

- **Please fill out the session survey:**

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Paper – pick up and put in drop box



Understanding our world.