



ESRI

2013 Esri Europe, Middle East,  
and Africa User Conference  
October 23-25<sup>th</sup>, 2013 Munich Germany

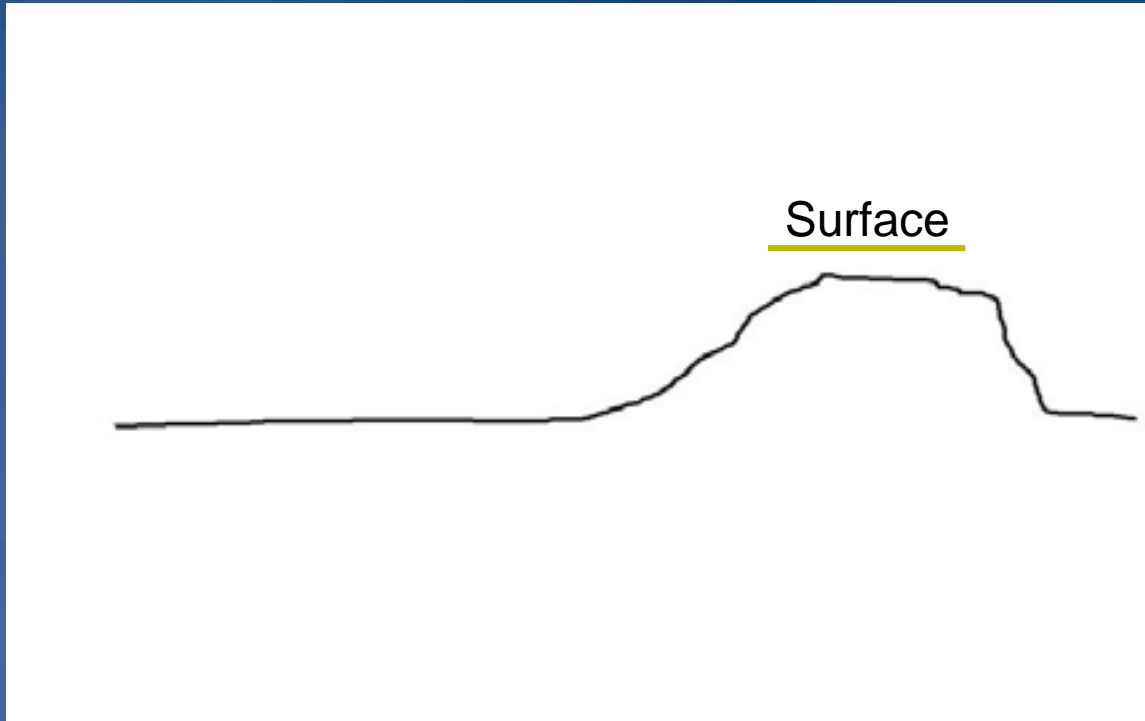
# 3D Analyst: An Introduction

A complete system for 3D GIS

Eric Wittner | Esri  
ewittner@esri.com

# Surface data

## *3D GIS information*

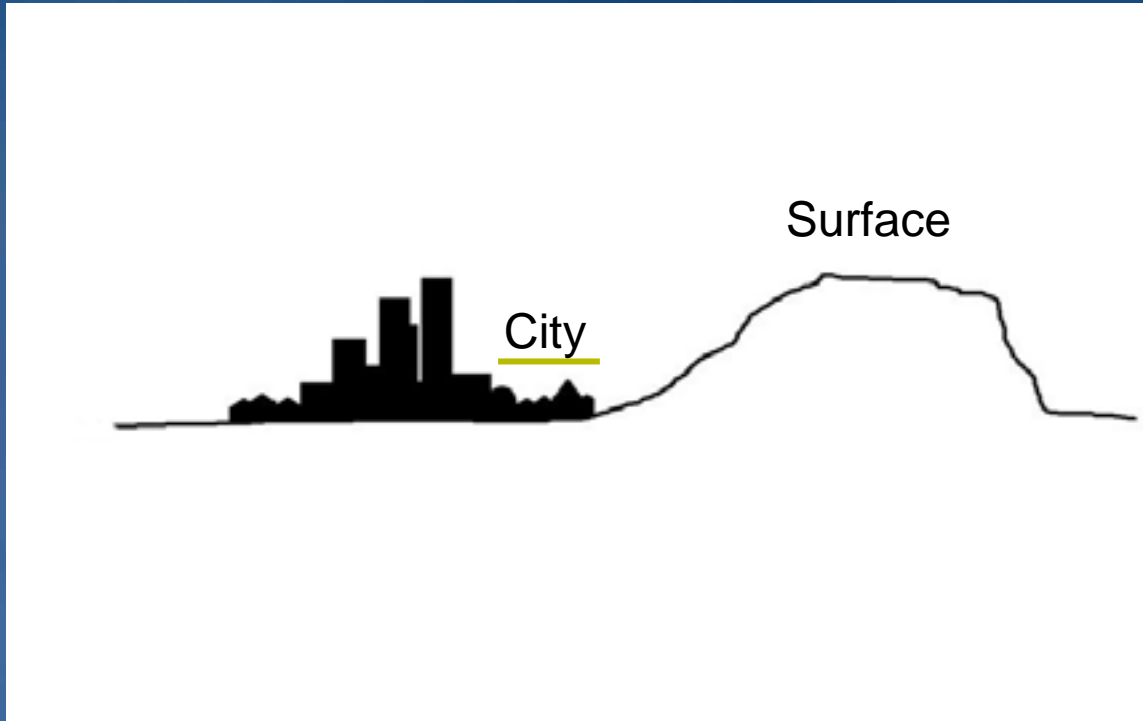


Surface data

- Civil engineers
- Defense
- Forestry
- Government

# City data

## *3D GIS information*



### Surface data

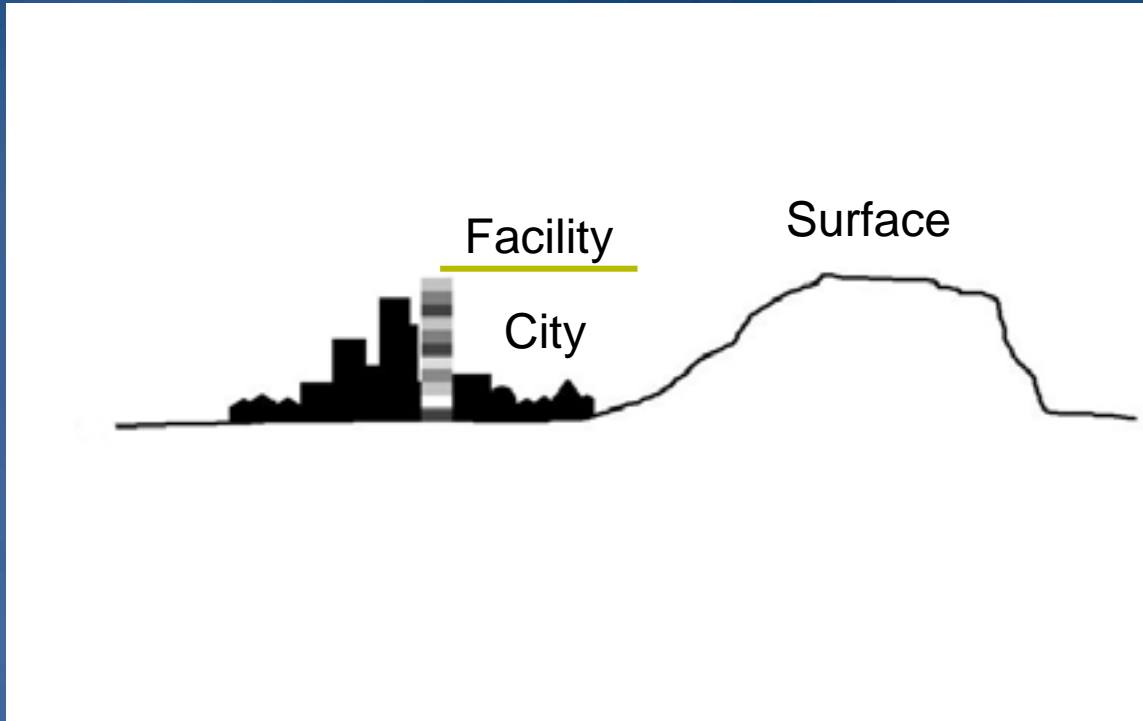
- Civil engineers
- Defense
- Forestry
- Government

### City data

- Planners
- Emergency
- Public safety

# Facility / campus data

## 3D GIS information



### Surface data

- Civil engineers
- Defense
- Forestry
- Government

### City data

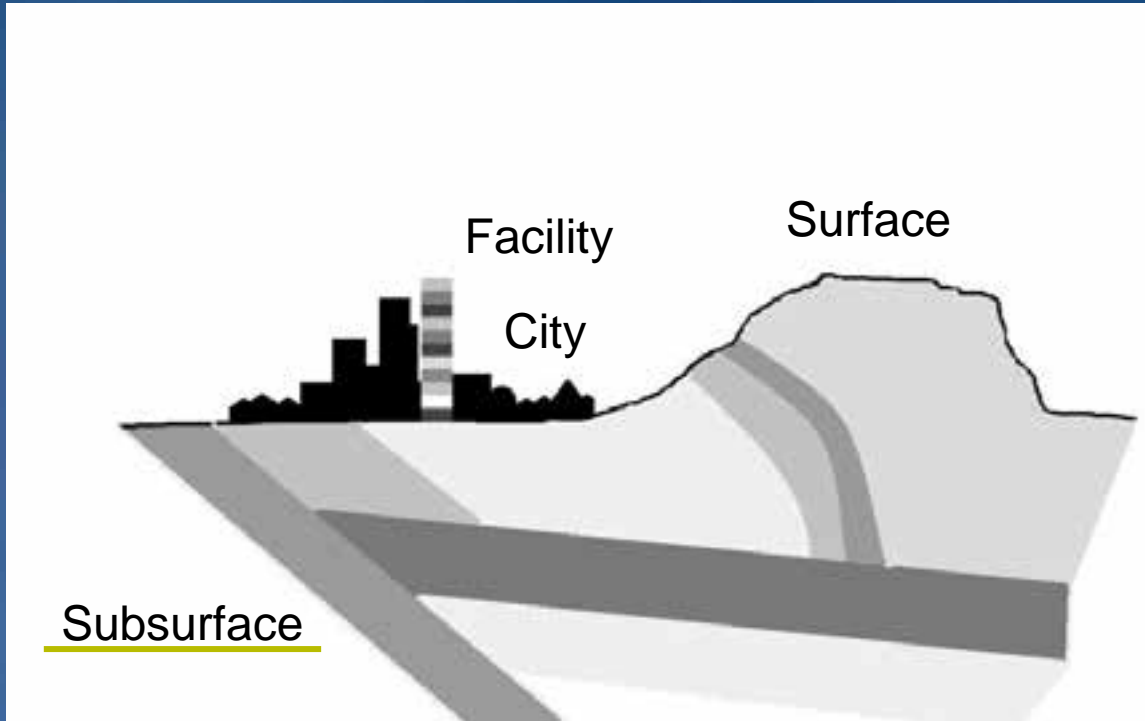
- Planners
- Emergency
- Public safety

### Facility data

- Facilities Managers
- Defense
- Universities

# Subsurface data

## 3D GIS information



### Subsurface data

- Geologists
- Oil&gas
- Mining

#### Surface data

- Civil engineers
- Defense
- Forestry
- Government

#### City data

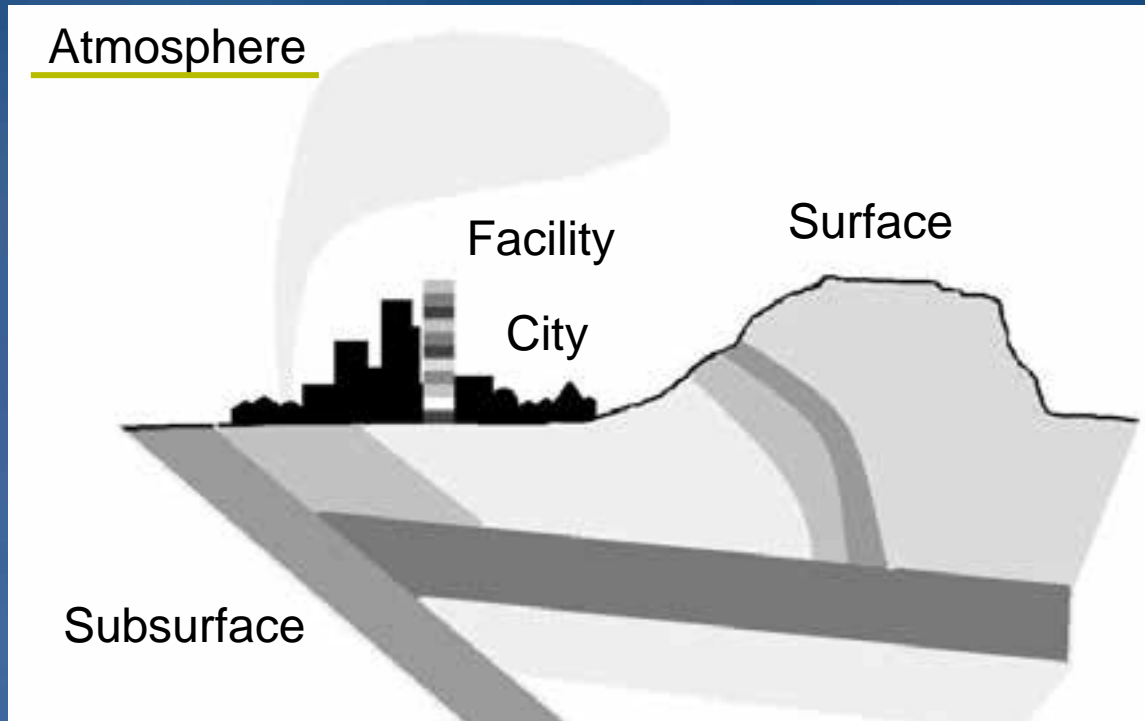
- Planners
- Emergency
- Public safety

#### Facility data

- Facilities Managers
- Defense
- Universities

# Atmospheric data

## 3D GIS information



- Subsurface data
- Geologists
  - Oil&gas
  - Mining

- Atmospheric data
- Scientists
  - Government

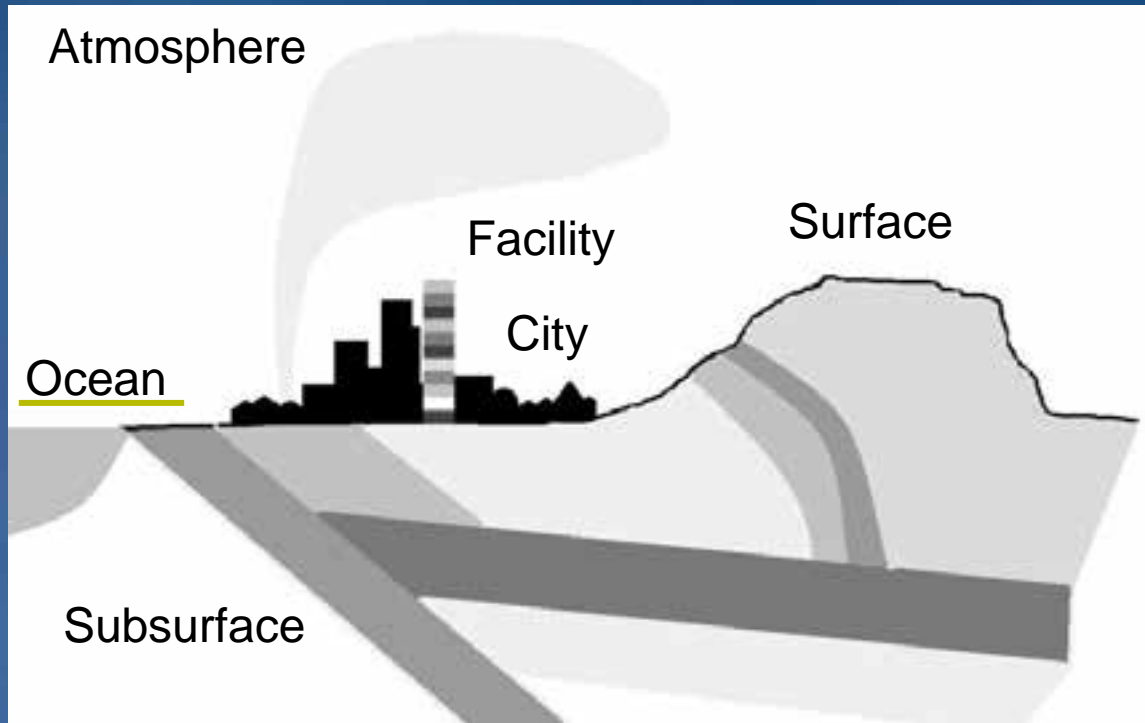
- Surface data
- Civil engineers
  - Defense
  - Forestry
  - Government

- City data
- Planners
  - Emergency
  - Public safety

- Facility data
- Facilities Managers
  - Defense
  - Universities

# Oceanic data

## 3D GIS information



- Subsurface data
- Geologists
  - Oil&gas
  - Mining

- Atmospheric data
- Scientists
  - Government

- Oceanic data
- Scientists
  - Government
  - Fisheries

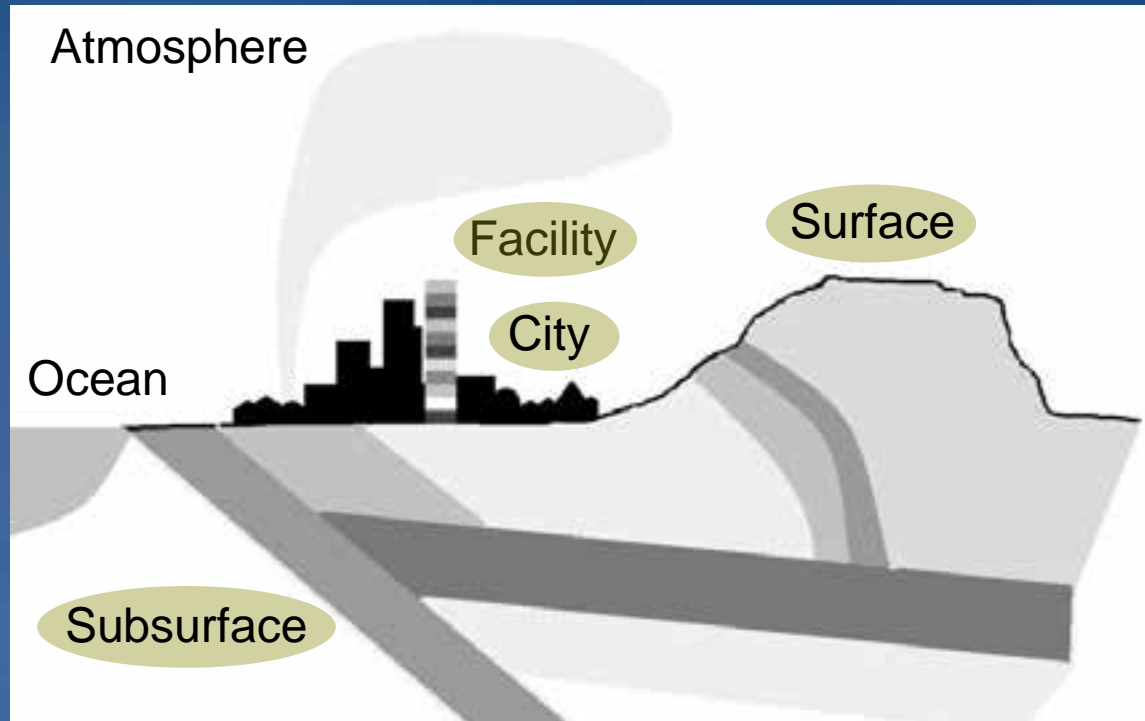
- Surface data
- Civil engineers
  - Defense
  - Forestry
  - Government

- City data
- Planners
  - Emergency
  - Public safety

- Facility data
- Facilities Managers
  - Defense
  - Universities

# ArcGIS is 3D

## 3D GIS information



- Subsurface data
- Geologists
  - Oil&gas
  - Mining

- Atmospheric data
- Scientists
  - Government

- Oceanic data
- Scientists
  - Government
  - Fisheries

- Surface data
- Civil engineers
  - Defense
  - Forestry
  - Government

- City data
- Planners
  - Emergency
  - Public safety

- Facility data
- Facilities Managers
  - Defense
  - Universities



# Demo

Phildelphia

# Welcome to the 3D family ...

Visualize  
Manage  
Analyze  
Share

**ArcGIS**

**CityEngine**

2D-to-3D

Edit

Share

**ArcGIS  
Online**



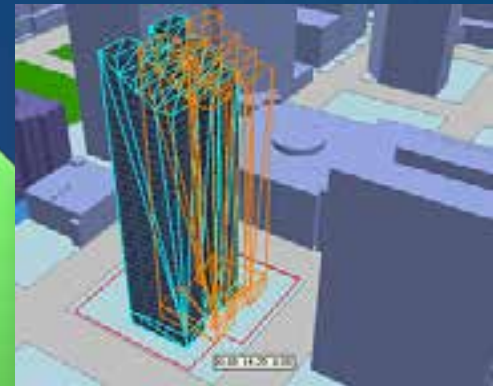
# ArcGIS

*Provides a complete system for 3D GIS*



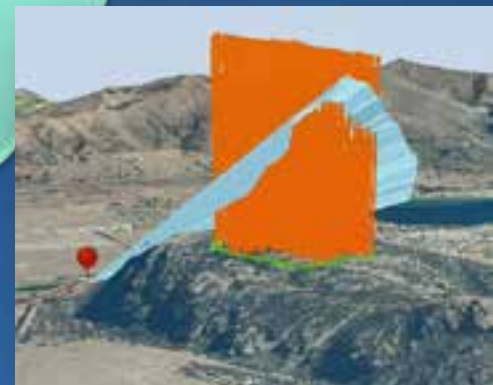
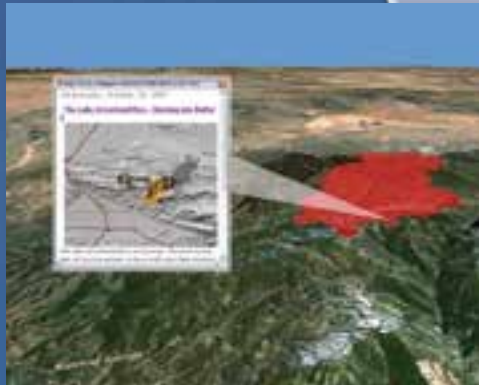
Visualize

Manage



Share

Analyze



Your GIS information in 3D

# Users of 3D GIS



# Local government

## 3D cities

**Visualize**

Manage  
Analyze  
Share



Topographic maps



Aerial photographs



Vector data



High resolution terrain

### Visual Impact



Photo realistic 3D buildings



Before



After

#### Partners:

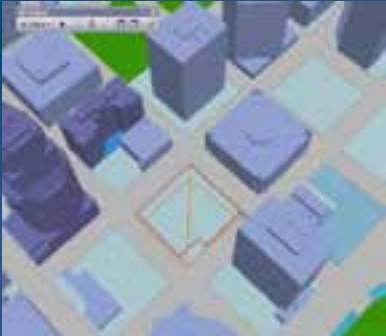
- Pictometry
- CyberCity3D
- Blom
- TeleAtlas
- VirtuelCity

**Providing 3D insight into your information**

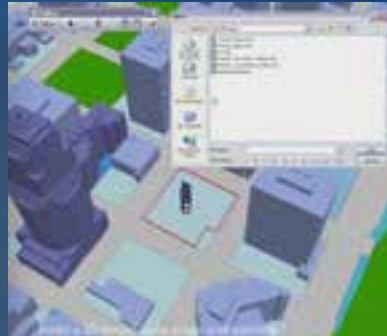
# Local government

## 3D cities

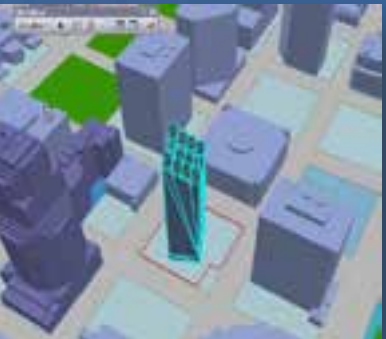
Visualize  
**Manage**  
Analyze  
Share



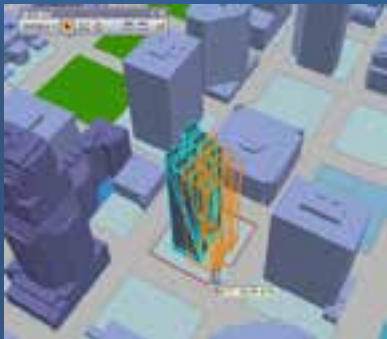
Create 3D city elements



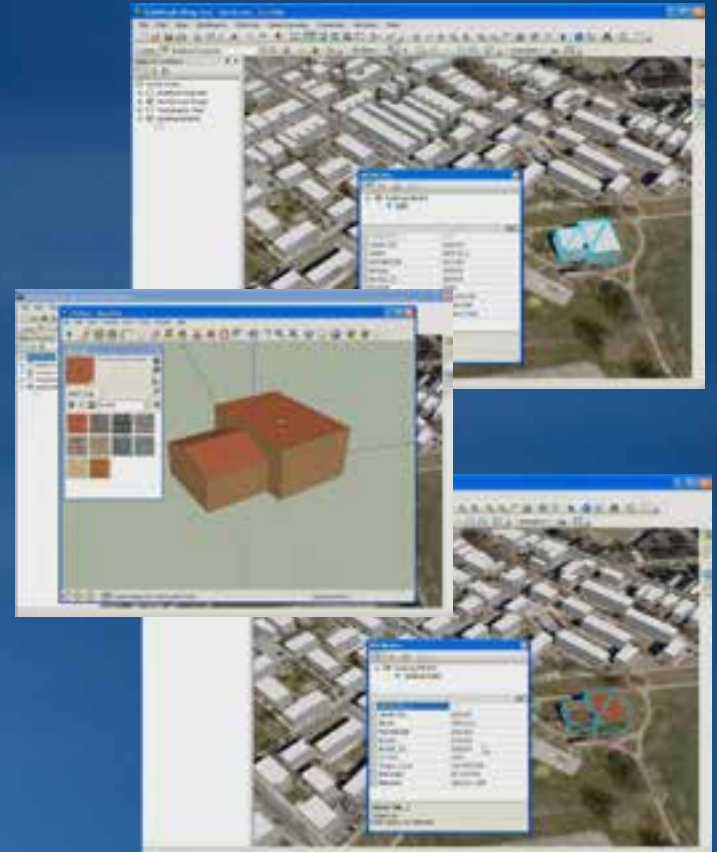
Import / replace buildings



Scale



Move, rotate



Export to COLLADA


Create, Build, and Manage GIS in 3D

# Local government

## *3D cities*

Visualize  
Manage  
**Analyze**  
Share



Maximum building height 



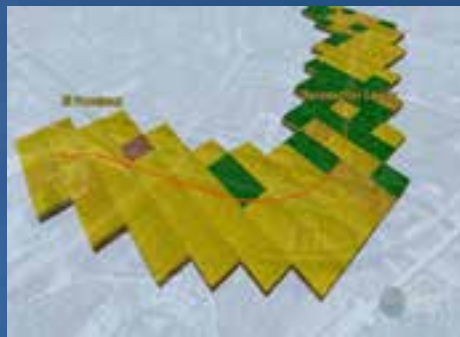
Skyline analysis



Blast impact 



Volumetric Shadows / glare 



Subsurface analysis



3D land use planning

Enabling better decisions leveraging 3D

# Local government

## *Virtual cities*

Visualize  
Manage  
Analyze  
**Share**

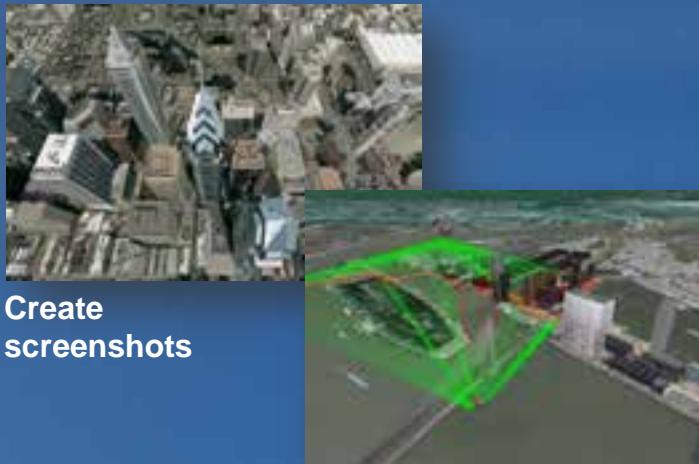


### WebGIS

- Publish Virtual Cities as 3D services
- KML



### Post to ArcGIS.com



Create  
screenshots

Export video animations



Mobile 3D

**Communicating GIS using 3D**



# Facilities Management

## Campus model

**Visualize**

Manage  
Analyze  
Share



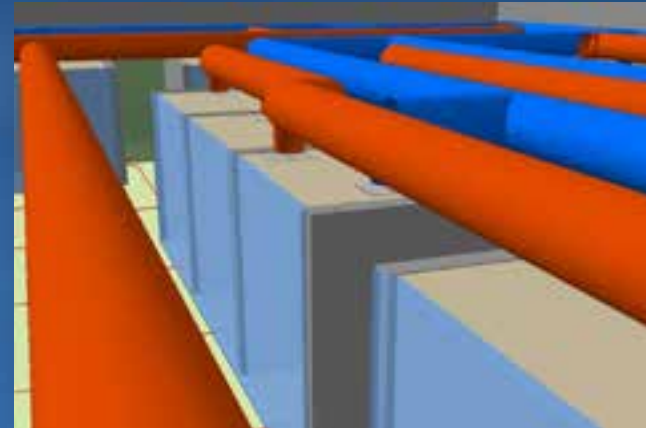
Campus



3D transportation network



Spaces within a building



Interior assets

Partners:

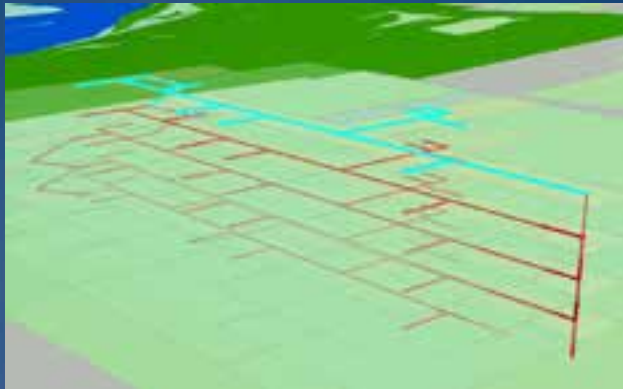
- PenBay Media
- Archibus
- Woolpert

**Providing 3D insight into your information**

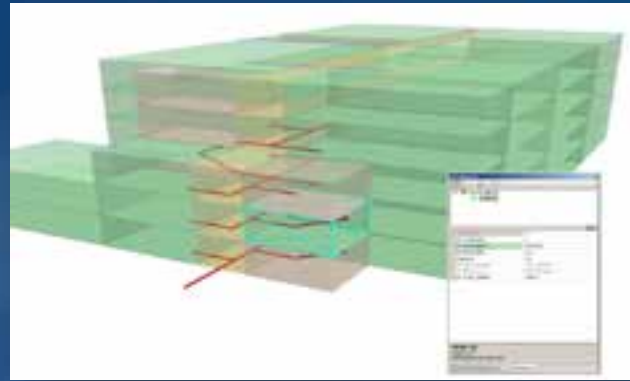
# Facilities Management

*Campus model*

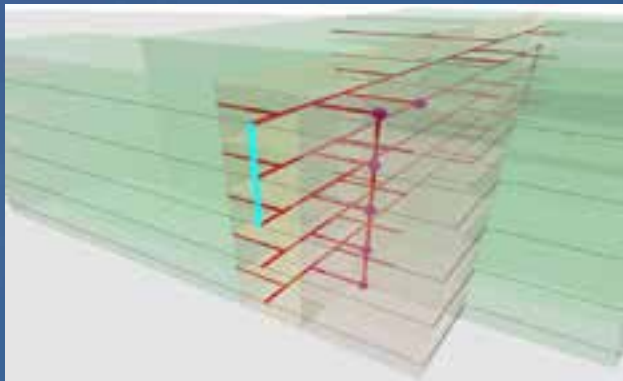
Visualize  
**Manage**  
Analyze  
Share



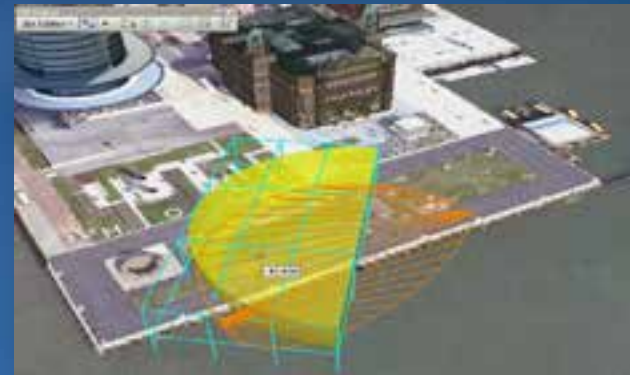
Add a new floor



Update room attributes in 3D



Edit, store vertical elements



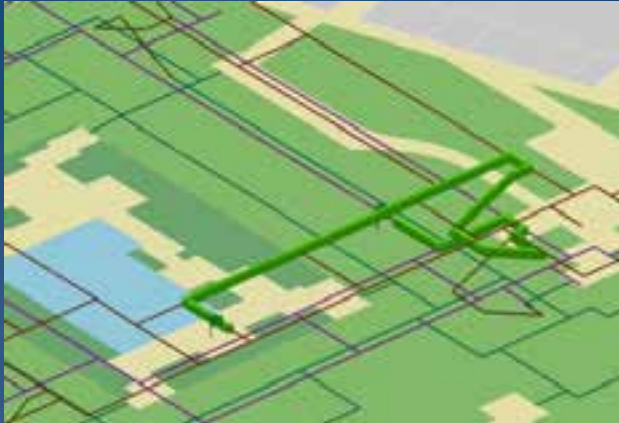
Add security cameras

**Create, Build, and Manage GIS in 3D**

# Facilities Management

## *Campus model*

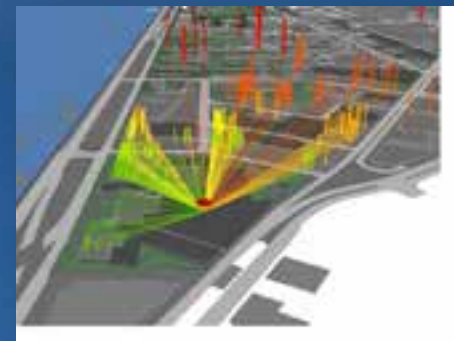
Visualize  
Manage  
**Analyze**  
Share



Interior transportation networks 



Interior direct sunlight 



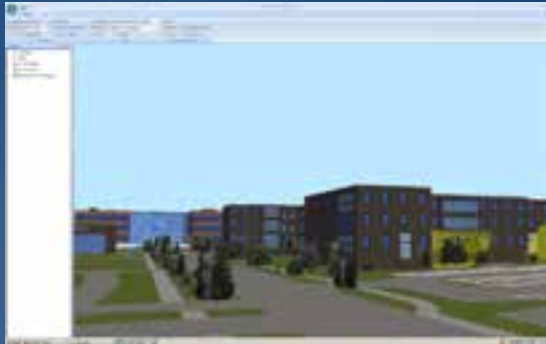
Space management: Parking distance analysis (MIT campus)

Enabling better decisions leveraging 3D

# Facilities Management

## Campus model

Visualize  
Manage  
Analyze  
**Share**

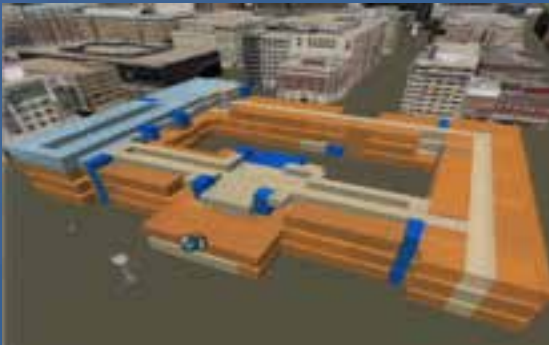


### WebGIS

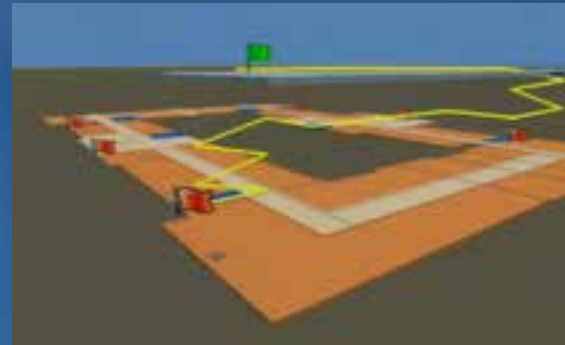
- Publish Campus as 3D services
- KML



### Post to ArcGIS.com



### Create screenshots



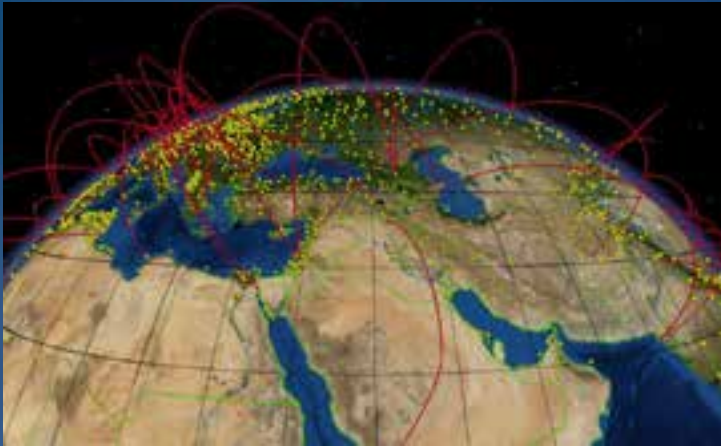
### Export video animations

## Communicating GIS using 3D

# Defense / Public Safety

**Visualize**

Manage  
Analyze  
Share



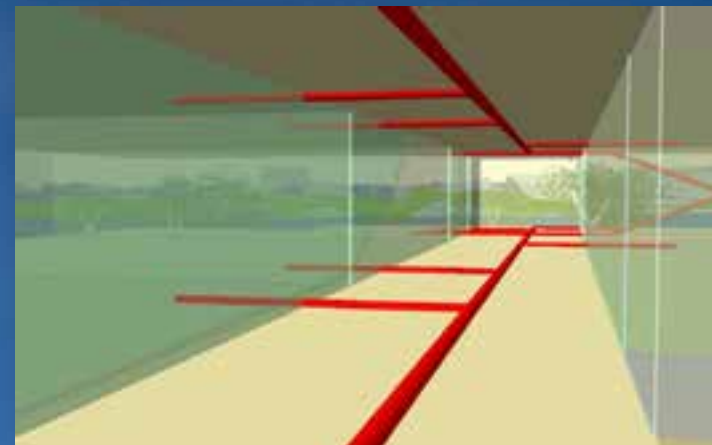
Global



City



Regional

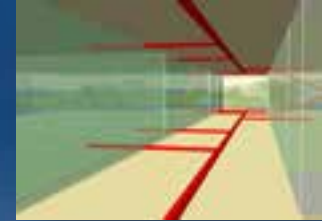


Building interior

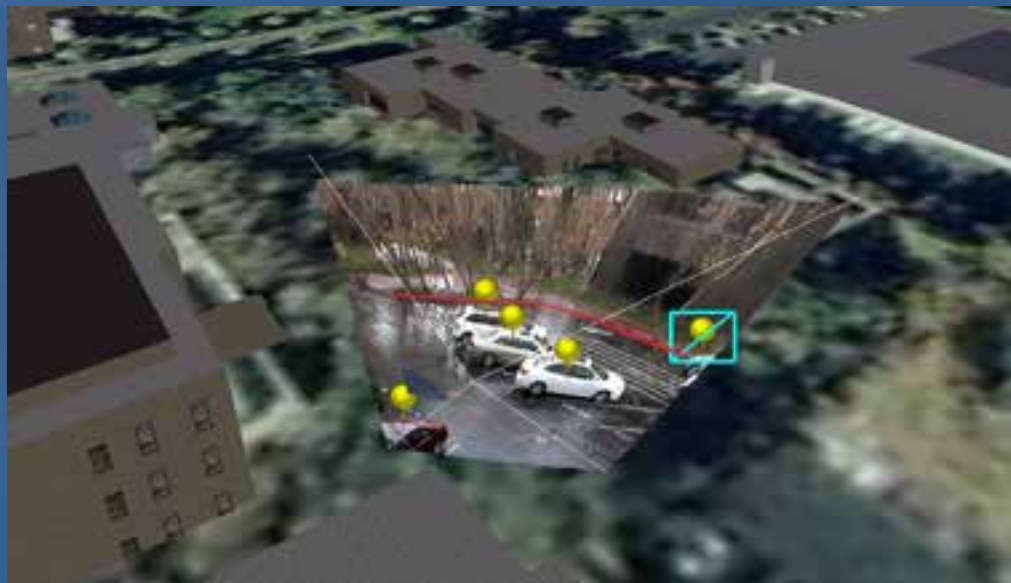
**Providing 3D insight into your information**

# Defense / Public Safety

Visualize  
**Manage**  
Analyze  
Share



GIS data at any scale

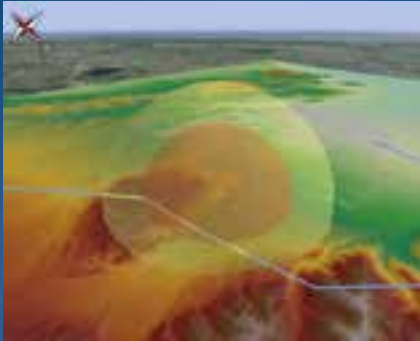


Add new features in an operational environment

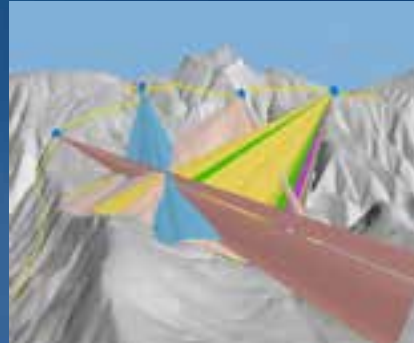
Create, Build, and Manage GIS in 3D

# Defense / Public Safety

Visualize  
Manage  
**Analyze**  
Share



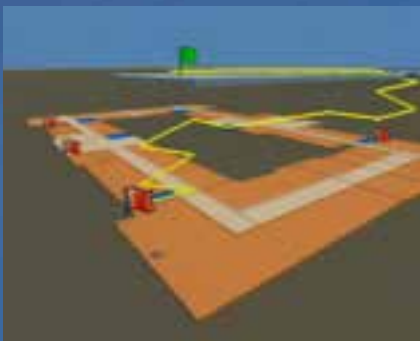
Threat domes 



3D viewshed 



Sniper / Spotter coverage 



Emergency 3D routing



Airspace infringement

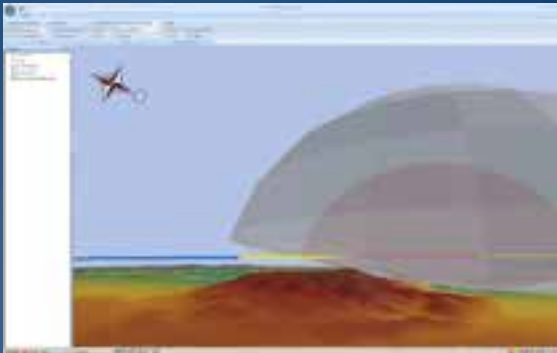


Security camera coverage 

Enabling better decisions leveraging 3D

# Defense / Public Safety

Visualize  
Manage  
Analyze  
**Share**

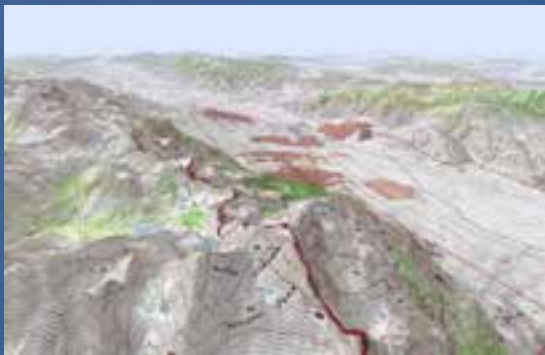


WebGIS

- Publish as 3D services
- KML



Post to ArcGIS.com



Create screenshots



Export video animations

**Communicating GIS using 3D**



# Civil engineering / Natural resources

**Visualize**

Manage  
Analyze  
Share

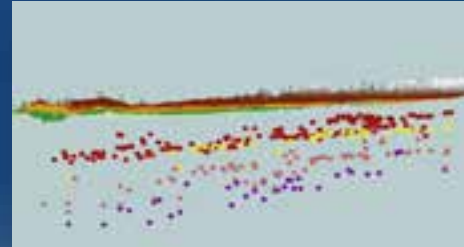
Lidar data



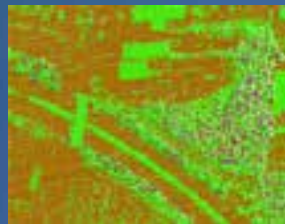
Point cloud



Intensity



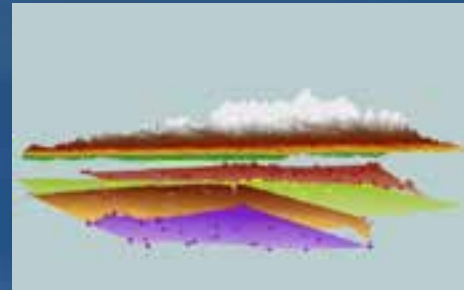
Well data



Class codes



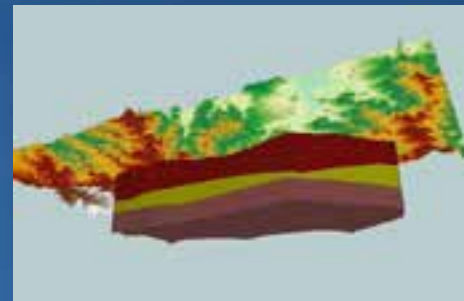
Contours



Horizons



Terrain dataset



Subsurface volumes

Partners:

- QCoherent
- Overwatch-VLS
- Optira
  
- Aquaveo

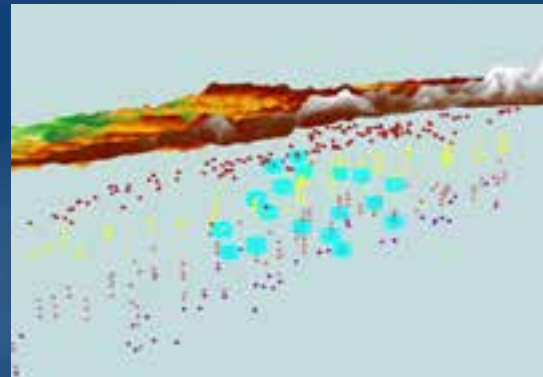
**Providing 3D insight into your information**

# Civil engineering / Natural resources

Visualize  
**Manage**  
Analyze  
Share



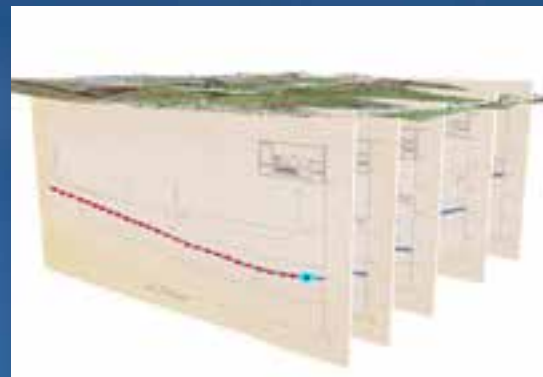
Lidar in terrain dataset



Manage subsurface well points



Profile lidar points



Create subsurface  
horizons



TIN editing

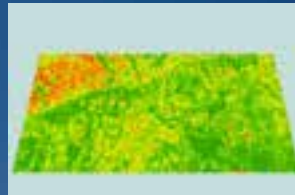
**Create, Build, and Manage GIS in 3D**

# Civil engineering / Natural resources

Visualize  
Manage  
**Analyze**  
Share



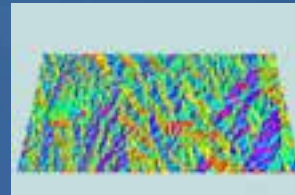
Elevation



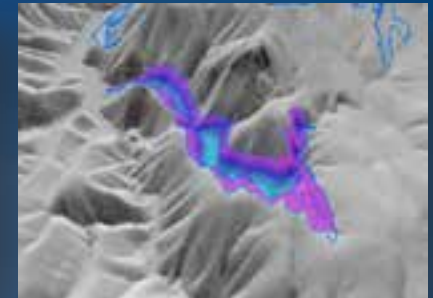
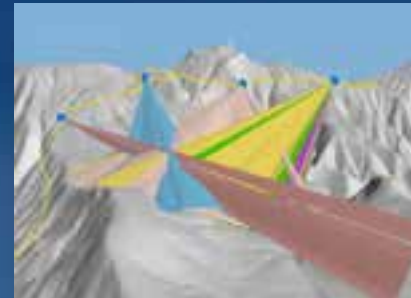
Slope



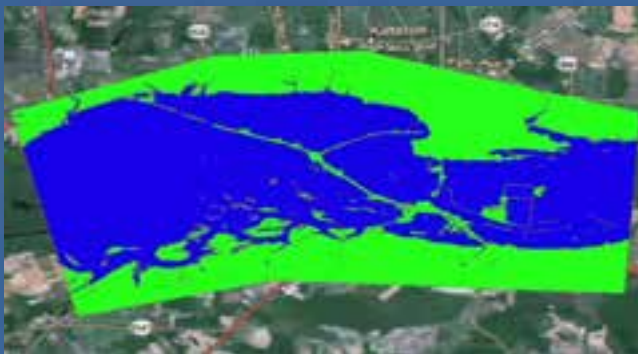
Hillshade



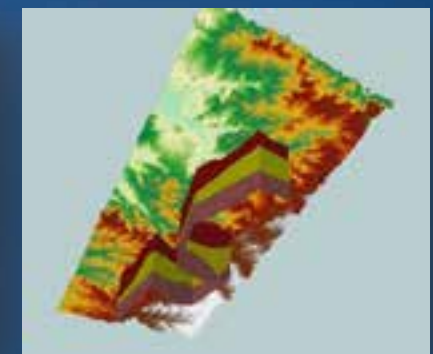
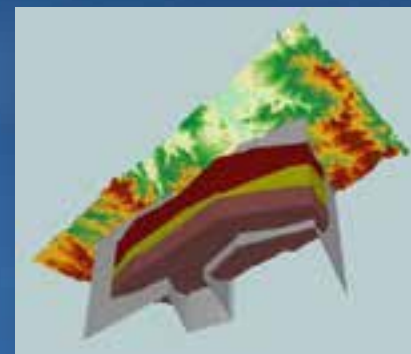
Aspect



3D Viewshed 



Flood plain

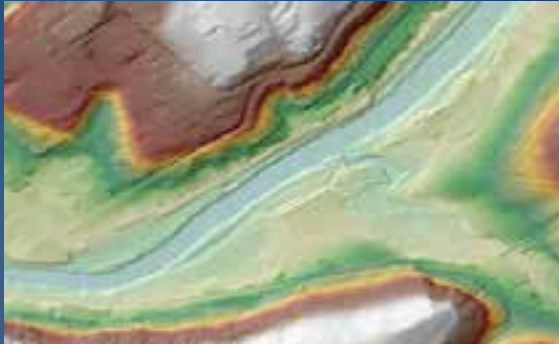


Fence diagrams 

Enabling better decisions leveraging 3D

# Civil engineering / Natural resources

Visualize  
Manage  
Analyze  
**Share**



## WebGIS

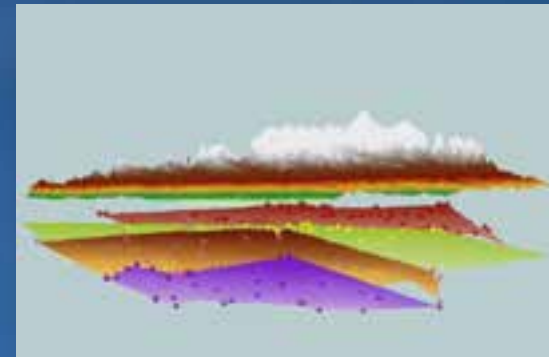
- Publish as 3D services
- KML



## Post to ArcGIS.com



## Create screenshots



## Export video animations

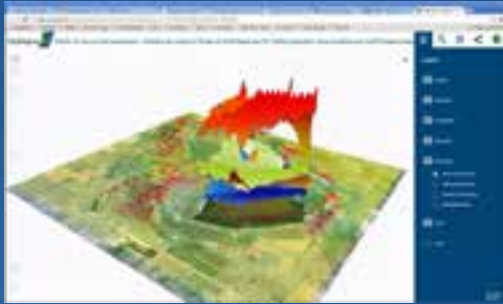
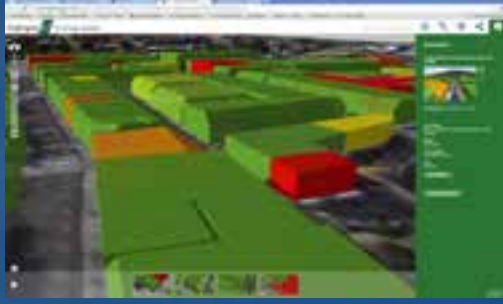
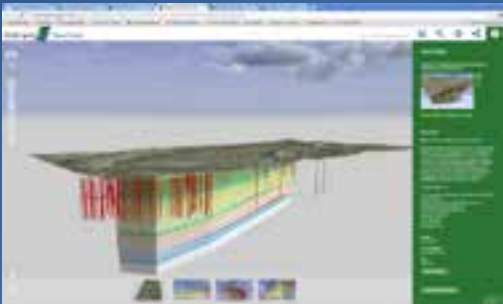
**Communicating GIS using 3D**



ESRI

# What new in 10.2

# Share 3D Scenes

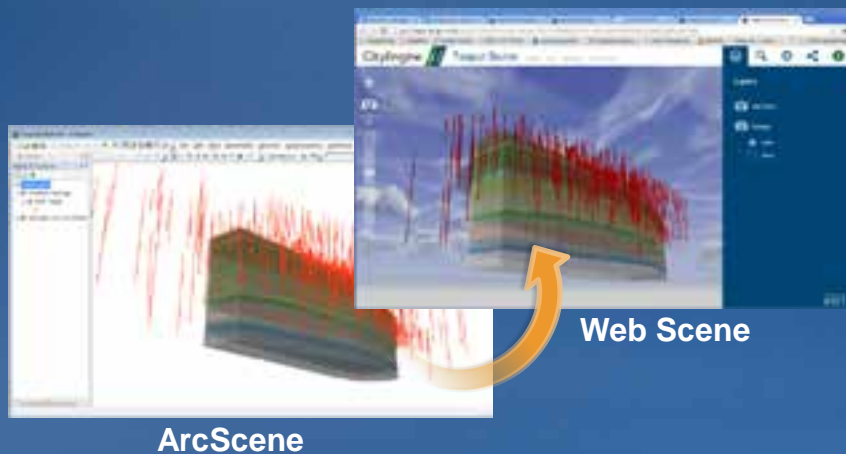


# Share 3D Scenes

*Publish existing 3D content to the web*

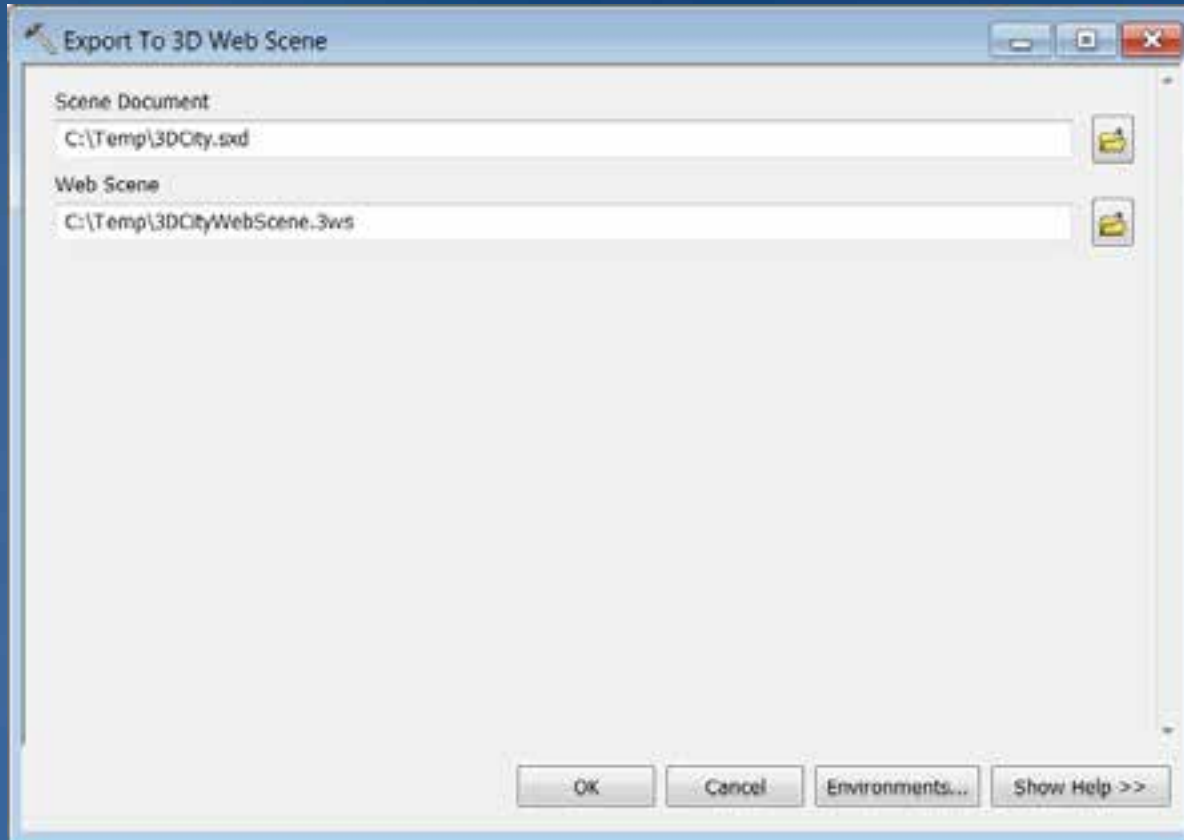
## Share your ArcScene document as a Web Scene

“Clip and Share”



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

# Export to 3D Web Scene





## ArcScene Layer Types

- Feature layer (point, line, polygon and multipatch geometries)
  - Layer extrusion or 3D symbology
- Raster layer
- TIN layer

Note: LAS dataset and Graphics layer **cannot** be exported to 3ws.

## ArcScene document properties

- Scene coordinate system
- Area of Interest (AOI)
- Bookmarks
- Group Layers
- Vertical exaggeration

# Demo

Wind and deposition

# Creating 3D objects in ArcGIS

In ArcGIS 10.1

Via symbology (eg: point symbols)

Using GP tools (eg: Buffer 3D)

Importing external models (eg: COLLADA)

In ArcGIS 10.2

Using pre-authored CityEngine rule packages

*Rules*



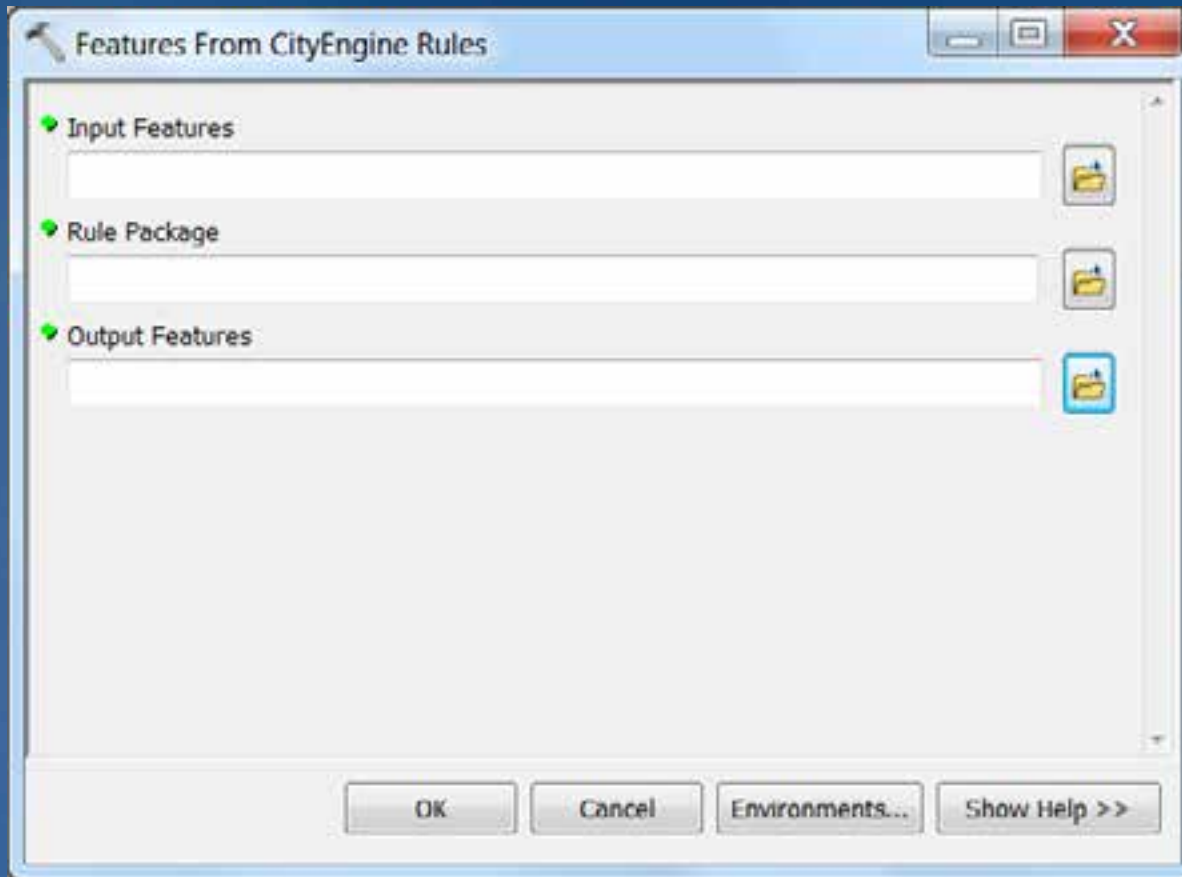
*Rule  
Package*



*Attributes*

*Geometry*

# Features From CityEngine Rules

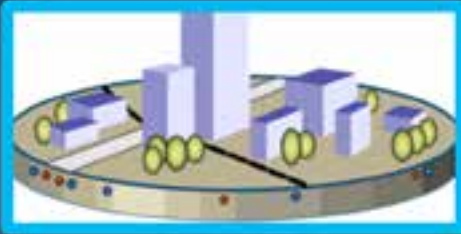


# ArcScene Layer Types

- **At 10.2, Polygon source geometry only**
  - Buildings (real and imagined)
  - Zoning regulations
  - ...
- **Line support (eg: for streets) is coming later**
- **Until then, export features from CityEngine**

# 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

# ArcGIS for 3D Cities solution

*Create, manage and utilize your 3D city model*

## Benefits:

- Database driven 3D City model
- Based on Esri's 3D City Information Model
  
- Supports different themes / views on the city



GDB

Buildings  
Transportation  
Installations  
Utilities  
Zoning  
Landuse  
Land cover  
Subsurface  
Atmosphere



- Comes with ready use apps

# ArcGIS for 3D Cities Apps



*For city administrations: urban planning, emergency response, transportation facilities, utilities departments*



# ArcGIS 10.2 – CityEngine 2013

## Bringing easy 3D Content Creation to ArcGIS

### ArcGIS 10.2

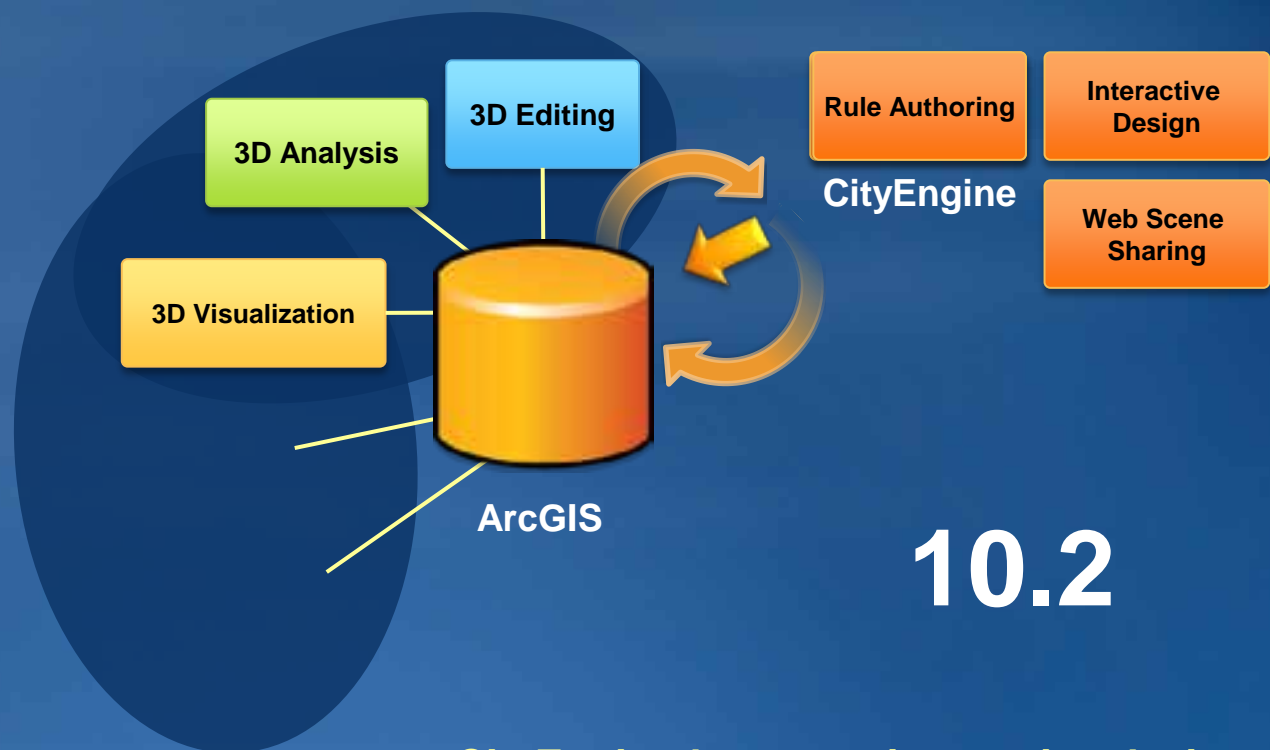
- 2 CityEngine-based GP tools

### CityEngine 2013

- Rule Packages

### Solutions

- 3D City Information Model
- Gallery of building and tree types



# 10.2

- CityEngine becomes interactive design and rule authoring environment

# ArcGIS 10.2 & CityEngine 2013

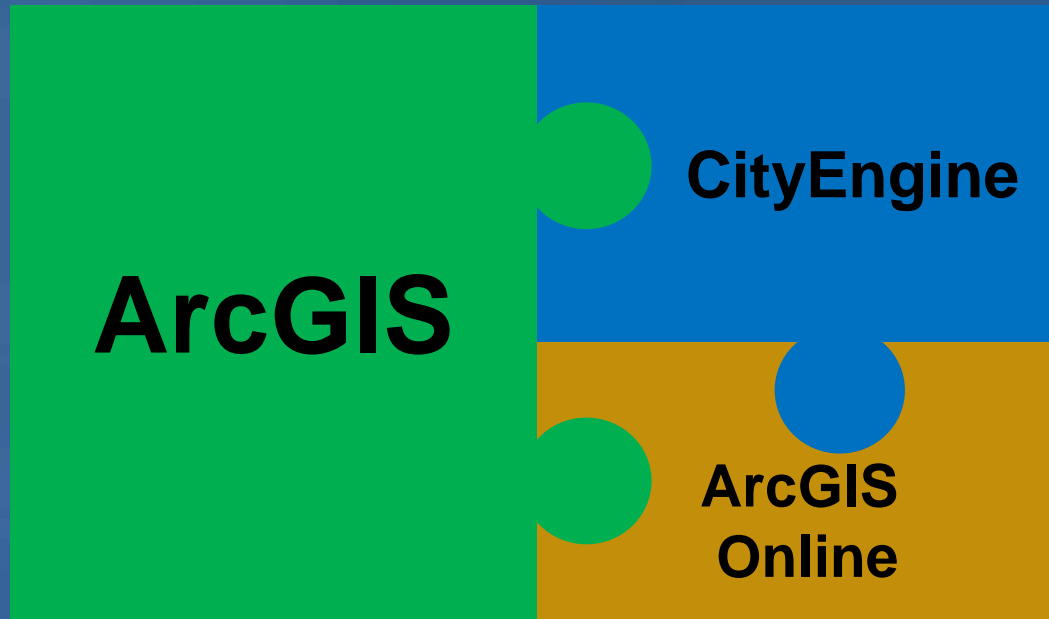
Store  
Analyze  
Visualize  
2D-to-3D  
Share

**ArcGIS**

**CityEngine**

**ArcGIS  
Online**

2D-to-3D  
Edit & Design  
Share



# Share your 3D Scenes

- 3D models in the browser and on mobile device

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



## Stream 3D Scenes to the Browser and Mobile Devices (Q2 2014)



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

# Web scenes get better and more integrated

Now

CityEngine Web Scene in Browser



Future

online & on-premise solution for 3D

ArcGIS Web Scene in Browser



ArcGIS Web Scene on devices



3D Runtime for Developers



focused apps

+ 3D Service



# Useful links

## CityEngine 2013

### – Support

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

### – Marketing

- Product: <http://www.esri.com/software/cityengine/index.html>
- Resource Center: <http://resources.arcgis.com/content/cityengine/about>  
online tutorial, videos, blog, forum, templates
- Forum: <http://forums.arcgis.com>
- Ideas: <http://ideas.arcgis.com/ideaList?c=09a300000004xET&category=Esri+CityEngine>

### – Training

- <http://training.esri.com>



Understanding our world.