3D across the ArcGIS Platform

Chris Andrews | 3D Product Manager

The experience of GIS is changing

The GIS of the future is

- Mobile
- Immersive
- Visually compelling
- Real time/time aware
- Consumerized/User friendly
- Deep and Smart
- Scalable and Distributed

3D is the common visual and analytical experience for tomorrow's GIS

Massive amounts of new data available

- Lidar from drones, trucks, backpacks, airplanes, and satellites
- High resolution, global-scale mesh created from aerial and satellite imagery
- Spherical and oblique imagery from consumer and industrial devices
- Underground information from millions of boreholes
- Large processing pipelines from Vexcel, Harris, and others
- Potential of IoT and indoor location

UAV

Tiled Mesh

Indoor

BIM

IoT

Oblique

4D

LiDAR

FMV

Spherical Imagery

Core 3D Capability

Anywhere In Any Environment

- Use 2D and 3D GIS in a single GIS workflow
- Reuse dynamic services across clients
- Securely collect, manage, curate 3D data
- Conduct analysis across real-time and historical data
- Create tailored experiences for different types of users

Cross-platform | Open | Accessible

Desktop | Professional 3D GIS

Powerful 2D/3D desktop authoring and data management

- 3D streaming for global and local scenes
- Rich spatial analysis for advanced 3D workflows
- LiDAR classification, feature extraction and editing
- BIM (IFC) and KML (KMZ) interoperability support
- ArcGIS Pro SDK for Microsoft .NET to extend workflows

Advanced authoring tool for Urban Design

- Interactive design/modeling tools
- Procedural rule authoring
- Dynamic 3D streets and blocks
- Virtual reality with ArcGIS 360 VR

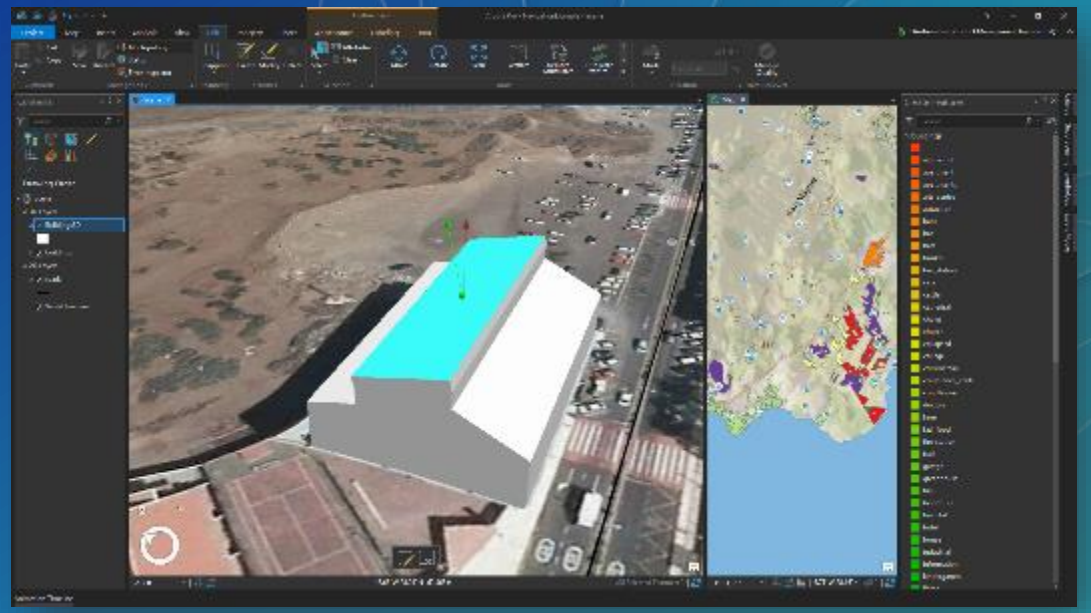
ArcGIS Extensions

- 3D Analyst
- Spatial Analyst
- Network Analyst
- Data Interoperability

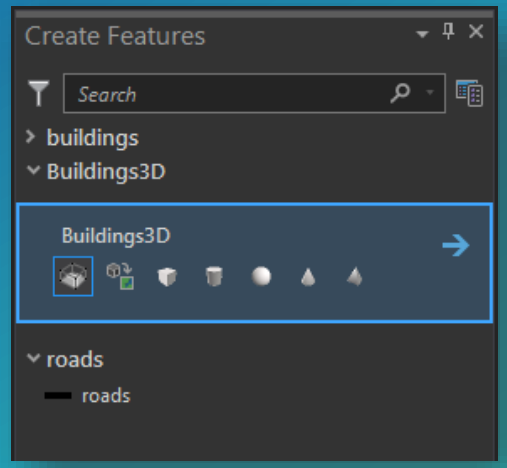
ArcGIS Pro | 3D navigation

- Underground navigation
- 3D navigation control
- Dynamic view linking 2D-3D or 3D-3D

ArcGIS Pro | 3D editing

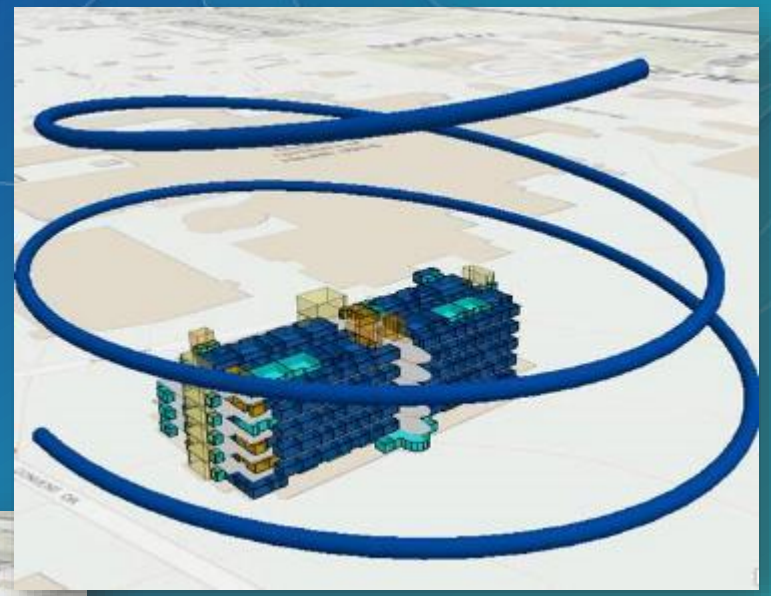


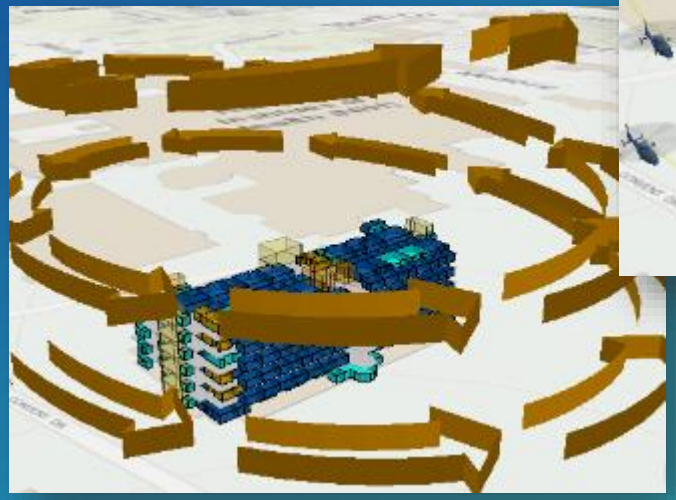
- Create new 3D objects
- Geometric shapes
- Snap to scene layers
- Apply procedural rules
- Use standard OBJ, DAE formats



ArcGIS Pro | 3D cartography

- Geometric Effects in 3D
- Advanced cartographic options
  - Military, Scientific





ArcGIS Pro | Storytelling with Animation

- Create rich animations with 3D content, overlays
- Use Range and Time
- Screen overlays
  - Placement
  - Text and imagery content
  - Timing
- Use geodesic paths

CityEngine 2017 | New capabilities

Scenarios

Local Edits

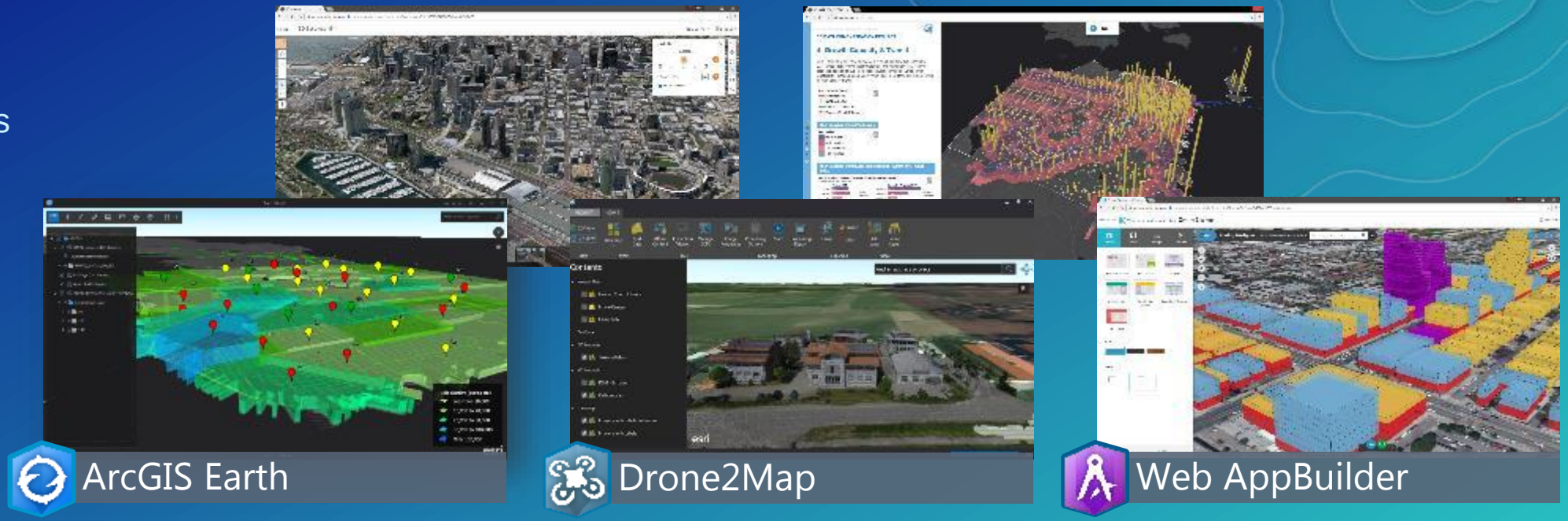
Context Queries

CGA Enhancements for Zoning

3D Measure

3D Apps

3D Tools For The Field, Office, and Community



ArcGIS Earth	Easy-to-use 3D data exploration for Enterprise users
Drone2Map	Streamline the creation of professional imagery products from drones
Web Scene Viewer	View 3D maps in any standard web browser
Web AppBuilder	Build powerful 3D GIS apps without writing a single line of code
Story Maps	Combine 3D maps with narrative text, images, and multimedia content

ArcGIS Earth | 1st Year

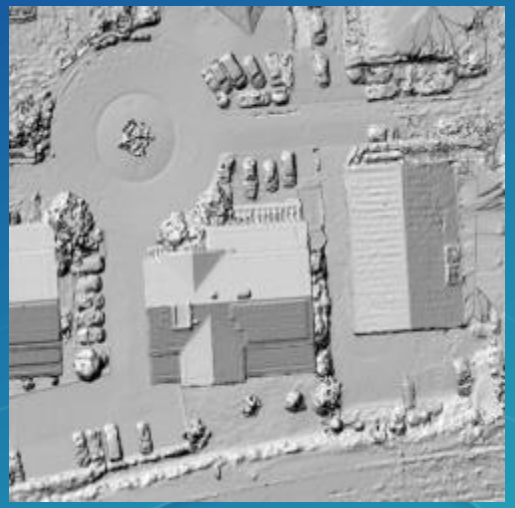
- Earth launched in production Jan 2016
- Focus on innovation, agility
  and customer feedback
- Releasing quarterly
  - 4 releases since UC 2016
- Free for download

ArcGIS Earth | Consistent experience for desktop users

- Browse Online/Enterprise
- Authenticate with PKI, IWA
- Add local data
- Navigate
- Use KML
- Configure and personalize

Drone2Map | Create 2D and 3D products from drone imagery

Orthomosaics



Digital Surface Models

Point Clouds and Meshes

Smart Inspection

More Apps

Extending Industry Specific Workflows

Field

- Workforce
- Navigator
- Collector
- Survey123
- Drone2Map

Office

- ArcGIS Earth
- Explorer
- Maps for Office
- Insights
- Maps for Adobe Creative Cloud
- GeoPlanner
- Operations Dashboard
- Maps for SharePoint

Community

- Photo Survey
- Story Maps
- Open Data
- Quick Report
- Crowdsource

Enterprise

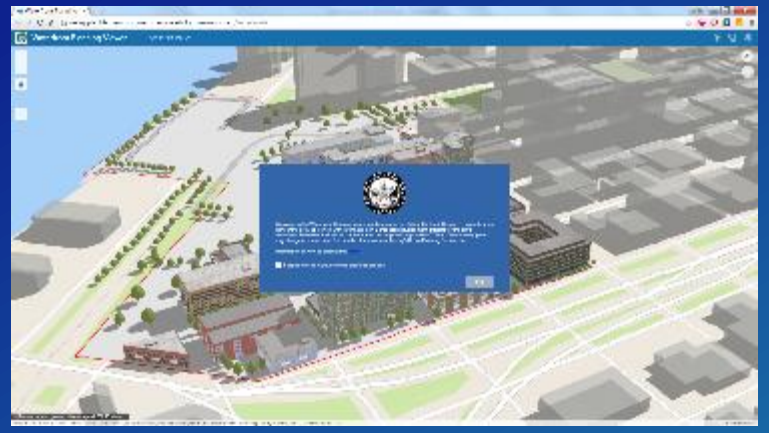
Hosted 3D In The Cloud and/or On-Premise

Enterprise data and services

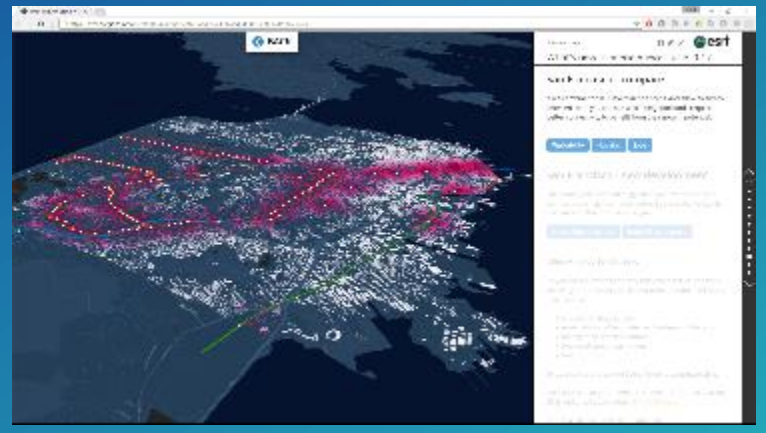
- Web Scene
  - Vehicle for cross-platform 3D capability
  - Collection of layers, environment settings, slides, animation
  - Essential for 3D apps on any platform or experience
- Scene Layer
  - Scalable cache of graphics, styles, and attributes
  - 3D Objects, 3D Points, Integrated Meshes, Point clouds

ArcGIS Online	Content and services for sharing ideas in 2D and 3D
ArcGIS Enterprise	Scalable 2D/3D enterprise content distribution and geoprocessing
GeoEvent Server	Connect and manage real-time information (IoT)

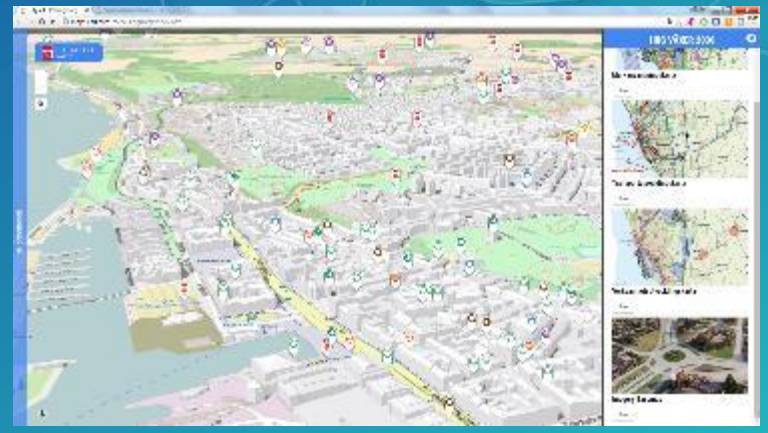
More ways to use scenes



Web AppBuilder



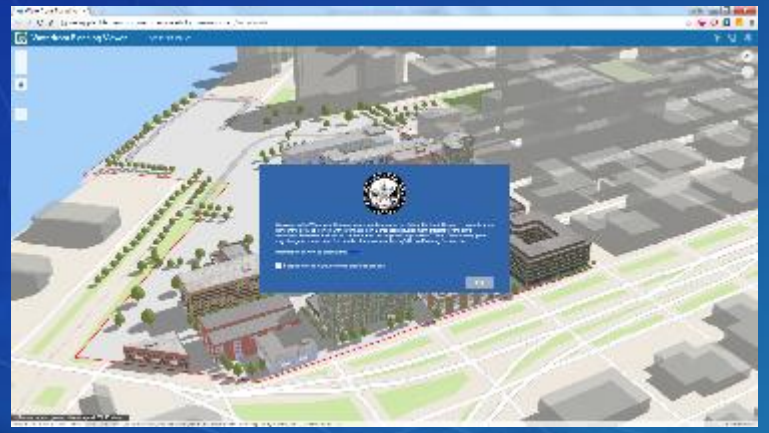
Story Maps



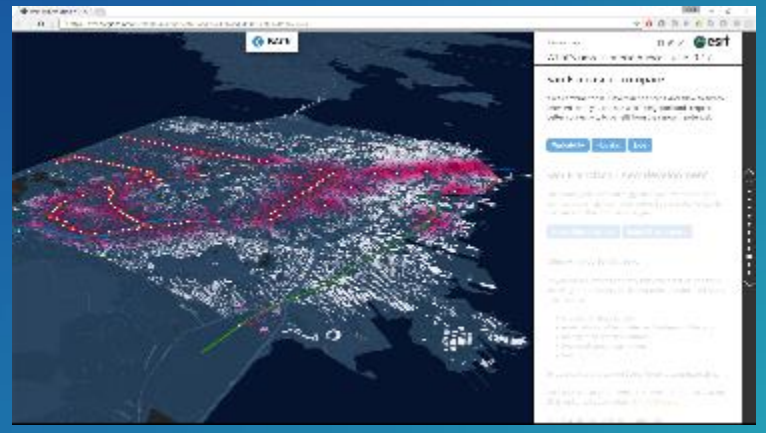
JS API Custom apps

3D in JavaScript | From API to configurable apps

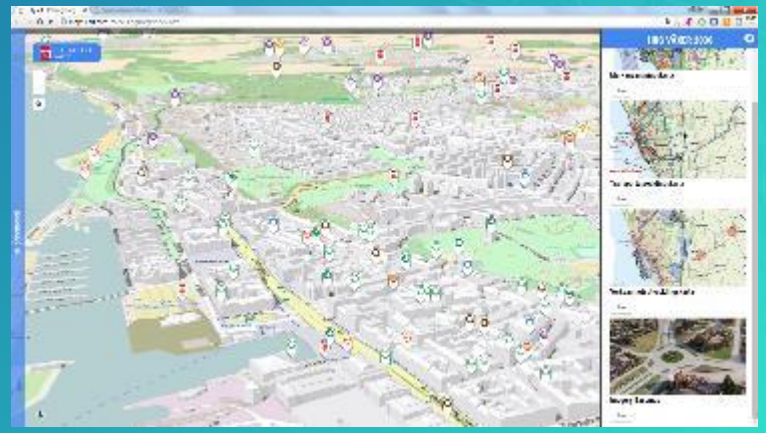
- WebGL 3D experiences that run in a browser with no plug-in
- Customize, configure, or use out-of-the-box experiences
- Combine 2D and 3D content from your Organization with Living Atlas data



Web AppBuilder



Story Maps



JS API Custom apps

Standards

Enabling customers & partners through sharing and integration

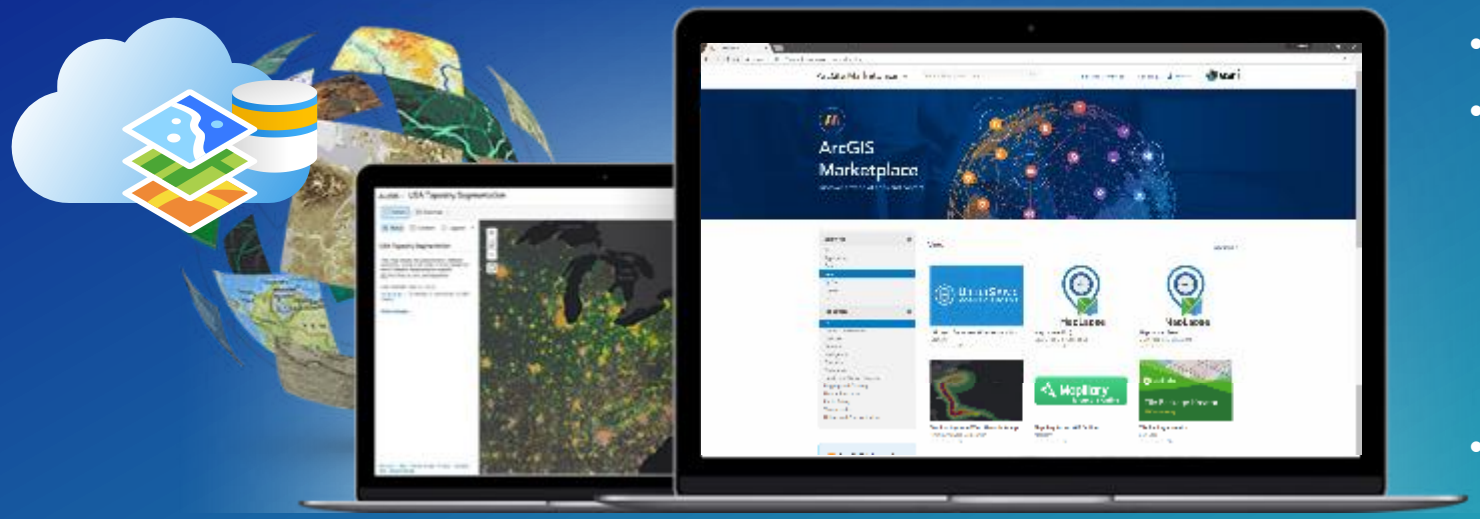
Open Software, Standards and Data enable organizational resiliency

- Ensure access to data
- Guarantee interoperability
- Enable innovation
- Encourage usage and adoption

I3S	Scalable 3D scene content for visualization and distribution
LERC	Raster (imagery and elevation) compression technology for 2D and 3D
GeoREST	Esri open REST APIs for access to any kind of GIS content and services

Content

Esri and 3rd Party Partner Content



Ready-to-Use Maps and Data

- Global Coverage
- Compiled from Best Available Sources
  - Basemaps
  - Imagery
  - Demographics
  - Landscape
- Tens of Thousands of Open Datasets

ArcGIS Marketplace	3rd party geospatial apps and data from Esri's global Partner Network
Living Atlas	3D and 2D content for use throughout mapping applications

Developer Tools

Development and Scripting Tools For Extending/Customizing

Android
HTML5
Java
C#
REST
JavaScript
Web
QML
.NET
C++
Python
Qt
Swift
Windows
Xamarin
Apple
Objective-C

Reduce Development Costs

- 3D Everywhere
- Vector Tiles
- Smart Mapping
- Leverage User Roles
- Data Flows Between Apps

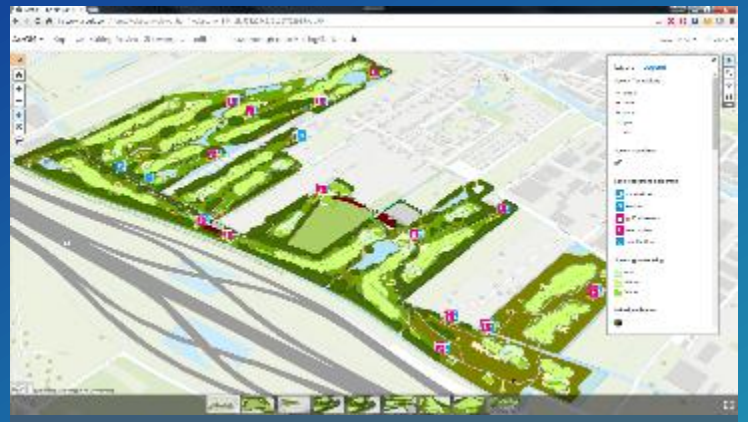
ArcGIS Runtime SDKs	Developer tools for 2D and 3D native iOS, Android, Windows solutions
ArcGIS JavaScript API	Developer toolkit for building and extending 2D and 3D web apps

Enterprise workflows

Large Enterprises

Exploring data securely on premises

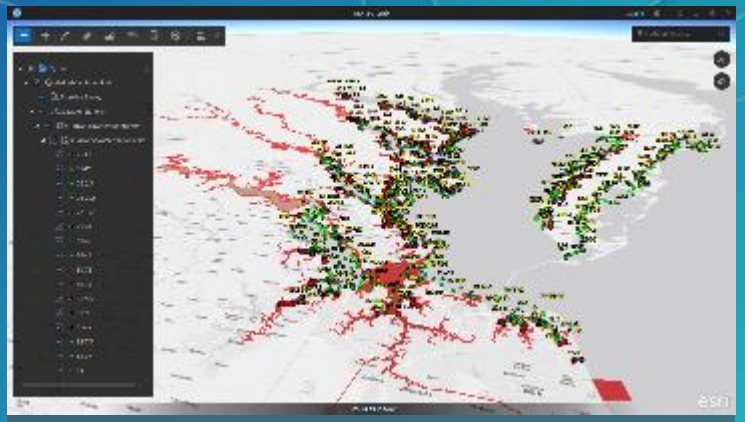
Law enforcement, federal agencies & large companies need to explore information across large areas using 3D GIS behind a firewall



Small Enterprises

Sharing 3D using ArcGIS Online

City planners, urban designers, and small AEC firms want to create and share plans and status with constituents in 3D



Hybrid scenario

3D with large data packages in connected and disconnected workflows

Program management agencies, emergency managers, and utilities agencies need to use 3D within the organization for planning and to share with collaborators in the field to plan, respond and act

CAD, BIM, and GIS

3D Virtual Construction

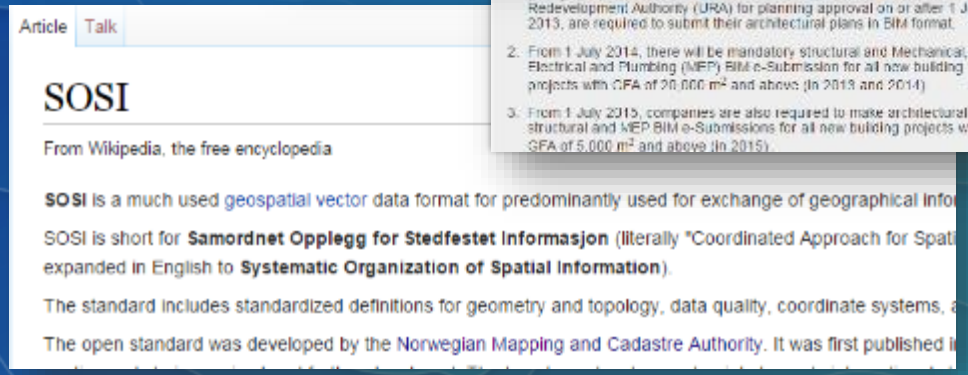
NEXT CITY Inspiring Better Cities.

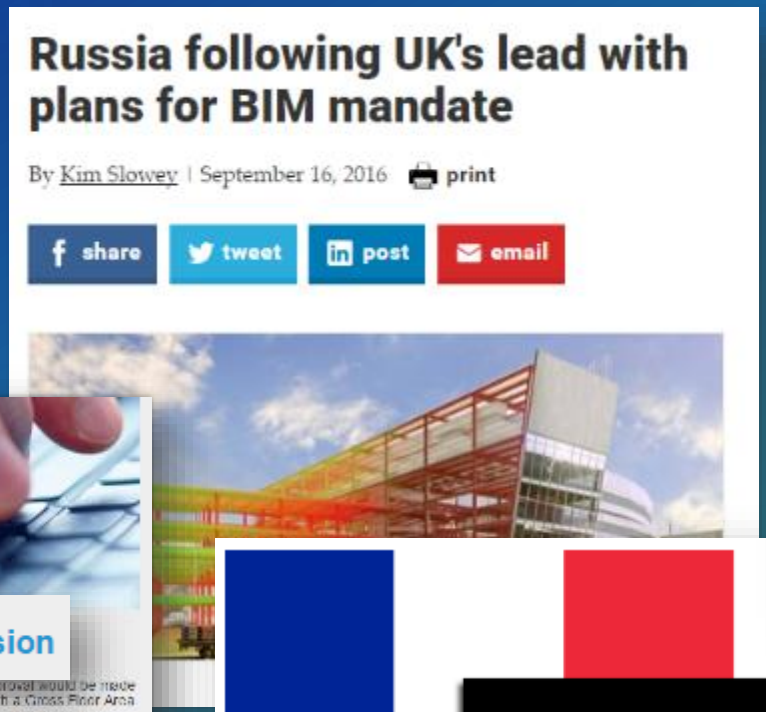
The Future of Resilience

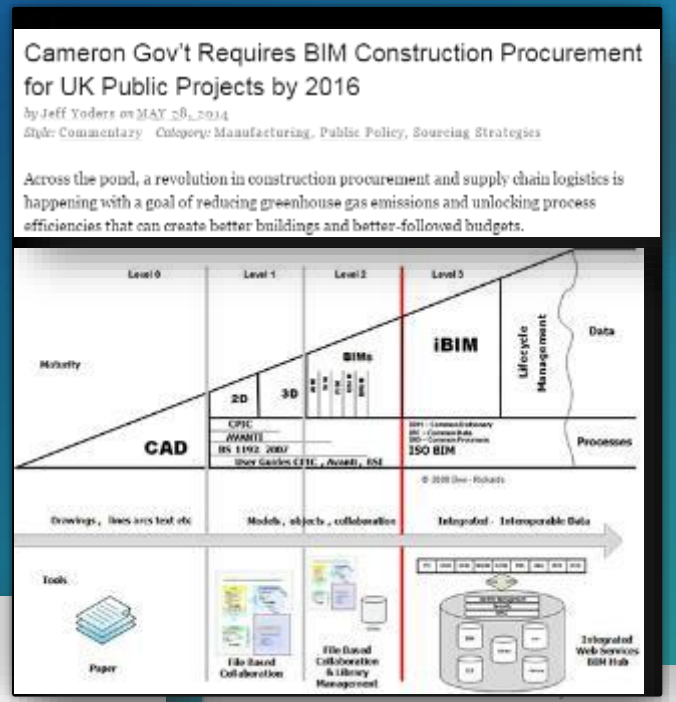
75% of the Infrastructure That Will Exist in 2050 Doesn't Exist Today

BY AURORA ALMENDRAL | OCTOBER 22, 2014

BIM is a process for increasing efficiency throughout the construction process



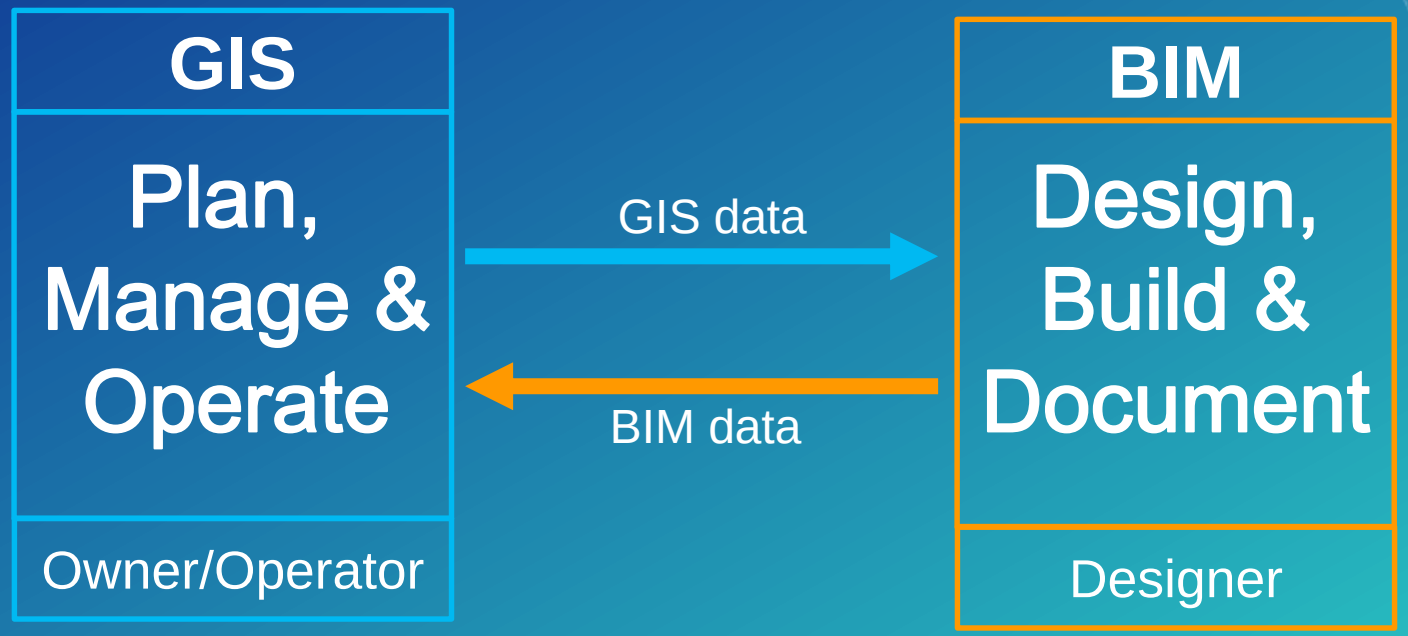




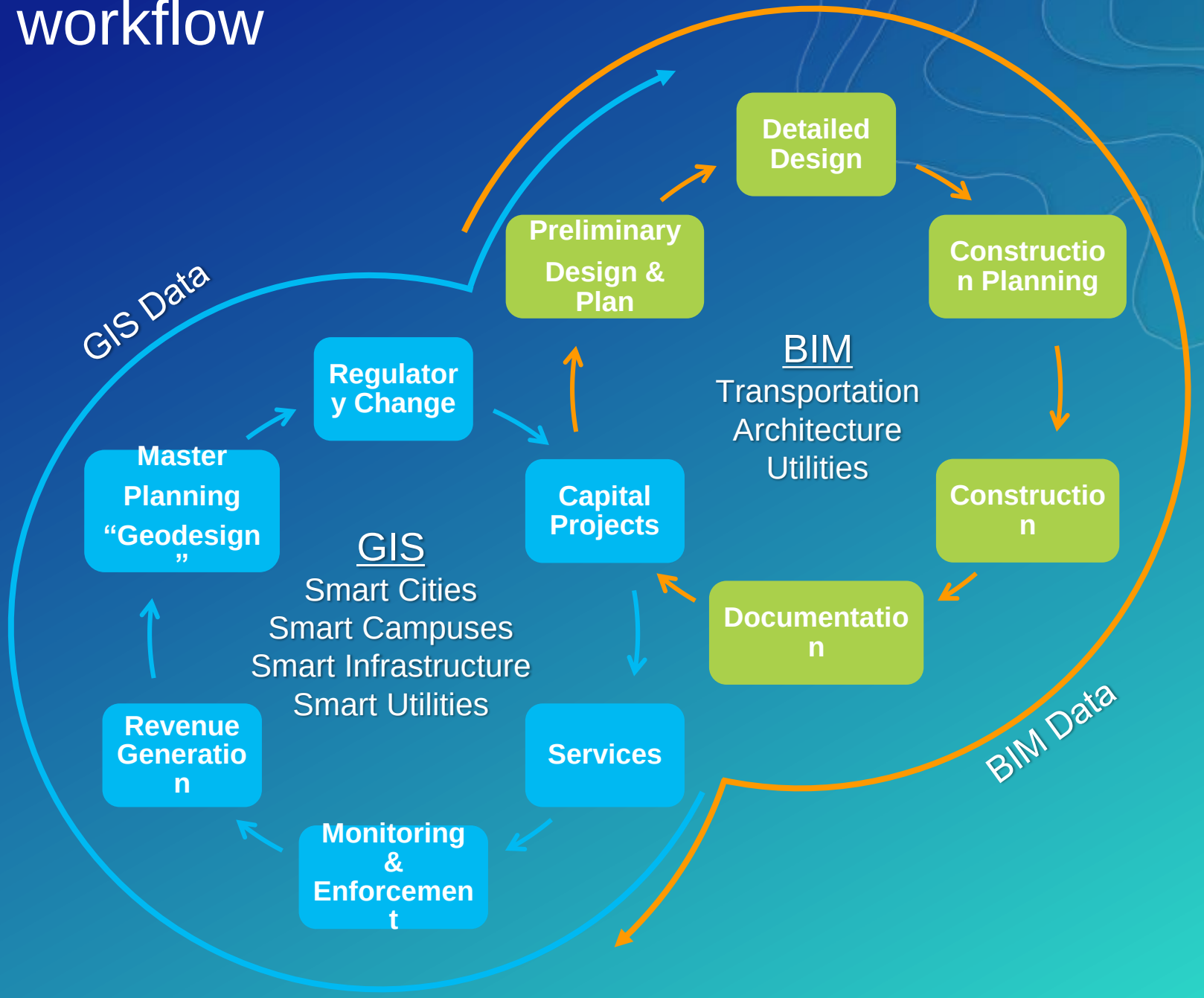
BIM + GIS

Changing the way cities and utilities design, build, and manage resilient infrastructure

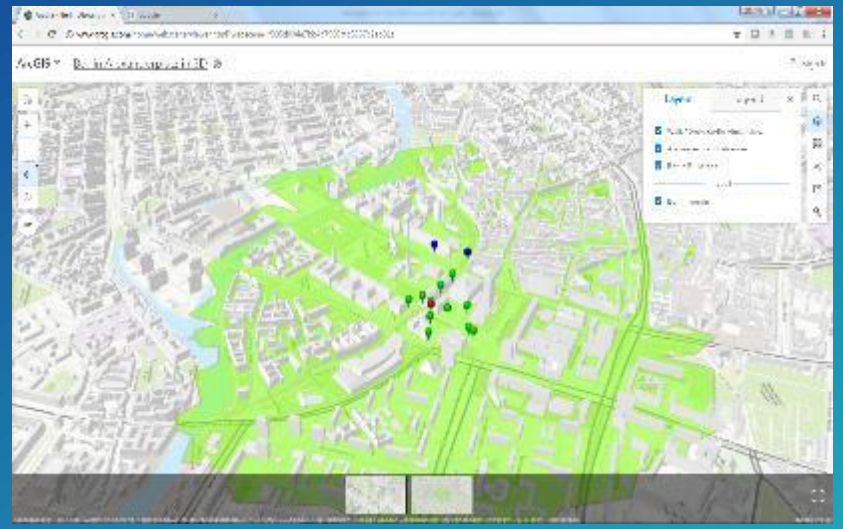
High-level GIS-BIM workflow



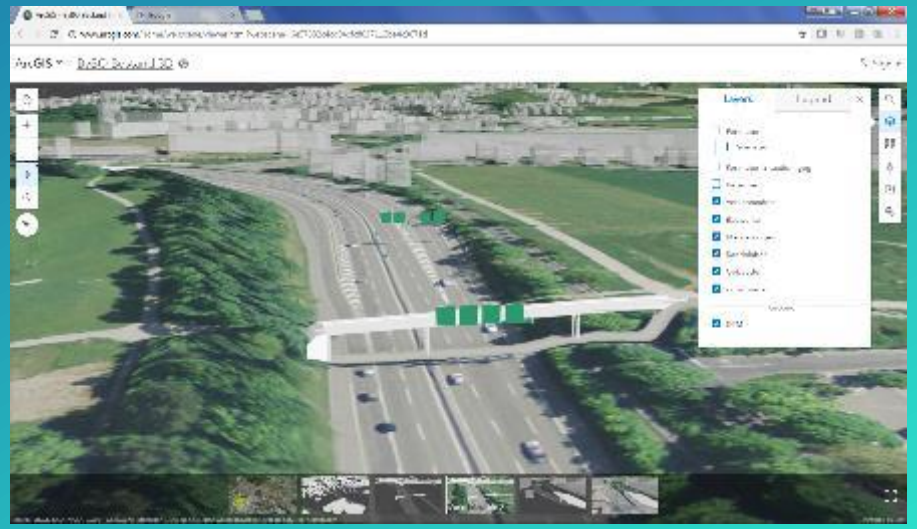
GIS-BIM workflow overlap



BIM as Features



BIM Visualization



VR / AR / MR

VR/AR/MR research

- Core capability vs. app vs. toolkit
- AR and VR as Esri Labs projects
- MR as research (Hololens)
- Challenge: Game engine-type performance (90 fps)

ArcGIS 360 VR

- VR experience
  - Simple creation of mobile VR demos for non-expert user experience
  - Quick immersion into design to experience impact of projects and proposals

- VR application for Samsung Galaxy
  - Adding Google Daydream (Cardboard experiences)
  - Additional support for viewing by a web app

- Currently an Esri Labs project

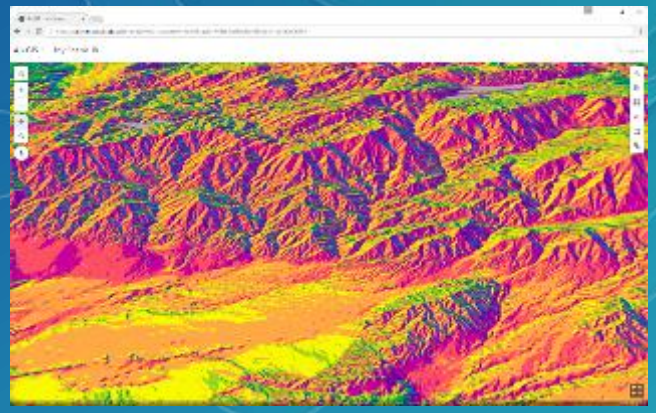
AuGeo

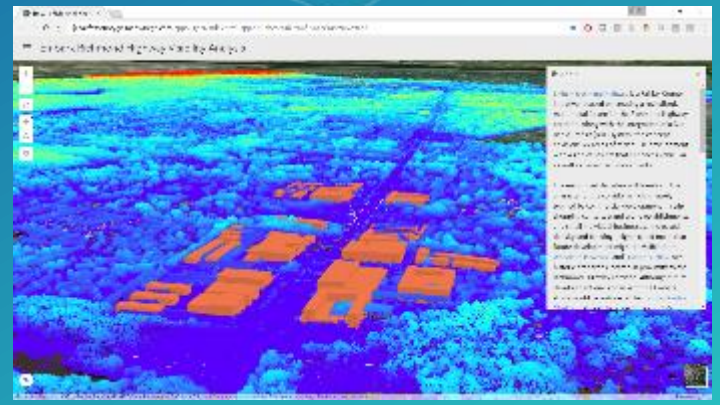
- AR experience
  - Easy-to-use iOS and Android app to demonstrate Augmented Reality
  - Display of point feature service information around the user’s location
- Currently an Esri Labs project
- Built with AppStudio for ArcGIS
  - Source code planned to be released at UC

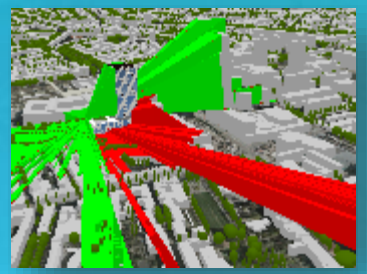
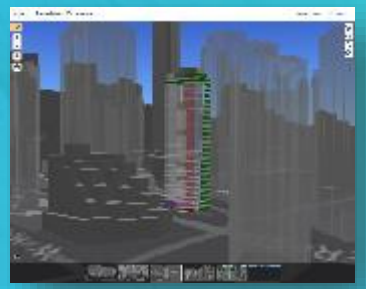
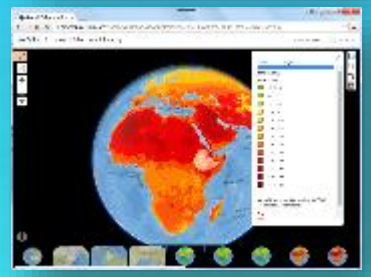
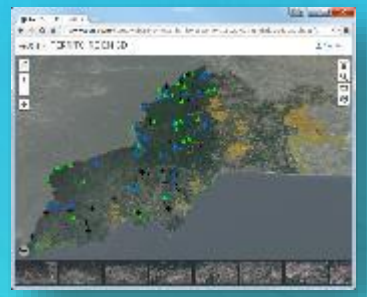
Wrap up

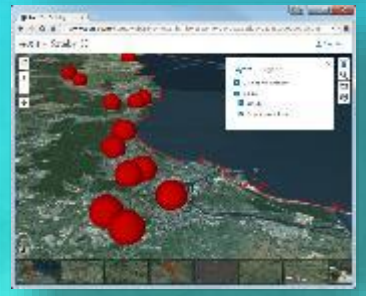
3D in Esri today

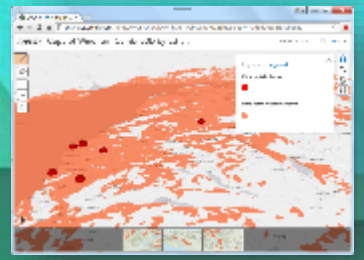
- Create and manage 3D content
  - Point clouds, meshes, 3D objects, and 3D vector data
- Use Living Atlas elevation and imagery
- Host 3D content in ArcGIS Online or on premises
- Author 3D experiences across platforms
- Use open specifications (I3S) to distribute data
- Communicate with stakeholders through
  - Animation
  - Free web apps
  - Free desktop apps
- Build custom JavaScript and native apps









Future of 3D in ArcGIS

- BIM-GIS interoperability
- Visual effects
- Ease of use
- Interactive analytical tools
- 3D editing
- Mobile 3D
- Real-time and Big Data for immersive 3D
- Augmented Reality / Virtual Reality

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