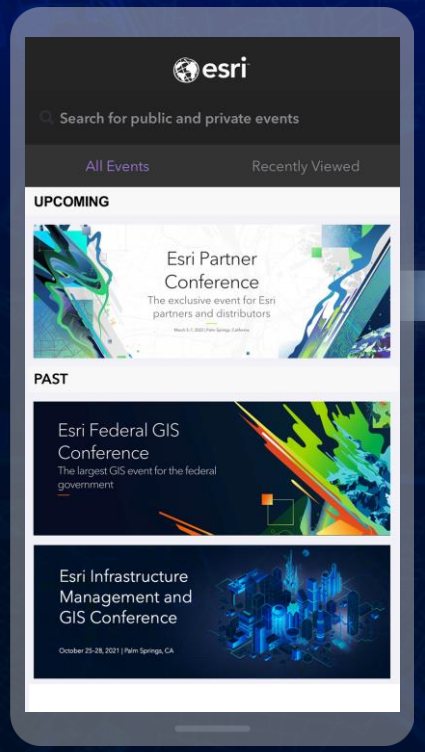
Getting Started with ArcGIS for Developers

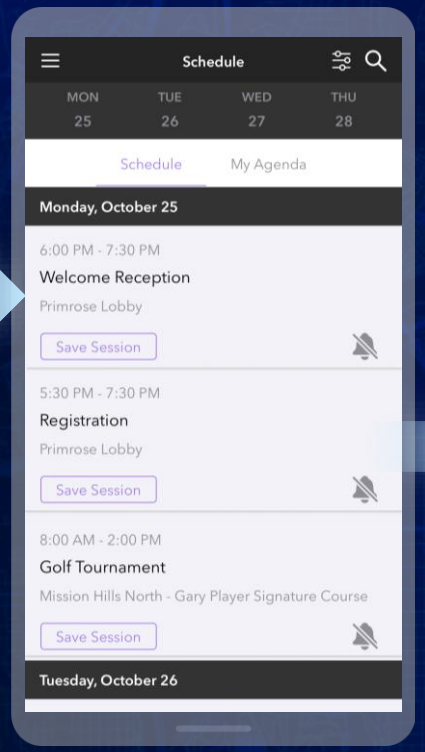
Stewart Rouse
Jim Barry
Mike Branscomb

Please Share Your Feedback in the App

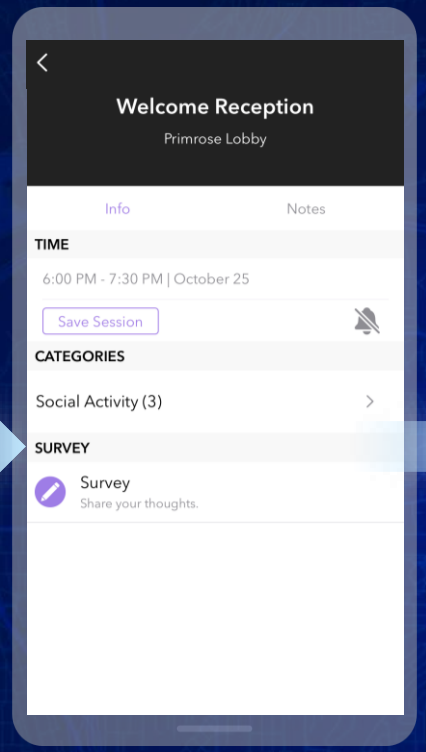
Download the Esri Events app and find your event



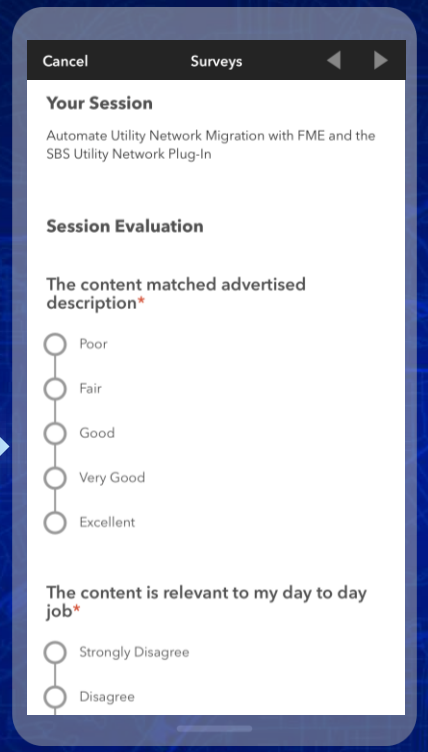
Select the session you attended



Scroll down to "Survey"



Log in to access the survey



Getting Started with ArcGIS for Developers

Agenda

- ArcGIS thru a developer’s lens
- ArcGIS Platform
- Web App Development
- Native App Development
- Extending the ArcGIS System
- Scripting and Automating
- Resources for your success

ArcGIS: thru a developer lens

ArcGIS Developer

APIs & SDKs for Building Apps, Extending ArcGIS . . . and Automating Workflows

- Performance
- Visualization and Analytics
- Data Hosting
- Developer Experience
- Low Code/No Code Builders

Extending

Pro Add-Ins

Pro SDK

Device Apps

Game Engine Plugins

Runtime SDKs

SOIs / SOEs

Enterprise SDK

Creating Apps

Builders

JavaScript Mapping API

Web Apps

Calcite

Automating

Scripts

Python API

Notebooks

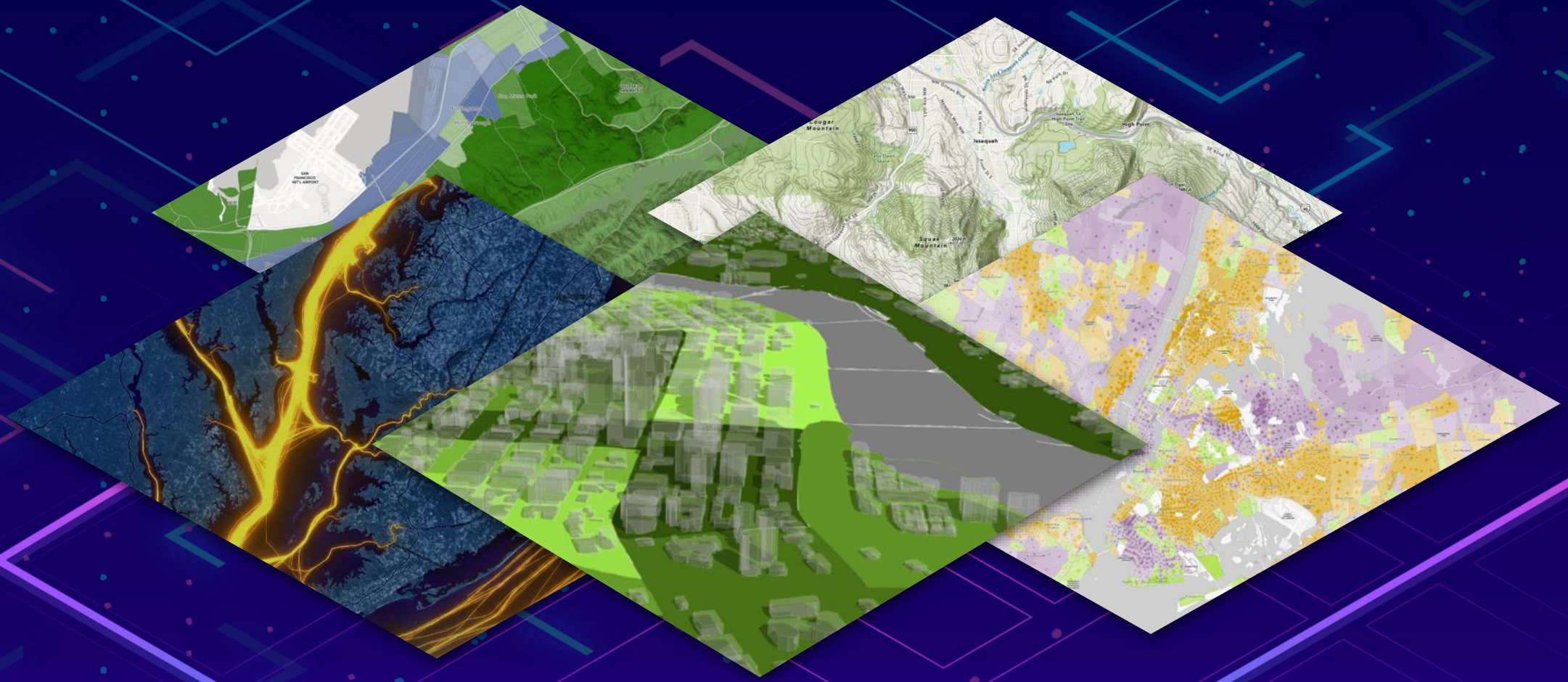
Open Source APIs

ArcGIS Location Services

OpenLayers, Leaflet . . . and More

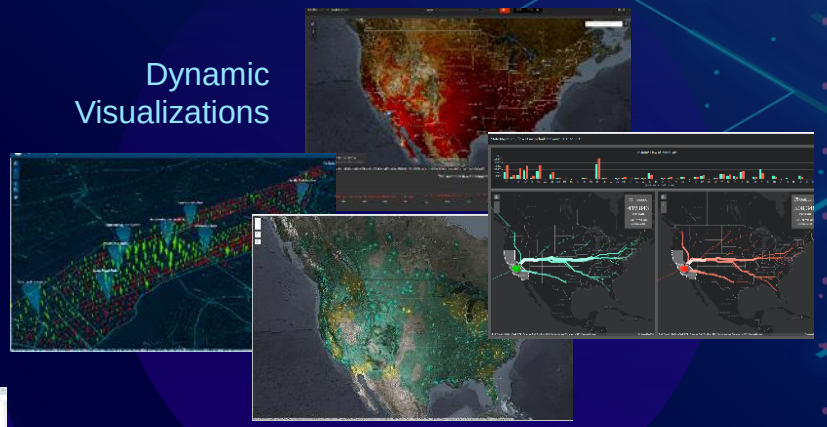
ArcGIS Platform

Providing Developers
With Powerful Mapping and Location Services

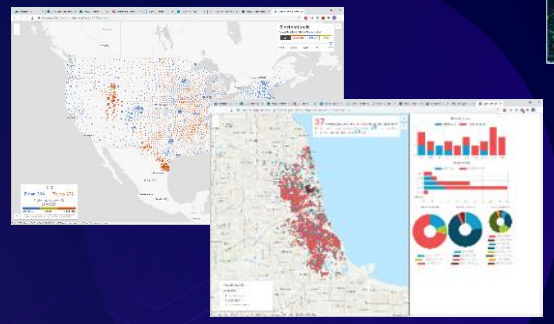


ArcGIS Platform | Build Solutions with Location Services

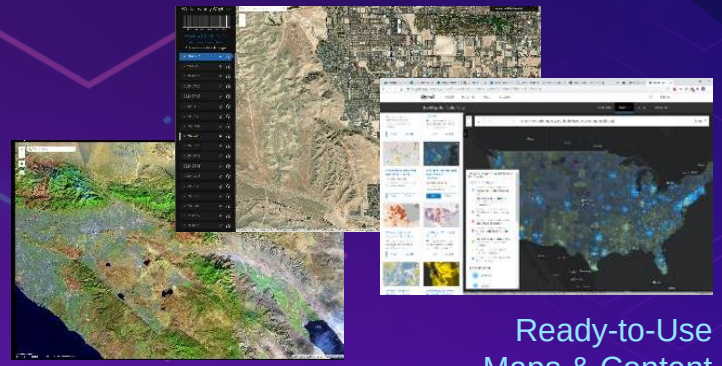
Engaging Maps
& Solutions



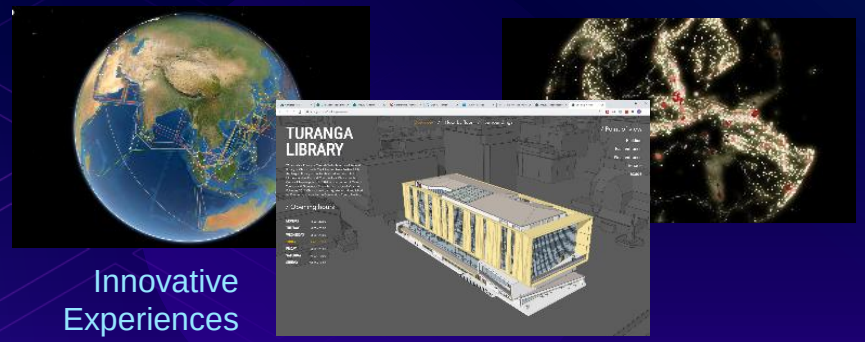
Dynamic
Visualizations



Hosted Data



Ready-to-Use
Maps & Content



Innovative
Experiences

ArcGIS Platform | Location Platform-as-a-Service

Location Services

Content &
Capabilities

Developer Experience

Mapping APIs
Open-Source Mapping Libraries
Developer Resources

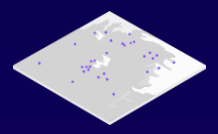
Business Model

Consumption-Based

An intuitive developer experience
for accessing and using ArcGIS Platform

ArcGIS Platform | Collection of Location Services

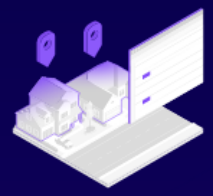
Extensive Content and Powerful Capabilities



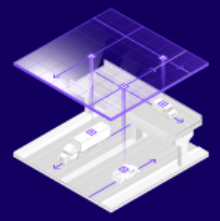
Basemaps

Data Hosting

Data Visualization

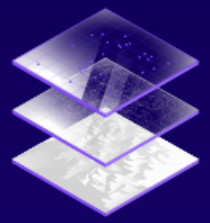


Geocoding & Search

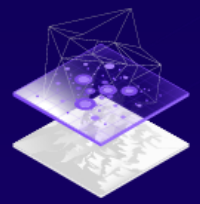


Routing & Directions

Demographic Data



Data Layers



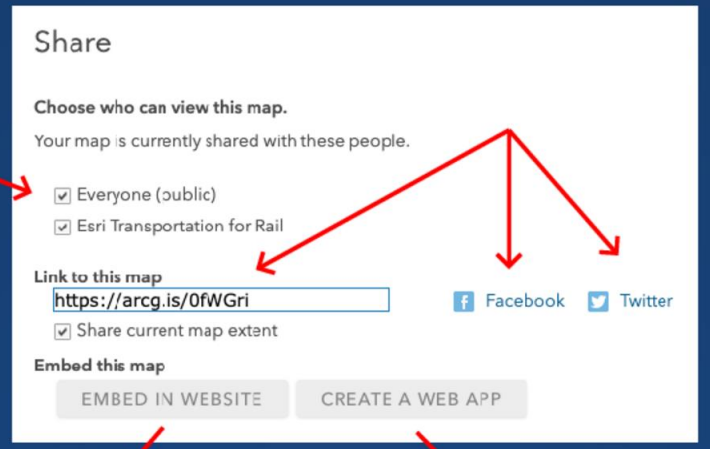
Spatial Analytics

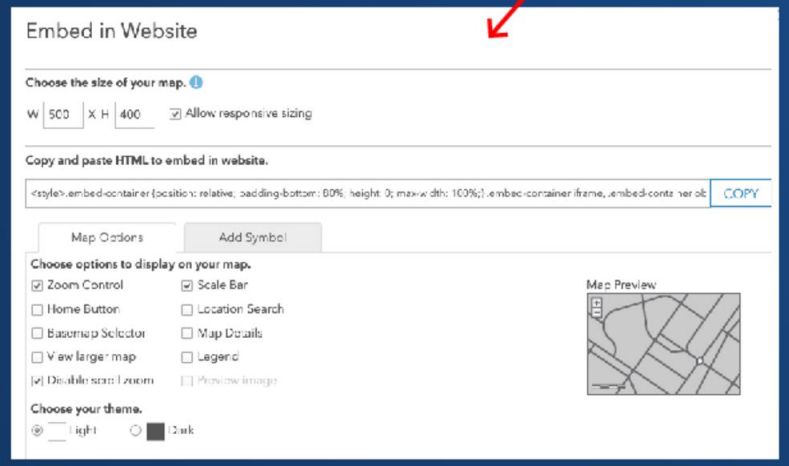
ArcGIS Platform | Collection of Location Services

Extensive Content and Powerful Capabilities

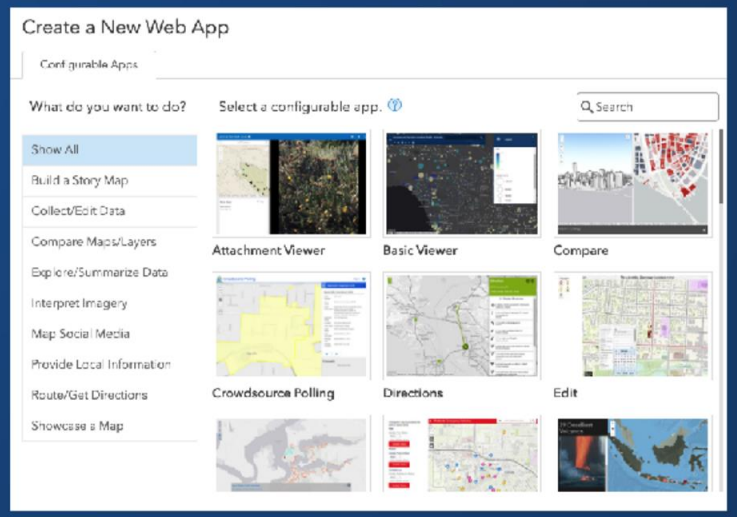
Deployment Options

Web App Development

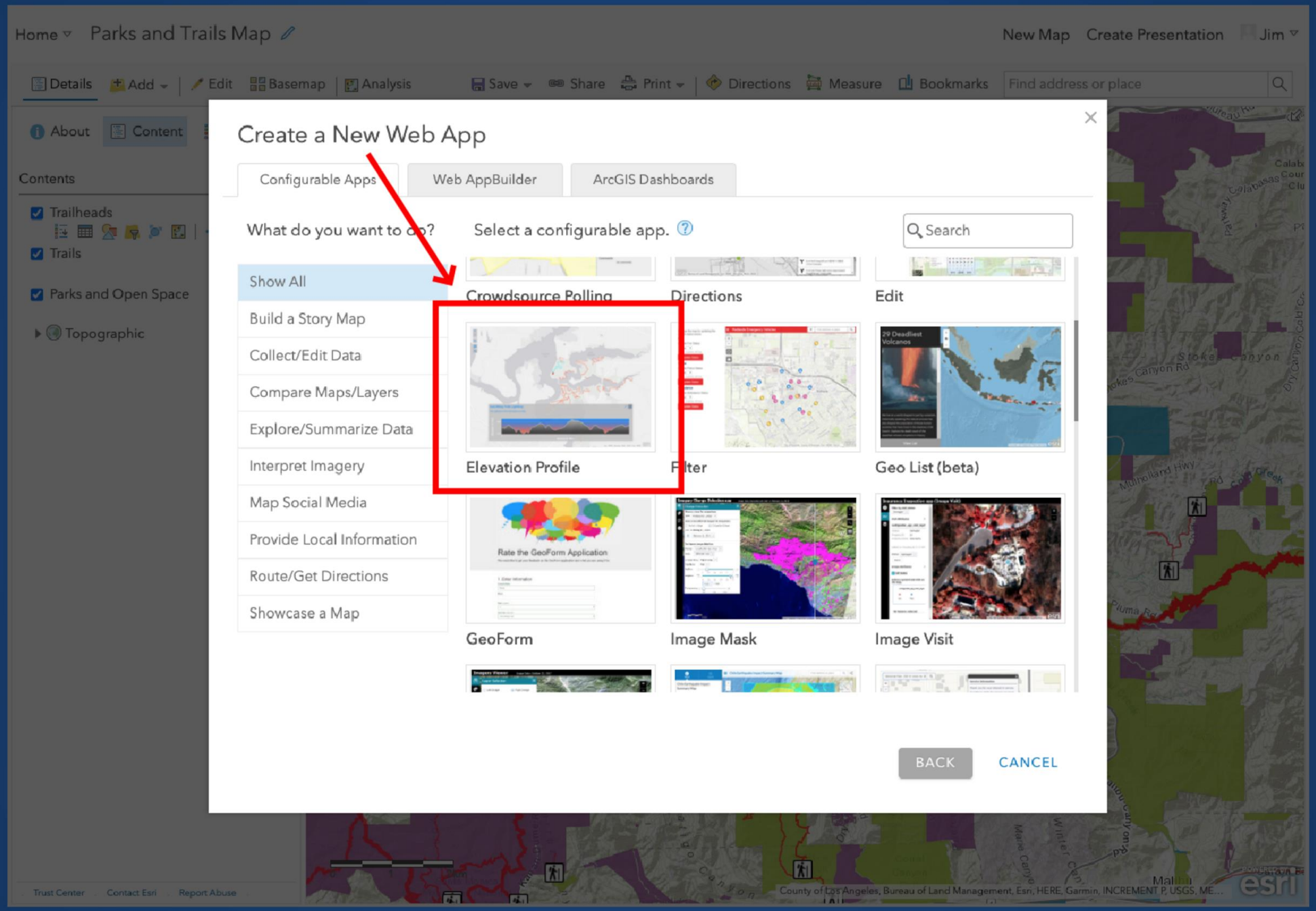


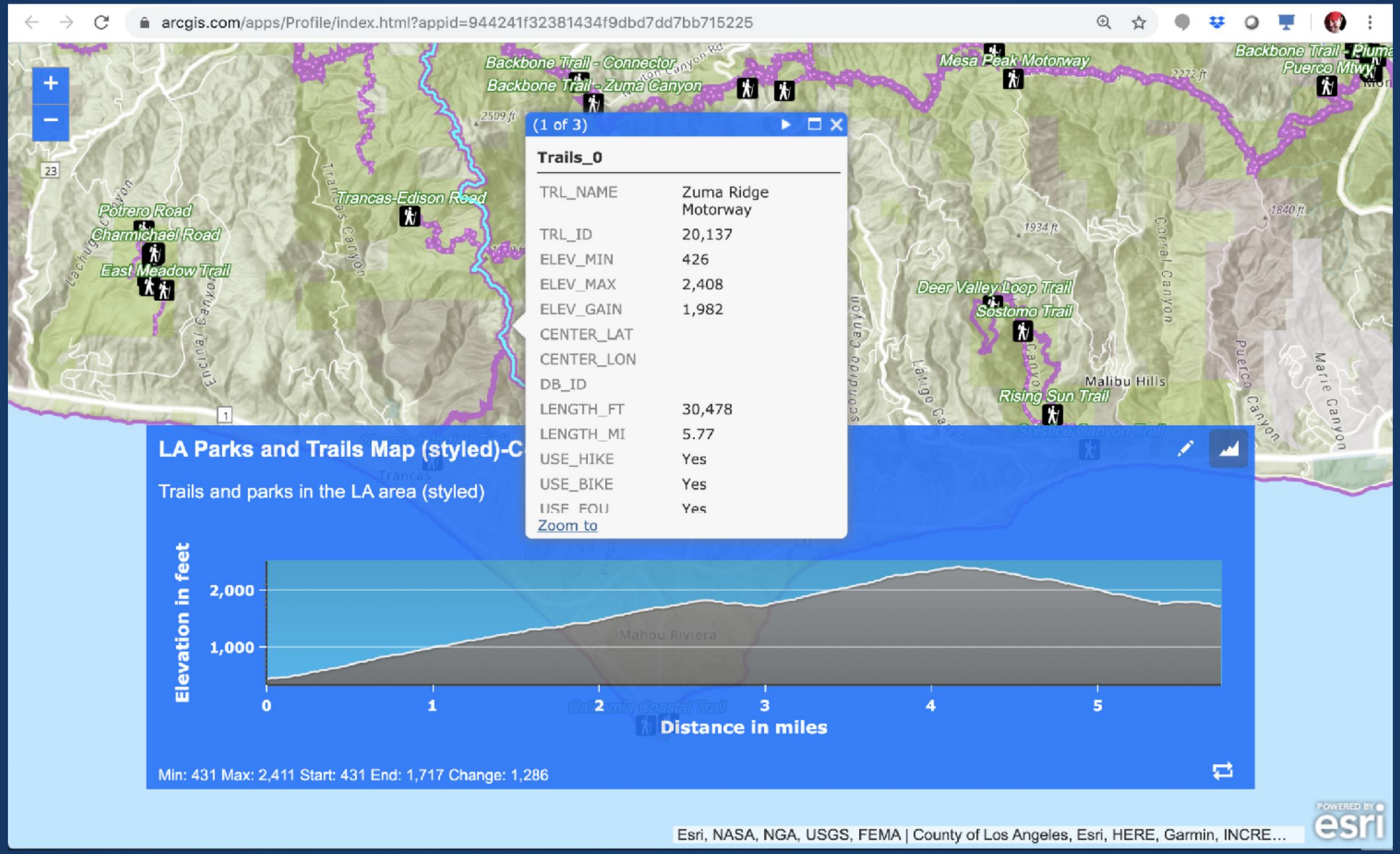


gives you <style> and <iframe> tags, premade for you



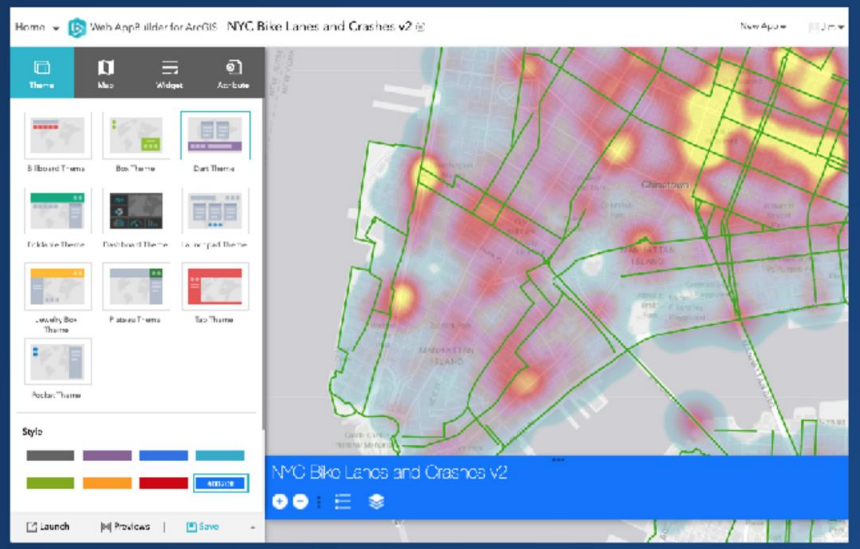
configurable web app templates


Home
Parks and Trails Map
New Map
Create Presentation
Jim
Details
Add
Edit
Basemap
Analysis
Save
Share
Print
Directions
Measure
Bookmarks
Find address or place
About
Content
Contents
Trailheads
Trails
Parks and Open Space
Topographic
Create a New Web App
Configurable Apps
Web AppBuilder
ArcGIS Dashboards
What do you want to do?
Select a configurable app.
Search
Show All
Build a Story Map
Collect/Edit Data
Compare Maps/Layers
Explore/Summarize Data
Interpret Imagery
Map Social Media
Provide Local Information
Route/Get Directions
Showcase a Map
Crowdsource Polling
Directions
Edit
Elevation Profile
Filter
Geo List (beta)
GeoForm
Image Mask
Image Visit
BACK
CANCEL
Trust Center
Contact Esri
Report Abuse
County of Los Angeles, Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, USGS, ME...
esri

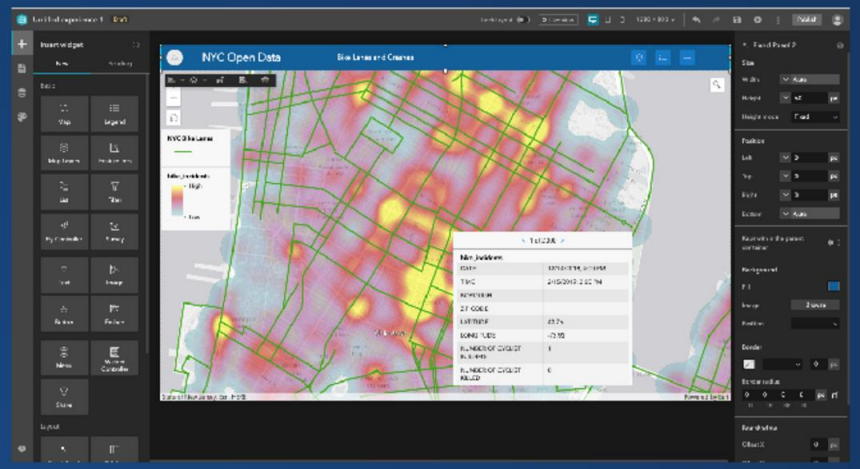

arcgis.com/apps/Profile/index.html?appid=944241f32381434f9dbd7dd7bb715225
Backbone Trail - Connector
Backbone Trail - Zuma Canyon
Mesa Peak Motorway
Backbone Trail - Piuma
Puerco Mtwy
Potrero Road
Charmichael Road
East Meadow Trail
Trancas-Edison Road
Deer Valley Loop Trail
Sostomo Trail
Rising Sun Trail
Malibu Hills
(1 of 3)
Trails_0
TRL_NAME Zuma Ridge Motorway
TRL_ID 20,137
ELEV_MIN 426
ELEV_MAX 2,408
ELEV_GAIN 1,982
CENTER_LAT
CENTER_LON
DB_ID
LENGTH_FT 30,478
LENGTH_MI 5.77
USE_HIKE Yes
USE_BIKE Yes
Zoom to
LA Parks and Trails Map (styled)-C
Trails and parks in the LA area (styled)
Elevation in feet
2,000
1,000
0
1
2
3
4
5
Distance in miles
Min: 431 Max: 2,411 Start: 431 End: 1,717 Change: 1,286
Esri, NASA, NGA, USGS, FEMA | County of Los Angeles, Esri, HERE, Garmin, INCRE...
POWERED BY esri

Build a custom apps without code

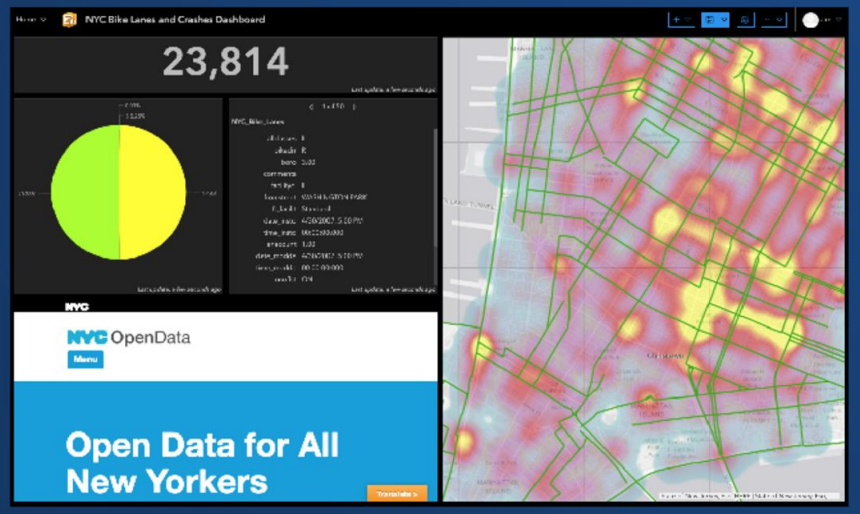
Web AppBuilder



Experience Builder

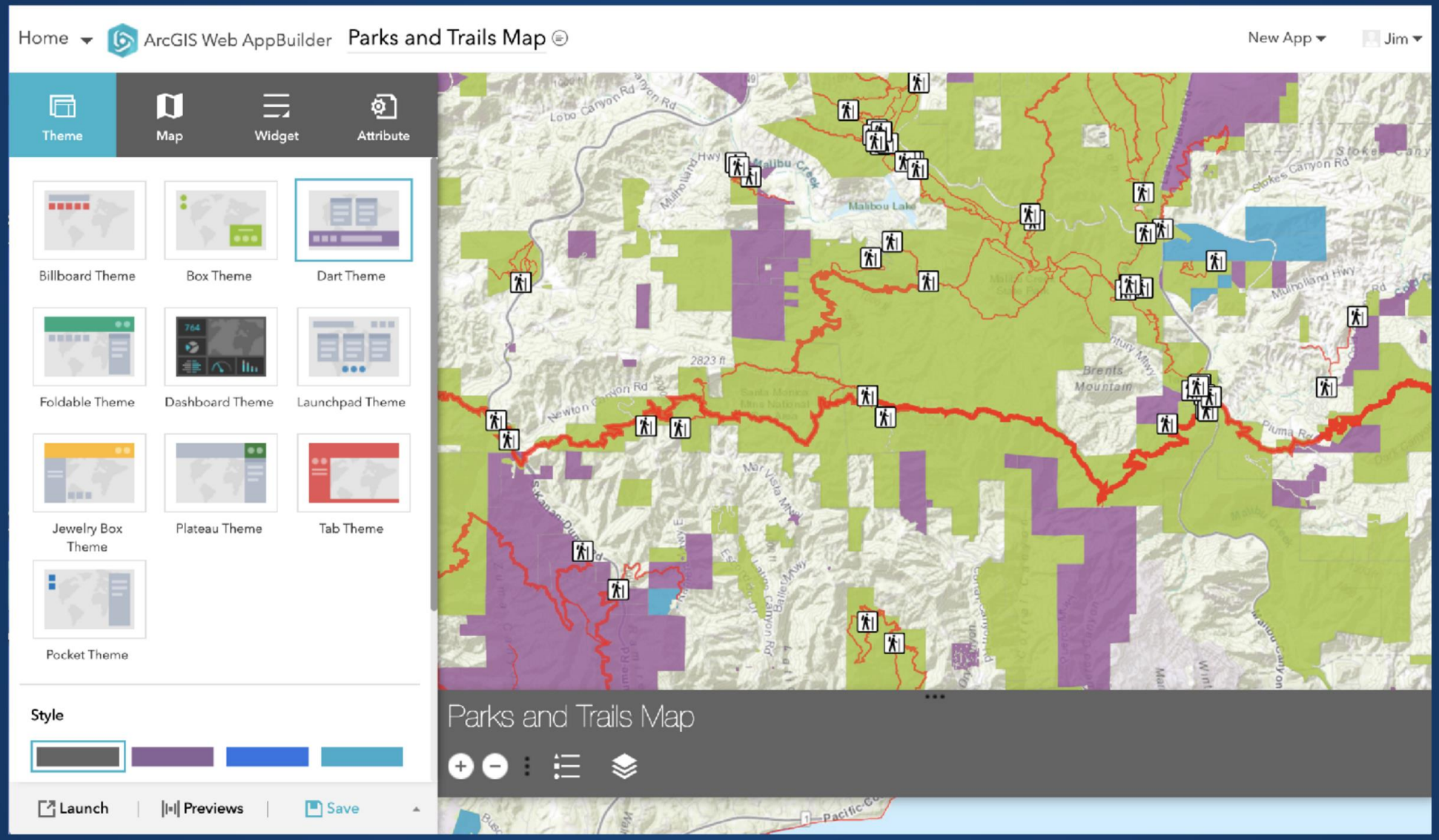


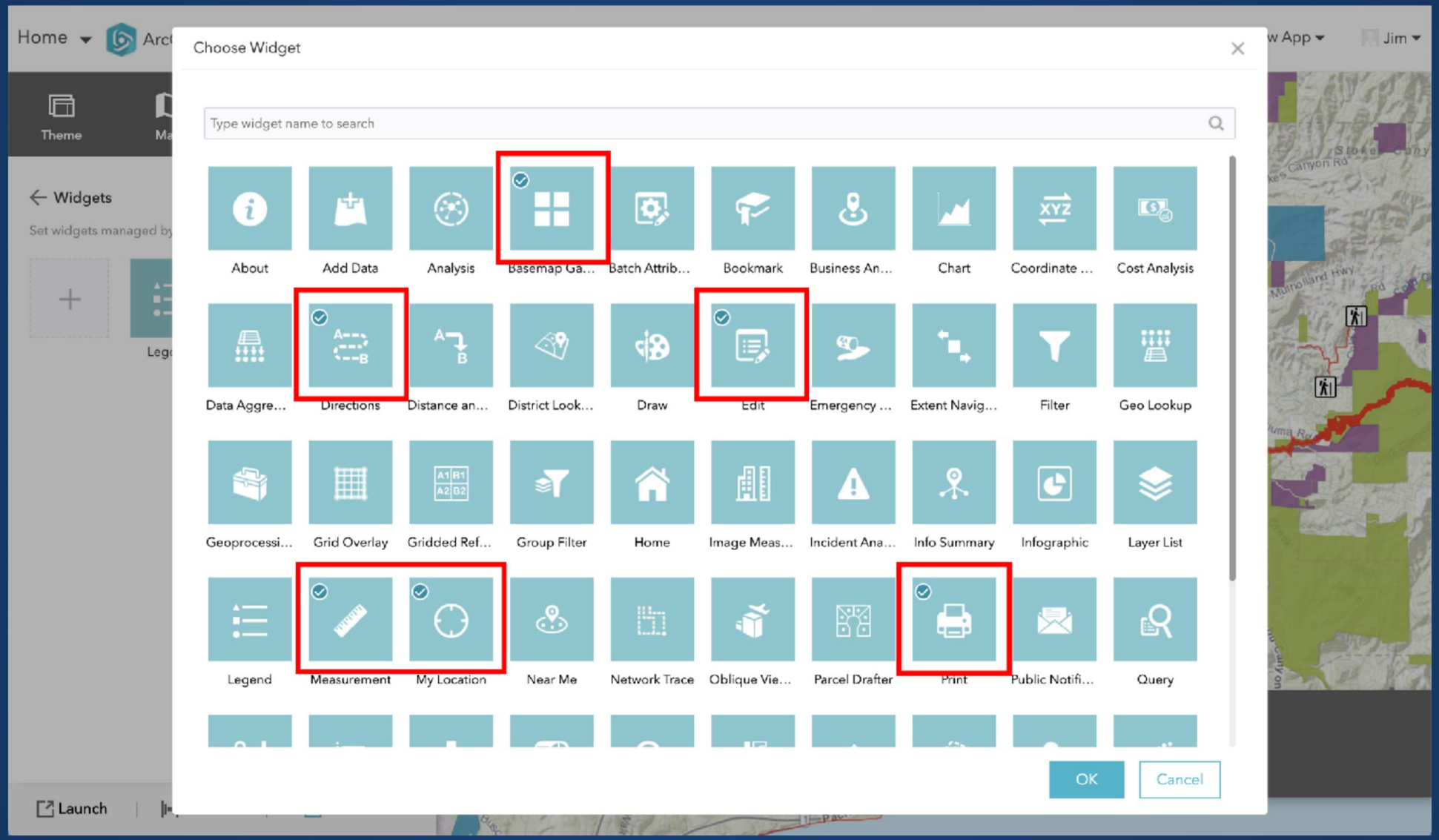
Operations Dashboard

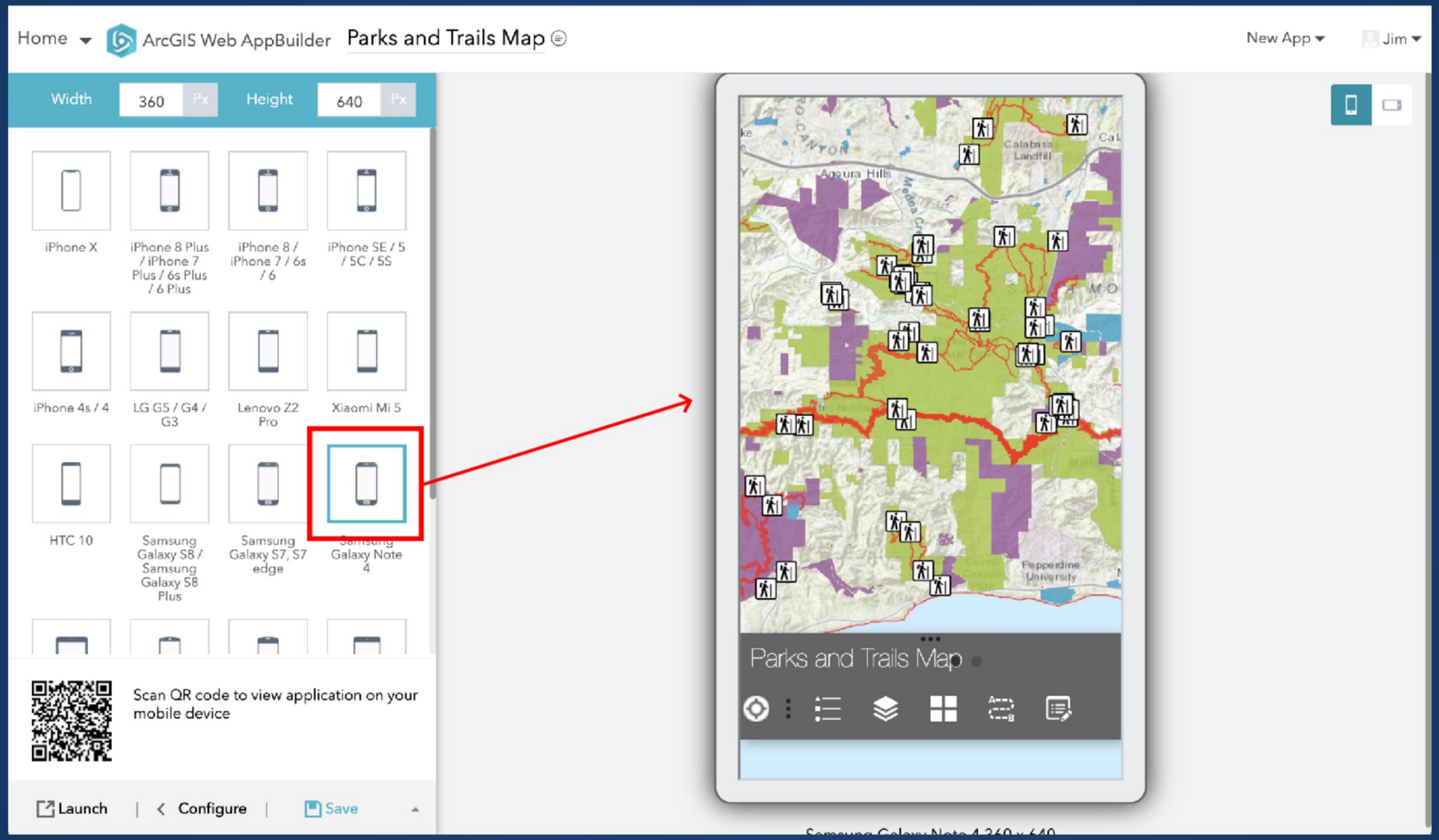


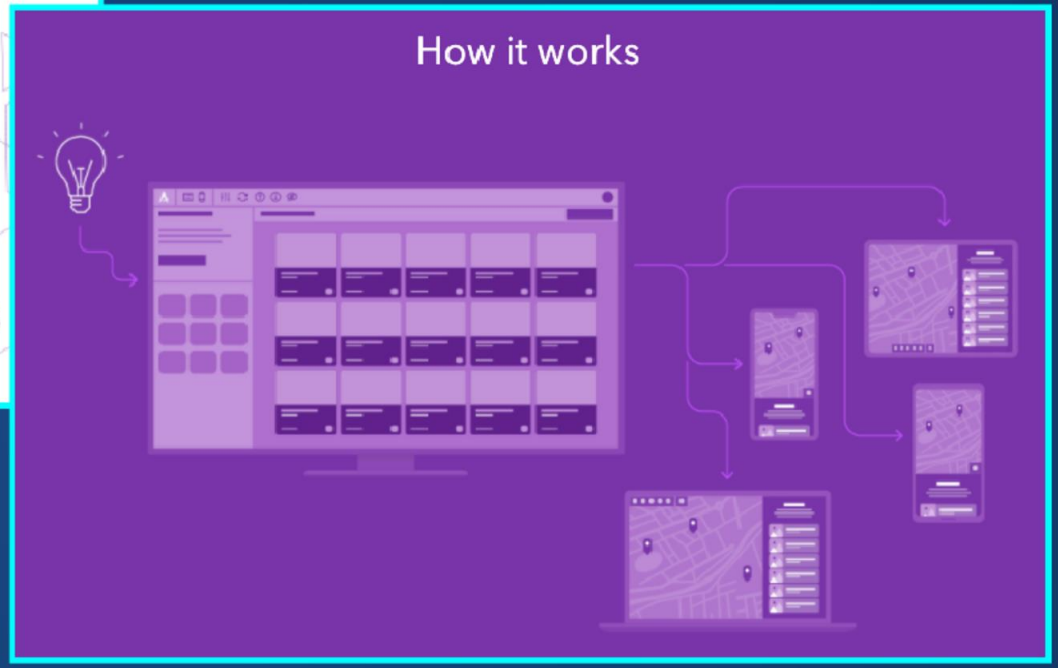
StoryMaps

Build dashboards quickly


Home
ArcGIS Web AppBuilder
Parks and Trails Map
New App
Jim
Theme
Map
Widget
Attribute
Billboard Theme
Box Theme
Dart Theme
Foldable Theme
Dashboard Theme
Launchpad Theme
Jewelry Box Theme
Plateau Theme
Tab Theme
Pocket Theme
Style
Launch
Previews
Save
Parks and Trails Map
Lobo Canyon Rd
Malibu Creek
Malibu Lake
Stokes Canyon Rd
Mulholland Hwy
Brents Mountain
Pluma Rd
Newton Canyon Rd
Mar Vista Mtn
Kanan-Dume Rd
Bailey Hwy
Pacific Co


Home
Theme
Widgets
Set widgets managed by
Launch
Choose Widget
Type widget name to search
About
Add Data
Analysis
Basemap Ga...
Batch Attrib...
Bookmark
Business An...
Chart
Coordinate ...
Cost Analysis
Data Aggre...
Directions
Distance an...
District Look...
Draw
Edit
Emergency ...
Extent Navig...
Filter
Geo Lookup
Geoprocessi...
Grid Overlay
Gridded Ref...
Group Filter
Home
Image Meas...
Incident Ana...
Info Summary
Infographic
Layer List
Legend
Measurement
My Location
Near Me
Network Trace
Oblique Vie...
Parcel Drafter
Print
Public Notifi...
Query
OK
Cancel
Jim


Home
ArcGIS Web AppBuilder
Parks and Trails Map
New App
Jim
Width
360
Px
Height
640
Px
iPhone X
iPhone 8 Plus / iPhone 7 Plus / 6s Plus / 6 Plus
iPhone 8 / iPhone 7 / 6s / 6
iPhone SE / 5 / 5C / 5S
iPhone 4s / 4
LG G5 / G4 / G3
Lenovo Z2 Pro
Xiaomi Mi 5
HTC 10
Samsung Galaxy S8 / Samsung Galaxy S8 Plus
Samsung Galaxy S7, S7 edge
Samsung Galaxy Note 4
Scan QR code to view application on your mobile device
Launch
Configure
Save
Parks and Trails Map



Custom native apps

Cross-platform: .NET, Java, Android, iOS, Qt

No code

Deploy within your organization, or publish to app stores

Build a custom apps with code

aka "Where's the API?"

Web APIs

ArcGIS API for JavaScript

Everything you need to build a compelling location experience for your business.

Esri Leaflet

A lightweight set of tools for building mapping applications with Leaflet and location services.

ArcGIS REST JS

Compact, modular JavaScript libraires for accessing the ArcGIS REST API and location services.

Mapbox GL JS

JavaScript library using WebGL that can render basemap layers and access location services.

OpenLayers

JavaScript library that can display basemap layers and access location services.

ArcGIS Experience Builder

Create web apps and pages visually with drag-and-drop.

ArcGIS Web AppBuilder

Create custom widgets and themes for web apps and pages with ArcGIS Web AppBuilder.

ArcGIS REST APIs

Build powerful apps with the ArcGIS REST APIs.

Mobile and Desktop APIs

ArcGIS Runtime API for Android

Develop native mapping and location analysis apps on Android devices.

ArcGIS Runtime API for iOS

Develop native mapping and location analysis apps for iOS devices.

ArcGIS Runtime API for Java

Develop native desktop mapping and location analysis apps with Java.

ArcGIS Runtime API for .NET

Develop native desktop and mobile mapping and location analysis apps with .NET.

ArcGIS Runtime API for Qt

Develop cross-platform mapping and location analysis apps for desktop and mobile devices.

ArcGIS AppStudio

ArcGIS AppStudio is a suite of productivity tools for building and deploying native apps to smartphones, tablets and laptop/desktop devices.

ArcGIS Survey123

ArcGIS AppStudio is a suite of productivity tools for building and deploying native apps to smartphones, tablets and laptop/desktop devices.

REST API

ArcGIS REST API | ArcGIS for D

developers.arcgis.com/rest/

ArcGIS Developers | Documentation | Features | Pricing | Support | Search | Dashboard | Jim Barry jbarry_rail

ArcGIS REST API | Home | Location-based Services | Services Reference | Users, Groups and Items | Enterprise Administration

REST

Build powerful apps with the ArcGIS REST API.

Directly access ArcGIS services including geocoding, routing & directions, and spatial analysis.

Get Started

Search the ArcGIS REST API documentation

Get Started
Use tutorials to build an app with the ArcGIS REST API.

Location-based Services
Search for addresses and places, routing and directions, and batch geocoding.

Services Reference
Access all ArcGIS services, including spatial analysis, geoenrichment, elevation, and offline map workflows.

Users, Groups and Items
ArcGIS services for managing groups, users, and items in either ArcGIS Online or ArcGIS Enterprise.

Enterprise Administration
Perform common tasks for ArcGIS Enterprise, including querying logs, or managing services and data stores.

Get started

Start learning how to integrate the ArcGIS REST API into your application with these short tutorials.

More Tutorials

https://route.arcgis.com/arcgis/rest/services/World/Route/NAServer/Route_World/solve?

stops=-117.1956,34.0564;-117.1825,34.0572&token=[*token*]&f=pjson

Geocoding

Converts addresses to locations and vice-versa including support for suggestions and place searching.

API Reference

Routing and Directions

Get directions, optimize routes and perform network analysis on a worldwide road dataset.

API Reference

Demographics and GeoEnrichment

Query hundreds of demographic, lifestyle variables and use them to enrich your existing datasets.

API Reference

Elevation

Analyze elevation, viewsheds and watershed against a worldwide elevation dataset.

API Reference

Spatial Analysis

Run a variety of analysis tasks to gain new insight into your data.

API Reference

Packaging

Bundle and package maps and data for offline use.

API Reference

ArcGIS REST API

Postman

Home | Workspaces | Reports | Explore | Search Postman | Invite | Upgrade

GET https://route.arcgi...

No Environment

https://route.arcgis.com/arcgis/rest/services/World/Route/NAServer/Route_World/solve?stops=-117.195679,34.056492;-117.182580,34.057279&token=0O2pPoaoY... Save

GET https://route.arcgis.com/arcgis/rest/services/World/Route/NAServer/Route_World/solve?stops=-117.195679,34.056492;-117.182580,34.057279&token=0O2pPoaoY2... Send

Params | Authorization | Headers (8) | Body | Pre-request Script | Tests | Settings | Cookies

Query Params

KEY	VALUE	DESCRIPTION	Bulk Edit
stops	-117.195679,34.056492;-117.182580,34.057279		
token	0O2pPoaoY2pFXwqHWyEBK6a-Fb5c6ZsTZP3wudCLl45tKSkR...		
f	pjson		

Body | Cookies (1) | Headers (14) | Test Results

Status: 200 OK Time: 425 ms Size: 9.37 KB Save Response

Pretty | Raw | Preview | Visualize | Text


```
"time": 0.87564898311221995,
"text": "Go north on New York St",
"ETA": -2209161600000,
"arriveTimeUTC": -2209161600000,
"maneuverType": "esriDMTStraight"
},
"compressedGeometry": "+hf6e4-1vvvvof+ij4dsq+0+1tr+0+4ks+0+373+0+1uv+0+7m8+0+9qu+0+1uv+0+183+0+2ae+0+2rk+0+1dq+0+12b-5n+8ua+5n+4f5",
"strings": [
 {
  "string": "New York St",
  "stringType": "esriDSTStreetName"
 }
]
},
{
 "attributes": {
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  "time": 1.9230695701414038,
  "text": "At the traffic light, turn right on W Redlands Blvd",
```
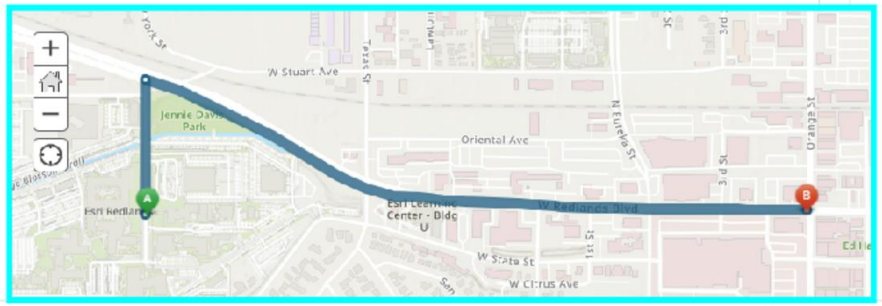




Find and Replace | Console | Bootcamp | Runner | Trash

arcgis-rest-js

compact, modular JavaScript wrappers for the ArcGIS REST API

javascript | web-development | arcgis | vanilla | rest-api | data-management | esri

TypeScript | Apache-2.0

Updated 3 days ago

ArcGIS Developers | Documentation | Features | Pricing | Support | Search | Jim Barry

Documentation / ArcGIS REST JS Guide | Home | API Reference | GitHub

- Introduction
- Key concepts
- Tutorials
- Services
- Layers
- Search
- Routing
- Demographics
- Tools
- Security
- Licensing
- Glossary

ArcGIS REST JS

ArcGIS REST JS is a collection of JavaScript modules for accessing location services, ArcGIS Online and ArcGIS Enterprise REST APIs.

Layers
Learn how to work with feature layers and feature services.

Geocode and search
Learn how to find addresses, businesses, and places with the geocoding service.

Route and directions
Learn how to find a route and directions and service areas with the routing service.

ArcGIS REST JS
- Get started
  1. Sign up for a free developer account
  2. Get an API key
  3. Quick start
  4. Tutorials

Was this page helpful? Yes No

Find a route and directions

Routing is the process of finding the path from an origin to a destination in a street network. You can use the route service to find routes, get driving directions, calculate drive times, and solve complicated, multiple vehicle routing problems. To create a route, you typically define a set of stops (origin and one or more destinations) and use the service to find a route with directions. You can also use a number of additional parameters such as barriers and mode of travel to refine the results.

In this tutorial, you find a route and directions for an origin and destination by accessing the route service.

> **NOTE**
> To learn more about the routing and the route serivce, visit Routing in the *Mapping APIs and location services guide*.

Prerequisites

You need a free ArcGIS developer account to access your dashboard and API keys. The API key must be scoped to access the services used in this tutorial.

Find a route and directions
- Prerequisites
- Steps
  - Create a new pen
  - Make the request
- Result
- What's next?

Solution
View in CodePen

Estimated time
10 minutes

Was this page helpful?
Yes No

ArcGIS REST JS- Find a route and directions

Jim Barry

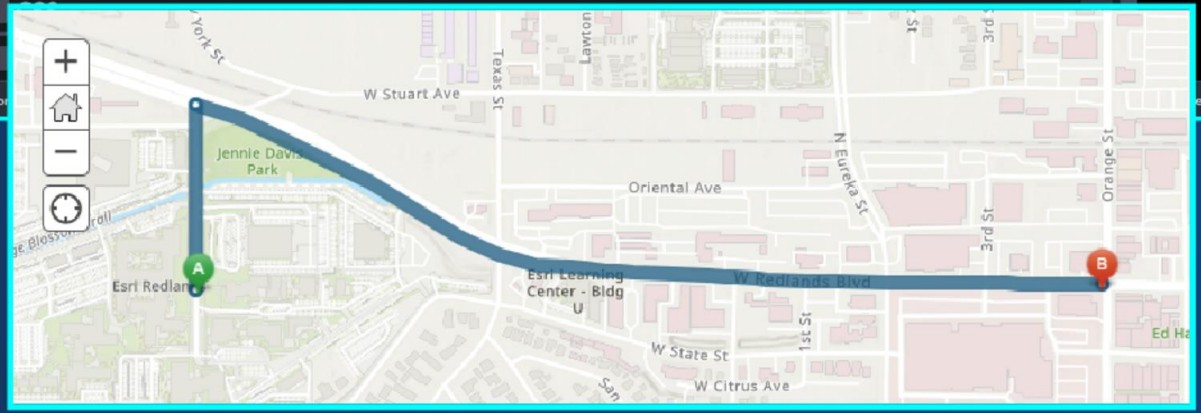
Run | Save | Settings | Change View

HTML

```html
<!-- require ArcGIS REST JS libraries from https://unpkg.com -->
<script src="https://unpkg.com/@esri/arcgis-rest-request@3.0.0/dist/umd/request.umd.js"></script>
<script src="https://unpkg.com/@esri/arcgis-rest-auth@3.0.0/dist/umd/auth.umd.js"></script>
<script src="https://unpkg.com/@esri/arcgis-rest-routing@3.0.0/dist/umd/routing.umd.js"></script>
<script>
  const apiKey = "AAPKecb1070309f14bbbb9514215XXXXXXXXDTUYrznv7FPOv2ibTdlDQA_z34xWyNSe7BLcUASW";
  const authentication = new arcgisRest.ApiKey({
    key: apiKey
  });
  arcgisRest.solveRoute({
      stops: [
        [-117.195679, 34.056492],
        [-117.182580, 34.057279]
      ],
      authentication
    })
    .then(response => {
      console.log(response);
      document.getElementById("result").textContent = JSON.stringify(response, null, 2);
    });
</script>

</body>

</html>
```


```
      "length": 0,
      "time": 0,
      "text": "Start at Location 1",
      "ETA": -2209161600000,
      "arriveTimeUTC": -2209161600000,
      "maneuverType": "esriDMTDepart"
    },
    "compressedGeometry": '+hf6e6-1vvvvvp+ij4duu+0+0',
    "strings": [
      {
        "string": "Location 1",
        "stringType": "esriDSTStreetName"
      }
    ],
    "geometry": {
      "paths": [
        [
          [
            -117.19570992217272,
            34.05649198233346
          ],
          [
            -117.19570992217272,
            34.05649198233346
          ]
        ]
      ]
    }
  },
  {
    "attributes": {
      "length": 0.20665004076289953,
      "time": 0.87564898311222,
      "text": "Go north on New York St",
      "ETA": -2209161600000,
      "arriveTimeUTC": -2209161600000,
      "maneuverType": "esriDMTStraight"
    },
    "compressedGeometry": '+hf6e4-1vvvvof+ij4dsq+0+1tr+0+4ks+0+373
    "strings": [
      {
        "string": "New York St",
        "stringType": "esriDSTStreetName"
      }
    ],
    "geometry": {
      "paths": [
        [
          [
            -117.19570994353388,
```


LESS THAN A MINUTE AGO | Delete | Add to Collection | Fork | Embed | Export | Share

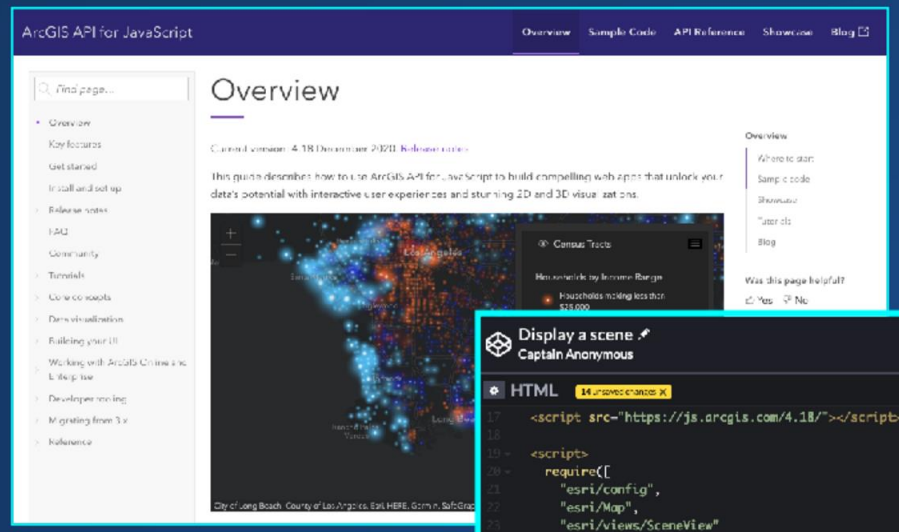


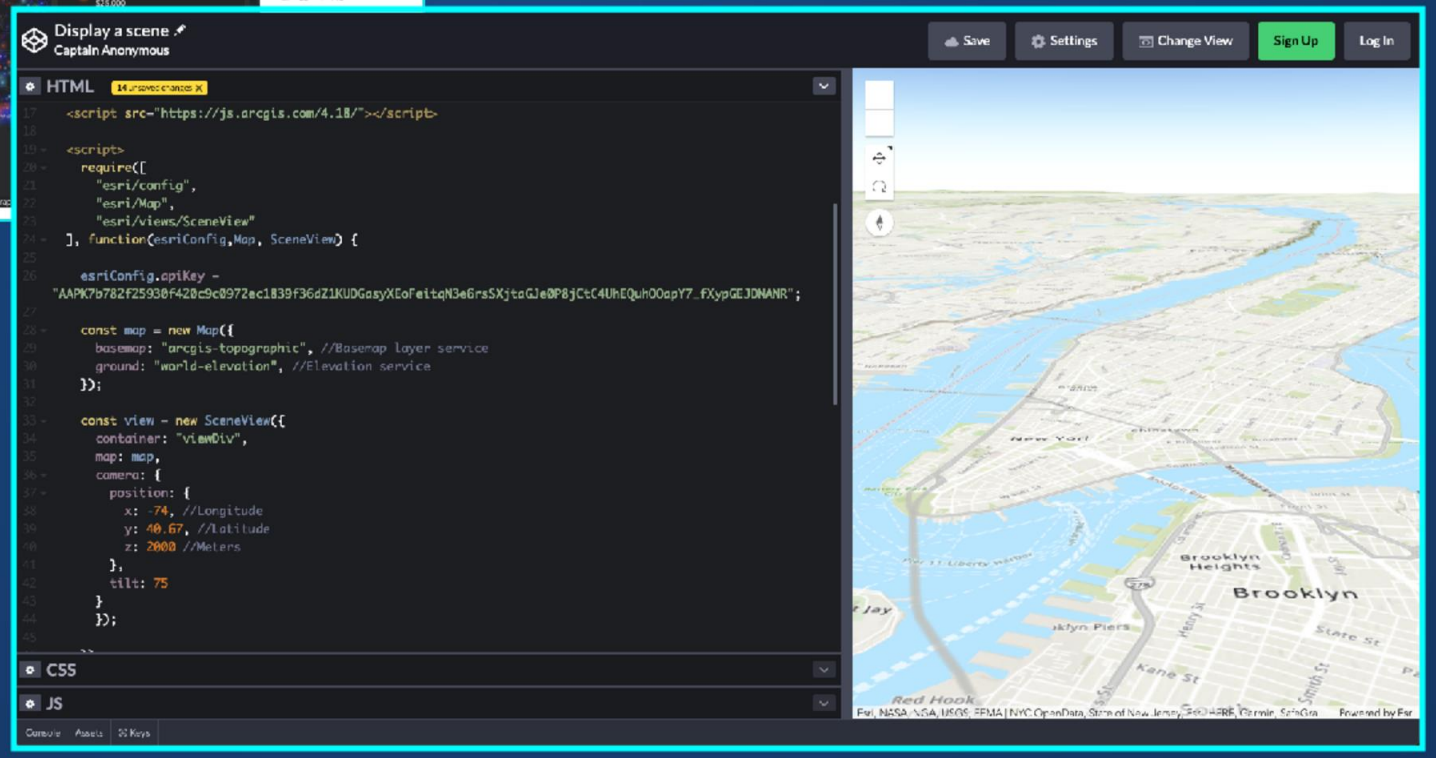
JavaScript API

ArcGIS API for JavaScript - developer website

https://developers.arcgis.com/javascript/latest

24 Tutorials - *10-15 min each*





Full support for:

- Popular web frameworks
- TypeScript

JavaScript Frameworks

- *github.com/**esri***

for non-Dojo apps

esri-loader
A tiny library to help load ArcGIS API for JavaScript modules in non-Dojo applications

TypeScript 414 Apache-2.0 80 6 10
Updated 10 days ago

Angular

angular-cli-esri-map
Example Angular component for building mapping applications with the ArcGIS API for JavaScript

TypeScript 83 Apache-2.0 46 5 7
Updated 9 days ago

angular-esri-map Archived
A collection of directives to help you use Esri maps and services in your Angular applications

JavaScript 215 Apache-2.0 111 0 0
Updated on Nov 20, 2020

React

esri-react-boot
Esri ArcGIS JS API + React utilizing Redux and Saga

JavaScript 38 Apache-2.0 24 5 14
Updated 8 days ago

react-arcgis
A few components to help you get started using the ArcGIS API for JavaScript and esri-loader with React

TypeScript 276 Apache-2.0 69 7 26
Updated 10 days ago

react-sceneview
React component that wraps the ArcGIS JS API 4.x SceneView

JavaScript 10 Apache-2.0 4 2 0
Updated on Jun 4

react-redux-js4
Boilerplate ArcGIS JS API 4.x app using React and Redux

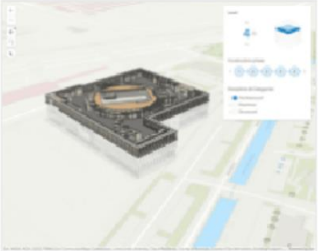
JavaScript 64 Apache-2.0 23 1 0
Updated on Jan 22, 2018

Find page...

- Get Started
  - Featured samples
  - Intro to MapView (2D)
  - Intro to SceneView (3D)
  - Intro to layers
  - Intro to popups
  - Intro to widgets
- Latest Samples
- Mapping and Views
- Layers
- FeatureLayer
- SceneLayer
- MapImageLayer
- CSVLayer
- ImageryLayer
- PointCloudLayer
- Custom Layers
- Query
- Editing
- Draw
- Visual effects
- Visualization
- Clustering
- Popups
- Graphics
- Searching
- Time
- Analysis
- Widgets
- Widgets (Advanced)
- More 3D
- Other

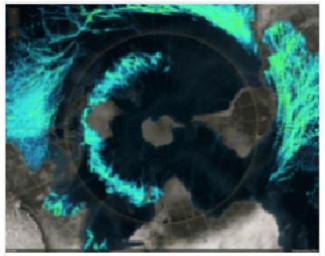
Sample code

Highlight feature with effects and blending

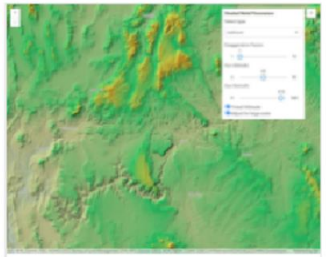


Filter BuildingSceneLayer with BuildingExplorer

Point clustering - advanced configuration



CSVLayer - Project points on the fly

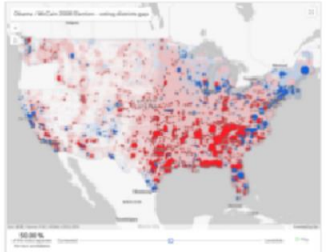


ImageryTileLayer - shaded relief renderer

SceneLayerView - query statistics by geometry

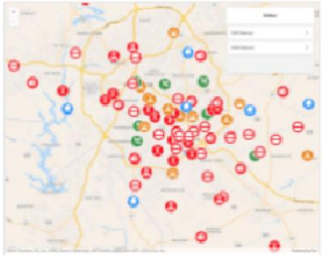
Dot density

Realistic water visualization in 3D

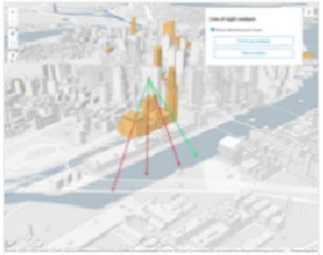


Animate layer view effect

Edit features in 3D with the Editor widget



Edit features with the Editor widget



Line of sight widget

Line of sight widget
Jim Barry

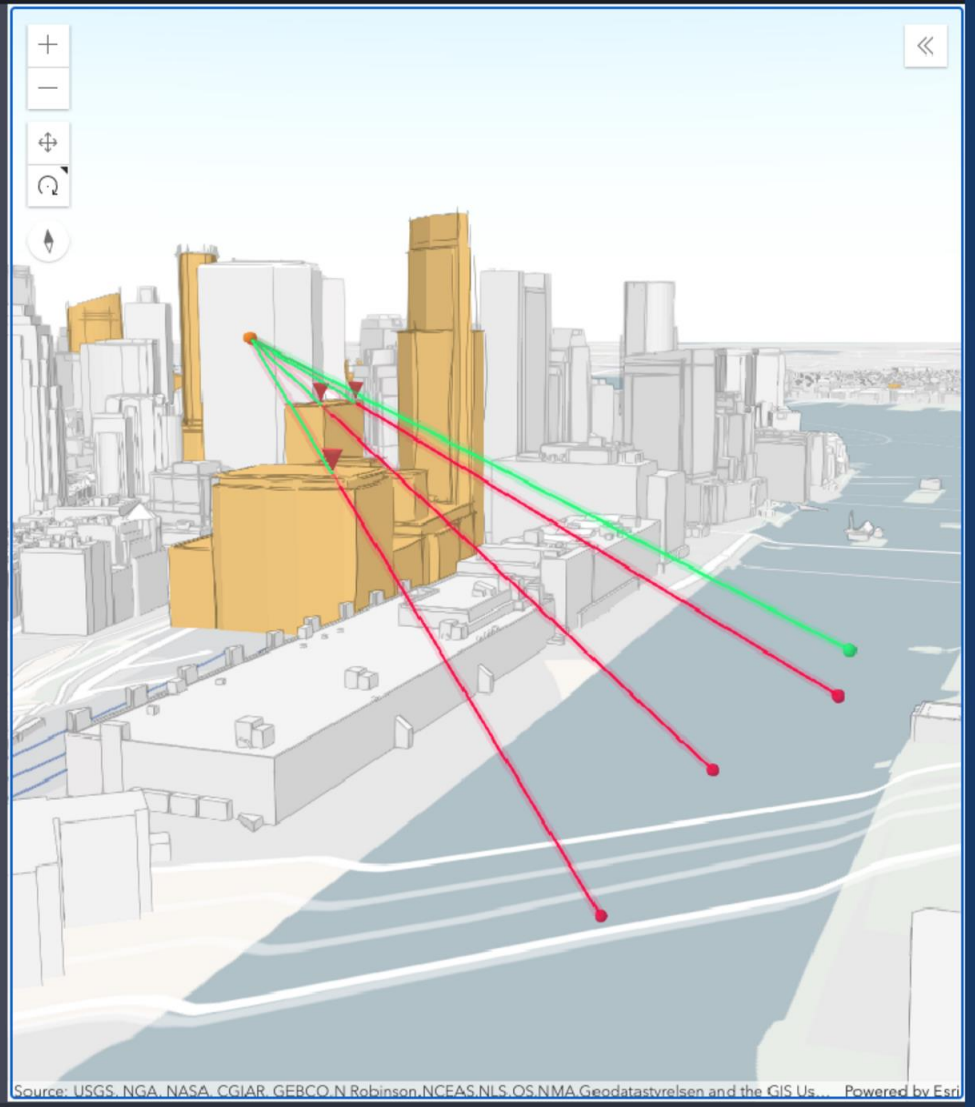
Save | Settings | Change View

HTML

```
/*************************************
 * Initialize the LineOfSight widget
 *************************************/

const lineOfSight = new LineOfSight({
  view: view,
  container: "losWidget"
});

/*************************************
 * Add symbols to mark the intersections
 * for the line of sight
 *************************************/

const viewModel = lineOfSight.viewModel;

// watch when observer location changes
viewModel.watch("observer", function(value) {
    setIntersectionMarkers();
});

// watch when a new target is added or removed
viewModel.targets.on("change", function(event) {
  event.added.forEach(function(target) {
    setIntersectionMarkers();
    // for each target watch when the intersection changes
    target.watch("intersectedLocation", setIntersectionMarkers);
  });
});

// an inverted cone marks the intersection that occludes the view
const intersectionSymbol = {
  type: "point-3d",
```

CSS

JS



Console | Assets | ⌘ Keys

New Relic: Explore your whole system in an instant.

Other Web APIs

Esri Leaflet

A lightweight set of tools for building mapping applications with Leaflet and location services.

OpenLayers

JavaScript library that can display basemap layers and access location services.

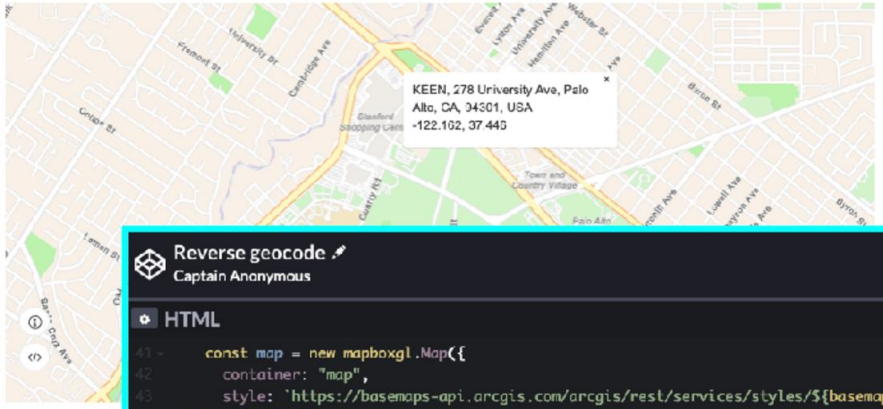
Mapbox GL JS

JavaScript library using WebGL that can render basemap layers and access location services.

Using Esri Location Services with Mapbox GL JS

Reverse geocode

Learn how to find an address near a location with the geocoding service.



Reverse geocode
Captain Anonymous

Save | Settings | Change View | Sign Up | Log In

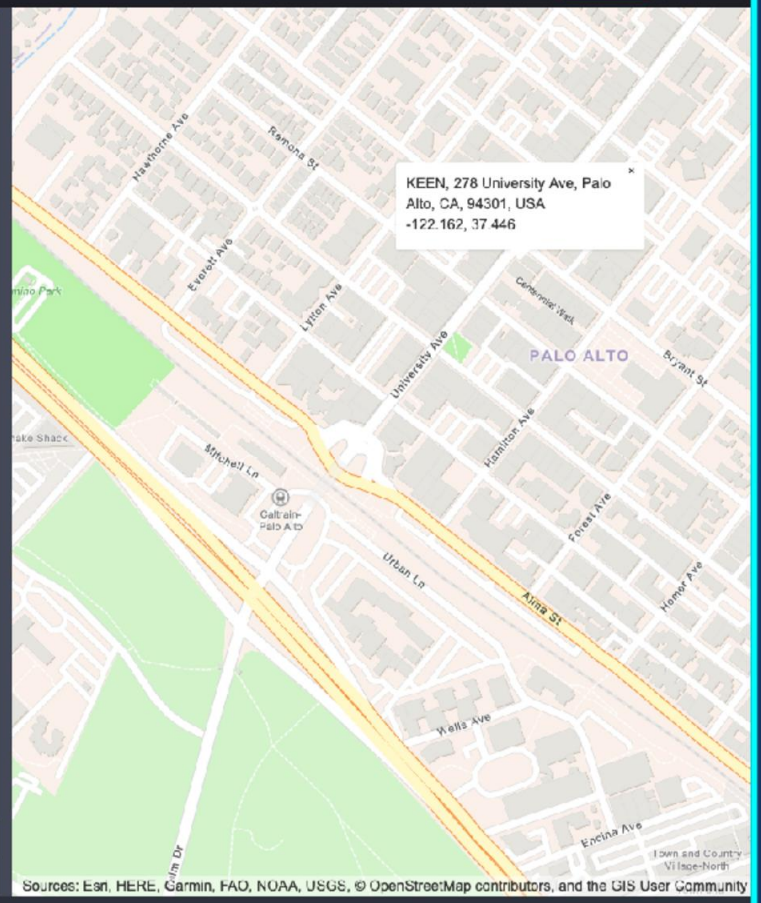
HTML

```
    const map = new mapboxgl.Map({
      container: "map",
      style: `https://basemaps-api.arcgis.com/arcgis/rest/services/styles/${basemapEnum}?type=style&apiKey=${apiKey}`,
      zoom: 12,

      center: [2.3522,48.8566] // Paris

    });

    map.on("click", (e) => {
      const coords = e.lngLat.toArray();

      const authentication = new arcgisRest.ApiKey({
        key: apiKey
      });

      arcgisRest
        .reverseGeocode(coords, {
          authentication
        })
        .then((result) => {

          const lngLat = [result.location.x, result.location.y];

          const label = `${result.address.LongLabel}<br>${lngLat[0].toLocaleString()}, ${lngLat[1].toLocaleString()}`;

          new mapboxgl
            .Popup()
            .setLngLat(lngLat)
            .setHTML(label)
            .addTo(map);

          })
```

CSS

JS

Console | Assets | Keys



How to use API keys

Create your first API key

An API key is required to access ArcGIS location services.

Configure your API key

Scope key access to specific services and referrer headers.

Restrict API key access from specific clients

Configure client access with your API key by configuring authorized referrers.

Monitor use of your API keys

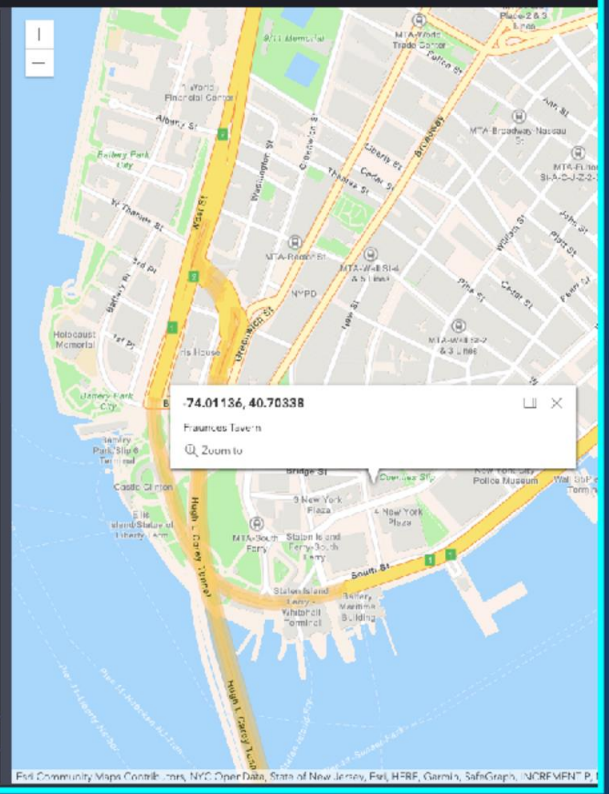
Learn how to monitor usage of your API keys.

ArcGIS API for JavaScript: Reverse geocode

Jim Barry

HTML

```
<script src="https://js.arcgis.com/4.18/"></script>
<script>
  require([
    "esri/config",
    "esri/Map",
    "esri/views/MapView",
    "esri/tasks/Locator"
  ], function(esriConfig, Map, MapView, Locator) {

    //esriConfig.apiKey = "YOUR-API-KEY";
    esriConfig.apiKey = "AAPK5d7a6979ce5644xxxxx_____xxxxxxTmp5gRyxScDij4dfx8QPui";

    const map = new Map({
      basemap: "arcgis-navigation"
    });

    const view = new MapView({
      container: "viewDiv",
      map: map,
      center: [-74.005, 40.705],
      zoom: 15
    });
    // Find address

    const locatorTask = new Locator({
      url: "http://geocode.arcgis.com/arcgis/rest/services/World/GeocodeServer"
    })

    view.on("click", function(evt) {
      const params = {
        location: evt.mapPoint
      };
      locatorTask.locationToAddress(params)
        .then(function(response) { // Show the address found
          const address = response.address;
          showAddress(address, evt.mapPoint);
```




```
require([
  "esri/config",
  "esri/Map",
  "esri/views/MapView",
  "esri/tasks/Locator"
], function(esriConfig, Map, MapView, Locator) {

  //esriConfig.apiKey = "YOUR-API-KEY";
  esriConfig.apiKey = "AAPK5d7a6979ce5644xxxxx_____xxxxxxTmp5gRyxScDij4dfx8QPui";
```

API Keys

...turn on location services

ReverseGeocoderKey for JB | Modified 6 hours ago

View Usage | Edit API Key | Delete API Key

AAPK5d7a6979ce5644xxxxx_____xxxxxxTmp5gRyxScDij4dfx8QPui

Services

Basemaps | Geocoding (not stored)

Allowed Referrers

Any referrer header is allowed.

Native App Development

App Builders and SDKs for creating Native Apps

From no/low-code to full code

Native Apps

Apps on devices

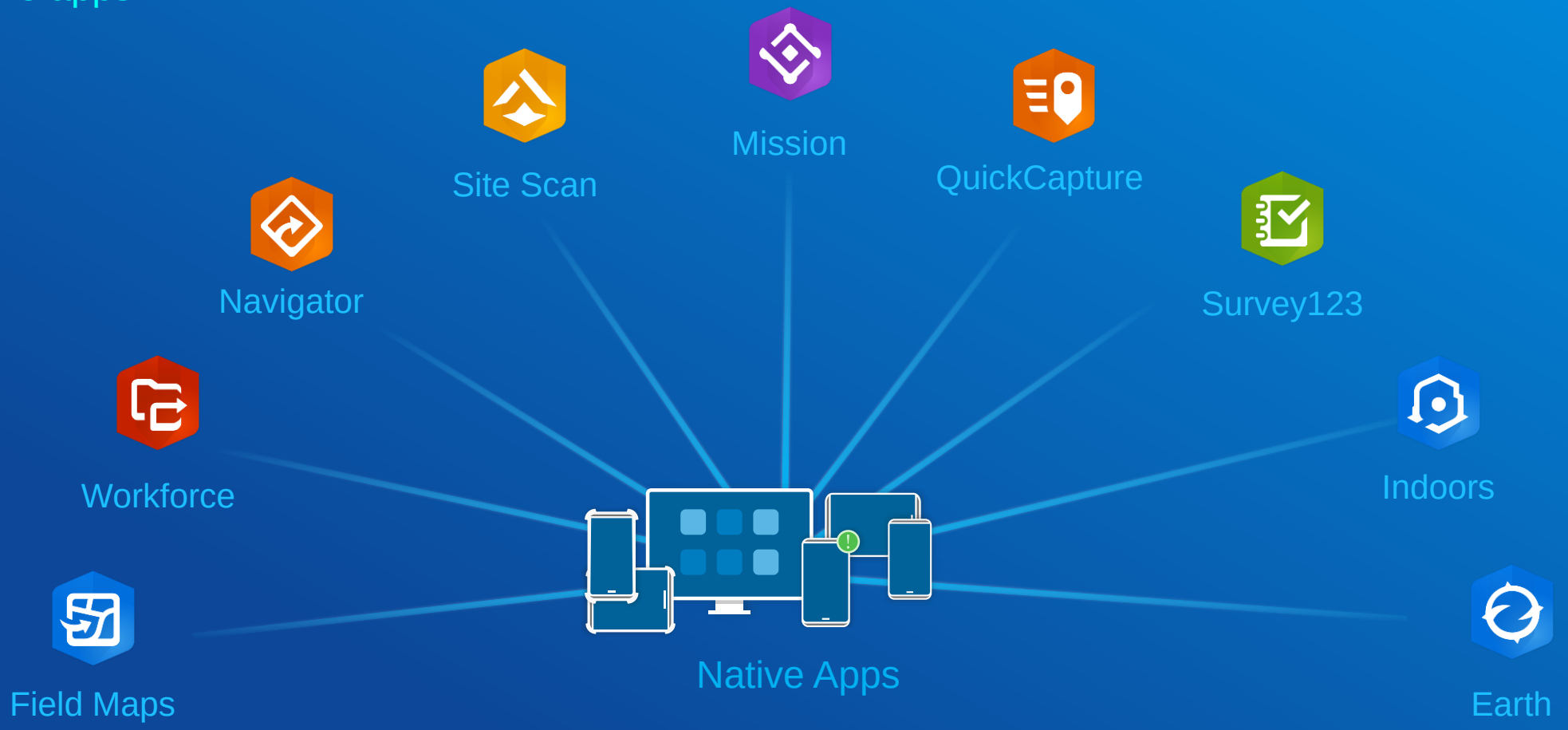
Native Apps

Introduction

- Use the term ‘native’ to differentiate from web and web/hybrid apps
- Apps built with native device/platform APIs
- Access device capabilities e.g. Bluetooth, GPS, notifications
- Deliver highest performance
- Enable offline workflows
- UI / UX consistent with device environment
- App stores provide trusted source

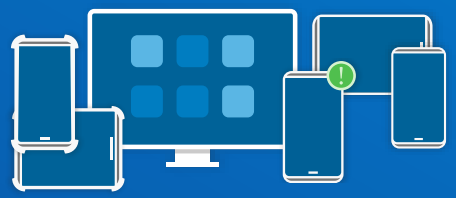
Esri apps

Native apps



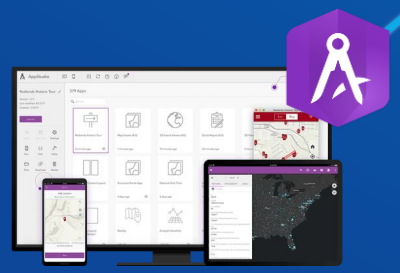
Building native apps

From no-code to full code



Your native Apps

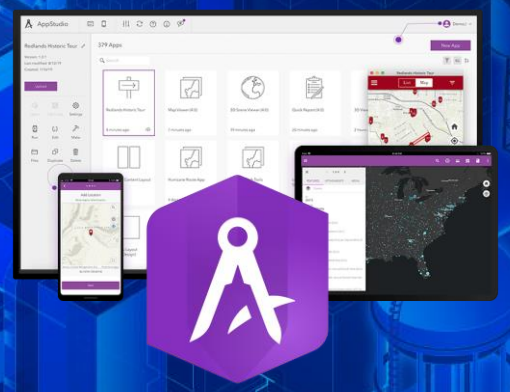
AppStudio



ArcGIS Runtime SDKs

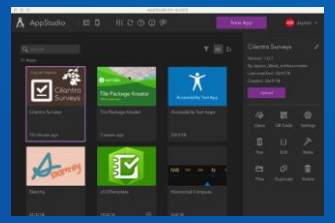
AppStudio

Native app builder

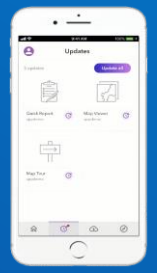


ArcGIS AppStudio

Workflow



AppStudio Desktop

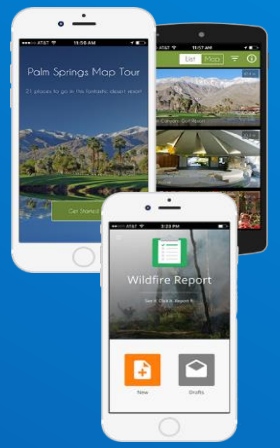


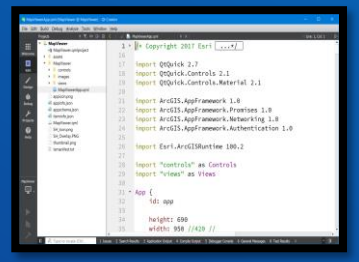
AppStudio Player

AppStudio Player

App stores

Mobile Device Management





Optionally customize

ArcGIS AppStudio

Benefits

- No-code / low-code framework for building native apps for devices
- Cross-platform apps for Android, iOS, Linux, macOS, and Windows
- AppStudio Player enables deployments without installing new apps
- AppStudio Cloud Make tool builds standalone apps
- Build and publish your apps to App stores
  - Google Play
  - Apple App Store
  - Microsoft Store
  - Ubuntu Apps Directory

Apps, app builders, and your apps

Powered by ArcGIS Runtime SDKs

ArcGIS Runtime SDKs

Power native apps

ArcGIS Runtime SDKs

Architecture

- 5 SDKs
- 5 Platforms
- Platform-specific or cross-platform
- Same capabilities across all Runtime SDKs

ArcGIS Runtime: Road Ahead

2022 – 2023

2022	April	August	Q4	Q1	2023
	100.14	**100.15**	**200.x**		

Enhancement themes:

- Arcade
- Maps and Layers, Labeling
- Offline maps
- Device location, Indoor positioning
- 3D Scenes
- Geodatabase
- Toolkit

- Long Term Support (LTS) release
- Extra year of General Availability
  - 5 years total
- No new features
- Performance & bug fixes
- 3rd Party Updates

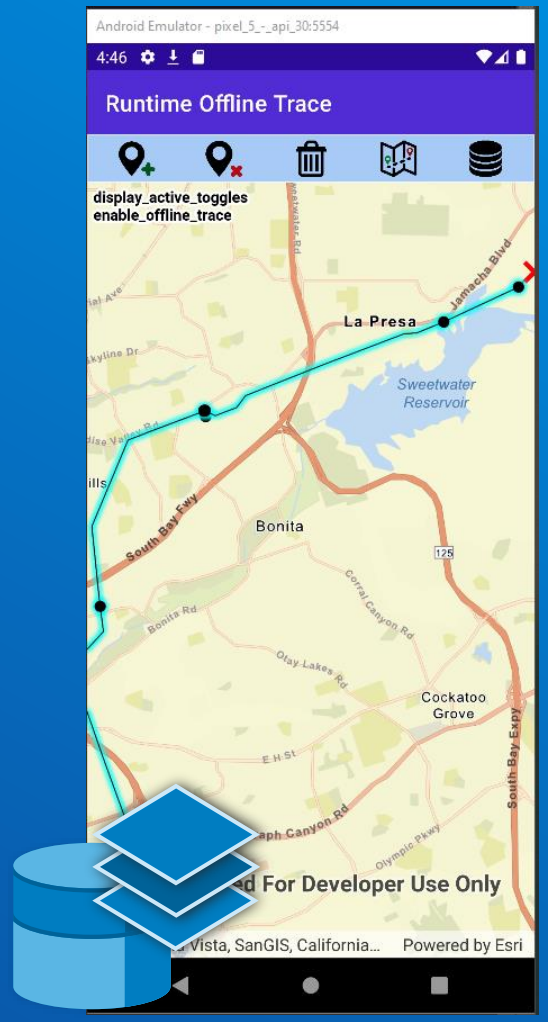
- API advancements
  - Kotlin
  - Swift
  - .NET MAUI
  - Qt 6
  - JavaFX 17
- New features
  - Offline Utility Networks
  - Real-time data
  - Global 3D basemap

Esri Confidential, Subject to Change

New features

200.x series

- **Offline Utility Network tracing**
- Utility Networks in mobile geodatabases on the device
  - Includes data, network topology, and indexes
- Load Utility Network and layers
- Builds on existing capabilities for locations, barriers, tracing
  - Connected, downstream, upstream, and subnetwork traces
- Incremental support in 2023-2024 for:
  - Offline map areas and sync
  - Additional trace types (isolation, loops, shortest path)
- Targeting next Utility Network Management release
  - Late-2023

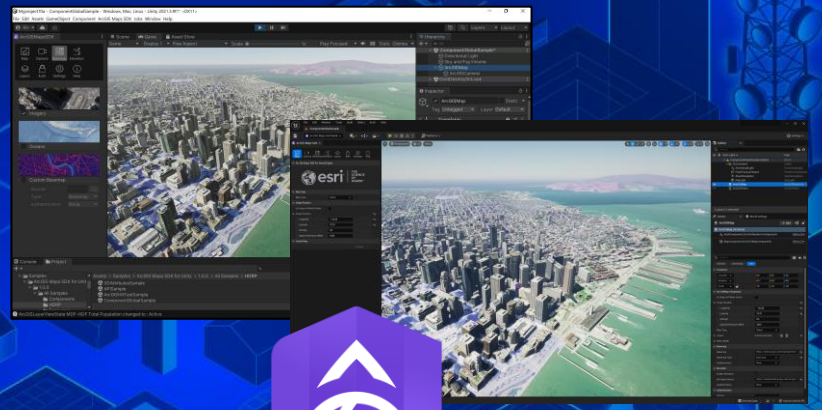


Esri Confidential, Subject to Change

10:28 AM Tue Aug 30
100%
TUE
30
Calendar
Clock
Photos
Camera
FaceTime
Maps
Settings
Podcasts
Notes
Voice Memos
Shortcuts
Stocks
Folder
News
Calculator ›
AccuWeather
App Store
Zoom
Productivity
ArcGIS UITests
ArcGISRuntim...
.NET
OfflineTrace
Record it!

ArcGIS Maps SDKs

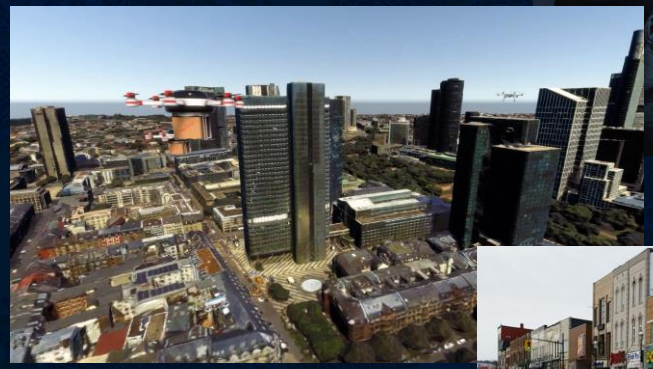
Game Engine apps



ArcGIS Maps SDKs

Immersive 3D GIS Solutions

- Bring ArcGIS to game engines
- Build the next generation of 3D apps
- Access to real-world, geospatial data
- Photo-realistic 3D and AR/VR experiences
- Interactive and immersive
- Modeling and simulation
- Real-time analysis



ArcGIS Maps SDKs

2022 – 2023

1.0 **1.1**

2022 **Q2** **Q4** **2023**

- Maps SDK for Unity
- Maps SDK for Unreal Engine
- High performance cached/tiled layers
  - Image Tiled Layer
  - 3D Object Scene Layer
  - Integrated Mesh Layer

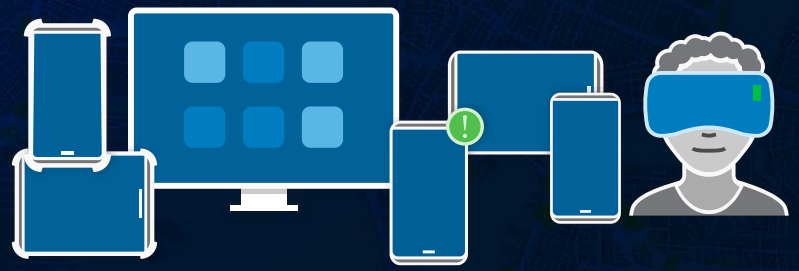
- Online and offline
- API Key and OAuth 2.0
- Global and local scenes
- Geometry Engine
- Android, iOS, macOS, Windows, & XR devices

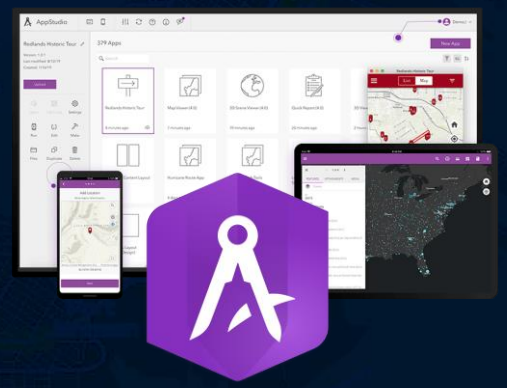
- Vector tile layers
- Scene layer rendering
  - PBR materials
  - Draco compression
- SDK improvements

Esri Confidential, Subject to Change

App builders and SDKs for native and game engine apps

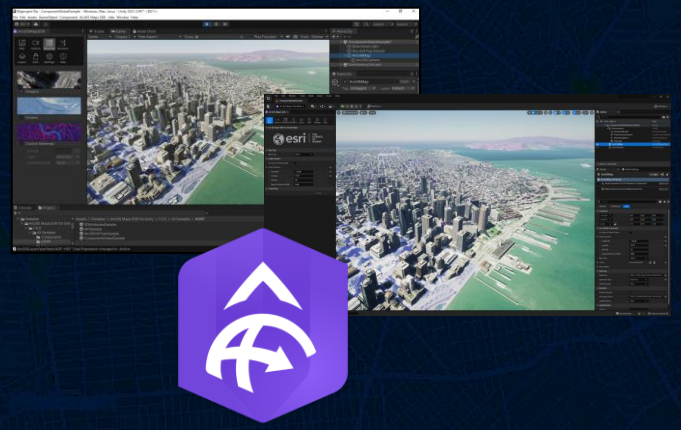
AppStudio, ArcGIS Runtime SDKs, ArcGIS Maps SDKs





AppStudio

ArcGIS Runtime SDKs



ArcGIS Maps SDKs

ArcGIS Runtime

The journey so far… up to 2022

100.13 – Dec 2021 Utilities, 3D vector tiles

100.12 – Aug 2021 Geotriggers, mobile gdb

100.11 – Apr 2021 Utilities, Labeling API

100.10 – Jan 2021 Utilities, GNSS

100.9 – Aug 2020 Utilities, OGC

100.8 – May 2020 Utilities, Overlays

100.7 – Dec 2019 Utilities, Tracing

100.6 – Aug 2019 Utilities, Navigation, AR

100.5 – April 2019 3D Web GIS

100.4 – Oct 2018 Defense

100.3 – July 2018 3D Web GIS

100.2.1 – Feb 2018 Offline map

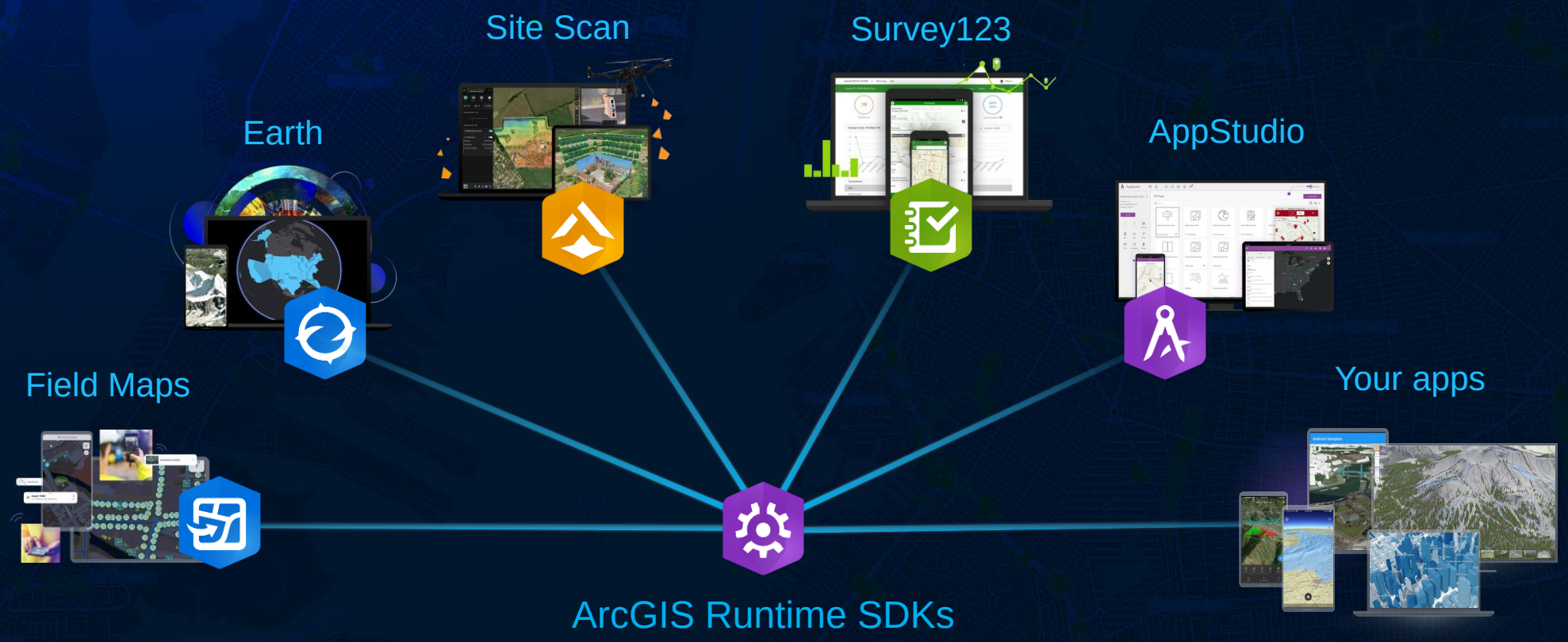
100.2 – Dec 2017 Local data and analysis

100.1 – June 2017 2D Web GIS and 3D mobile

100.0 – Nov 2016 Basic mapping

Apps, app builders, and your apps

Powered by ArcGIS Runtime



New capabilities

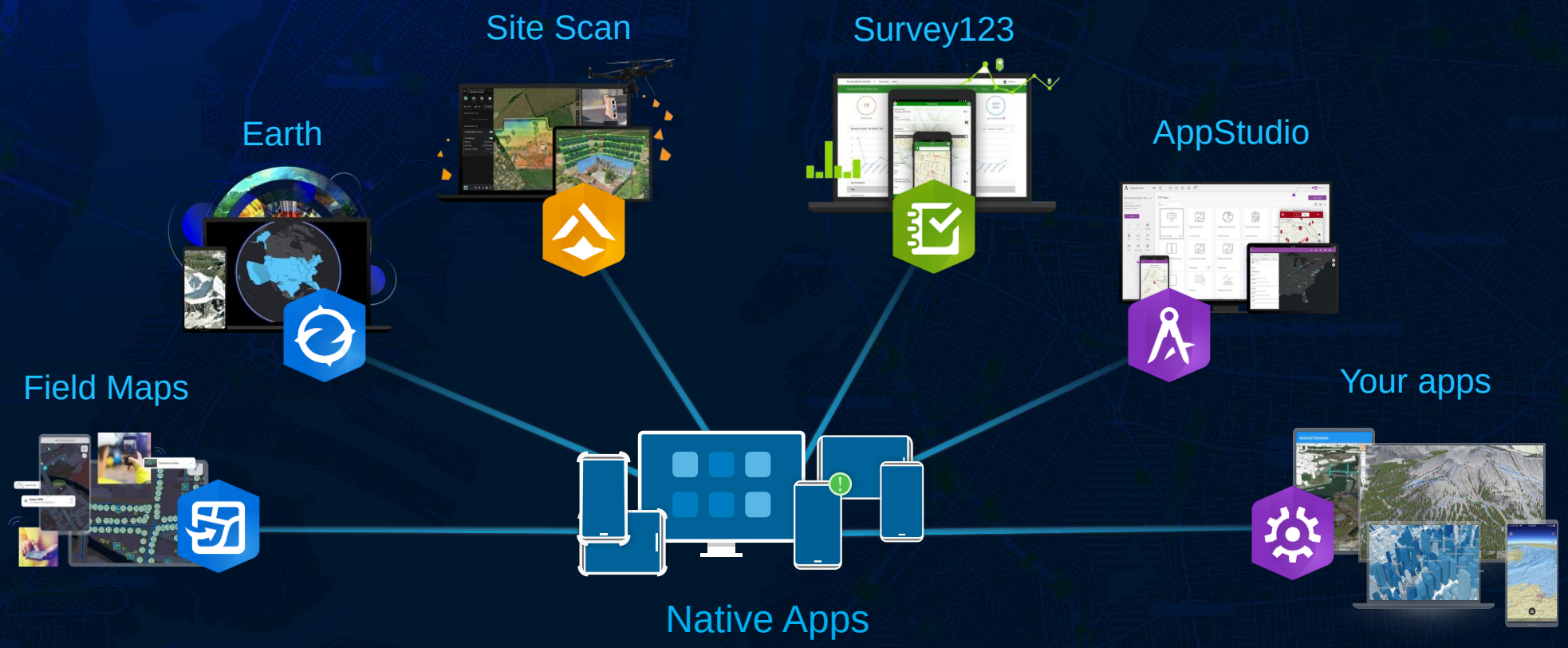
200.x series

- Enhanced support for real-time data
- ‘Dynamic Entity Layer’
- Initial focus on Stream Service Data Source
- Rendering feed data on a map (including track properties)
- Connect/reconnect to point stream layers
- Load stream layers from Web Maps or by URL
- Cache data in local data store to visualize previous entities and interrogate entities
- Including purge options for entities that 'expire’
- Support identify, select, labels, legend info, min/max scale

Esri Confidential, Subject to Change

Apps, app builders, and your apps

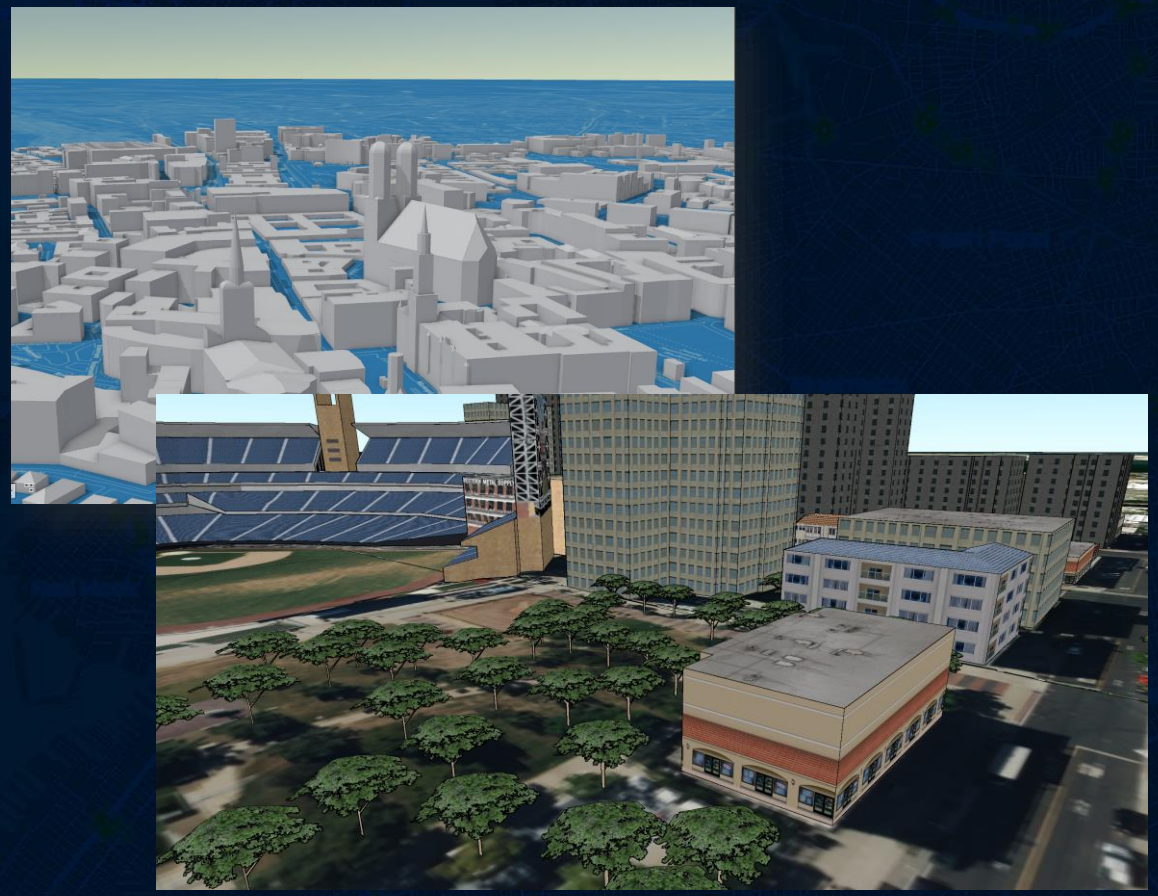
Native apps



New capabilities

200.x series

- OpenStreeetMap (OSM) 3D Basemap
  - Elevation surface
  - Vector Tiles
  - 3D Buildings
  - 3D Trees
  - Labels/symbols
- Mask buildings/trees by feature ID or polygon
- Edge effect rendering
  - 3D Object Scene Layer



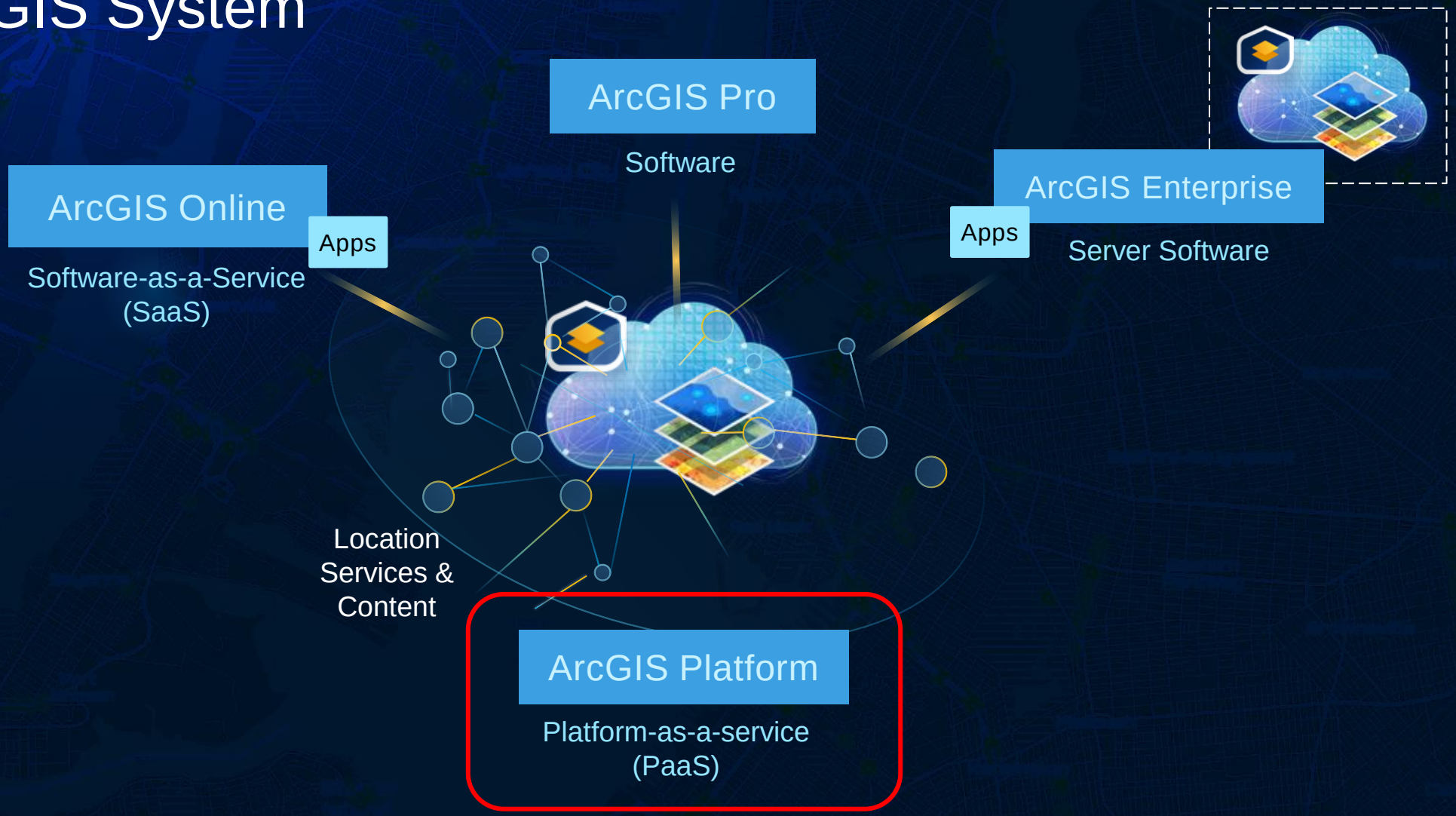
Esri Confidential, Subject to Change

ArcGIS Runtime

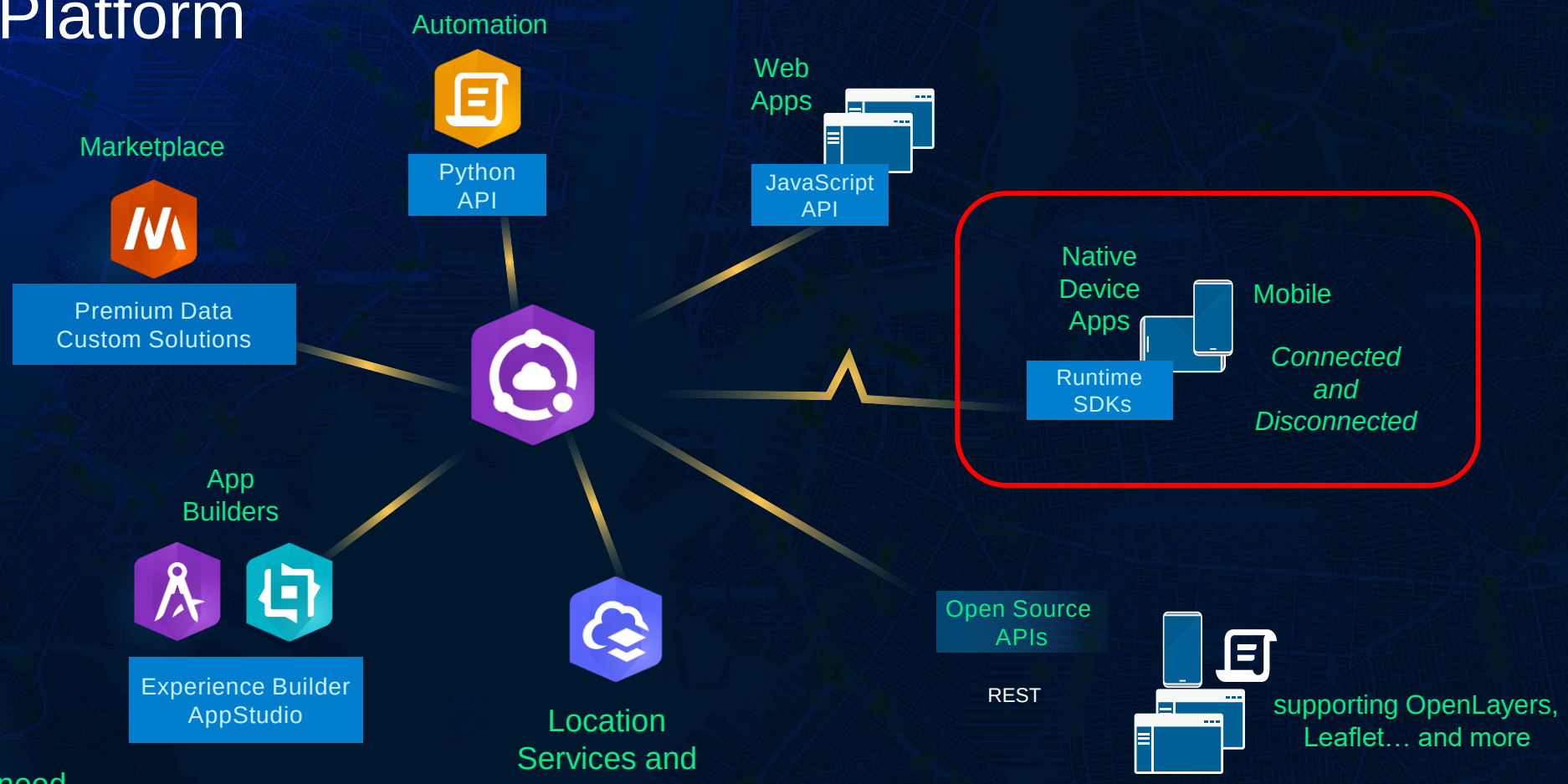
Highlights

- Add mapping and analytics to native device apps
- Deliver the best mobile experience
- Support multiple platforms
- Power offline workflows
- Integrate with the ArcGIS System

ArcGIS System



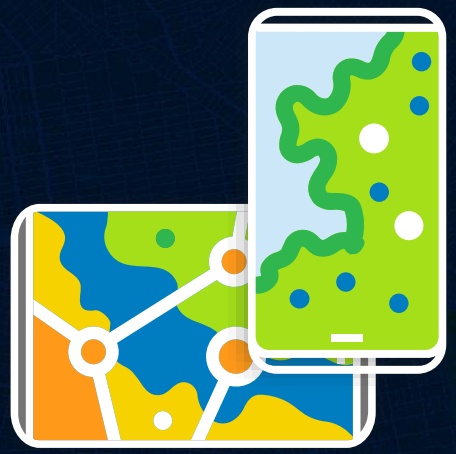
ArcGIS Platform



- High Performance
- Easy to Access
- Use only what you need
- Rich Data-Driven Visualization
- Secure data hosting

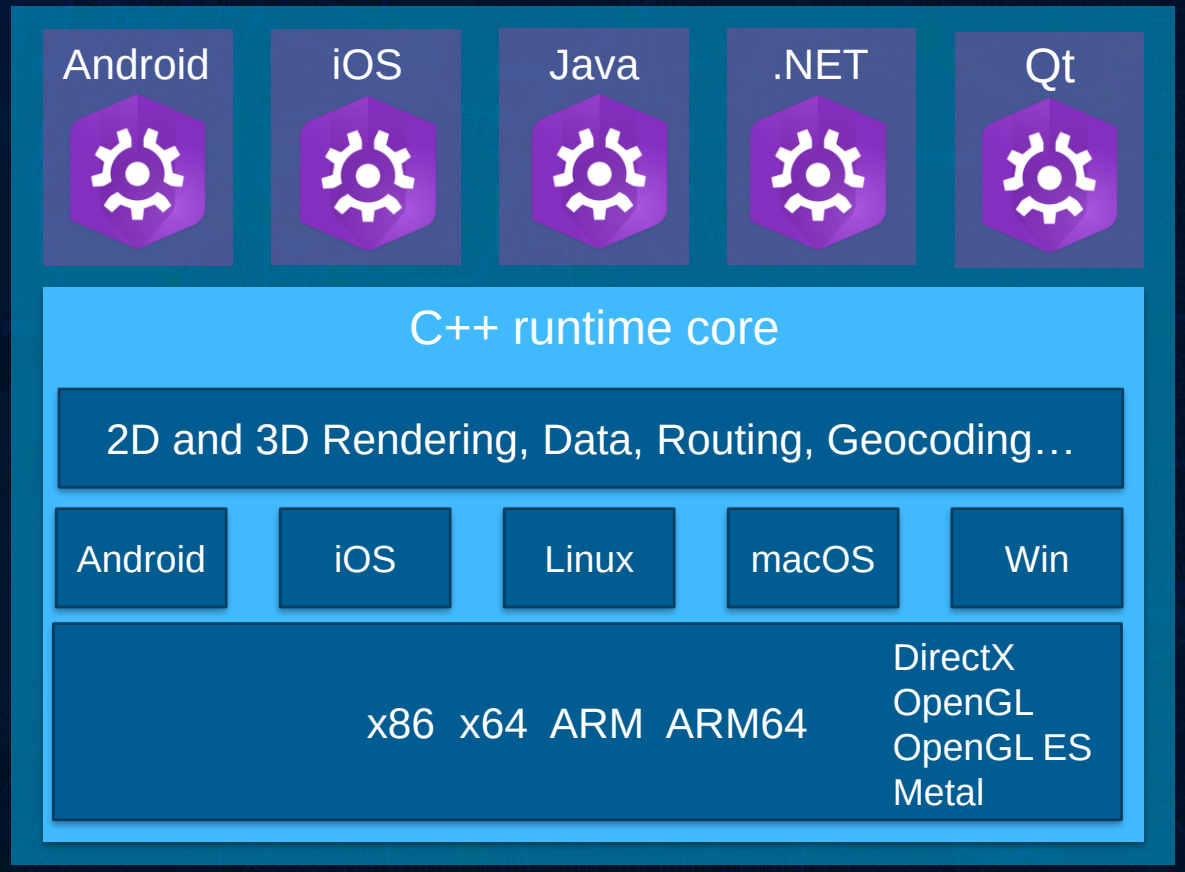
ArcGIS Runtime highlights

- Add mapping and analytics to native apps
- Deliver the best mobile experience
- Support multiple platforms
- Power offline workflows
- Integrate with the ArcGIS System



ArcGIS Runtime SDKs

- 5 SDKs
  - Android, iOS, Java, .NET, Qt
- Runtime core written in C++ for maximum performance and consistency
- Same capabilities across all SDKs
- 5 platforms
  - Android, iOS, Linux, macOS, Windows
- Architectures and rendering APIs

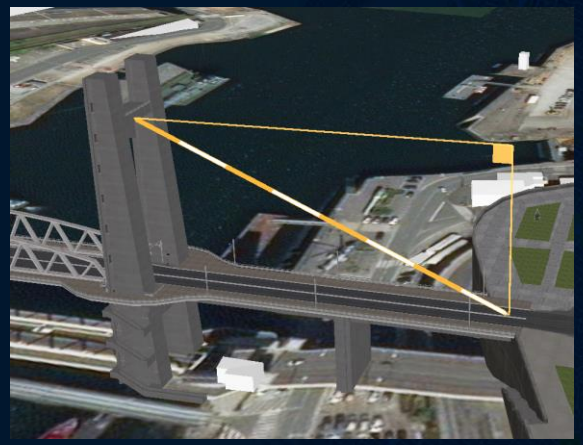


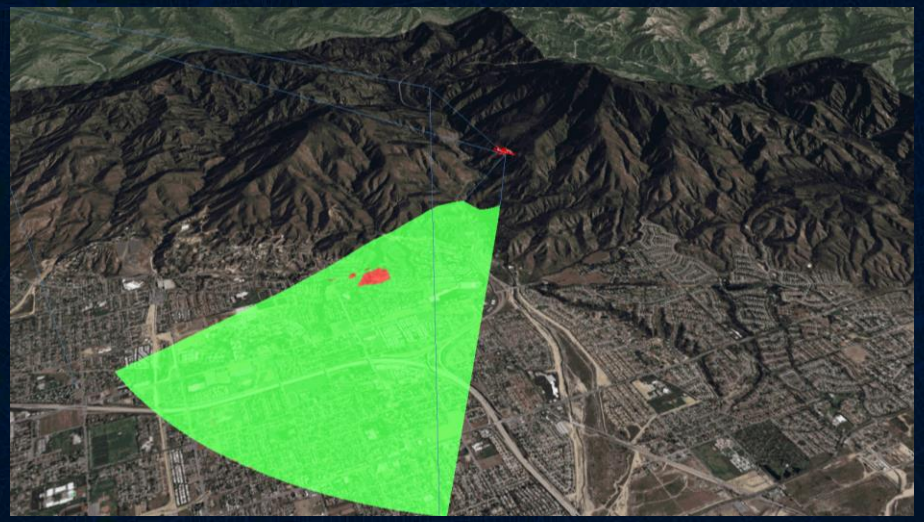
3D content

- Scene layers optimized for display of 3D content
  - 3D Object
  - Integrated Mesh
  - Point Clouds
  - Point
- Surfaces
  - Image service
  - Tile package
  - Raster
- Features
  - Model symbols
  - Extruded features

Analysis

- Utility networks
- Geoprocessing
- Transportation networks
- Geocoding
- Geometry
- Interactive 3D analysis
  - Line of sight
  - Viewshed
  - Measure

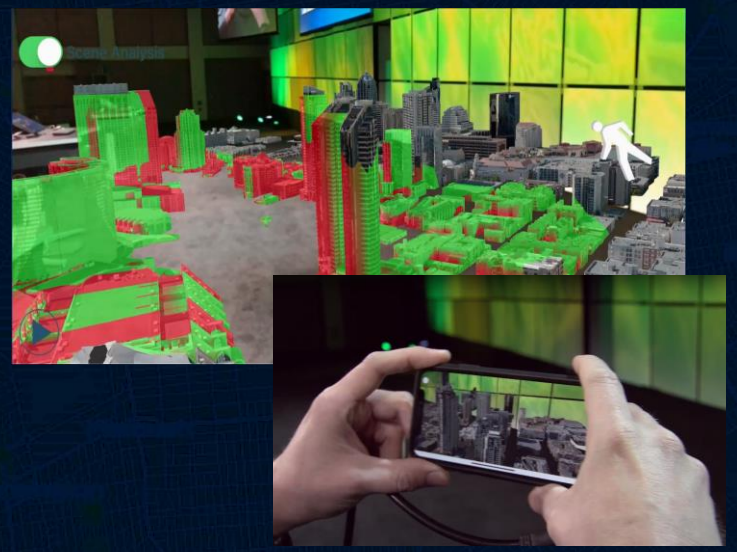




Augmented Reality (AR)

- AR for mobile platforms
  - iOS & Android devices
  - Not intended for VR or MR scenarios

- AR available for
  - ArcGIS Runtime SDKs for
    - Android, iOS, Qt, and .NET
  - Open-source toolkits to work with hardware

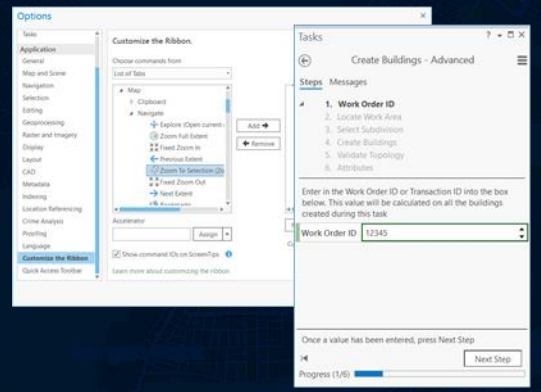


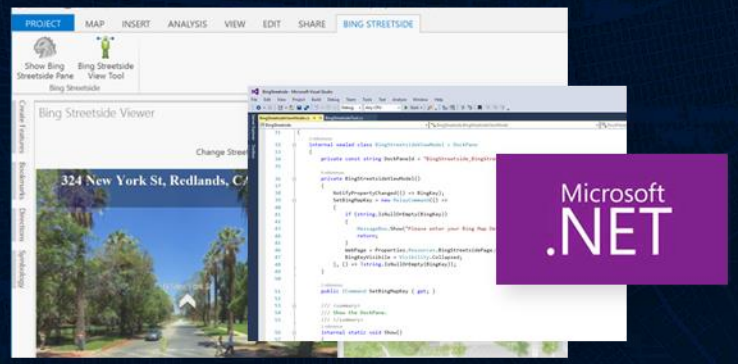
Extending the ArcGIS System

Extending ArcGIS Pro

Options:

- Configure UI through settings, and workflows through Tasks
- Automate using geoprocessing and Python
- Extend with your own custom tools and solutions using the ArcGIS Pro SDK for .NET

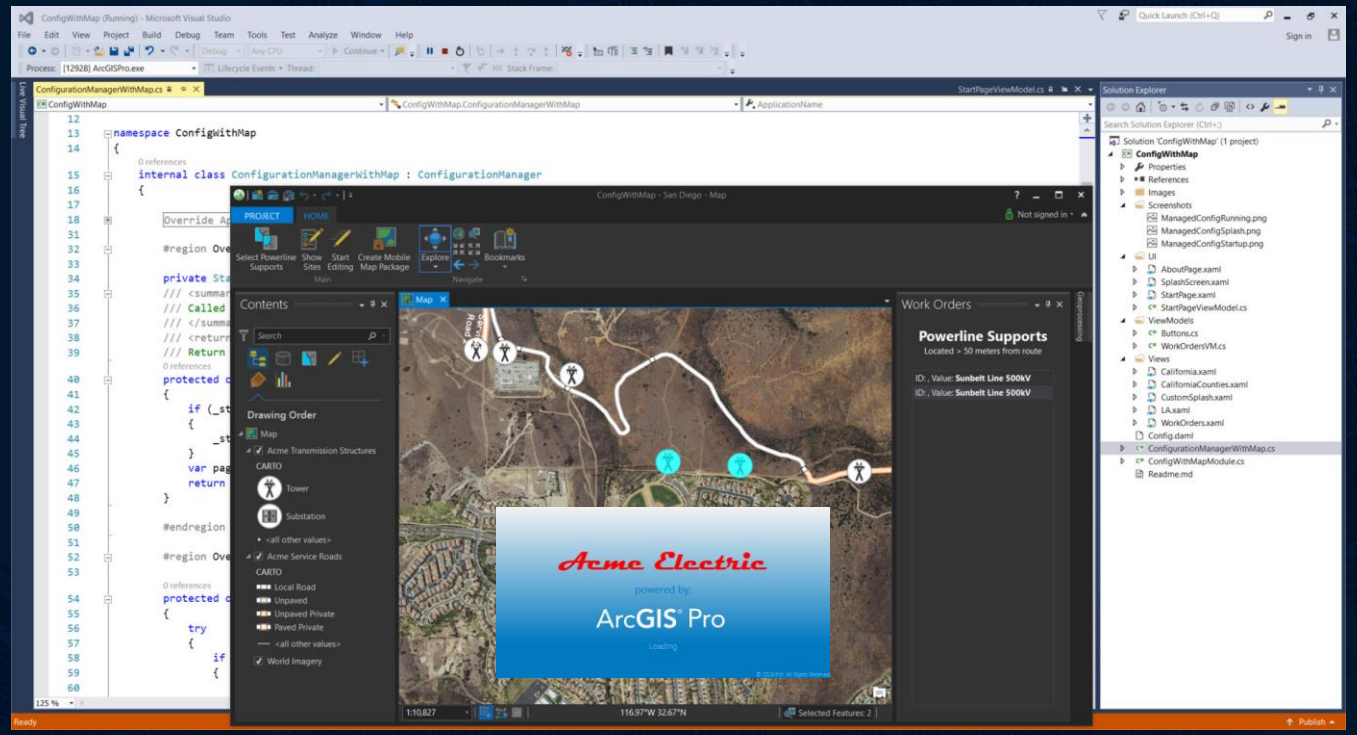




Configurations

- Custom start-up UX – splash screen, start page
- Vary UI / UX based on user role

- Documentation
  - ProConcepts – Configurations concepts
  - ProGuide – Configurations walk-through
  - Samples –
    - ConfigWithMap
    - ConfigWithStartWizard



ArcGIS Pro and Python

- Geoprocessing tools (2000+) of them
  - Modelbuilder visual programming interface
- ArcGIS Python Libraries in Pro
  - ArcPy
    - access to geoprocessing tools and functions for automation
  - ArcGIS API For Python
    - analyzing spatial data, managing your Web GIS, and performing spatial data science
- Python command line
  - exploratory coding and running short snippets
- Script tools
  - Python and R scripts you have written as the source for your own geoprocessing tools
- Notebooks
  - Powerful tool for spatial data science, visualization and sharing

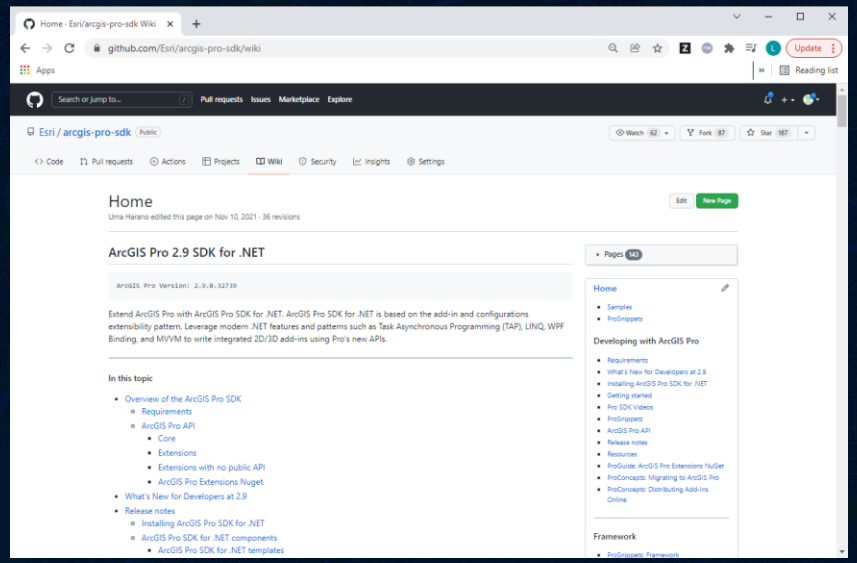
ArcGIS Pro SDK for Microsoft .NET

- Extensibility API for customizing and extending the ArcGIS Pro application
  - SDK is designed and built specifically for this purpose

- Microsoft Visual Studio
  - C# and VB
  - 4 different extensibility patterns to choose from
    - Add-ins, Configurations, Plug-in Datasources, Corehost

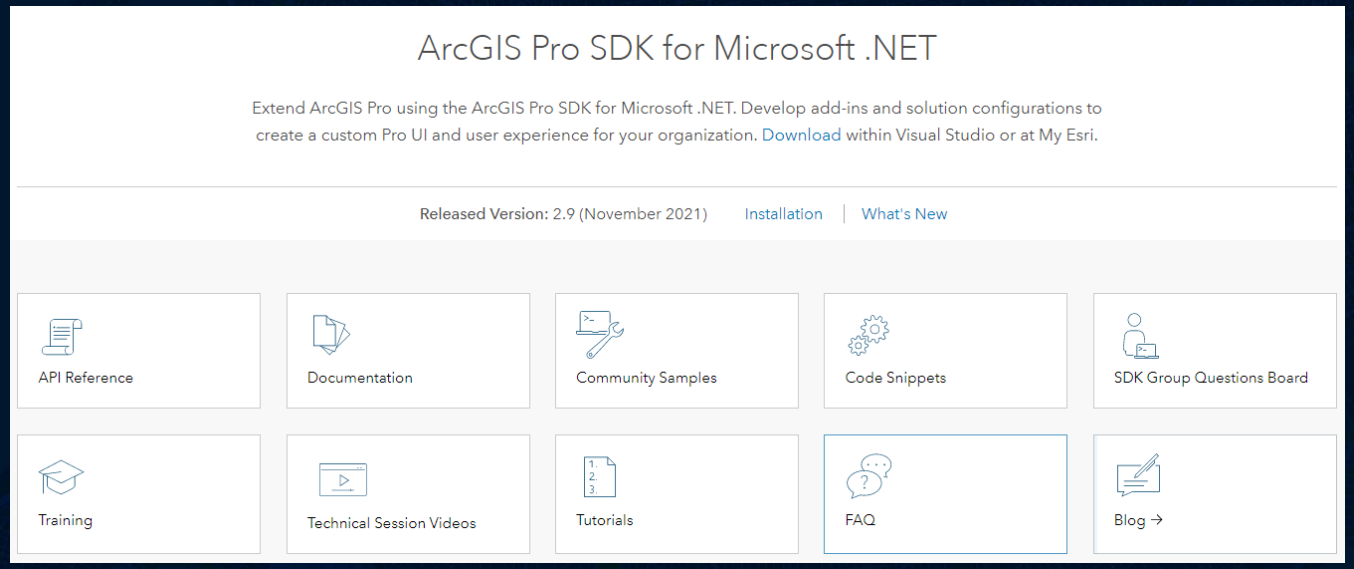
- Currently at release is 3.0
  - Almost 30,000 classes and methods available in the public API

ArcGIS Pro SDK Resources for You



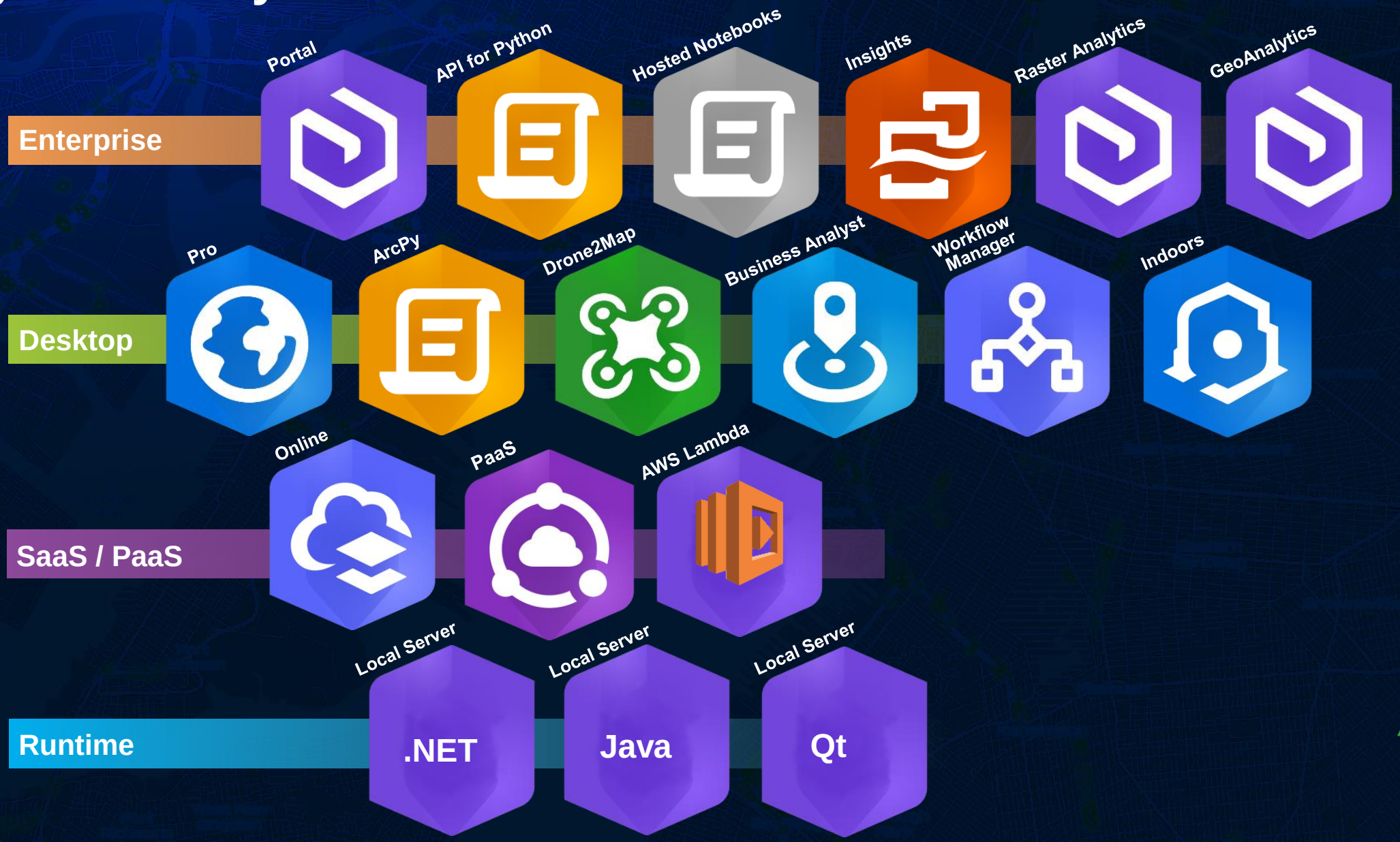
- Complete API Reference
  - each assembly, class and method
- Over 200 Community samples
- 1000's of code snippets
  - copy/paste ready
- Concept Documents
- Step by Step Tutorials and Guides
- Videos

https://pro.arcgis.com/en/pro-app/latest/sdk/



Scripting and Automating

Python Everywhere



ANACONDA

Integrate, Extend, Infuse

ArcGIS Enterprise

Workflow

Automation

Tools, APIs and capabilities . . .
to support scripting
and automating your tasks

ArcGIS API for Python

AI model training / retraining, QA and deployment

AI / ML Engineer

Decision Maker

Data science, content management, administration and user tasks

Analyst

Author and update Dashboard apps, StoryMaps and more

Data Scientist

Bulk publishing and data management tasks

Content Manager

Schedule, callback and execute notebooks as scripted tasks

Organization Administrator

System Administrator

. . . and a lot more

SPATIAL

Analysis

Analytical Methods and Spatial Algorithms

Data Science

Identify Patterns, Trends, and Anomalies

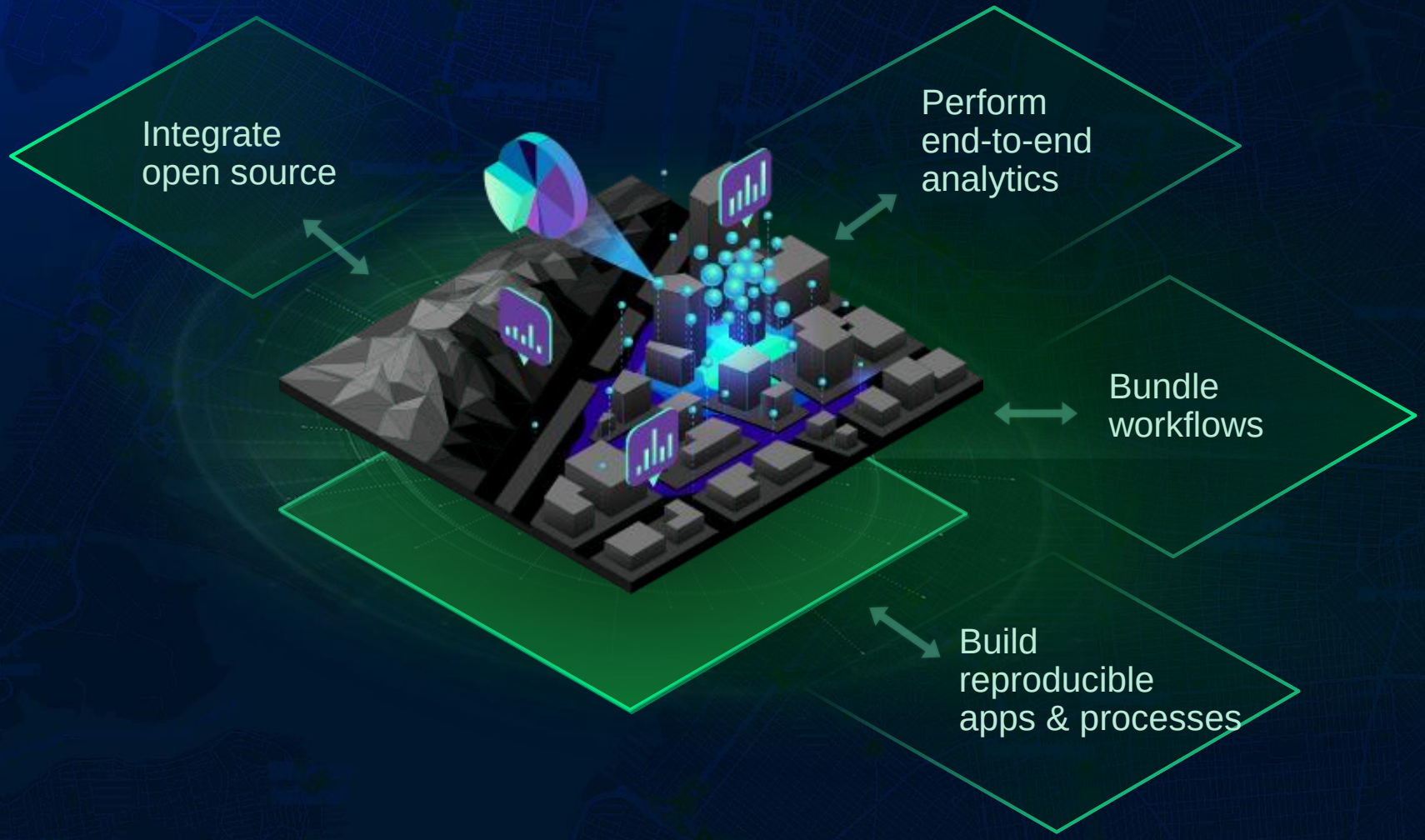
Artificial Intelligence

Solve Complex Problems, Using ML and DL Techniques

Applying GIS, the Science and the Technology

ArcGIS Is a Comprehensive System for Analysis

Designed for Analysts, Data Scientists and Developers



Advancing Spatial Science

Data Engineering

Visualization & Exploration

Spatial Analysis

Machine Learning & AI

Big Data Analytics

Modeling & Scripting

Sharing & Collaboration

example
example2

Sample Notebooks

100+

- Valuable to run as-is, or modify to fit

Information extraction from Madison city crime reports using Deep Learning

Temperature forecast using time series data

Vehicle detection and tracking

Shipwrecks detection using bathymetric data

Increase Image Resolution using SuperResolution

SAR to RGB image translation using CycleGAN

Identifying country names from incomplete house addresses using Deep Learning

Classification of Raw Point Clouds using Deep Learning & generating 3D Building Models

Automatic road extraction using deep learning

Prediction of energy generation from Solar Photovoltaic Power Plants using weather variables

Detection of electric utility features and vegetation encroachments from satellite images using deep learning

Forecast monthly rainfall using TimeSeriesModel

Land cover classification using hyperspectral imagery and deep learning

Streams Extraction using Multi TaskRoadExtractor

Change Detection of Buildings from Satellite Imagery

Land Parcel Extraction using Edge Detection model

Generating RGB Imagery using Pix2Pix

Address Standardization and Correction with SequenceTo Sequence

Model explainability for ML Models

Detecting Mussel Farms using Deep Learning

Forecasting Air Temperature in California using ResCNN model

Count cars in aerial imagery using deep learning

Classify land cover to measure shrinking lakes

Lunar Craters Detection using Deep Learning

Training a wind turbine detection model using large volumes of training data

Landsat 8 to Sentinel-2 using Pix2Pix

Image scene classification using FeatureClassifier

Image Captioning Using Deep Learning

Covid case forecasting Using TimeSeriesModel from arcgis.learn

Chennai Floods 2015 - A Geographic Analysis

Analyzing violent crime

Finding hospitals closest to an incident

Which college district has the fewest low-income families?

Designate Bike Routes for Commuting Professionals

Locating a new retirement community

Finding grazing allotments

Analyzing growth factors of rental properties in New York City

How green is New Delhi?

Safe Streets to Schools

Which areas are good cougar habitats?

Data Visualization - Construction permits near Washington DC, part 1/2

Data Summarization - Construction permits near Washington DC, part 2/2

Analyzing United States tornadoes

Finding a New Home

Mapping the 2019 Novel Coronavirus Pandemic

Time Series Analysis of the 2019 Novel Coronavirus Pandemic

Predictive Analysis of the 2019 Novel Coronavirus Pandemic

Identifying facilities at risk of forest fires using spatial overlay analysis

Predict Floods with Unit Hydrographs

River Turbidity Estimation using Sentinel-2 data

Finding suitable spots for AED devices using Raster Analytics

California wildfires 2017 - Thomas Fire analysis

Counting features in satellite images using scikit-image

Creating raster information product using Raster Analytics

Historical wildfire analysis

Predicting El Niño Oscillations

Snow avalanche hazard mapping

Raster Analytics - Calculate wildfire landslide risk

Creating hurricane tracks using GeoAnalytics

Analyze New York city taxi data

Forecasting PM 2.5 concentration using big data analysis techniques

Crime analysis and clustering using geoanalytics and pyspark.ml

Spatial and temporal distribution of service calls using big data tools

Data Preparation - Global hurricane analysis, part 1/3

Exploratory Statistics - Global hurricane analysis, part 2/3

Correlation - Global hurricane analysis, part 3/3

Calculating cost surfaces using weighted overlay analysis

Identifying suitable sites for new ALS clinics using location allocation analysis

Analyzing and predicting Service Request types in DC

Constructing drive time based service areas

Drive time analysis for opioid epidemic

Finding routes for appliance delivery

Calculating origin destinations matrix

Pawnee Fire analysis

Calculate Impervious Surfaces from Spectral Imagery

Visualize monthly changes in Hirakund reservoir using video

Mapping infrastructural damage due to Beirut blast

Coastline extraction using Landsat-8 multispectral imagery and band ratio technique

Coastline classification using Feature Classifier

Determining site suitability for oil palm plantation

Detecting swimming pools using deep learning

Plant species identification using a TensorFlow Lite model within mobile devices

Land Cover Classification using Satellite Imagery and Deep Learning

Land cover classification using sparse training data

Extracting building footprints from drone data

Detecting super blooms using image classification

Feature Categorization using Satellite Imagery and Deep Learning

Automate Road Surface Investigation Using Deep Learning

Detecting and Categorizing Brick Kilns from Satellite Imagery

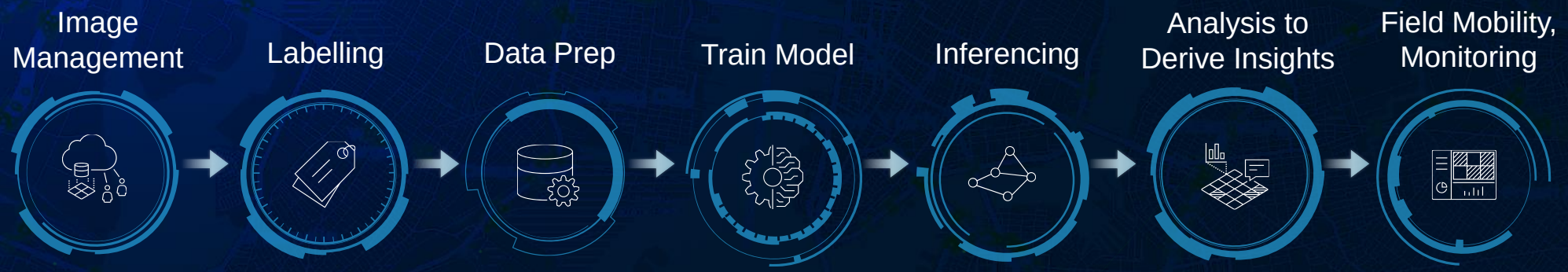
Extracting Slums from Satellite Imagery

Automate building footprints extraction using instance segmentation

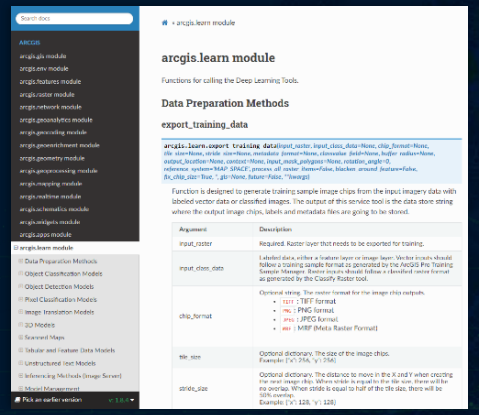
Reconstructing 3D buildings

Detecting settlements using supervised classification

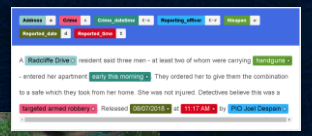
Deep Learning in ArcGIS



- Dozens of models for various geospatial workflows
- Models for imagery, video, 3D, tabular, timeseries and text (NLP)
- Integration with popular deep learning libraries



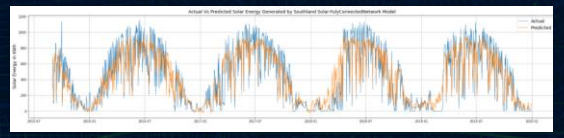
Text



Optical imagery

Point cloud

Motion imagery



Tabular & Time Series

8:00 AM PDT - Wednesday, Nov 2

GeoAI: Automating Data Collection

In this session, we will introduce you to the width and breadth of AI tools included with ArcGIS, and demonstrate tools and techniques for using GeoAI within ArcGIS for automating the collection and update of useful GIS data from photos, aerial imagery, video, and Lidar.

Jim Barry, Esri
Stewart Rouse, Esri

Session Type: Technical Workshop

Session Level: All Attendees

Topic: AI/ML

Esri Products: ArcGIS API for Python, ArcGIS Pro

Industry Classification: Cross Sector

Keywords: Rail, AI, Deep learning, Data collection

Access Type: In-Person, Recorded, Livestream

YOU ARE A SPEAKER **Wednesday, Nov 2 | 8:00 AM - 9:00 AM PDT** | Primrose B | Available Online

Developer Resources

training.esri.com – *learn your way*

- Documents
- E-Learning
- Instructor-Led
- Learning Plans
- MOOCs
- Story Maps
- Teacher Resources
- Training Seminars
- Tutorials
- Videos
- Web Courses

Select a Focus Area

Get Started	Build Desktop Apps	Build Mobile Apps	Build Web Apps	Script and Automate

WEB COURSE
Basics of JavaScript Web Apps — 1 Hour, 15 Minutes Free (4421)

LEARNING PLAN
ArcGIS API for JavaScript Fundamentals — 3 Courses (27)
Added by Esri on May 5, 2020

VIDEO
ArcGIS API for JavaScript: An Introduction — 59 Minutes Free (625)

LEARNING PLAN
Esri ArcGIS API for JavaScript Certification 19-001 — 4 Courses (10)
Added by Esri Technical Certification on June 18, 2019

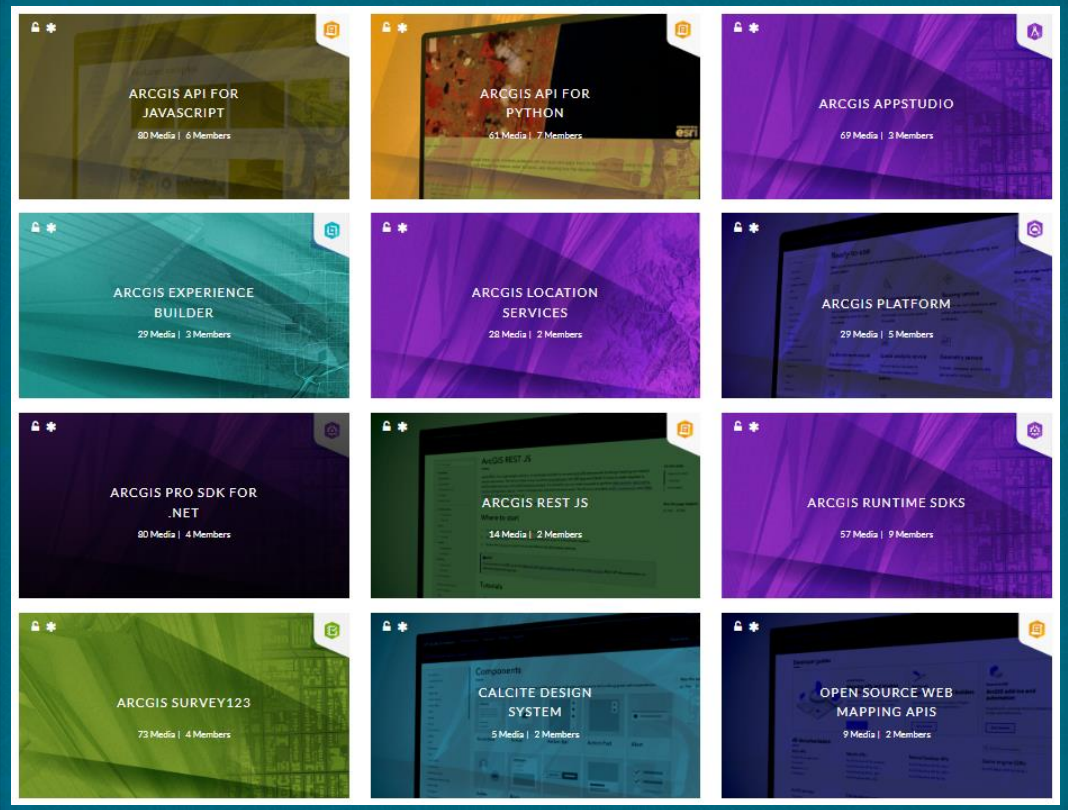
VIDEO
ArcGIS API for JavaScript: Programming Patterns and API Fundamentals — 61 Minutes Free (577)

LEARNING PLAN
Esri Partner Enablement: Extend ArcGIS - Web Applications — 14 Courses (3)
Added by Esri Partner Onboarding on May 5, 2020

VIDEO
ArcGIS Experience Builder: Customizing and Extending — 61 Minutes Requires Maintenance (438)

Videos – *several hundred of them*

- **mediaspace.esri.com**/category/ArcGIS+Developers/244548402
- **youtube.com/EsriTV** *(deprecated)*

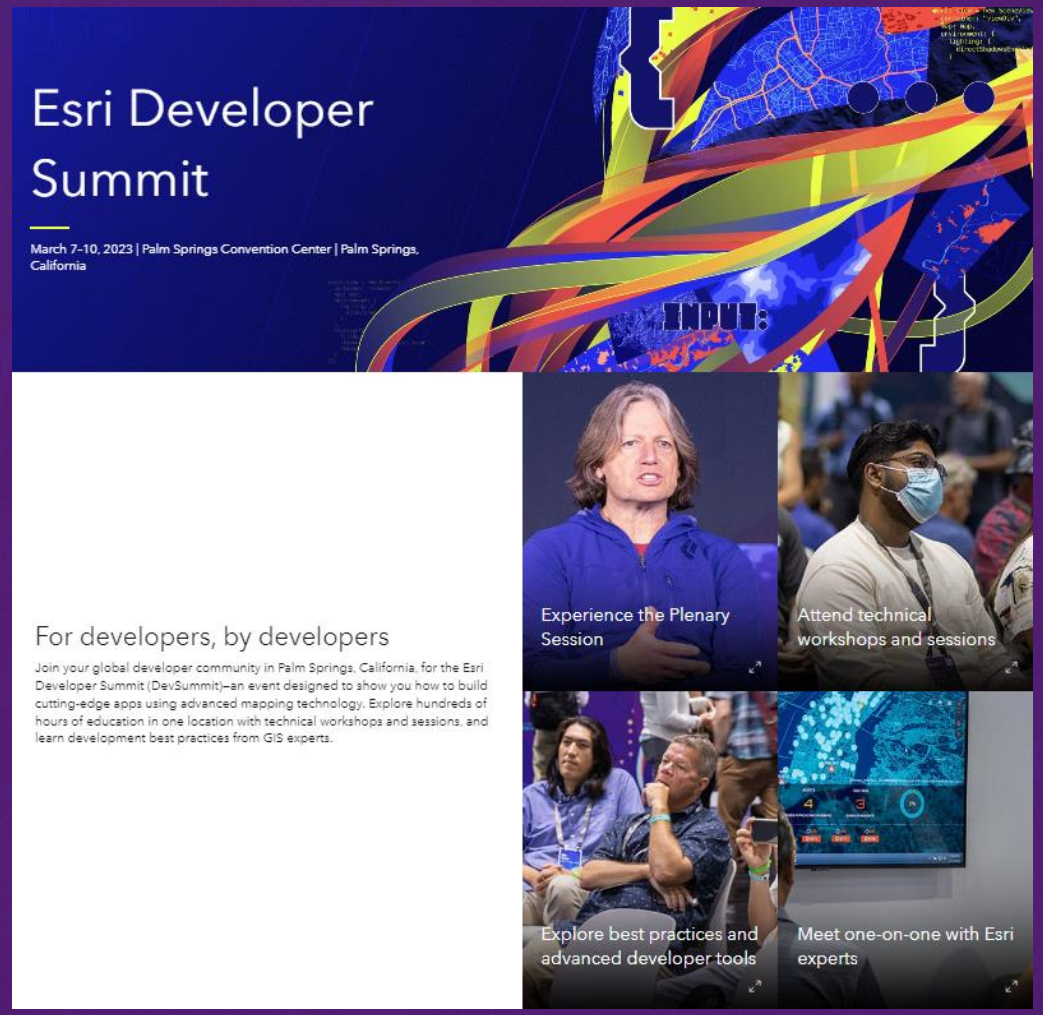


DevSummit

For Developers, By Developers

- Berlin *14-16 November 2022*

- Palm Springs *7-10 March 2023*
  - *tech sessions, demo theaters*
  - *hundreds recorded*
  - *dozens live-streamed*



The largest conference for geospatial developers in the world

GeoDev Webinars

"it's like DevSummit year-round"

- Monthly
- Live Q&A with presenters
- Recorded

GEODEV WEBINAR SERIES

Getting Started with ArcGIS Maps SDK for Unity

Date: October 26, 2022 Cost: Free
Time: 10:00 a.m.-11:00 a.m. (PT)
Location: Virtual

In this webinar, we'll demonstrate ArcGIS Maps SDK for Unity capabilities and provide a road map for new features and opportunities into 2023. We're excited to observe how you'll use ArcGIS Maps SDK with Unity to build immersive, cutting-edge 3D and XR experiences with real-world data!

Takeaways

- ArcGIS Maps SDK targets game engine developers that use Unity.
- It enables access to geospatial data from ArcGIS services and packages.
- Development is on Windows and macOS, and deployment is on Windows, iOS, and Android.
- It offers support for global and local scenes.

Register now →

GEODEV WEBINAR SERIES

ArcGIS IPS: Explore Indoor Positioning Technology & App Development

Date: November 9, 2022 Cost: Free
Time: 9:00 a.m.-10:00 a.m. (PT)
Location: Virtual

ArcGIS IPS, Esri's indoor positioning system, puts the blue dot on indoor maps. This webinar will provide you with a clear understanding of the technology powering ArcGIS IPS and demonstrate how to build a custom mobile indoor positioning app based on ArcGIS Runtime SDKs. Learn about the setup process, how to achieve the most accurate positioning results, and ways to enable indoor positioning in your own app.

Register now →

GEODEV WEBINAR SERIES

Getting Started with ArcGIS Maps SDK for Unreal Engine

Date: November 9, 2022 Cost: Free
Time: 11:00 a.m.-12:00 p.m. (PT)
Location: Virtual

In this webinar, we'll demonstrate ArcGIS Maps SDK for Unreal Engine capabilities and provide a road map for new features and opportunities into 2023. We're excited to observe how you'll use ArcGIS Maps SDK with Unreal Engine 5 to build immersive, cutting-edge 3D and XR experiences with real-world data!

Takeaways

- ArcGIS Maps SDK targets game engine developers that use Unreal Engine.
- It enables access to geospatial data from ArcGIS services and packages.
- Development is on Windows and macOS, and deployment is on Windows, iOS, and Android.
- It offers support for global and local scenes.

Register now →

esri.com/en-us/arcgis/products/develop-with-arcgis/events

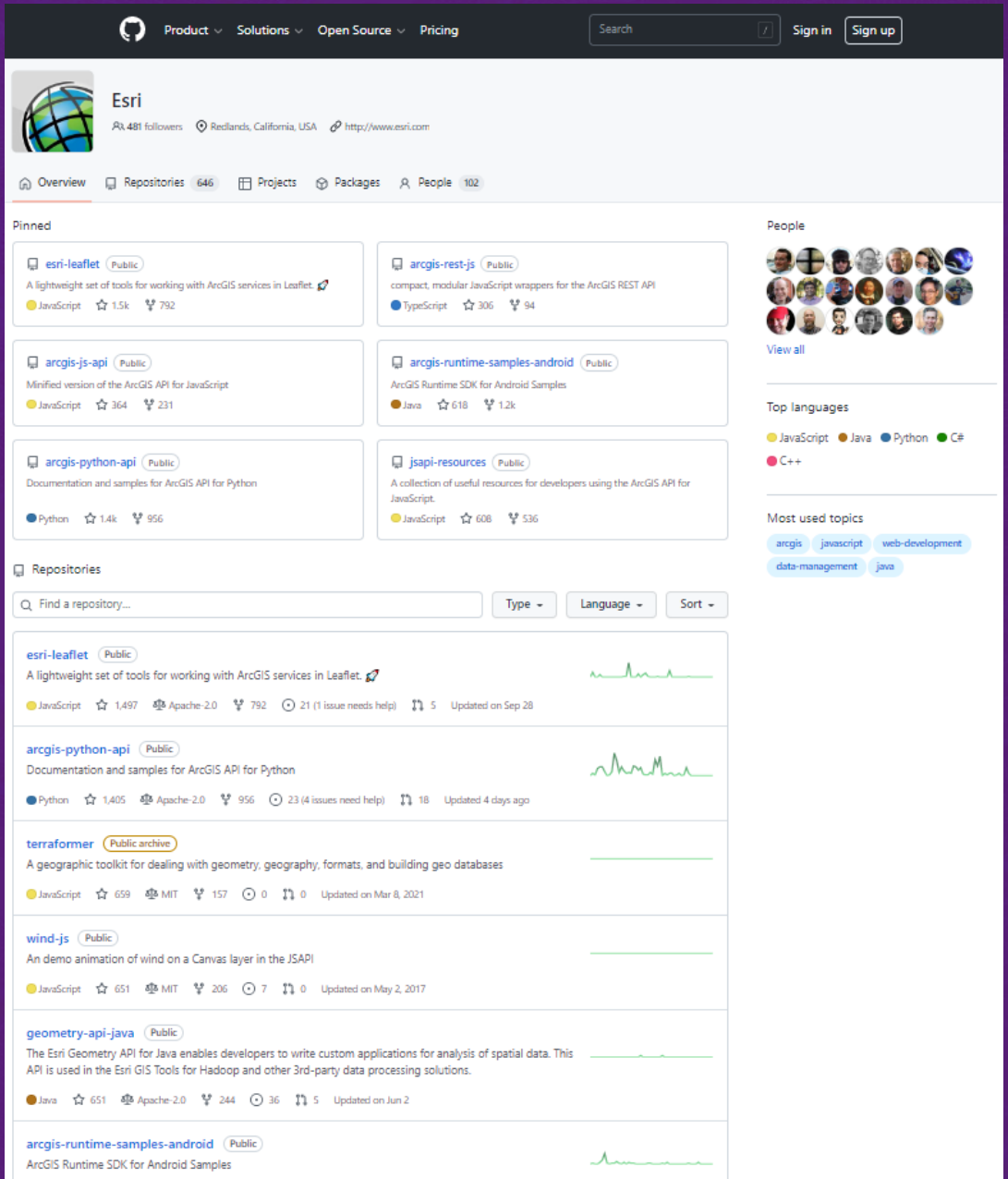
Developer Day at Esri UC

- Overview session
  - What's new, what's next
- Breakout tech sessions
- Pool social

Github.com/Esri

600+ repos

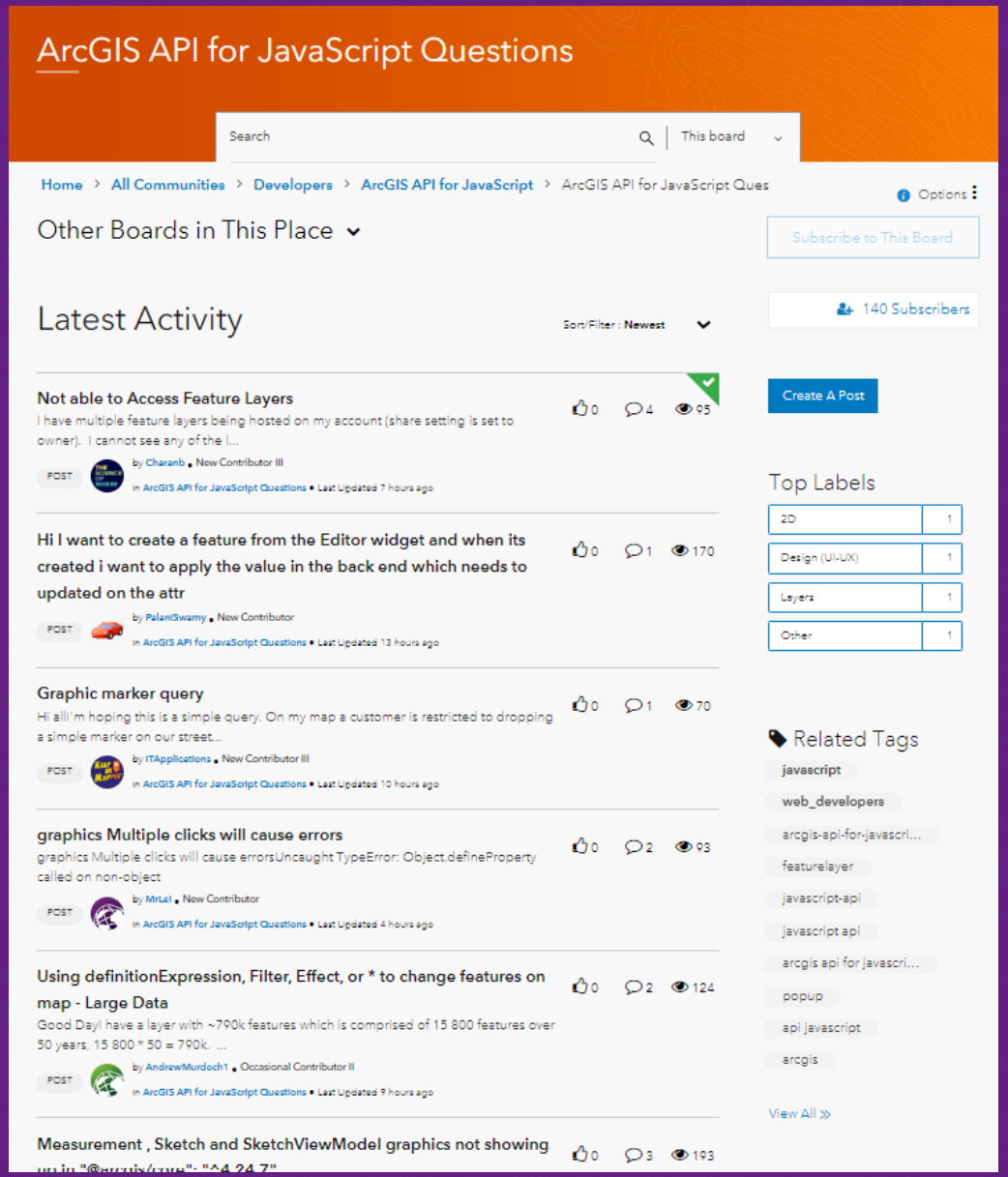
- Apps
- Libraries
- Widgets
- Extensions
- Documents
- …and more



community.esri.com

(formerly "GeoNet")

- Q&A Forums
- Blog articles
- Videos
- Code samples
- …and more



Hackathon Kickstarter

30-minute video

- *Data > Design > Develop*

- Free developer subscription
- Make and share maps
- Make custom apps without code
- Get started with your API
- Scripting

Hackathon Kickstarter Video: ArcGIS Platform for Developers

1253 0 03-22-2021 09:21 AM

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by JimBarry esri Esri Regular Contributor

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About the Author

http://twitter.com/jimbarry

When you're at a hackathon, you tend to use the tools that you know. That way you can put all of your effort and time into the app you're trying to build, and not into having to learn a new tool that might set you back.

But what if you want to use ArcGIS but don't have much experience with it?

Well, here's a video that in just 30 minutes will give you everything you need to get going and get productive with ArcGIS Platform and ArcGIS Online for hosting data, making maps, using location services, and making apps. Even during a fast-paced hackathon you may find that spinning up on a few key skills could be a great investment when you see what kinds of capabilities you can bring to your project.

In this video, we cover all 10 of these topics:

1. Who is Esri and What is ArcGIS?
2. Sign up for a free ArcGIS Online for Developers account
3. Search, find, import, create, and host map data on the cloud
4. Make, style, and share a web map
5. Use API Keys for activating content, location services, and interactive data analysis tools
6. Create custom web mapping apps without code: *StoryMaps, Dashboards, app builders and templates*
7. Create custom web mapping apps with code: *REST API, JavaScript API, Runtime SDKs*
8. Use ArcGIS along with other commercial and open source mapping tools
9. Data science with ArcGIS: *ArcGIS Python packages*
10. Community tools and resources: *online forums, open source projects*

Here is a link to the video: https://tiny.cc/ArcGISHacksVideo_v2

http://tiny.cc/arcgis-hackathon

Hackathon Kickstarter Cheat Sheet

tiny.cc/ArcGISHacksCheatSheet

Welcome to Esri and ArcGIS

ArcGIS from Esri provides powerful software and useful content for mapping and GIS (geographic information systems). This is software you can download, install, and run on your own machine, or you can use ArcGIS Online to work with these apps and tools on the cloud through a browser.

Sign-up

A great way to get started is to sign-up for a free Developer subscription of ArcGIS Online: https://developers.arcgis.com/

This is not a free trial, but a perpetually free subscription that gives you a base level of cloud storage and processing for hosting data, making maps, and sharing those maps and data visualizations with others, either by themselves, or wrapped inside highly customized web applications, with or without any coding on your part.

What can ArcGIS do?

On the ArcGIS for Developers front page, scroll down a bit to the section "*Explore the capabilities of ArcGIS*", and click through the list of capabilities and see if you can make use of those.

Getting started

When you're ready to get hands-on, here are the first 4 self-paced tutorials (10-15-min each) we recommend you use for getting started:

Import data: https://developers.arcgis.com/documentation/mapping-apis-and-location-services/data/tutorials/tools/import-data-as-a-feature-layer/

Create a web map: https://developers.arcgis.com/documentation/mapping-apis-and-location-services/maps/tutorials/tools/create-a-web-map/

Style feature layers: https://developers.arcgis.com/documentation/mapping-apis-and-location-services/visualization/tutorials/tools/style-layers-web-map/

Create a new dataset: https://developers.arcgis.com/documentation/mapping-apis-and-location-services/data/tutorials/tools/create-a-new-feature-layer/

For developers

If you are a web developer, or have some experience with JavaScript, try these:

Create a starter app: https://developers.arcgis.com/labs/javascript/create-a-starter-app/
Select a basemap: https://developers.arcgis.com/labs/javascript/select-a-basemap/
Search for an address: https://developers.arcgis.com/labs/javascript/search-for-an-address/

There are hundreds more short tutorials, most under 15 minutes each:
https://developers.arcgis.com/documentation/mapping-apis-and-location-services/tutorials/

For data scientists

You can use the ArcGIS API for Python to bring ArcGIS into your analytical workflows, perhaps with Jupyter Notebooks.
ArcGIS Pro has an ArcPy module as a Python interface to desktop workstation GIS capabilities.

Map content you can use

You can mix and overlay your map data with any number of thousands of other map layers of useful data made available through the Living Atlas of the World:
https://livingatlas.arcgis.com/en/

Building web apps for your maps

When you want to share your map inside of a custom web app, with tools your end-users can use, a great place to start is the ArcGIS Web AppBuilder:
https://doc.arcgis.com/en/web-appbuilder/

If you're familiar with the Johns Hopkins COVID-19 dashboard, well, you can make dashboards too, by clicking and dragging:
https://doc.arcgis.com/en/operations-dashboard/

Another great way to share maps, charts, images, and multimedia is by telling a story. Try ArcGIS Story Maps:
https://storymaps.arcgis.com/

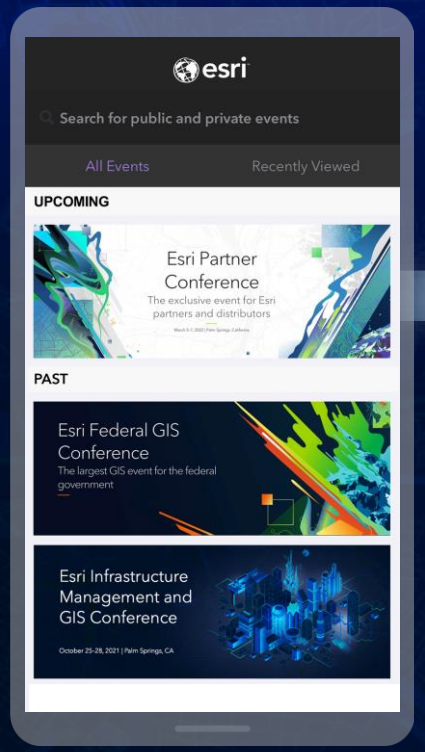
Twitter

- @ArcGISDevs
  - products, news, techniques
  - *…and more*

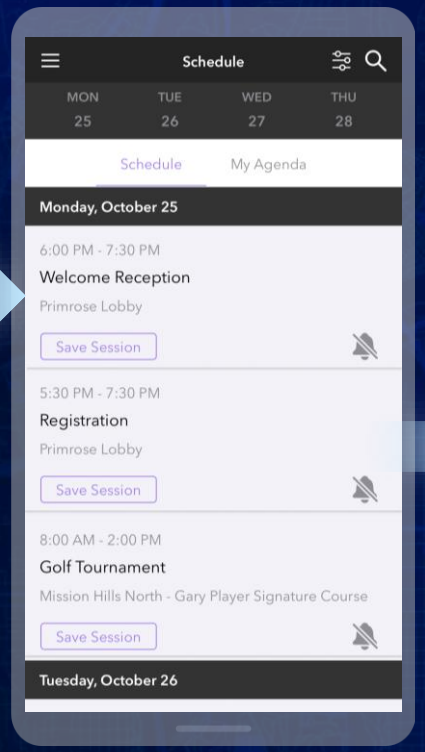
- @EsriDevEvents
  - conferences, webinars, meetups
  - *…and more*

Please Share Your Feedback in the App

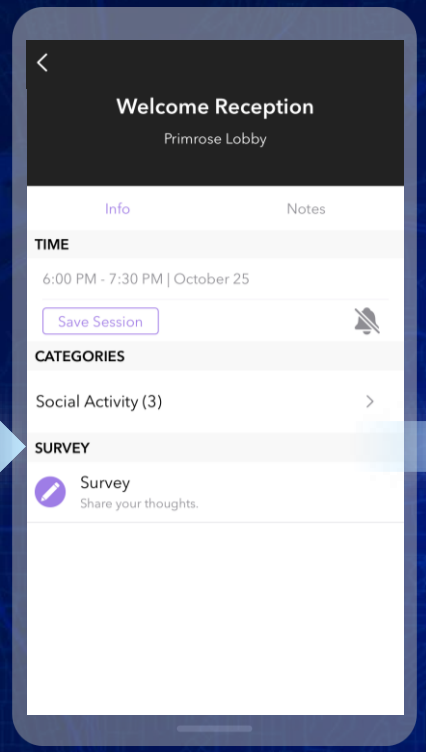
Download the Esri Events app and find your event



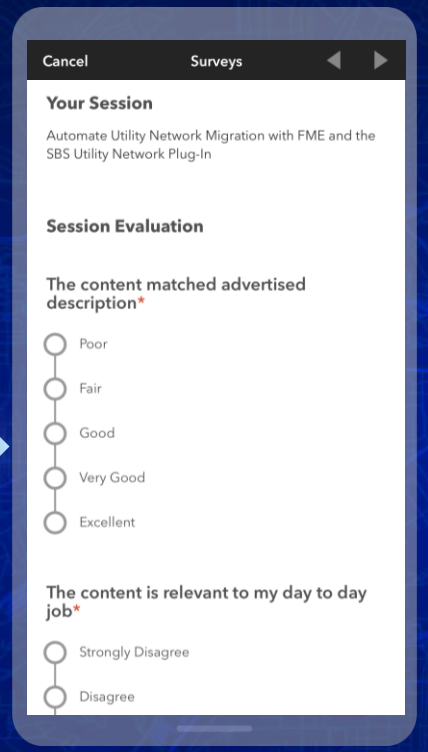
Select the session you attended



Scroll down to "Survey"



Log in to access the survey



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