

Esri Developer Summit 2015

The Road Ahead: Web 3D and Native Mobile

with Web AppBuilder for ArcGIS

Moxie Zhang, Esri R&D Center Beijing



What is Esri Web 3D

Web 3D App with JavaScript

Web 3D App with Web AppBuilder

3D Visualization with Web AppBuilder

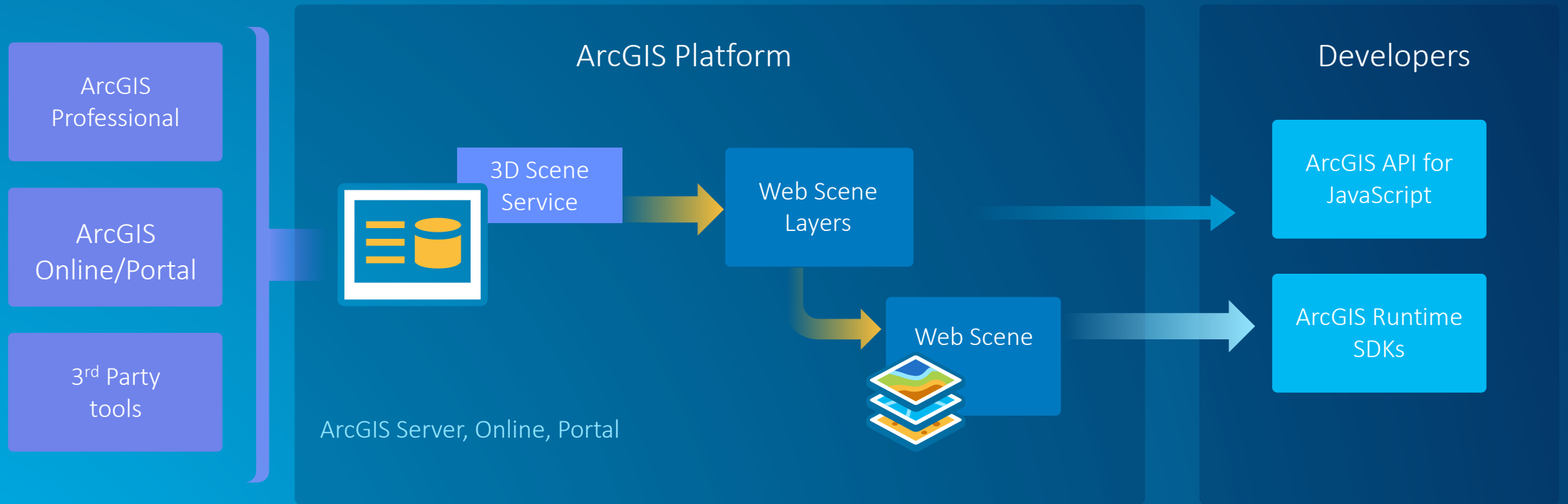
Native Mobile App with Web AppBuilde

An aerial, isometric 3D rendering of a modern city. The scene is filled with numerous skyscrapers of varying heights and architectural styles, interspersed with green parks, walkways, and a network of roads. The lighting is bright, suggesting a clear day. A semi-transparent blue banner is overlaid on the right side of the image, containing the text 'What is Web 3D for developers'.

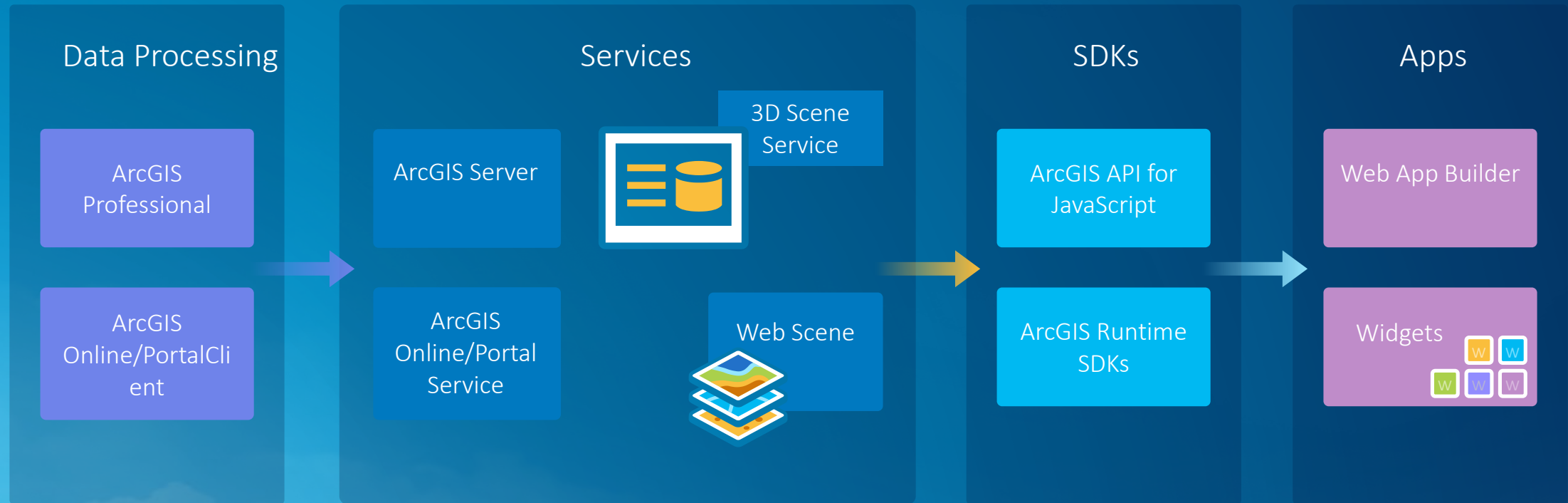
What is Web 3D

for developers

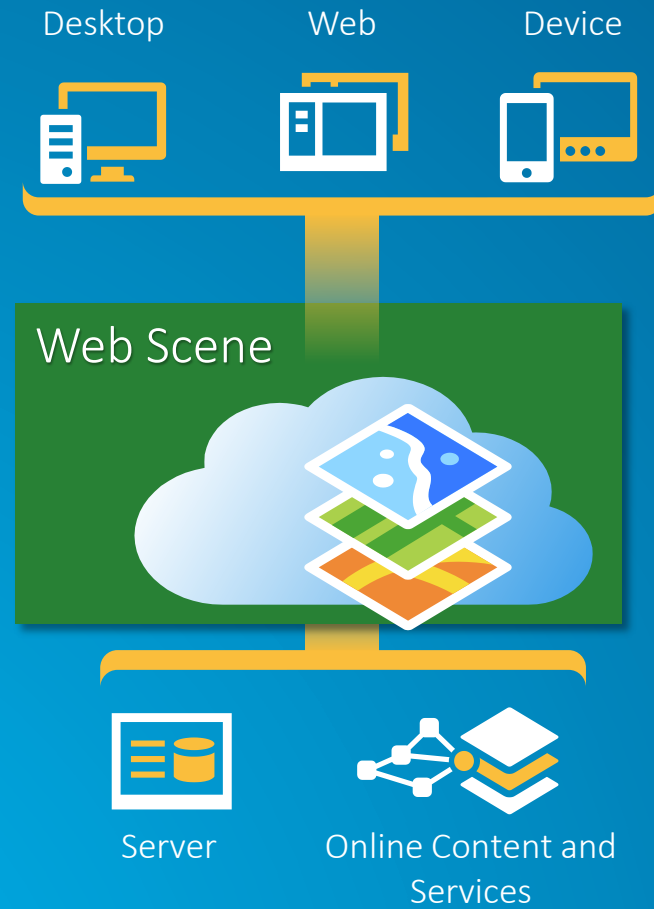
Web 3D Products for ArcGIS



Web 3D Development Architecture (Web AppBuilder)



Web Scene



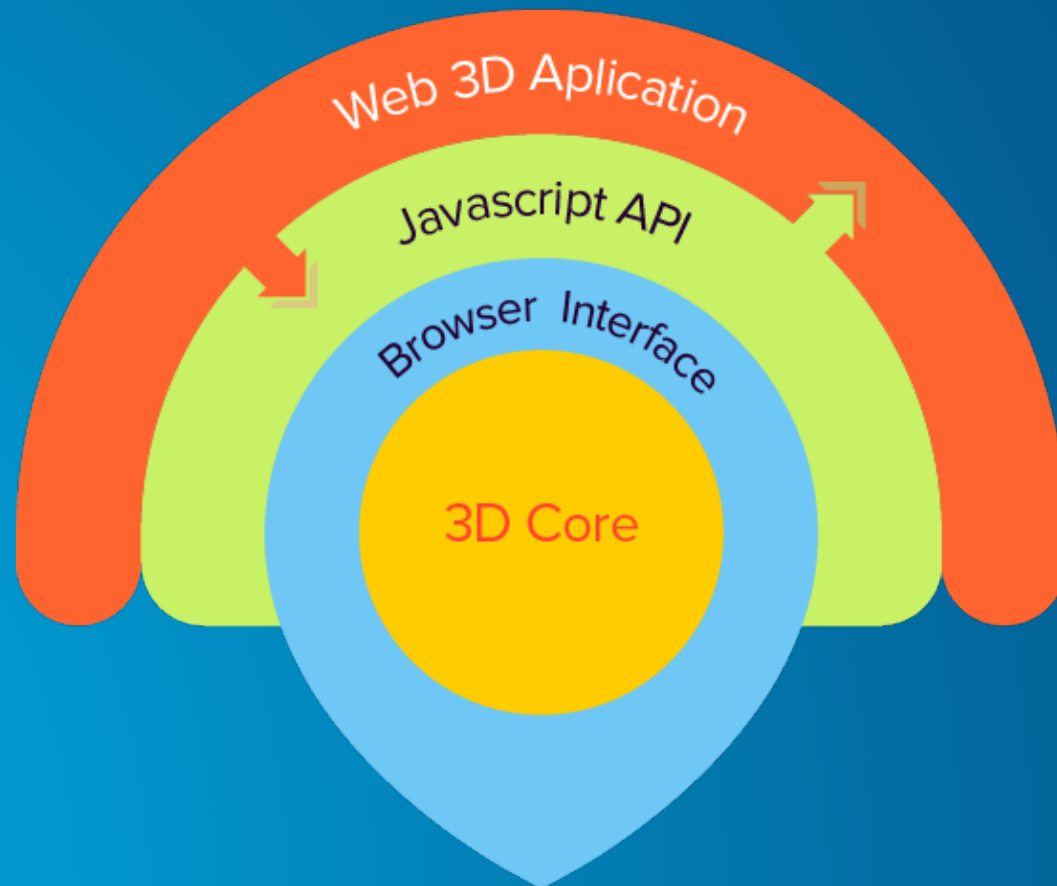
- New in ArcGIS Online and Portal
- Mash-up of 3D / 2D layers
- Consumed by all clients

Web Scene – designed for 3D

- 3D Layers
- 3D Symbology
- 3D Labels
- Table of Contents
- 3D Popups
- Tours
- ...



General 3D Web Application Architecture



Web 3D Client Architecture

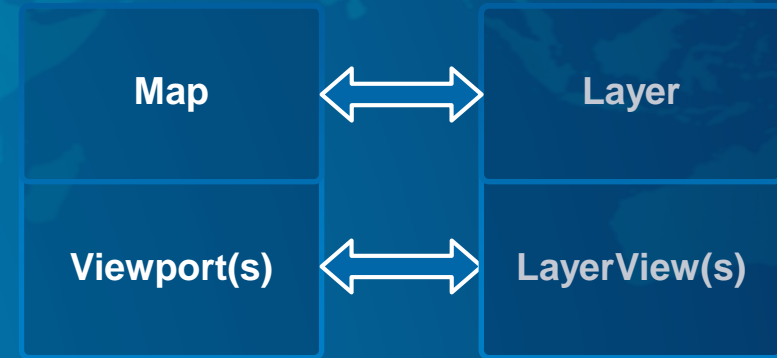
- **ArcGIS API for JavaScript with 3D capabilities**
 - New internal architecture but same* public JS API classes



- ** 99% backwards compatible code + new classes for 3D*

Web 3D Client Architecture

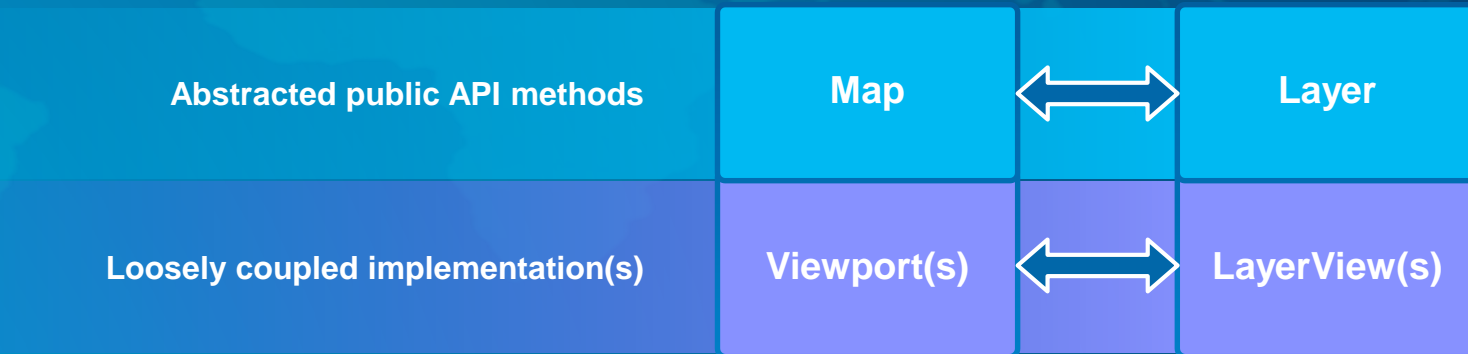
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Web 3D Client Architecture

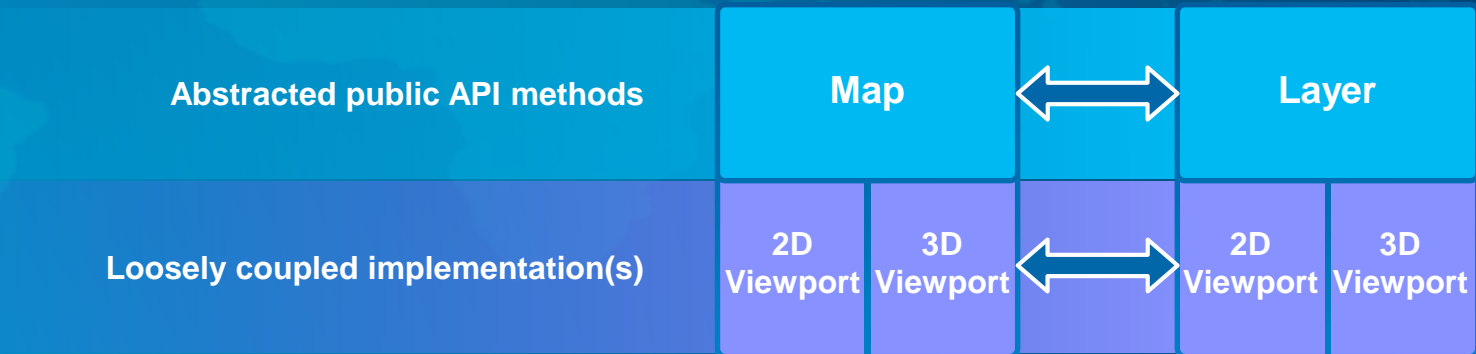
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Web 3D Client Architecture

- **ArcGIS API for JavaScript with 3D capabilities**
 - New internal architecture but same* public JS API classes



- ** 99% backwards compatible code + new classes for 3D*

App Development in 3D

3D Runtime SDK

- Full 3D Runtime functions
- High performance
- Large data set
- Machine Native code
- Mobile and desktop

JavaScript (WebGL Render)

- Pure browser app without plugin
- WebGL is maturing
- Under heavy development
- Performance and large data set support are improving
- Cross browser support

Application Development

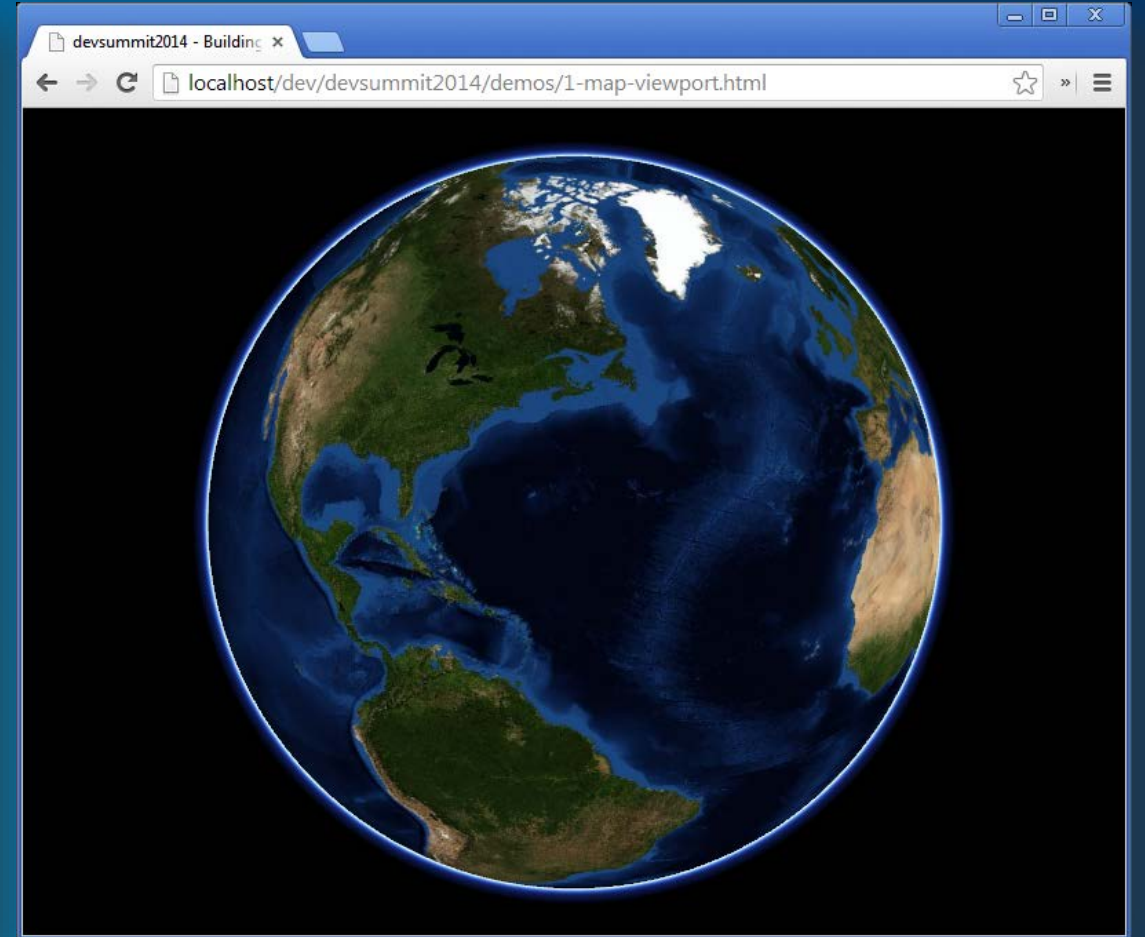
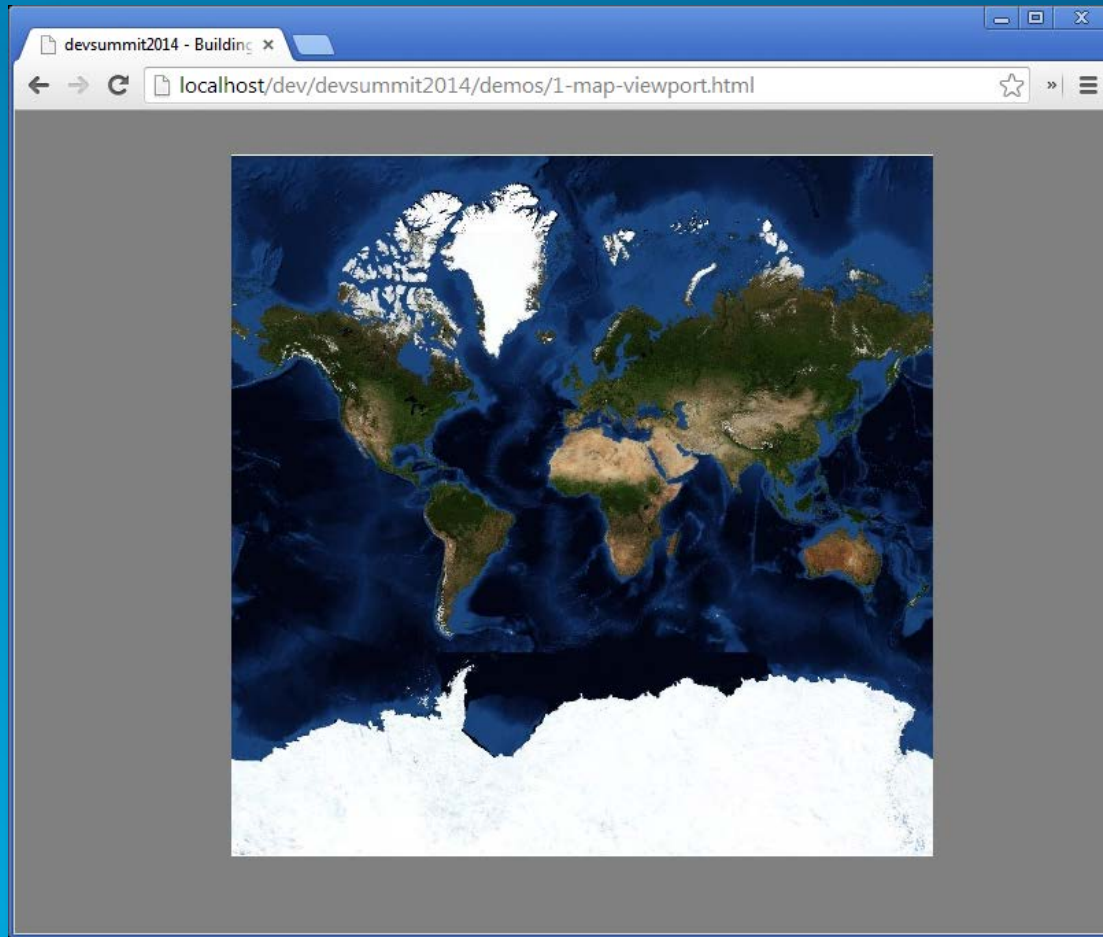
(1) Full app on API

(2) Widget/Theme for Web AppBuilder for ArcGIS



Build 3D Web App with JavaScript API

Map and Viewport



Create a Map

```
1 require([
2   "esri/Map"
3 ],function(
4   Map) {
5
6   // setup the map
7   // when creating a map, the option "viewportType"
8   // indicates which kind of map to create;
9   // the possible values are:
10  // "2d" - 2D map
11  // "3d-canvas" - WebGL based 3D map
12  // "3d-plugin" - Runtime core based 3D map
13
14  var map = new Map("mapDiv", {
15    viewportType: "3d-canvas"
16  });
17 };
```


Add a Basemap

```
1  require([
2    "esri/Map",
3    "esri/layers/ArcGISTiledMapServiceLayer"
4  ],function(
5    Map, ArcGISTiledMapServiceLayer) {
6
7    // setup the map
8    var map = new Map("mapDiv", {
9      viewportType: "3d-canvas"
10   });
11
12   // create tiled layer
13   var layer = new ArcGISTiledMapServiceLayer("http://",
14
15   // add layer to map
16   map.addLayer(layer);
17  });
```





Build Web 3D App

with Web AppBuilder

A menu of tools

Interactive content

Shortcut items

Map, of course

The "player"



Web App Builder for ArcGIS Components



Widget

- HTML/JavaScript/CSS
- Specific task
- Configuration in JSON
- NLS support
- Builder config UI

Theme

- HTML/JavaScript/CSS
- Layout
- Branding
- Widget panel and behavior
- Style (Color, etc.)
- Default widgets

Demo: Configure a Web 3D App

The screenshot displays the Web AppBuilder for ArcGIS interface. The top navigation bar includes 'Web AppBuilder for ArcGIS' on the left and 'Moxie3D' on the right. Below this, a secondary navigation bar features icons for 'Themes', 'Map', 'Widget', and 'Attribute'. The main content area is split into two panels. The left panel shows a 'Web Scene Owner' section with a small 3D scene thumbnail, the text 'Web Scene Owner esri_3d', 'Last Modified: 3/5/2015', and a 'More Details...' link. Below this is a 'Choose Web Scene' button. The right panel displays a large 3D aerial view of a city (Rotterdam) with a river and buildings. On the left side of this 3D view, there are four control icons: a plus sign (+), a minus sign (-), a four-way arrow (pan), and a house icon (home).

Web AppBuilder for ArcGIS

Moxie3D

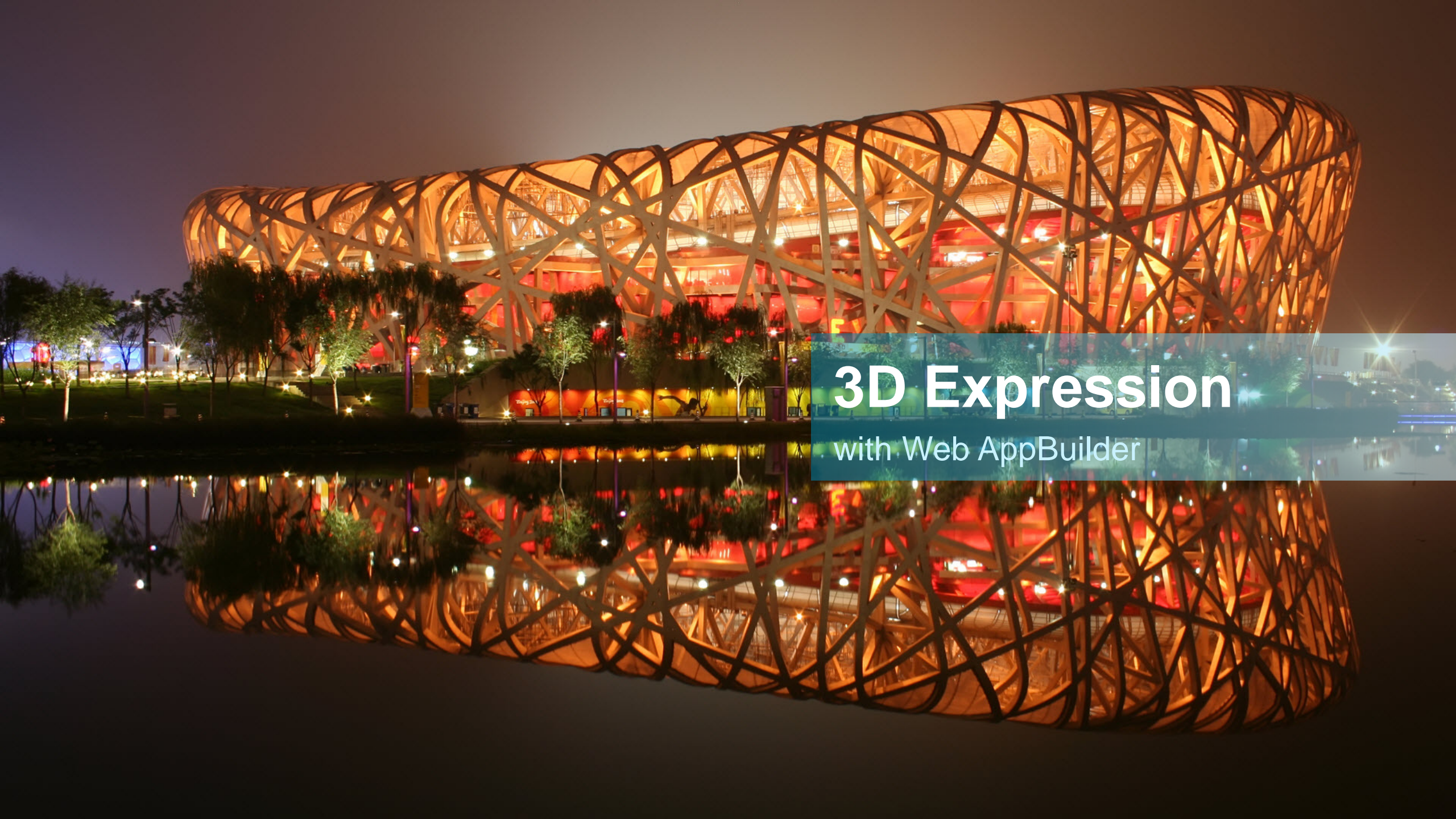
Themes Map Widget Attribute

Web Scene Owner
esri_3d
Last Modified:
3/5/2015
More Details...

Choose Web Scene

Rotterdam, the Netherlands Scene

This scene highlights layers for Rotterdam, The Netherlands available in ArcGIS to support your work in 3D. Use these layers in conjunction with your own layers to create new scenes focused on a specific topic or area of interest to you.



3D Expression

with Web AppBuilder

What's 3D Expression

A set of dynamic effects that visualize data in 3D space

Integrate with Web Scene

Integrate with Web 3D symbolization

A way to better visualize and understand data.

Demo: 3D Visualization

with 3D Expression

Why 3D Visualization

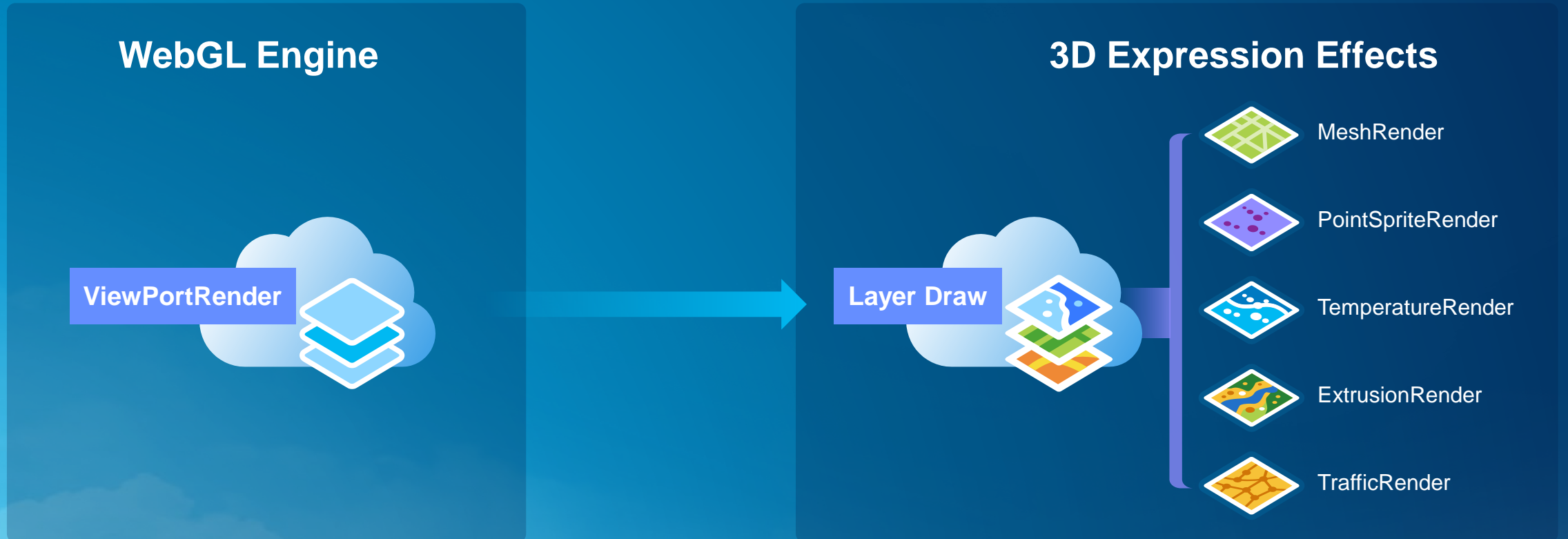
3D adds one additional dimension to data visualization.

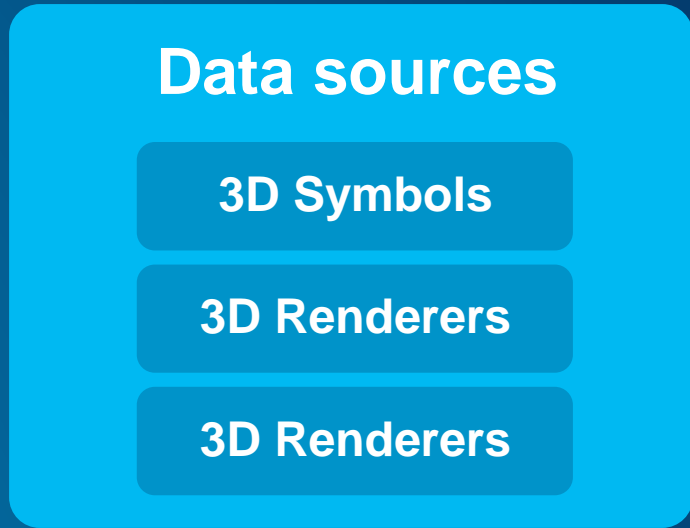
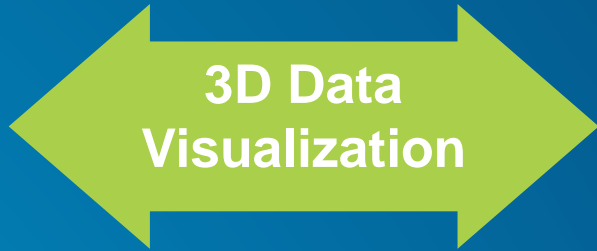
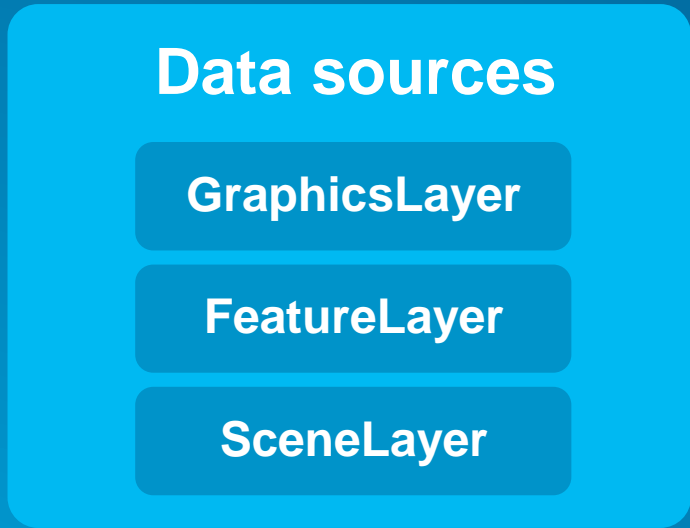
People tend to learn and understand from visual representations much easily than from textual representations.

3D visualization is more in-depth and more intuitional than 2D visualization.

3D visualization can better handle time-relevant data by supporting animated effects.

3D Expression Architecture





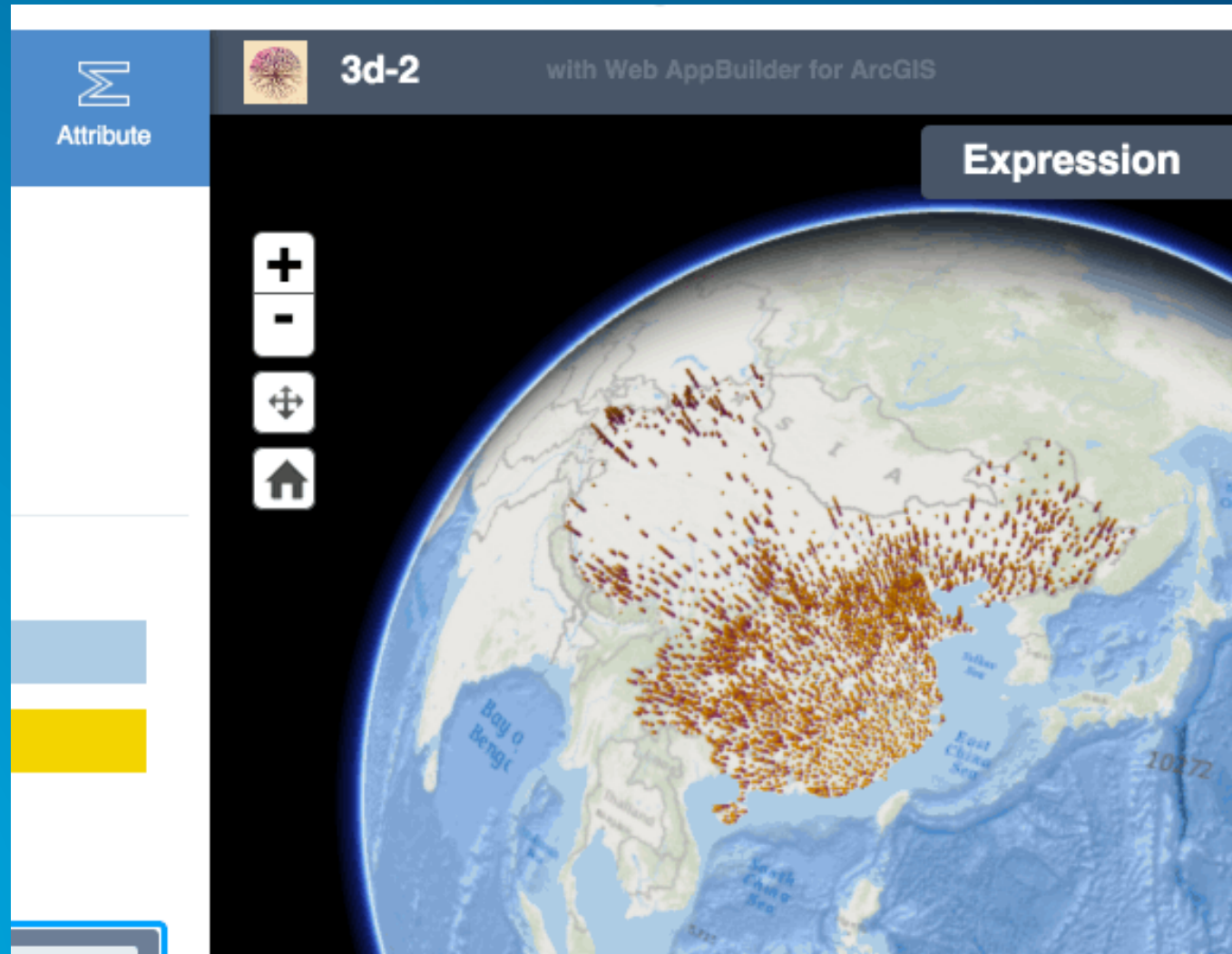
3D Map (Web Scene)

**Browser with WebGL Engine
Runtime 3D**



```
1 // featurelayer contains data of polygons
2 var featurelayer = ...
3 var defaultSymbol = new PolygonExtrusionSymbol({
4     "height": ...,
5     "color": ...
6 });
7
8 var renderer = new ClassBreaksRenderer(defaultSymbol, "value")
9
10 renderer.addClass(100, 200, new PolygonExtrusionSymbol({
11     height: ...,
12     color: ...
13 }));
14
15 renderer.addClass(201, 300, new PolygonExtrusionSymbol({
16     height: ...,
17     color: ...
18 }));
19
20 renderer.addClass(301, 400, new PolygonExtrusionSymbol({
21     height: ...,
22     color: ...
23 }));
24
25 map.addLayer(layer);
26 layer.setRenderer(renderer);
```

Demo: 3D Visualization with Web AppBuilder





Create Native Mobile App

with Web AppBuilder

Mobile app development starts with many options



...and there are different approaches to build an app

PURE HTML5



HYBRID NATIVE



PURE NATIVE



Beyond Native Apps



Create native iOS, Android, Mac and Windows apps in C#. Anything you can do in Objective-C, Swift or Java, you can do in C#.



Develop in Lua, use the same code-base and go cross-platform.







Deploying HTML5, native, or hybrid mobile apps using open and standards-based tools.



- Build native apps for iOS and Android using JavaScript
- Native UI, push, analytics, login modules "out-of-the box"
- Cloud build service, no need to setup Eclipse / Xcode
- Update your app without re-submitting to the App Store
- Open platform, extend with hooks, write native modules

Why Native App

-  Has better performance and user experience
-  Works connected and disconnected from internet
-  Has access of all device capabilities
-  Works with sensors connected to the device

A photograph of several rock climbers ascending a tall, craggy rock face. The scene is set against a clear blue sky. The rock is light-colored and shows signs of weathering. The climbers are wearing gear and are positioned at various heights on the cliff. The overall image has a blue tint.

... however, native app development is not easy

A well rounded native app needs on iOS and Android, at least

Need good mobile developers

Need two at least

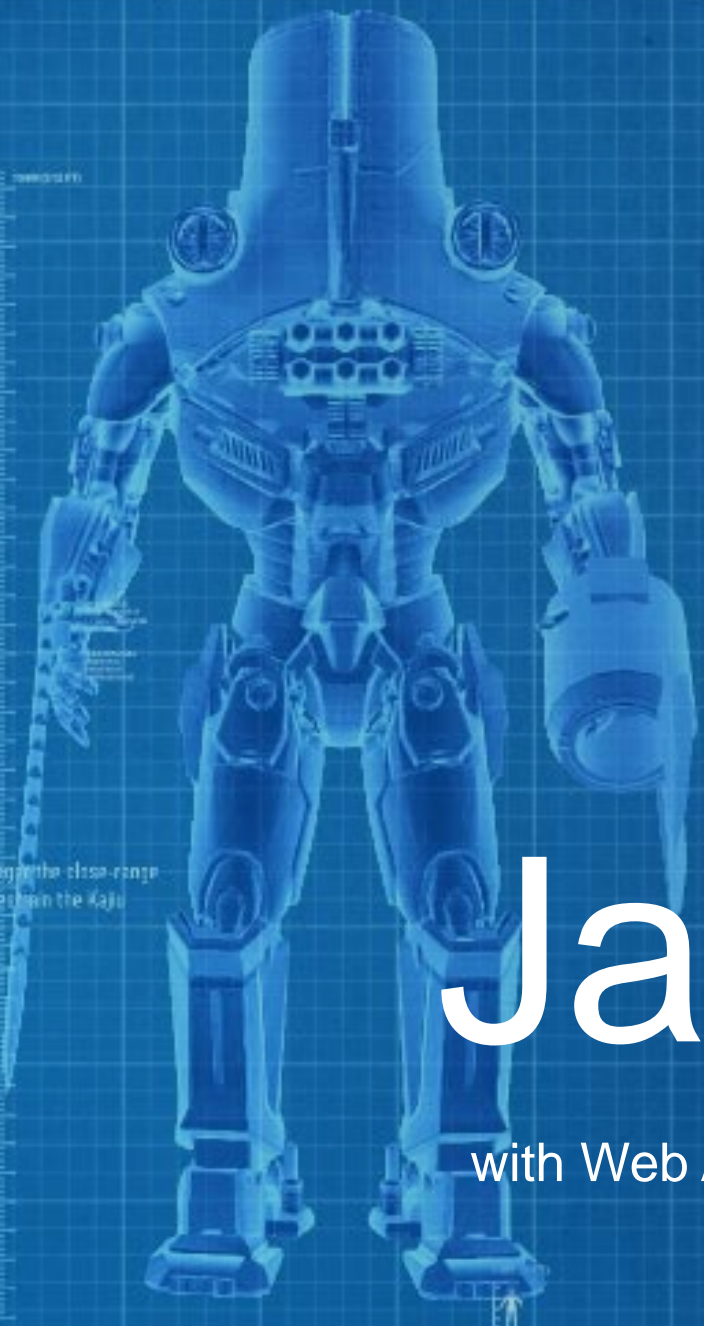
Esri customers usually do not have the above



Energy Core
This Jaeger holds unprecedented energy reserves, while acting as a strong visual design element for the Jaeger's head.

Chain Sword
This chain sword offers the Jaeger the close-range strike efficiency to slash and restrain the Kaji precisely from any angle.

Foot Spikes
Deep earth spikes, expansively deployed into the ground at the Jaeger's feet, are designed to anchor the Jaeger to a single spot.



Jaeger

with Web AppBuilder



Jaeger

Rapid mobile application development

A Jaeger app runs in pure native Runtime SDK includes all interactive and UI

A Jaeger app is built via configuration using Web AppBuilder for ArcGIS

Developers extend Jaeger by creating widgets using ArcGIS Runtime SDK

A Jaeger App

Panels with UI elements

As part of the Jaeger theme, panels and a fix number of UI elements are provided

Widgets

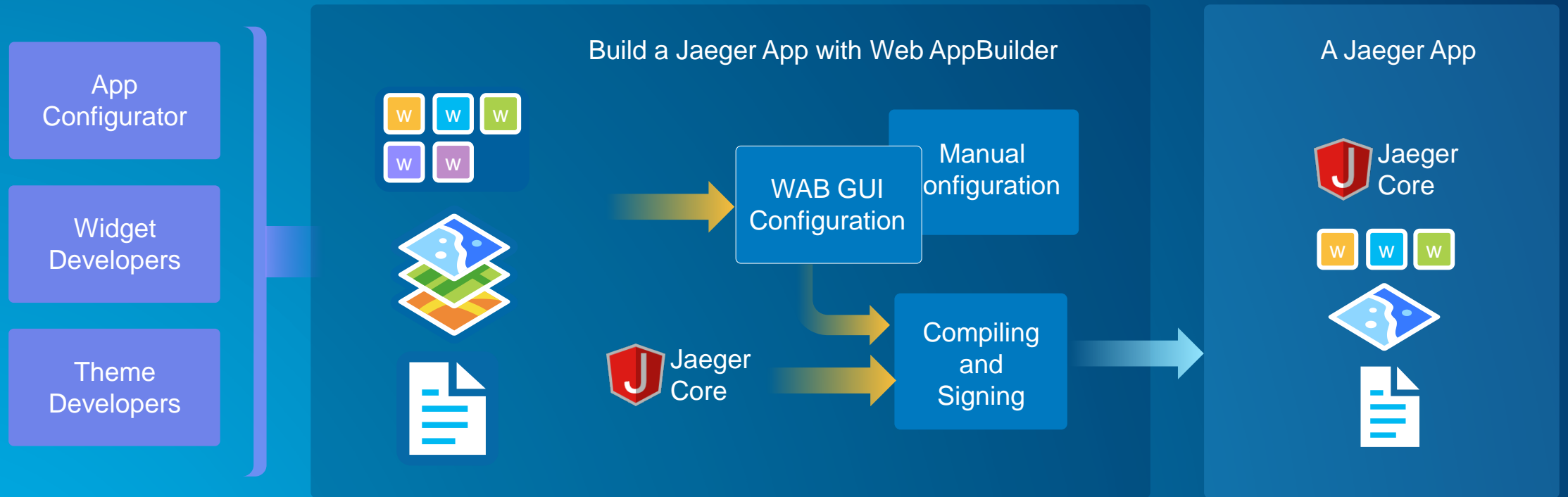
Functional modules that contain only programming logics without dealing with user interactive and visualization

Map and events

All map, events handling and visual aspect of Jaeger are handled in native core. No performance loss



How a Jaeger App is Built



Jaeger for iOS



Jaeger for Android





Create a Mobile App
for iOS and Android devices



under the hood



Energy Cell Refinery
This oversized power port holds unprecedented energy reserves and incendiary fuel, while acting as a strong visual decoy for Kaiju seeking the Jaeger's head.



Sting Blades
With adjustable retractors, these formidable blades are laced with carbon nanotubes that channel thermal energy.

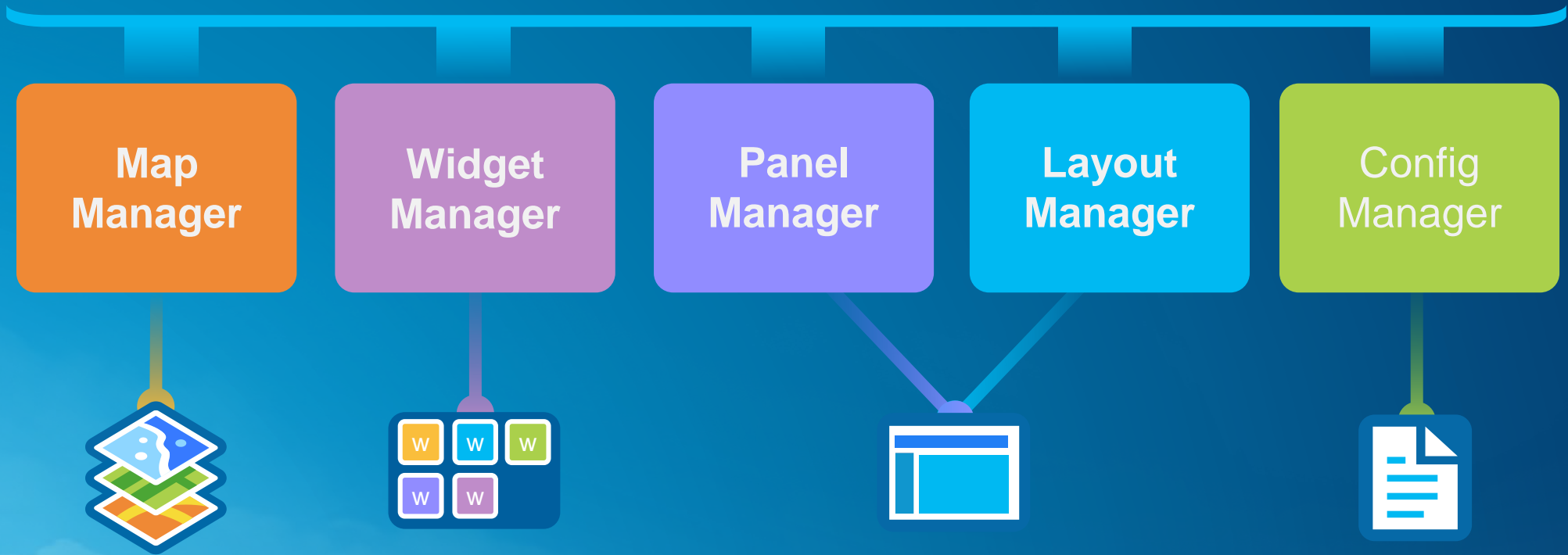


Mk 5 Lightweight Foot
The Mk5 lightweight foot offers improved flexibility and speed.



Inside Jaeger App

Messaging and Events

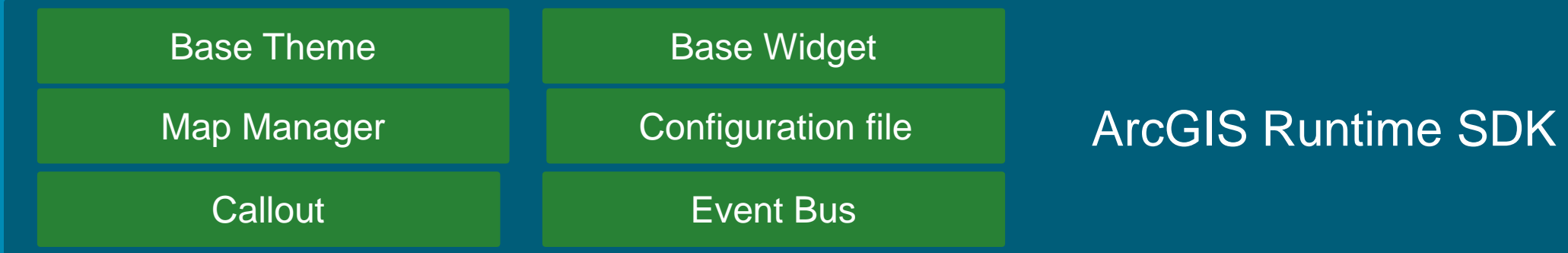




Jaeger for
developers

Develop Widgets with ArcGIS Runtime SDK

Jaeger Development Architecture



Android/iOS Platform SDK

Widget Lifecycle



App Start	<code>Widget.onCreate()</code>	
Two Layouts	Screen	<code>Customized Action</code>
	Pool	<code>Widget.onSelected()</code>
App Exit	<code>Widget.onDestroy()</code>	

Demo: Widget Development

```
8
9 #import "BaseWidget.h"
10 @interface ZoomIn : BaseWidget
11
12 @end
13
```

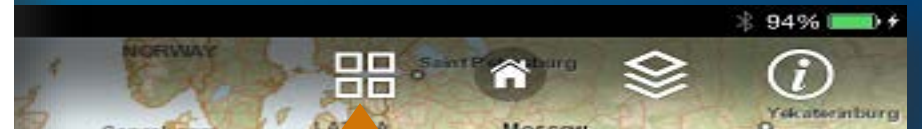
ZoomIn.h

```
11
12 @interface ZoomIn()
13 @end
14 @implementation ZoomIn
15 -(void)selected
16 {
17     [super selected];
18     [self.mapView zoomIn:YES];
19 }
20 @end
21
```

ZoomIn.m

```
"widgetPool": {
  "widgets": [
    {
      "label": "Zoom In",
      "uri": "ZoomIn"
    },

```

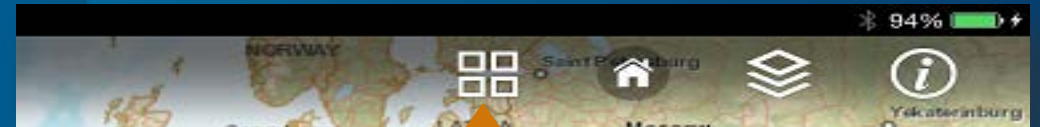


Widget Development

```
//ZoomIn.h
@interface ZoomIn : BaseWidget
@end
```

```
"widgetPool": {
  "widgets": [
    {
      "label": "Zoom In",
      "uri": "ZoomIn"
    },
  ],
}
```

```
//ZoomIn.m
@implementation ZoomIn
-(void)selected
{
  [super selected];
  [self.mapView zoomIn:YES];
}
}
```



Hello World

```
11
12 @interface HelloWorld()
13 @end
14 @implementation HelloWorld
15 -(void)create
16 {
17     [super create];
18     UIButton * button = [UIButton buttonWithTypeCustom];
19     [button setFrame:CGRectMake(40, 20, 200, 44)];
20     [button setTitle:@"HelloWorld" forState:UIControlStateNormal];
21
22     [button setBackgroundColor:[UIColor grayColor]];
23     [button addTarget:self action:@selector(helloWorld:) forControlEvents:
24         (UIControlEventTouchDown)];
25     [self.dataPanelView addSubview:button];
26 }
27 -(void)selected
28 {
29     [super selected];
30     [self showDataPanel];
31 }
32 -(void)helloWorld:(id)sender
33 {
34     UIAlertView *alert = [[UIAlertView alloc] initWithTitle:@""
35                         message:@"Hello World!"
36                         delegate:self
37                         cancelButtonTitle:@"Cancel"
38                         otherButtonTitles:nil];
39     [alert show];
40 }
41 @end
42
```

```
"widgetPool": {
  "widgets": [
    {
      "label": "HelloWorld",
      "uri": "HelloWorld"
    },
  ],
}
```

Hello World

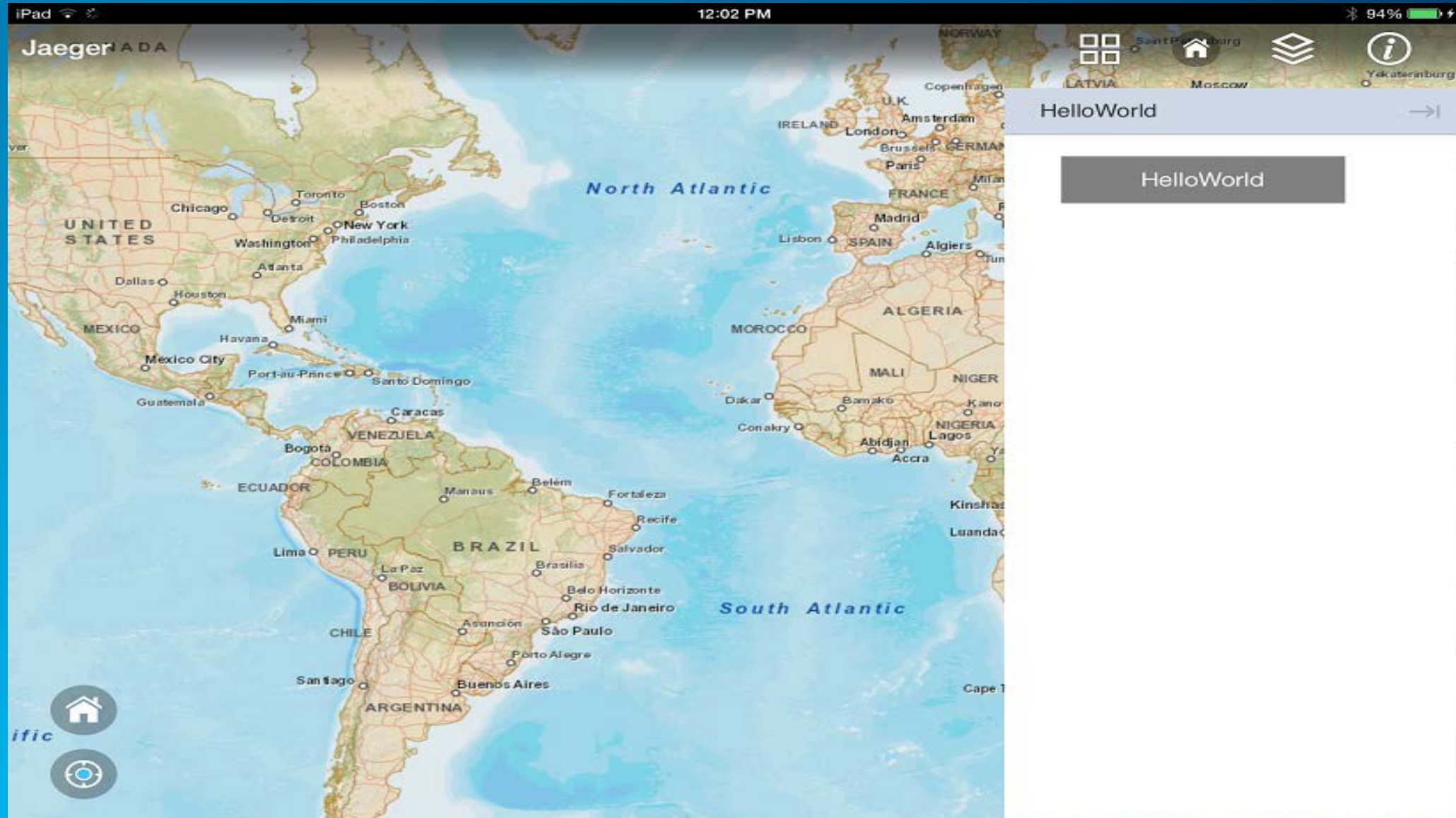
```
//HelloWorld.h
@interface HelloWorld : BaseWidget
@end

//HelloWorld.m
@implementation HelloWorld
-(void)create
{
    [super create];
    UIButton * button = [UIButton buttonWithTypeCustom];
    [button setFrame:CGRectMake(40, 20, 200, 44)];
    [button setTitle:@"HelloWorld" forState:UIControlStateNormal];

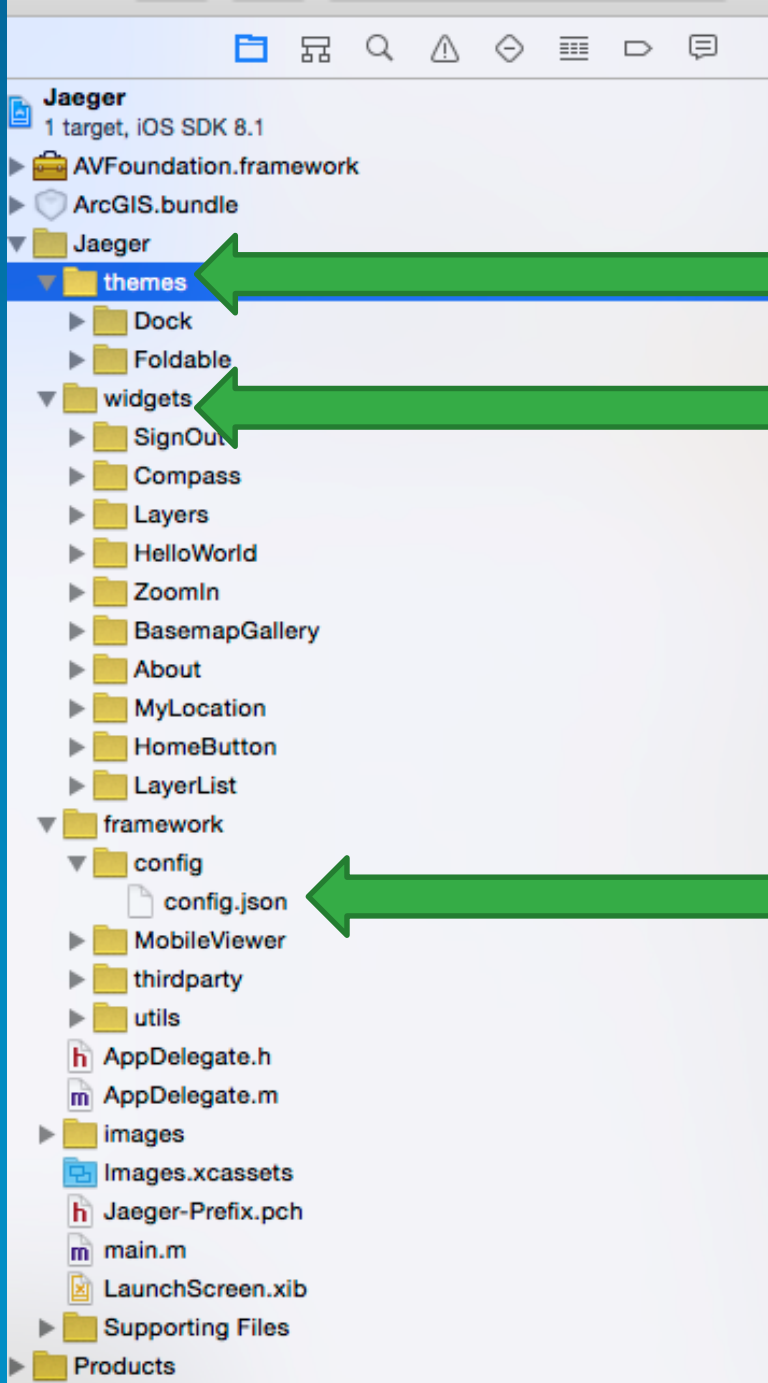
    [button setBackgroundColor:[UIColor grayColor]];
    [button addTarget:self action:@selector(helloWorld:) forControlEvents:(UIControlEventTouchDown)];
    [self.dataPanelView addSubview:button];
}
-(void)selected
{
    [super selected];
    [self showDataPanel];
}
-(void)helloWorld:(id)sender
{
    [self.mapView zoomIn:YES];
}
}
```

```
"widgetPool": {
  "widgets": [
    {
      "label": "HelloWorld",
      "uri": "HelloWorld"
    },
  ],
}
```

Hello World



Share the Widgets and Themes for Mobile



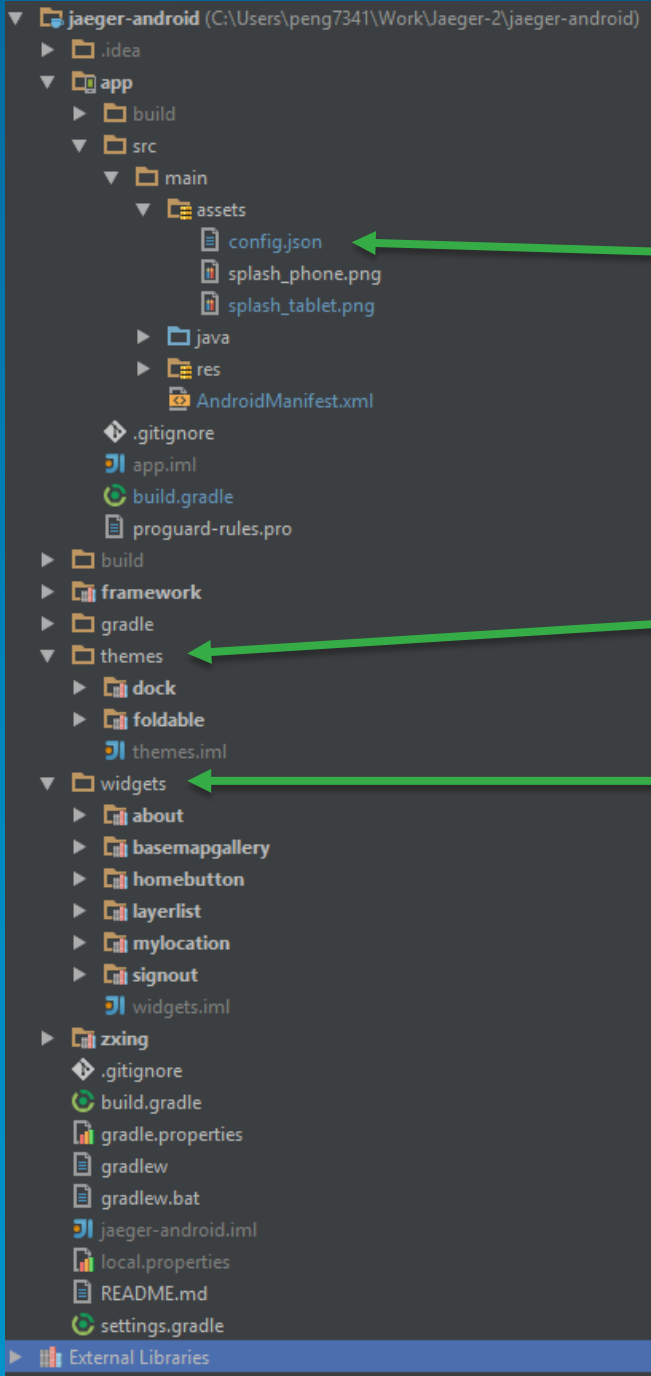
Themes

Widgets

config

Share Widget & Theme (iOS)

- Each Widget/Theme is a standalone library
- All the modules have their own resources & configuration files
- To share Widget/Theme, just share the library and resources



config

Themes

Widgets

Share Widget & Theme (Android)

- Each Widget/Theme is a standalone module
- All the modules have their own resources & configuration files
- To share Widget/Theme, just export the module using IDE



Web AppBuilder Community

on GeoNet

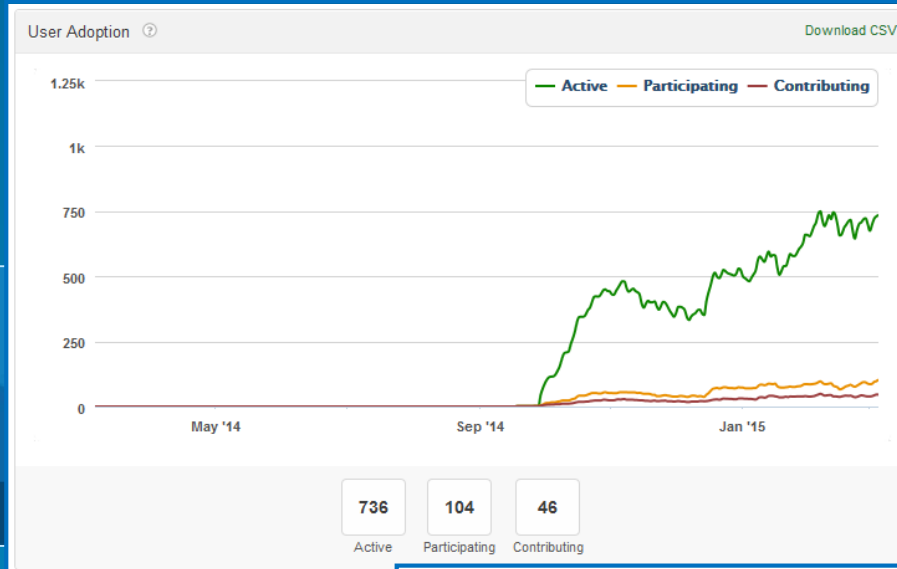
GeoNet – Esri Community

esri

All Places > GIS > Web GIS

Web AppBuilder for ArcGIS

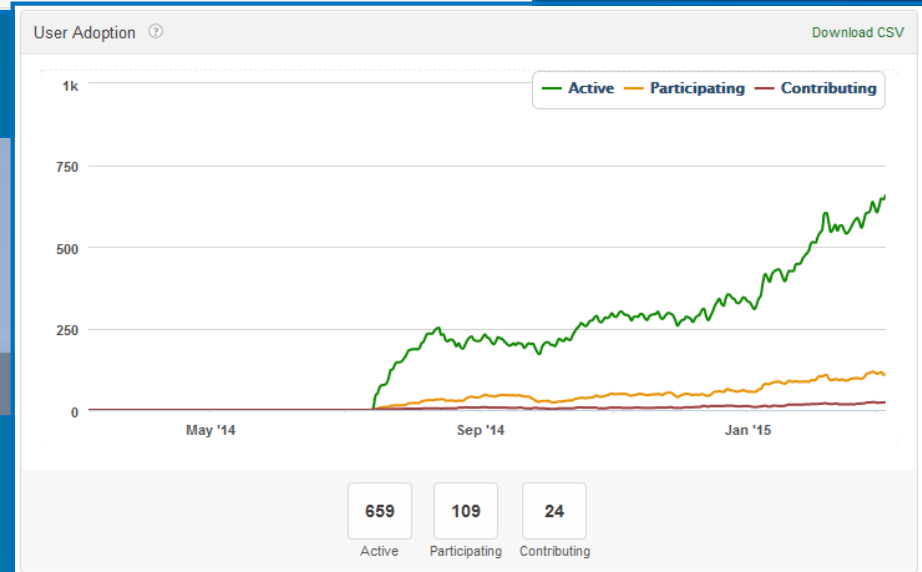
Overview Content People Subspaces and Projects



All Places >

Web AppBuilder Custom Widgets

Activity Content People Projects Calendar



Esri GeoNet Group Web AppBuilder

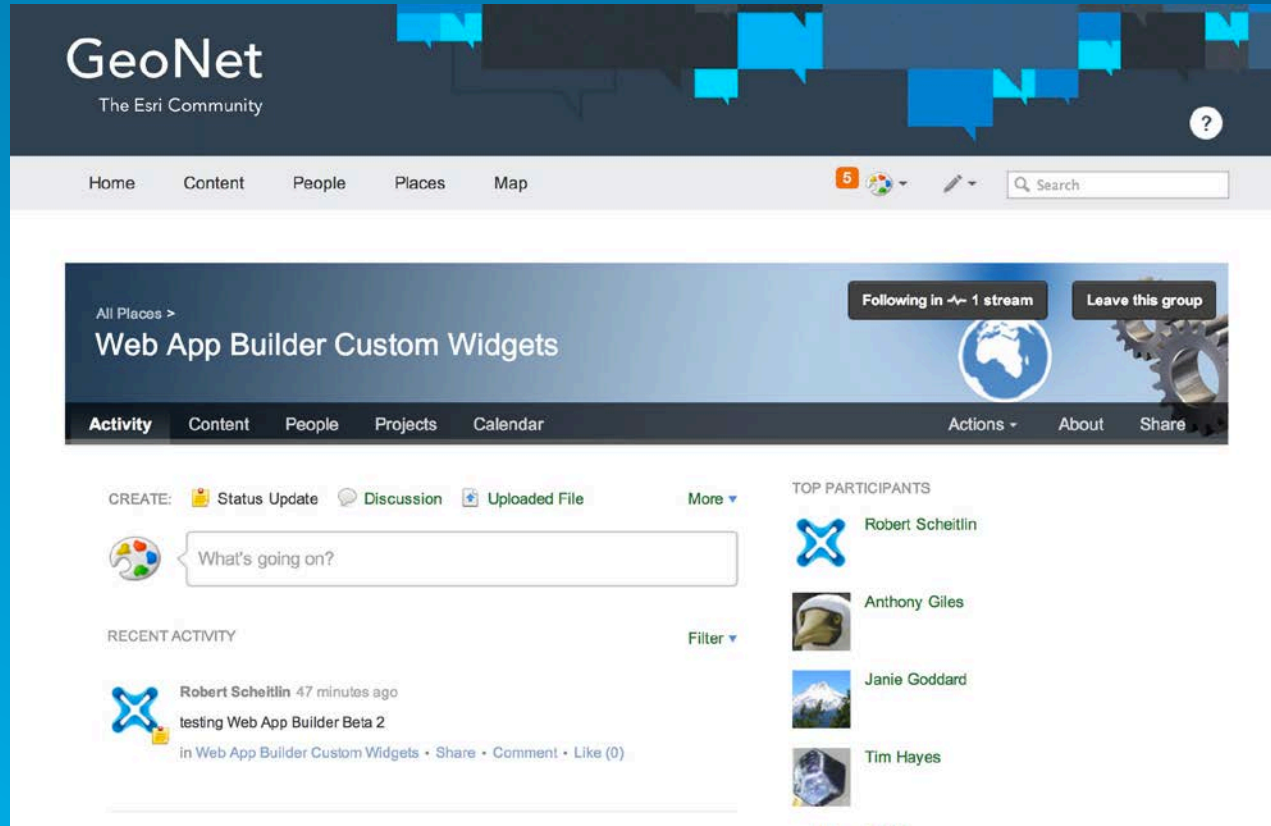
<https://geonet.esri.com/groups/web-appbuilder>

The screenshot shows the Esri GeoNet group page for "Web AppBuilder for ArcGIS". At the top, the Esri logo is on the left, and navigation links for "Industries", "Products", "Support & Services", and "About" are on the right. A search bar is also present. Below the navigation is a dark banner with the "GeoNet" logo and the tagline "The Esri Community". A secondary navigation bar includes "Home", "Content", "People", "Places", and "Map", along with a search bar and a notification icon. The main content area features a large banner image of a forest at sunset with the text "Web AppBuilder for ArcGIS" and a "Following in ~1 stream" button. Below the banner is a sub-navigation bar with "Activity", "Content", "People", "Projects", "Reports", "More", "Actions", "About", "Share", and "Manage". A "CREATE:" section offers options for "Status Update", "Discussion", and "Uploaded File". A text input field contains the placeholder "What's going on?". To the right, a "TOP PARTICIPANTS" section displays a message: "There are no top participants yet in this group."

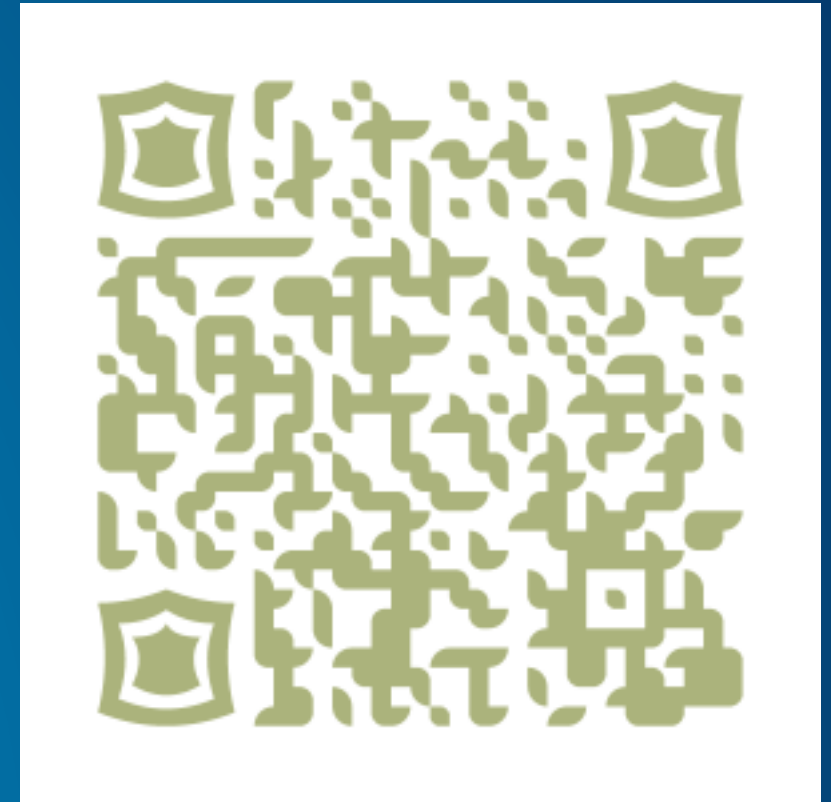


GeoNet Group Web AppBuilder Custom Widgets

<https://geonet.esri.com/groups/web-app-builder-custom-widgets>



The screenshot shows the GeoNet group page for 'Web App Builder Custom Widgets'. The page features a dark blue header with the GeoNet logo and 'The Esri Community' tagline. Below the header is a navigation bar with links for Home, Content, People, Places, and Map. A search bar is located on the right side of the navigation bar. The main content area has a dark blue banner with the group name 'Web App Builder Custom Widgets' and a 'Following in ~ 1 stream' indicator. Below the banner is a sub-navigation bar with links for Activity, Content, People, Projects, and Calendar. The main content area is divided into two columns. The left column contains a 'CREATE' section with options for Status Update, Discussion, and Uploaded File, and a text input field with the placeholder 'What's going on?'. Below this is a 'RECENT ACTIVITY' section with a 'Filter' dropdown. The right column contains a 'TOP PARTICIPANTS' section with a list of users: Robert Scheitlin, Anthony Giles, Janie Goddard, and Tim Hayes, each with a profile picture and a gear icon.



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