ArcGIS Online: Web Mapping with Arcade Expressions

Lisa Berry – Cartographic Product Engineer @lisaberry_gis

Paul Barker – Product Engineer @barker_pc

2019 ESRI DEVELOPER SUMMIT
Palm Springs, CA

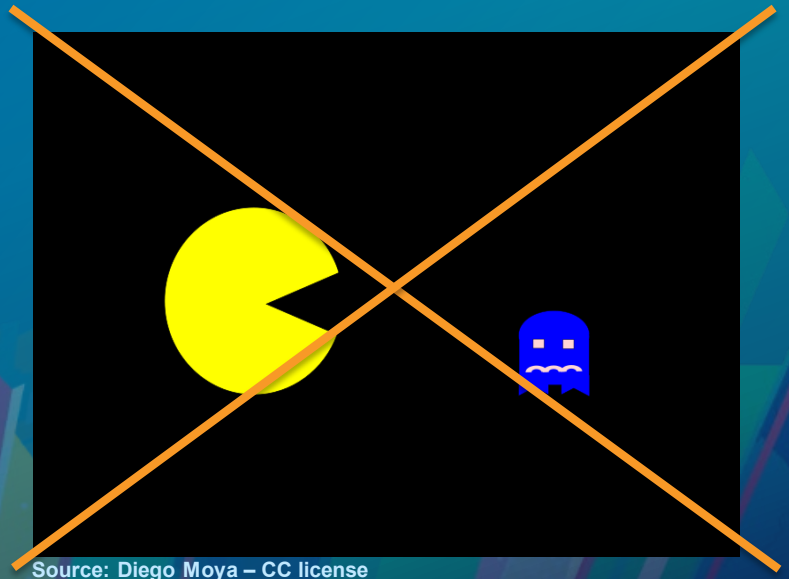
Agenda

- What is Arcade?
  - Demo: Write Your First Expression
- Why Use Arcade?
- Where to find it
  - Demo: Simple Arcade within a Web Map
- Get Fancy
  - Demo: Complex arcade expressions, Feature Sets
- Testing
- Considerations
- What's Next
- Resources

What is Arcade?

- Named after the arch not Pac-Man
- Lightweight expression language for working with your ArcGIS data (think excel for ArcGIS)
  - ArcGIS Pro
  - ArcGIS Online
  - Runtime SDKs
  - JavaScript API
  - Web Apps
- Simple or complex expressions to make data-driven adjustments to your web maps

Source: Andrew Dunn – CC license



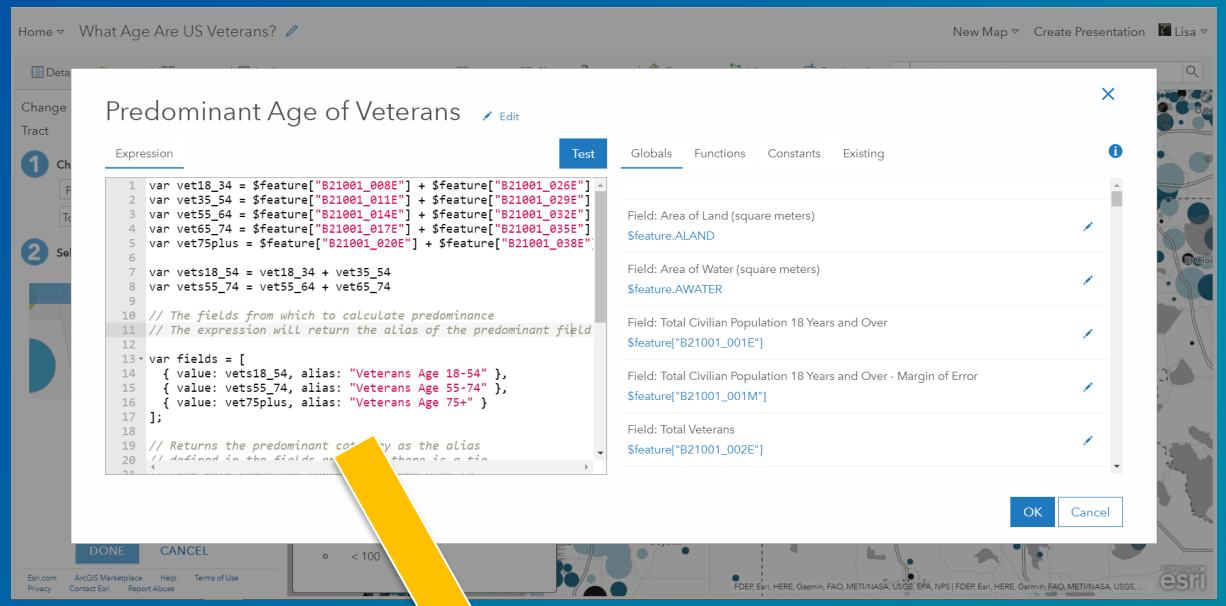
Source: Diego Moya – CC license

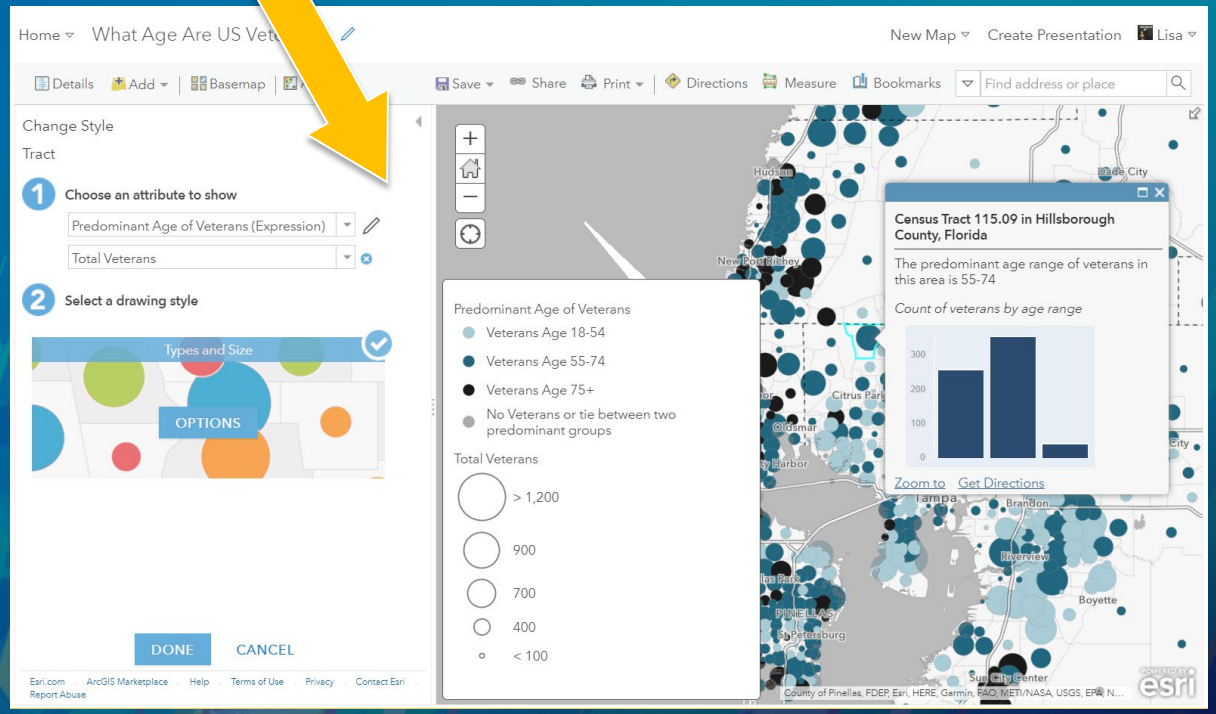
What is Arcade?

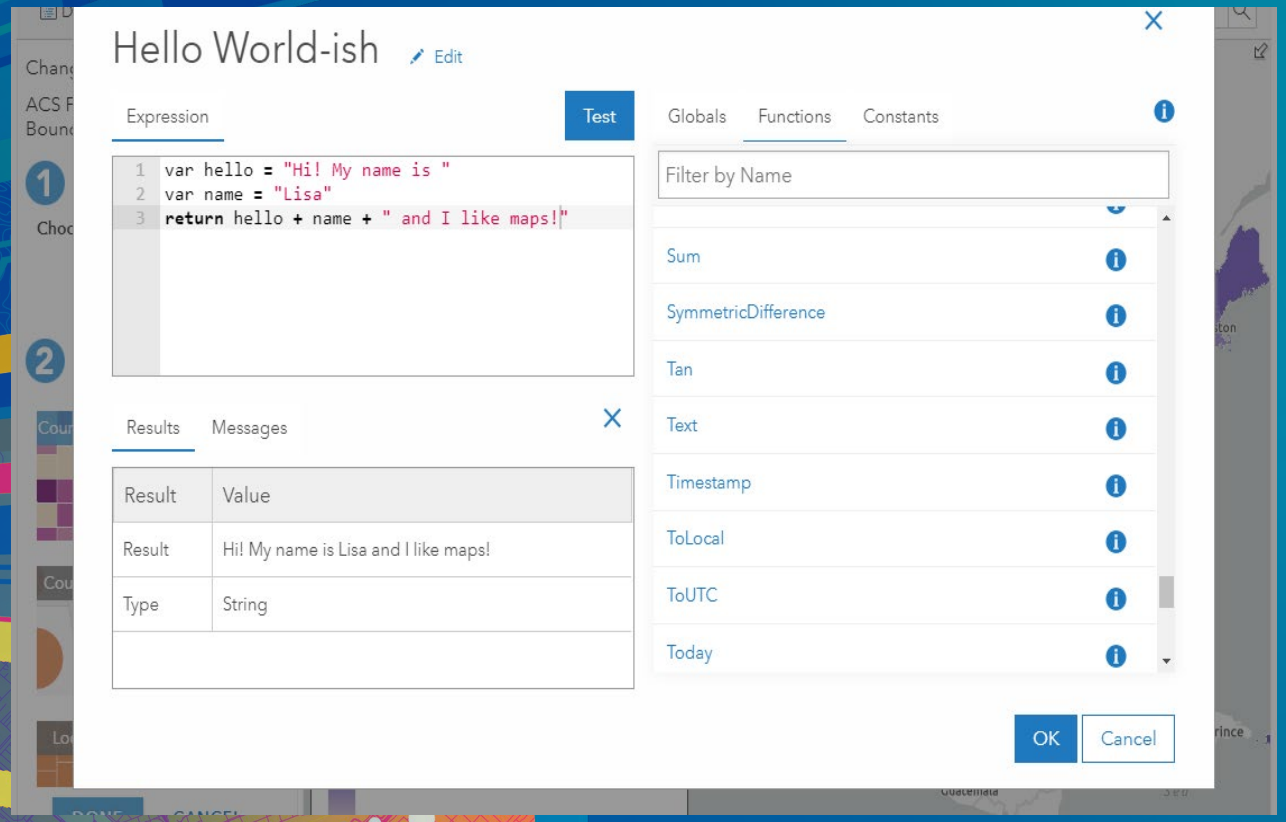
- Not a replacement for Python or geoprocessing
  - Arcade is lightweight and simple
- In-map calculator

Input/script → Arcade Executes → Resulting value

- Alternative to calculating a new field – meaning you don't have to own the layer







Write Your First Expression

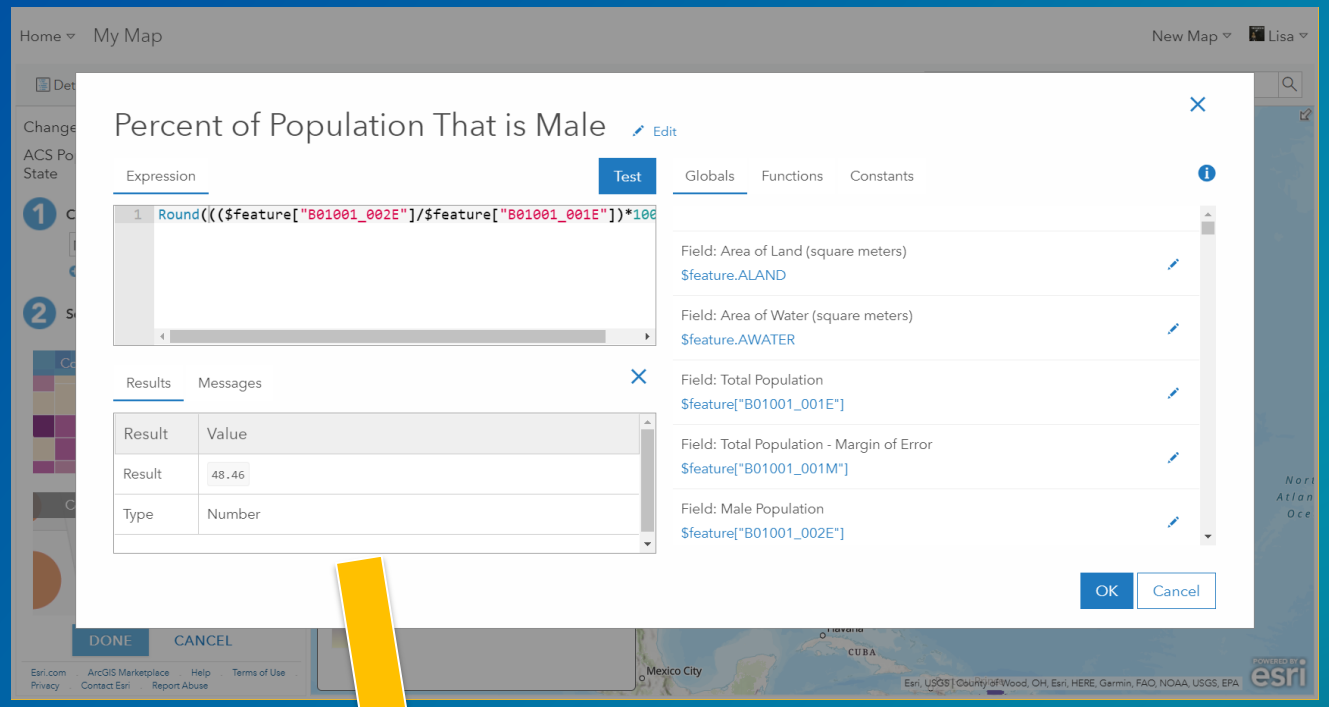
Lisa Berry

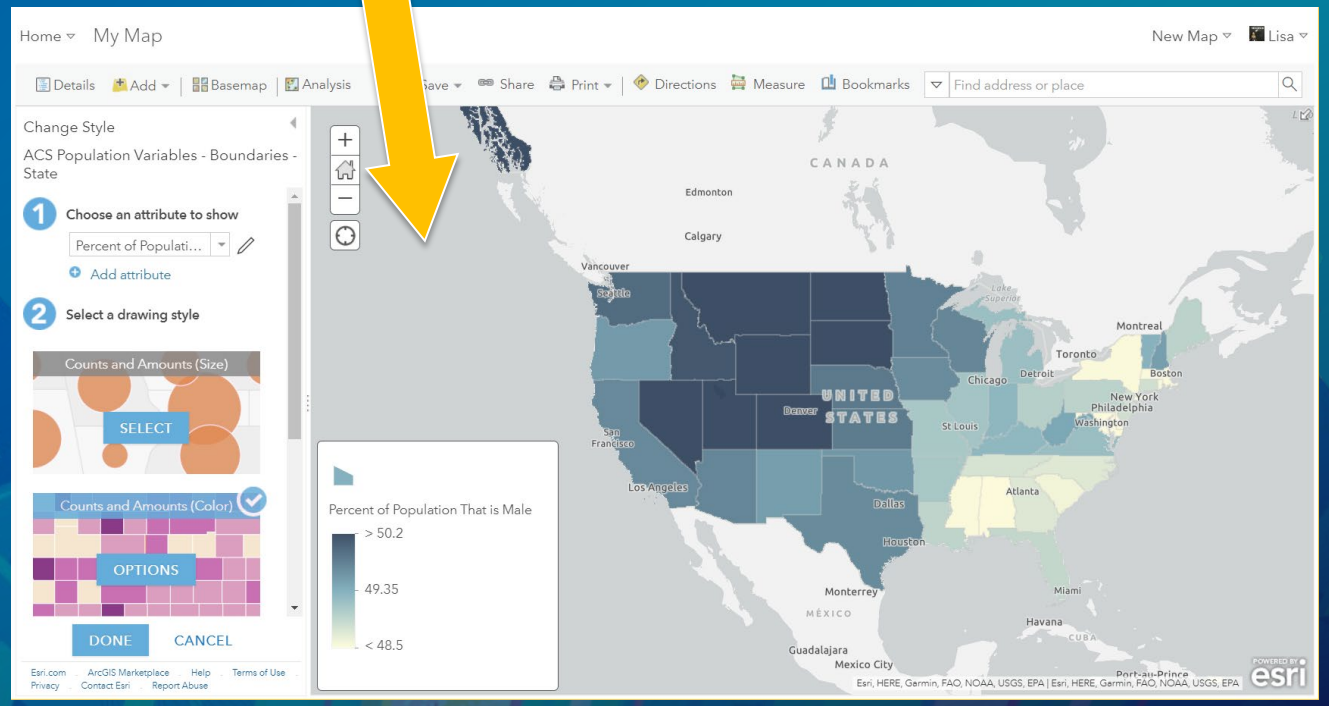
Why Use Arcade?

- Forgot to add a field? Used the wrong data type? Don’t own the data? No problem!
- On-the-fly calculations and data manipulation
- Easy to get started (excel-like functions and syntax)
- Expressions carry through to your downstream applications (portable)
- Secure
- Geospatial

Simple but Powerful

- Excel-like
- Simple
  - Write a basic calculation
  - Use a built-in function
  - Re-use existing expressions
- Examples:
  - Combine fields together
  - Format existing fields
  - Unit conversion
  - Rotate symbols
  - Improved text labeling





Home My Map New Map Lisa

Percent of Population Who is Male

Edit

Expression | Test | Globals | Functions | Constants | Existing

```
Round($feature["B01001_002E"]/$feature["B01001_001E"])*100
```

Expression

Globals

Functions

Constants

Existing

- Popup Text (Pop-up)
- Strength of Predominance (Transparency)
- Veterans Age 18-54 (Pop-up)
- Veterans Age 55-74 (Pop-up)
- Veterans Age 75+ (Pop-up)

OK Cancel

DONE CANCEL

Esri.com . ArcGIS Marketplace . Help . Terms of Use . Privacy . Contact Esri . Report Abuse

< 30

Mexico City

CUBA

Esri, USGS | County of Wood, OH, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA

Test it!

Percent of Population Who is Male

Edit

Expression | Test | Globals | Functions | Constants

```
1 Round((($feature["B01001_002E"]/$feature["B01001_0 ])*100
```

Results | Messages

Result	Value
Result	48.46
Type	Number

Field: Area of Land (square meters)
$feature.ALAND

Field: Area of Water (square meters)
$feature.AWATER

Field: Total Population
$feature["B01001_001E"]

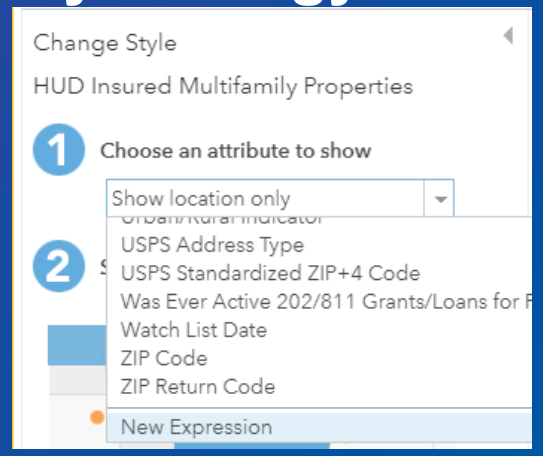
Field: Total Population - Margin of Error
$feature["B01001_001M"]

Field: Male Population
$feature["B01001_002E"]

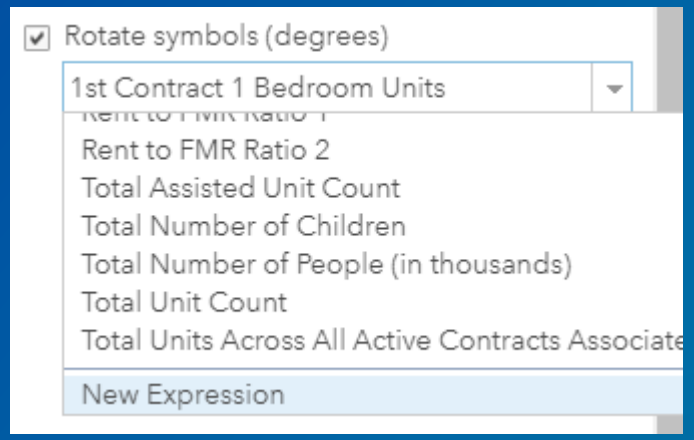
OK | Cancel

Where to find it in the Web Map

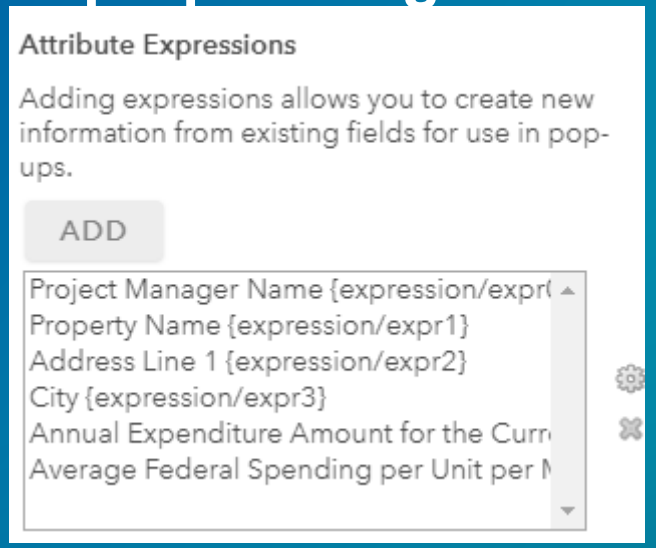
Symbology



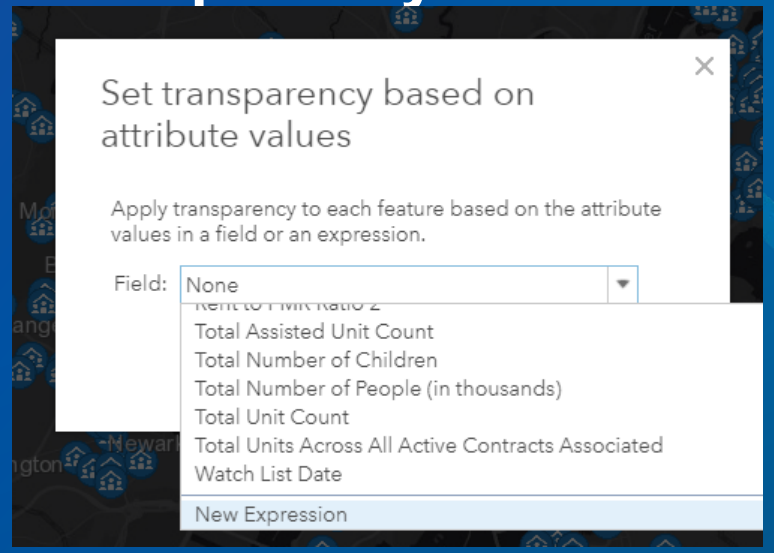
Rotation



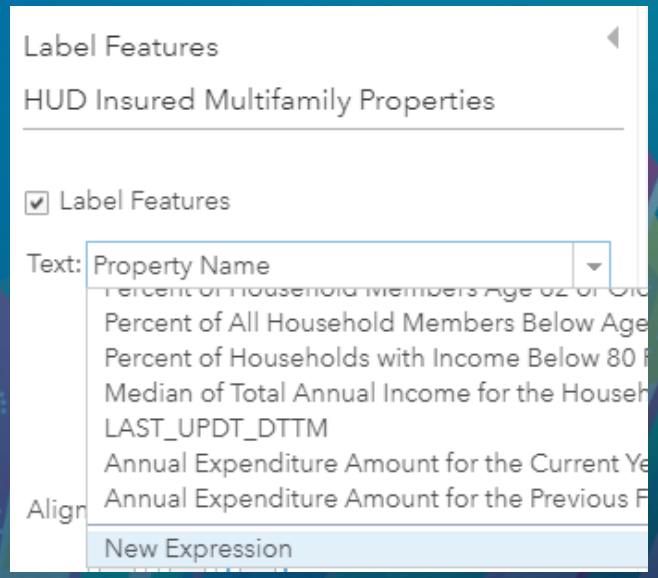
Pop-up Configuration

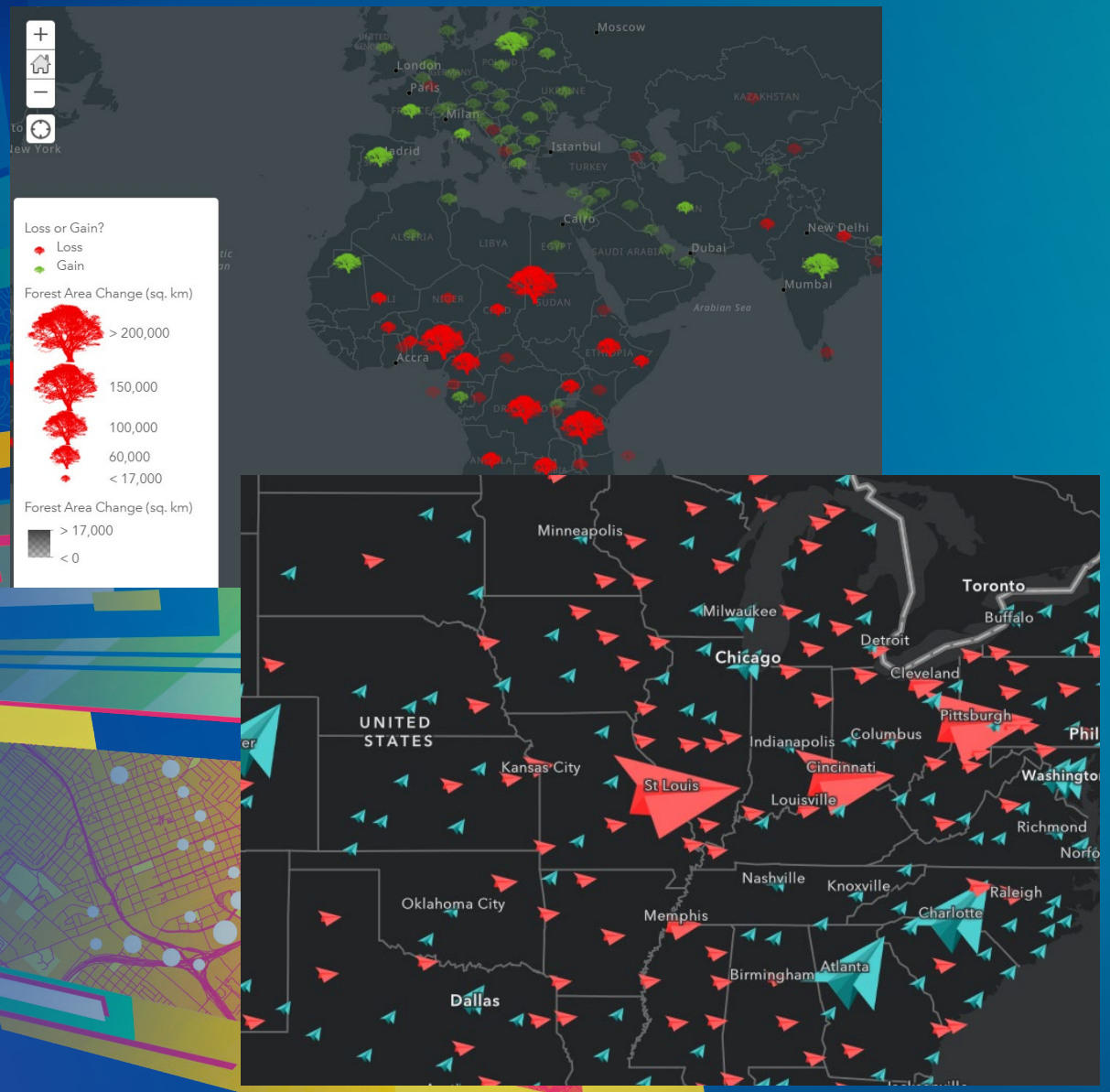


Transparency



Labels





Simple Arcade within a Web Map

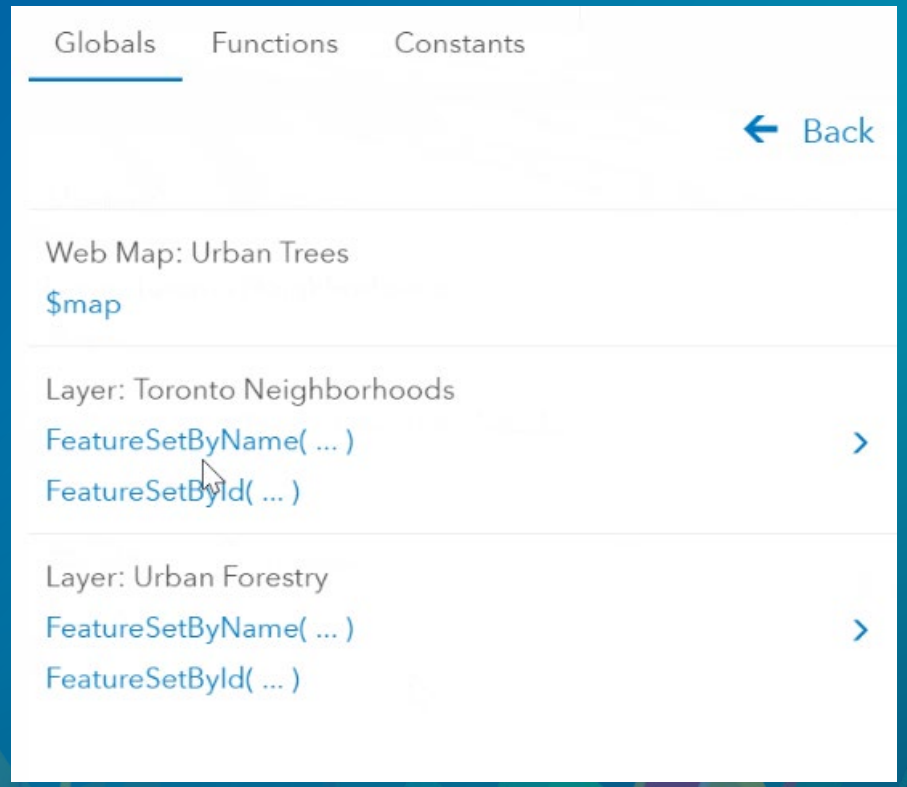
Lisa Berry/Paul Barker

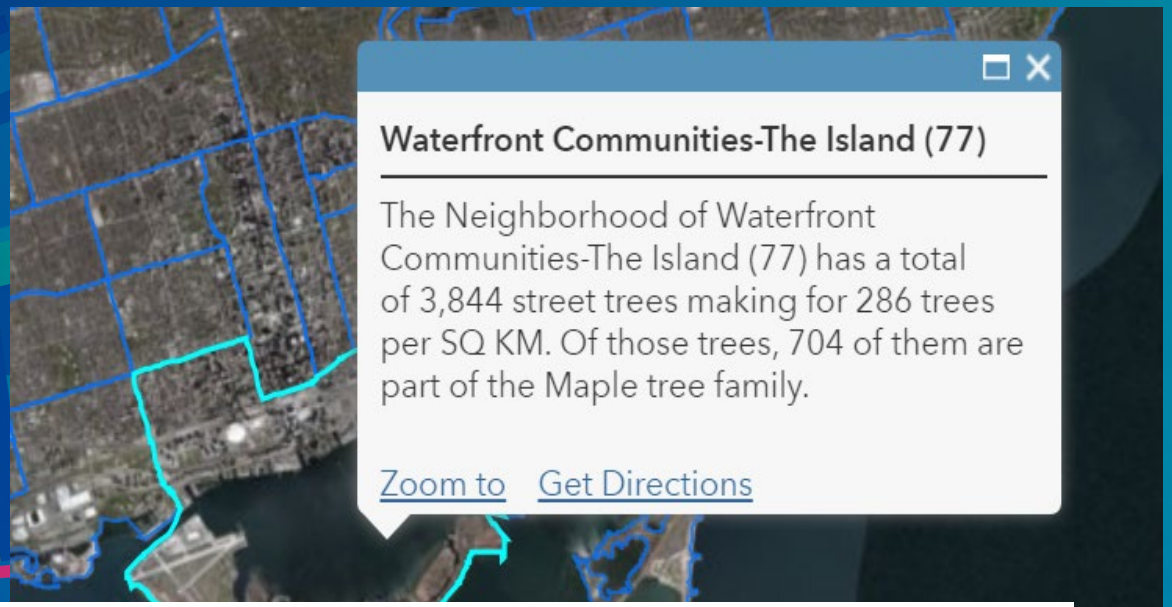
Get Fancy

- Discover and clean-up your data
  - Variables
  - User-built functions
  - Boolean logic
  - For loops
  - Conditional statements
  - Geometry functions
  - Feature Sets
- Examples:
  - Access related data in your popup
  - Complex calculations such as an index created from multiple fields
  - Render based on geographic relationships

What's a Feature Set?

- Feature sets are a way to access information from multiple features
  - From the same layer or any layer within your map ($map) or service ($datastore)
  - Work with data that is related either informally or formally
  - Can be very powerful when used responsibly





Trees per SQ KM

Edit

Expression

Test

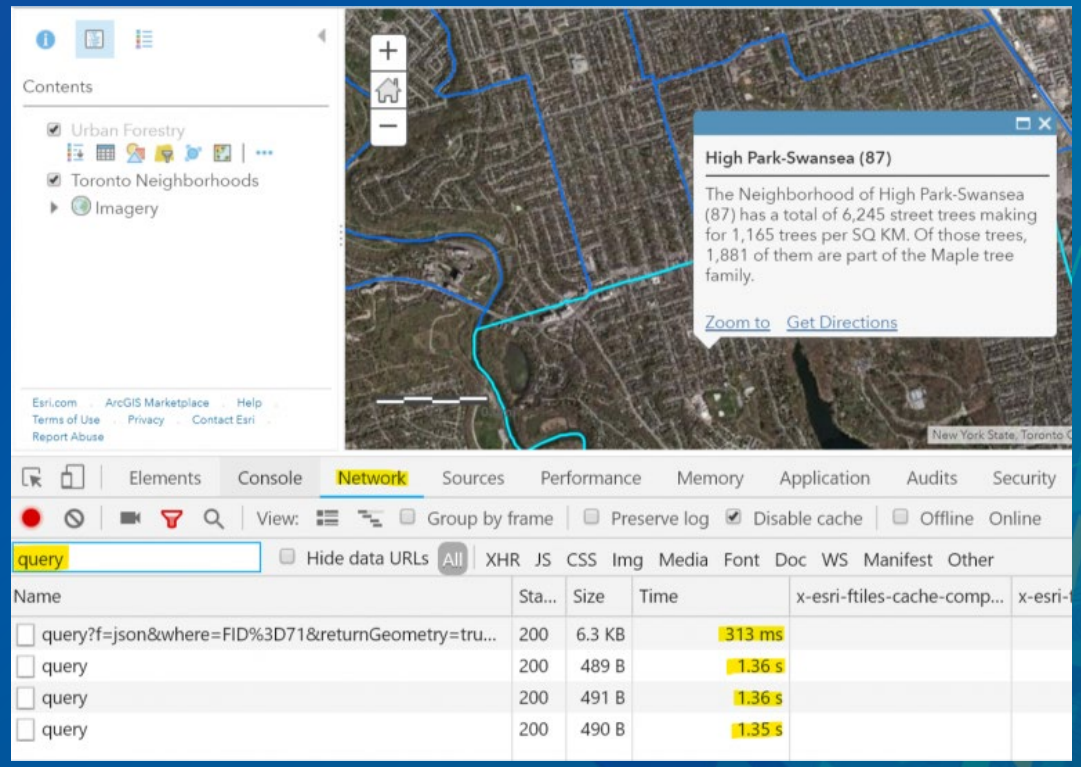
```
// define the FeatureSet Variable
var trees = FeatureSetByName($map,"Urban Forestry")

// Intersect the featureset with the neighborhood
// and get the total number of trees (count) for that
// neighborhood
var countTrees = Count(Intersects(trees,$feature))
var treeDensity = countTrees / AreaGeodetic($feature, 'square-kilo
return Round(treeDensity,2)
```

Get Fancy

Paul Barker/Lisa Berry

Troubleshoot your Expressions

- Plan things out in your head or on paper before you start
- The test feature and button are your friend
- Leverage log statements to debug code
- Factor out logic into functions in larger expressions



Considerations

- Check your network traffic – how big are your queries?
- When using feature sets, don’t make heavy queries (heavy = slow)
  - Use attribute queries instead of spatial queries when possible
- If you don’t need it, don’t request it!
- Chain functions as much as possible

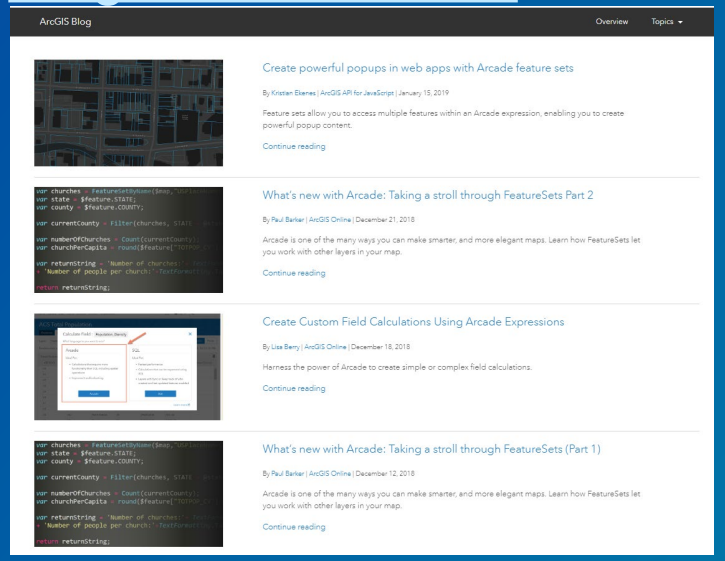
What's next

- Making it easier to work with attachments
- Simplifying working with feature sets when the data has relationships
- Additional functions to make your life easier
- Better URL/URI encoding options
- Revamped Arcade Editor

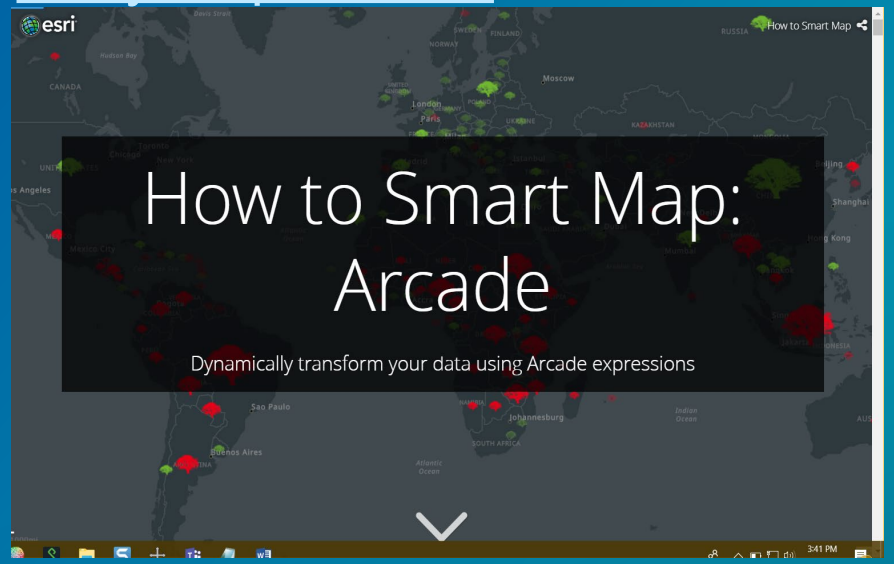
Resources for Arcade

http://esriurl.com/ArcadeResources

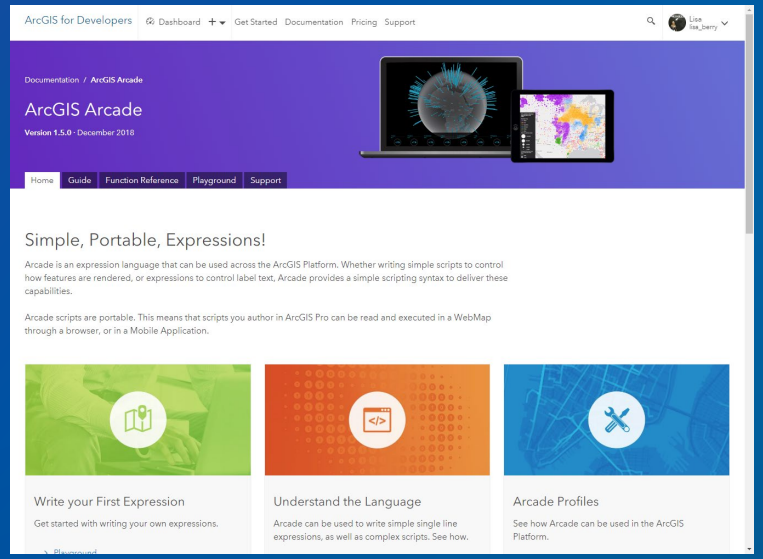
Blogs about Arcade



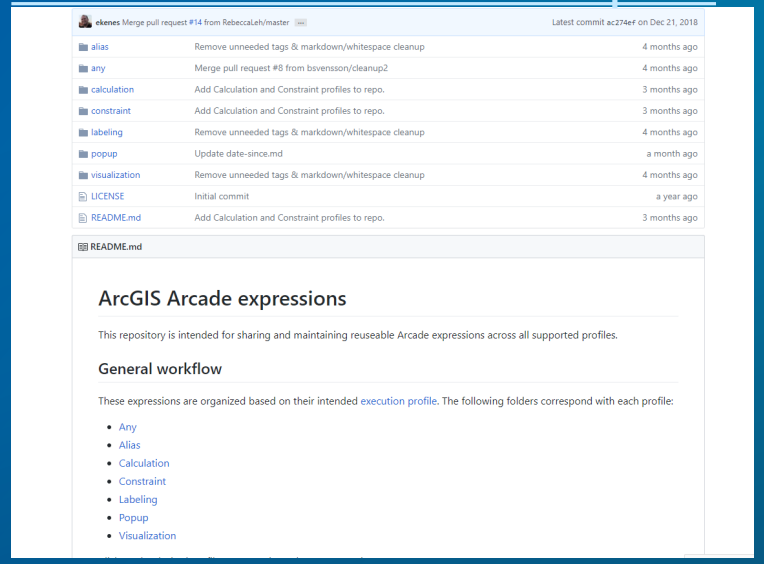
Story Map Tutorial



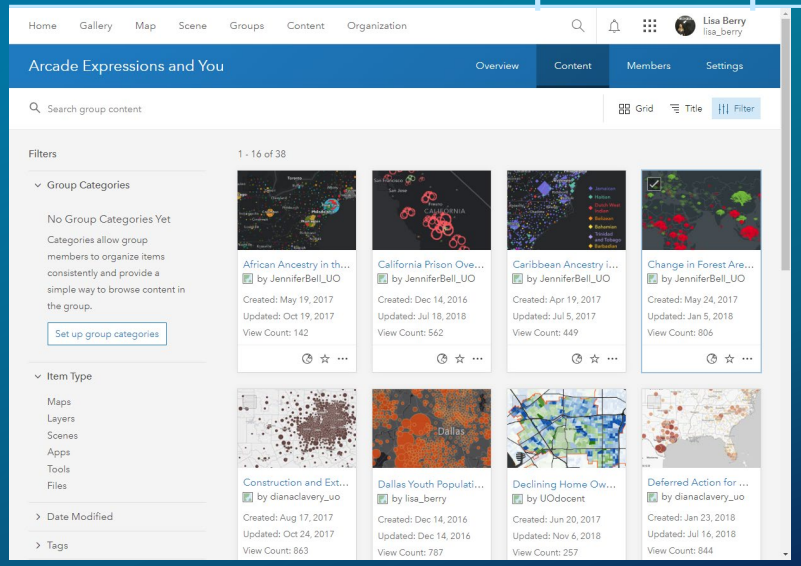
Documentation



GitHub – Arcade Examples



ArcGIS Online Group: Examples



Learn More About Arcade

Pump up Your Pop-ups With Arcade

Thursday 11-11:30am

Demo Theater 1 in Oasis

ArcGIS API for JavaScript: Using Arcade with your Apps

Thursday 2:30-3:30pm

Pasadena/Sierra/Ventura

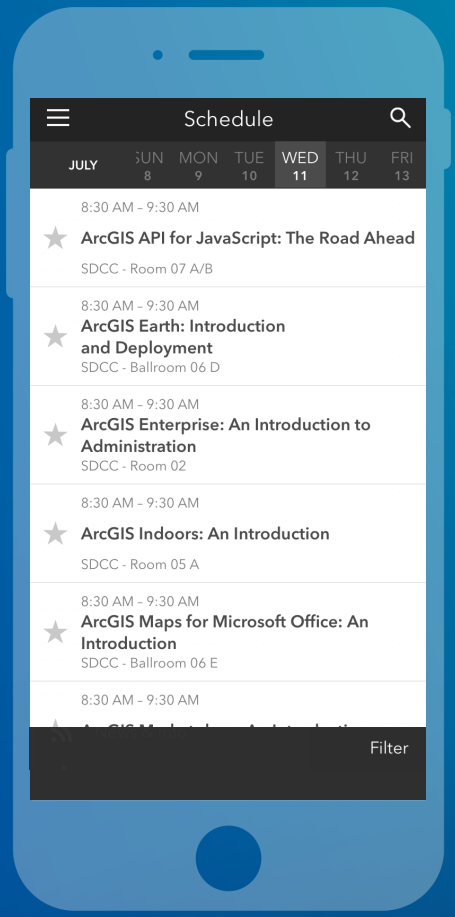
esri

THE SCIENCE OF WHERE

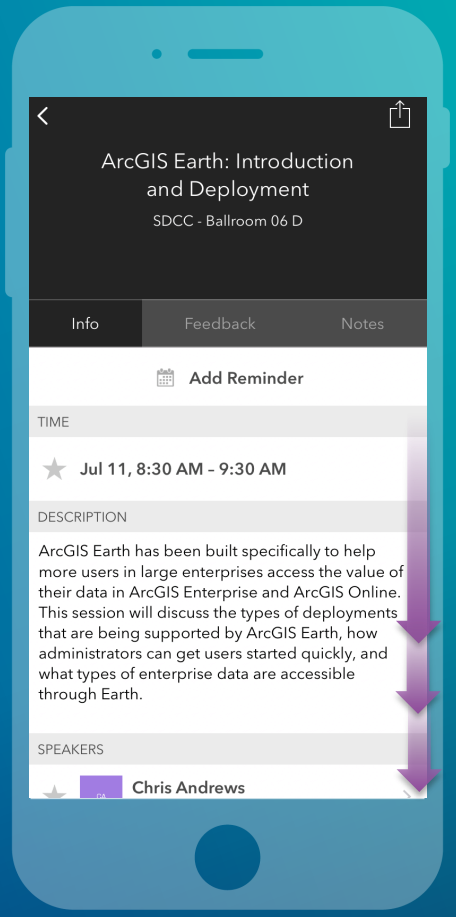
Please Take Our Survey on the App

Download the Esri Events app and find your event

Select the session you attended



Scroll down to find the feedback section



Complete answers and select “Submit”