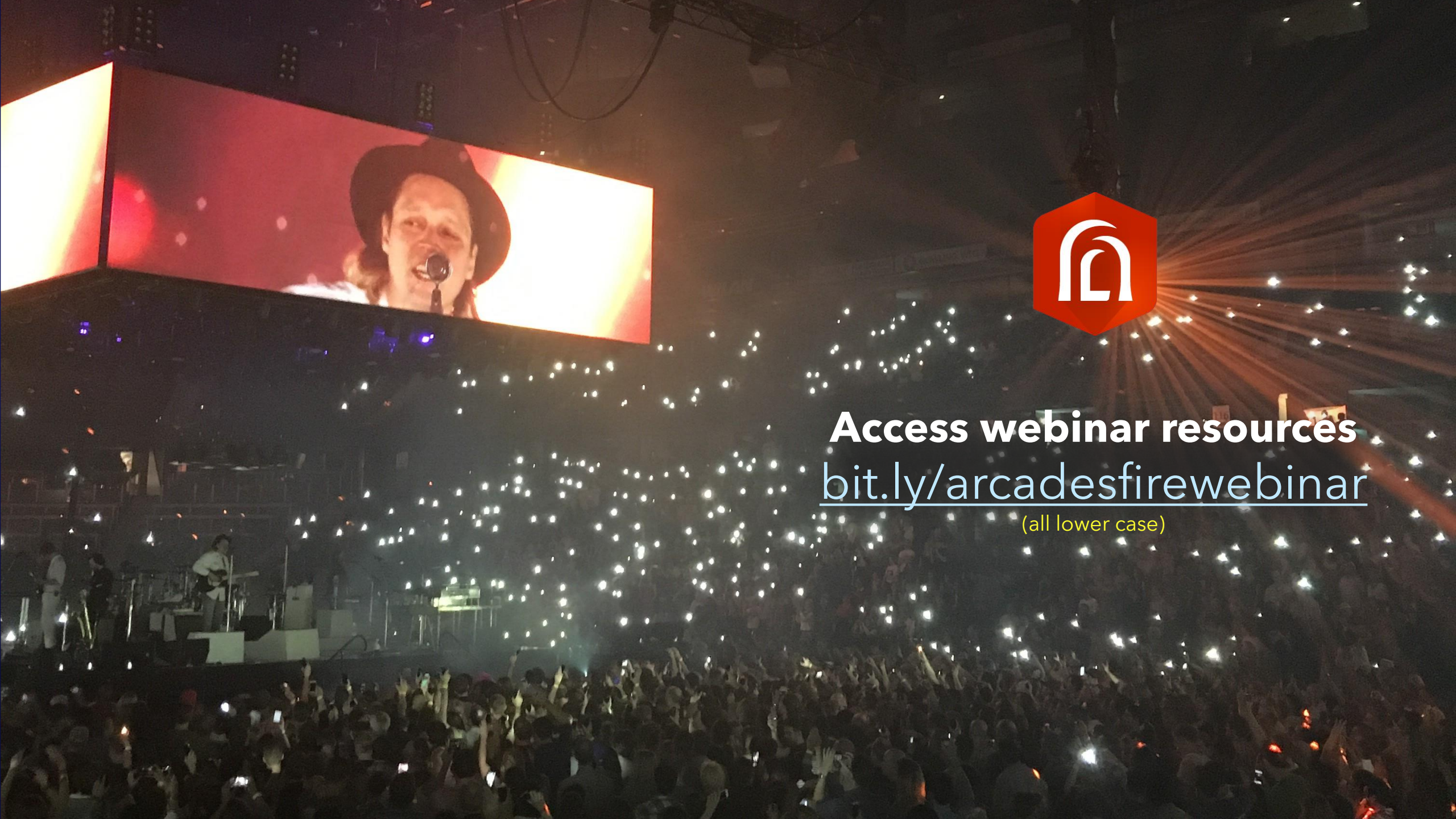# Today's Speakers

Emilie Rabeau
Technical Solutions Specialist

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Technical Solutions Specialist

Access webinar resources
bit.ly/arcadesfirewebinar
(all lower case)
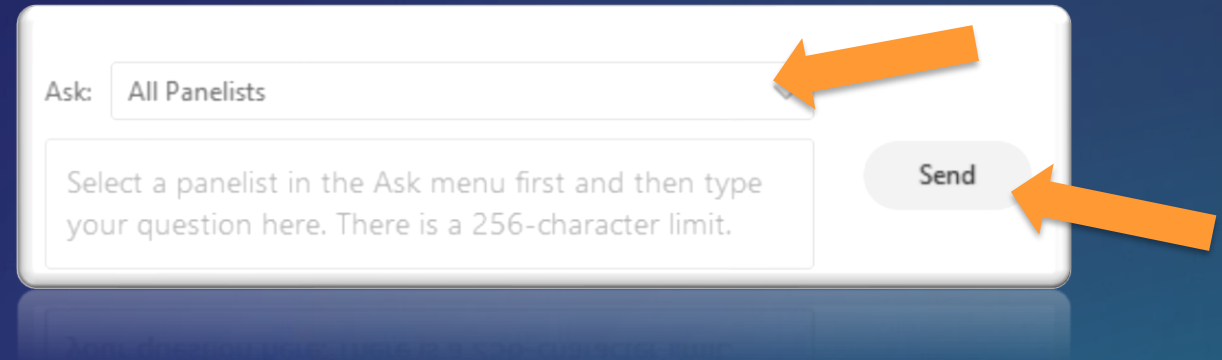
Surveys and Recordings

- We are recording today
- Expect an email from us with link
- Please share your thoughts on the exit survey

Open to Questions

- Please use the Q&A panel:
  - Choose *Ask: All Panelists*, type your question and click *Send*

- If you're unable to see the Q&A panel, click the three dots and then the Q&A button on the control dock at the bottom of your screen:
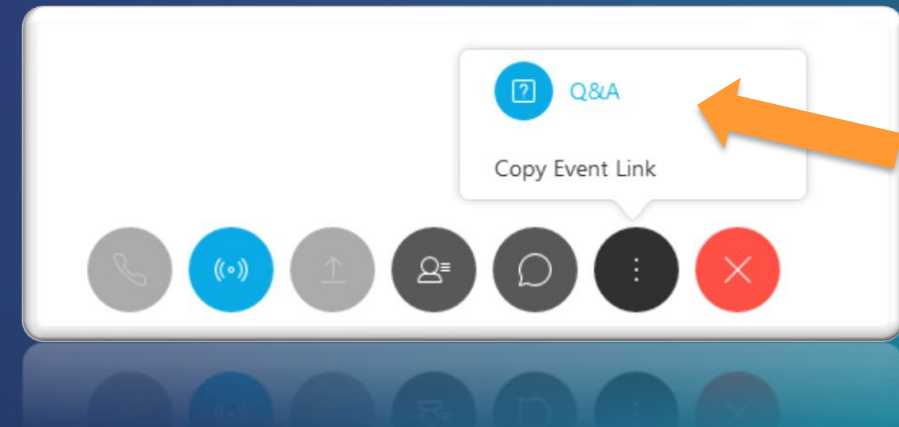
Today's Agenda

This webinar is designed to help you understand:

1. The basics of Arcade, including language syntax, logical statements, functions and profiles

2. Examples of how Arcade can be leveraged for creating custom symbology, pop-ups and labeling

3. How to build and implement Arcade-driven attribute rules to better validate your data

What is Arcade?

ar·cade

/ärˈkād/

noun

1. a simple expression-based scripting language written for use across ArcGIS

2. a covered passageway with arches along one or both sides

Photo by Hartmut Tobies on Unsplash

bit.ly/arcadesfirewebinar

Why Arcade?

Lightweight

Portable

SECURE

Geospatial

- Not a full programming / scripting language
- Not designed for writing standalone apps
- Not a replacement for geoprocessing or automation

Photo by Nuno Alberto on Unsplash

When to Arcade?

- Simpler things
  - **Combine fields together**
  - **Format existing values in fields**
  - **Perform math and manipulate text**
  - **Calculate new values on-the-fly**
  - **Alter symbology (transparency, rotation)**
  - **Make labels and popups look better**

- Fancier things
  - **Evaluate logical statements**
  - **Query and manipulate geometries**
  - **Establish rules for attributes**
  - **Access related data**
  - **Render based on geographic relationships**

EXPRESSION /
SCRIPT → ARCADE
EXECUTES → RETURNS
A VALUE

THINK SPREADSHEET FORMULA!

Where to Arcade?

- Profiles
  - *Context* and *rules* describing how and where the Arcade expression should be defined and executed
    1. Inputs that are available to the script as global variables
    2. Output types expected from the script
  - Example: *Labeling profile*

    The labeling profile allows the map author to write an expression that determines the label to show on the map for each feature. The script evaluates for each label as it is to be drawn. It is expected that the script returns a text value, comprising the label to be drawn.
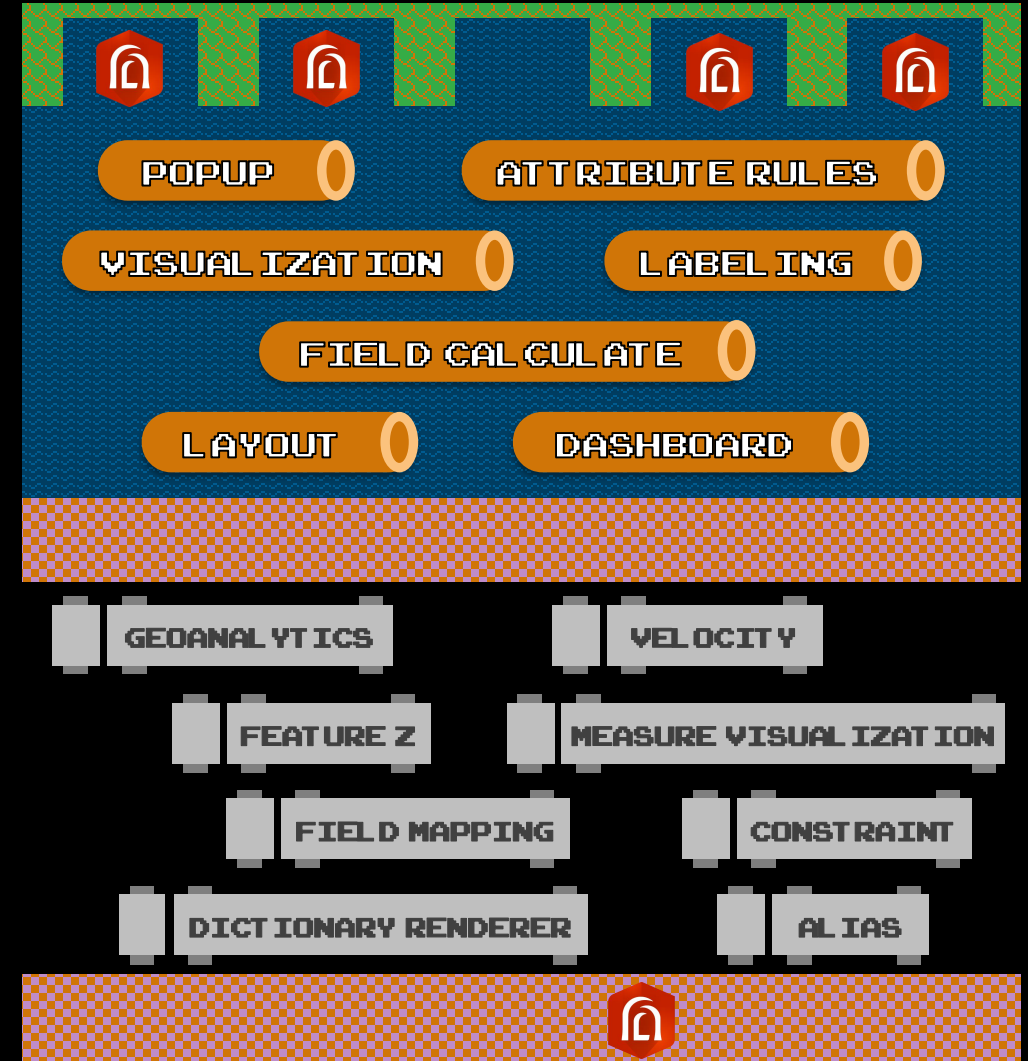
    Globals

Variable Name	Type	Description
$feature	Feature	The feature whose label is to be drawn on the map

    Return types
    Text

  - ArcGIS Pro, ArcGIS Online, ArcGIS Enterprise, ArcGIS API for JavaScript, ArcGIS Runtime SDK

POPUP   ATTRIBUTE RULES
VISUALIZATION   LABELING
FIELD CALCULATE
LAYOUT   DASHBOARD

GEOANALYTICS   VELOCITY
FEATURE Z   MEASURE VISUALIZATION
FIELD MAPPING   CONSTRAINT
DICTIONARY RENDERER   ALIAS

Current @ v.1.12 (Dec 2020)

How to Arcade?

- <u>Structure and Logic</u>
  - **Variables**
    - **Declare with *var***

      ```
      var city = "Prince Rupert";
      ```
    - **Global variables may be used depending on the *profile***

      ```
      var pop = $feature.POPFIELD;
      ```
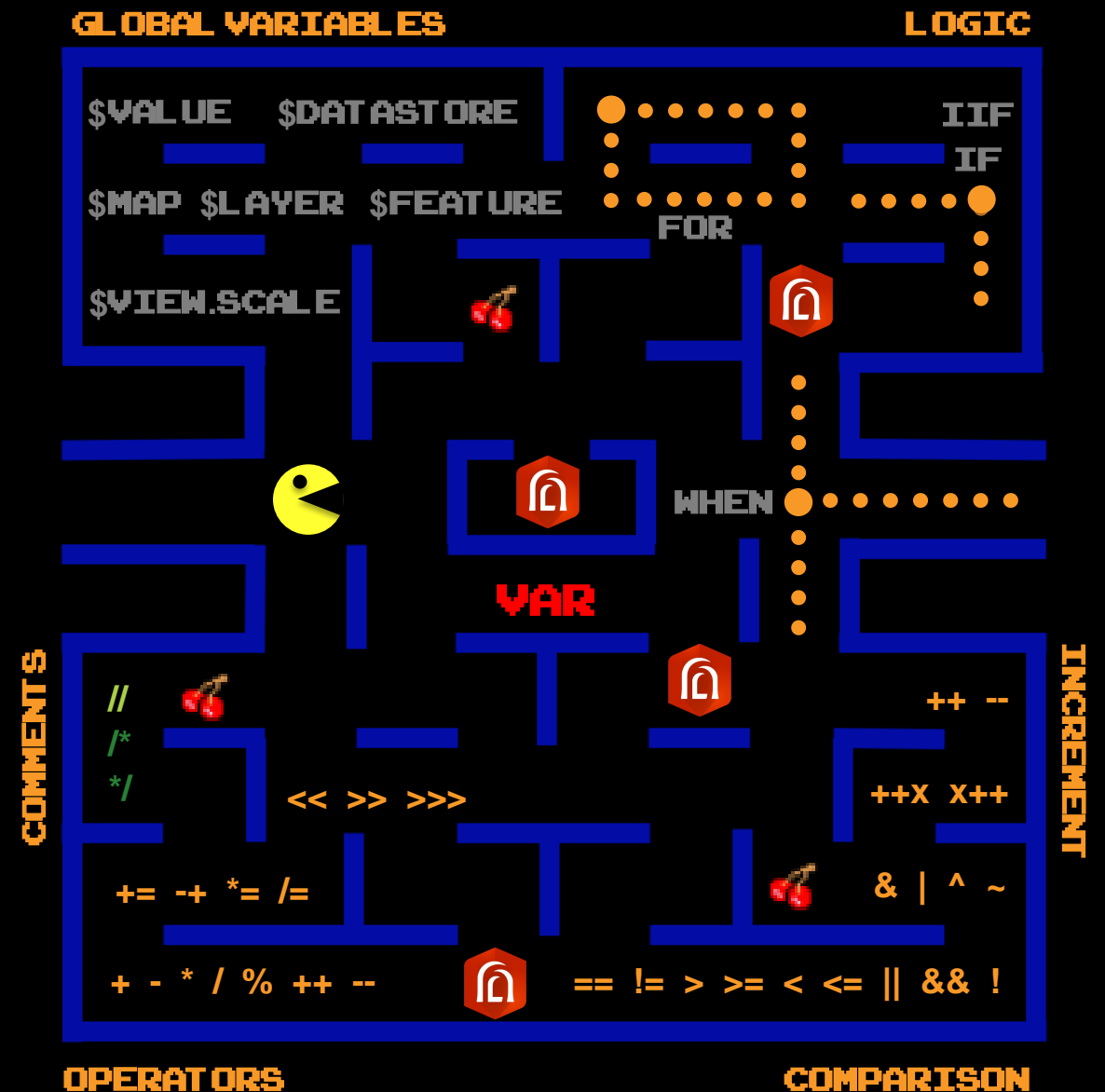 - **Control flow**
    - **Branches** `If()` `IIf()` `When()`
    - **Loops** `For()`
  - **Syntax**
    - **Single-line and multi-line comments**
    - **Arcade is forgiving**
      - **Case insensitive**
      - **Explicit vs. implicit return, type casting**

GLOBAL VARIABLES　　　　　**LOGIC**

$VALUE　$DATASTORE　　　　　IIF

　　　　　　　　　　　　　　　IF

$MAP $LAYER $FEATURE　FOR

$VIEW.SCALE

WHEN

VAR

COMMENTS
```
//
/*
*/
```
<< >> >>>

+= -+ *= /=

+ - * / % ++ --

OPERATORS

INCREMENT

++ --

++X X++

& | ^ ~

== != > >= < <= || && !

COMPARISON

How to Arcade?

- ## Type System

  - ### Standard objects

```
var num = 100;                    //number
var flg = true;                   //boolean
var day = Date(2021,2,11);        //date
var arr = ['A','B','C+','F'];     //array
```
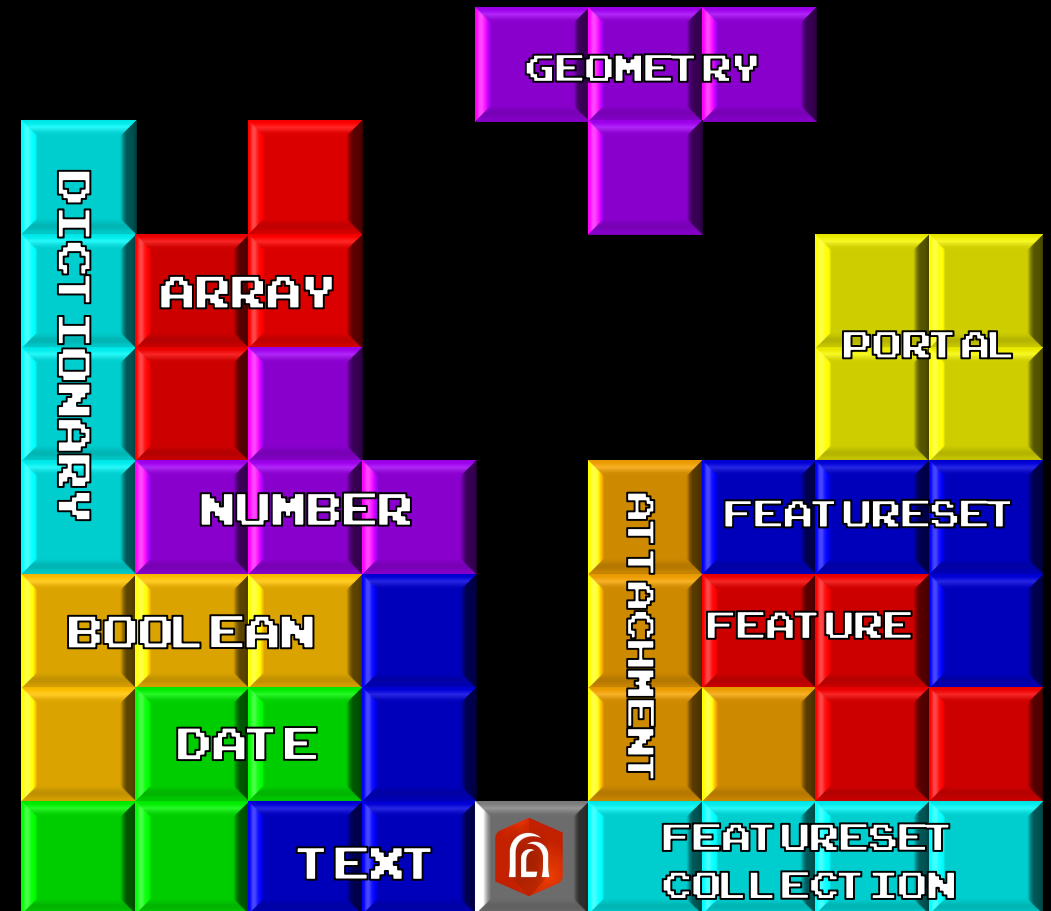
  - ### Geometry objects

    - #### Point, Multipoint, Polyline, Polygon, Extent

```
//general geometry creation
var geom = Geometry({'x':100,'y':150});
//create with geometry type function
var pt = Point({'x':100,'y':150});
```

  - ### Geospatial objects

```
//create feature set from layer in map
var parks = FeatureSetByName($map,'Parks');
var parkscount = Count(parks);
```


Current @ v.1.12 (Dec 2020)

How to Arcade?

- ## Functions

  - **Rich library of built-in functions that make it easy to author complex calculations**

    - **Examples:**

Mathematical Functions
Abs - Acos - Asin - Atan - Atan2 - Average - Ceil - Constrain - Cos - Exp - Floor - Log - Max - Mean - Min - Pow - Random - Round - Sin - Sqrt - Stdev - Sum - Tan - Variance
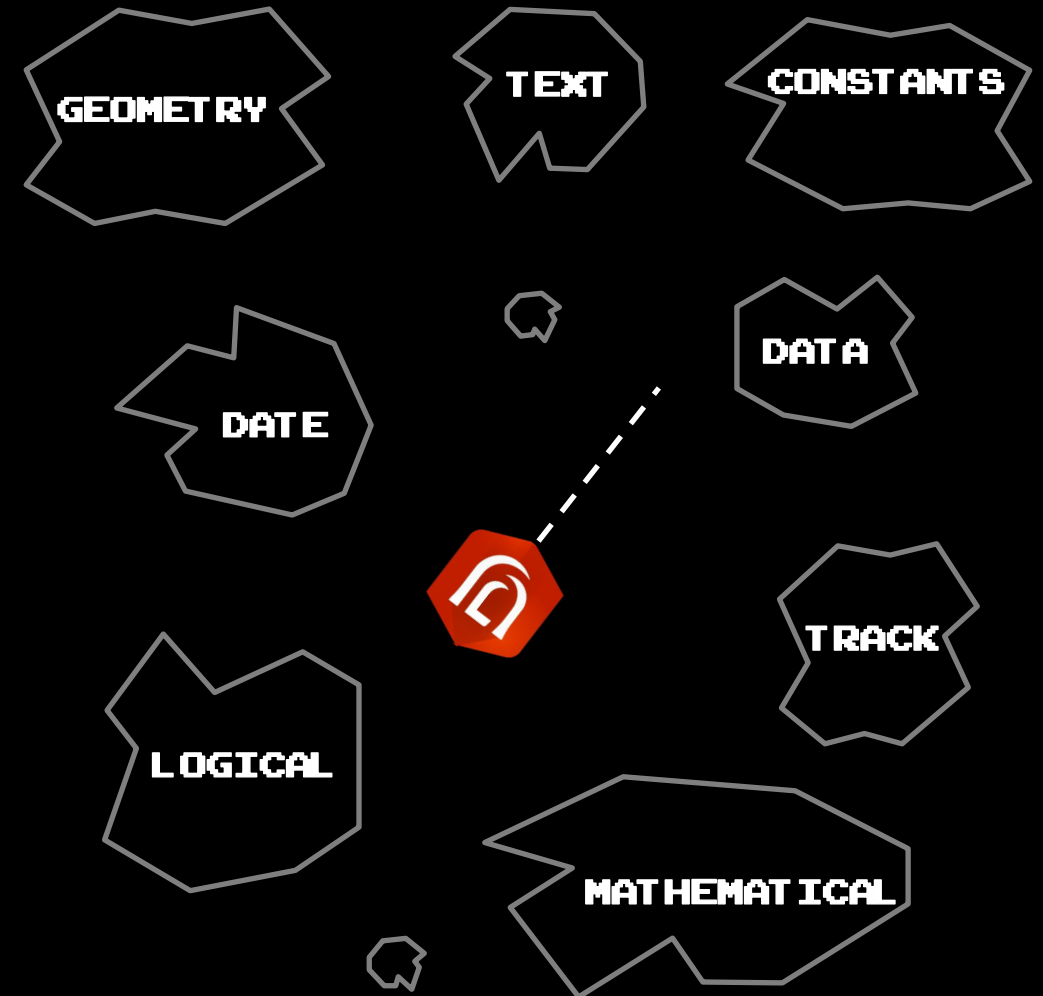**Text Functions**
Concatenate - Find - Left - Lower - Mid - Proper - Replace - Right - Split - Trim - Upper - UrlEncode
Geometry Functions
Angle - Area - AreaGeodetic - Bearing - Buffer - BufferGeodetic - Centroid - Clip - Contains - Crosses - Cut - Densify - DensifyGeodetic - Difference - Disjoint - Distance - DistanceGeodetic - EnvelopeIntersects - Equals - Extent - Generalize - Geometry - Intersection - Intersects - IsSelfIntersecting - IsSimple - Length - LengthGeodetic - MultiPartToSinglePart - Multipoint - Offset - Overlaps - Point - Polygon - Polyline - Relate - RingIsClockwise - Rotate - SetGeometry - Simplify - SymmetricDifference - Touches - Union - Within

  - **Build your own user-defined functions**

```
function tempcalc(x,y) {
    when(y=='F',(x*1.8)+32,y=='C',(x-32)*(5/9),'n/a');
}
text(round(tempcalc(20.25,'F'),2)) + ' degrees';
```

GEOMETRY

TEXT

CONSTANTS

DATA

DATE

TRACK

LOGICAL

MATHEMATICAL

How to Arcade?

- <u>Climb to success</u>

  5. **See if it works in your application(s)**

  4. **Write and test your code in the editor**

  3. **Access the Arcade editor (within your context)**

  2. **Pick your application**

  1. **Review the profile that matches your goals**
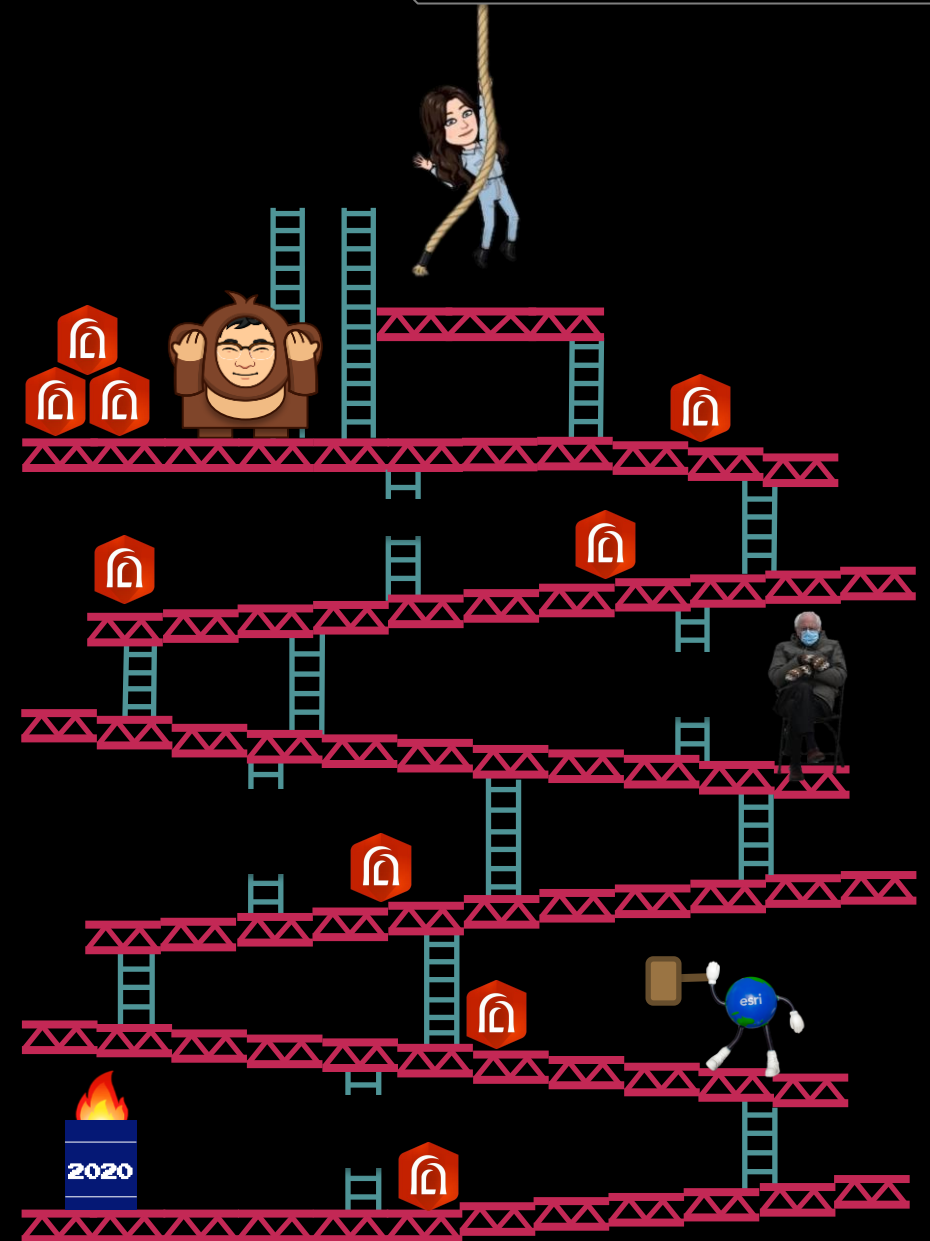
Who will demo Arcade?

- **Labeling**

- **Visualization**

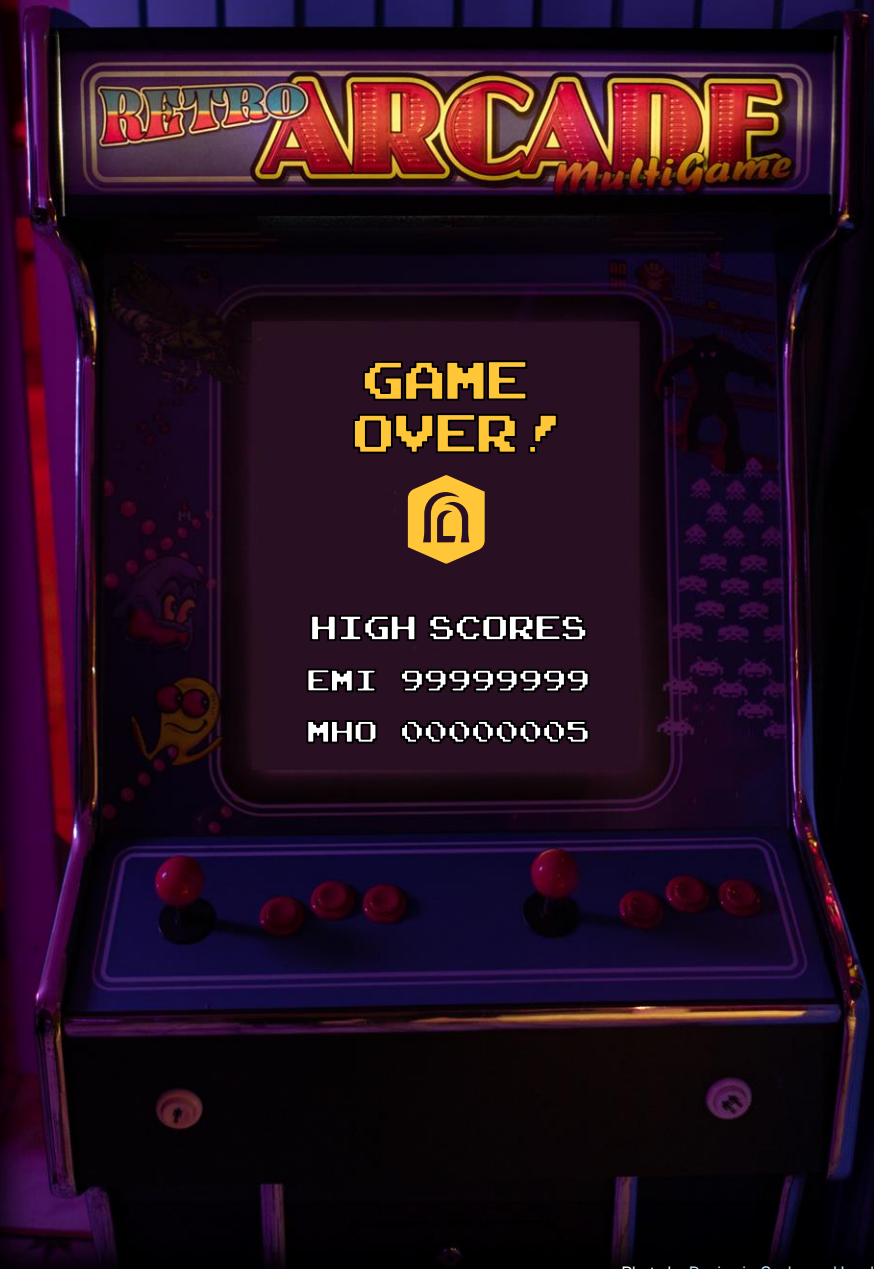- **Popup**
- **Field Calculate**

- **Attribute Rules**

How to Arcade best?

- Don't be heavy
  - **Balance complexity and performance**
  - **Be careful with feature sets**
  - **If you don't need it, don't request it**

- Express efficiently
  - **Have a plan before you start coding**
  - **Chain functions when you can**
  - **Leverage user-defined functions**

- Loving the debugging
  - **The *Test* feature and button are your friends**
  - **Use the *Console* function to post messages**
  - **Use *Developer Tools* to gauge performance**

- You don't have to own the data

Summary

In this webinar you learned about:

1. The basics of Arcade, including language syntax, logical statements, functions and profiles

2. Examples of how Arcade can be leveraged for creating custom symbology, pop-ups and labeling

3. How to build and implement Arcade-driven attribute rules to better validate your data

Resources

- Documentation
  - [ArcGIS for Developers: Arcade expression language](#)

- Story Map
  - [How to Smart Map: Arcade](#)

- Examples
  - [GitHub: Arcade expressions](#)
  - [ArcGIS Online group: Arcade Expressions and You](#)

- Learn ArcGIS
  - [Learning Path: Try ArcGIS Arcade](#)

- Blogs
  - [Your Arcade Questions Answered](#)
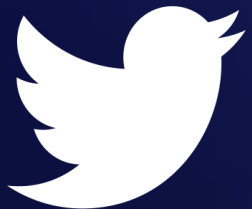 - [ArcGIS Blog: Arcade](#)

Resources

- Upcoming seminar
  - [ArcGIS Pro: Take Desktop GIS to the Next Frontier](#) – March 31
- Upcoming webinars
  - [Get NG9-1-1 Ready with the Address Management App](#) – February 24
  - [Flying Solo with ArcGIS Field Maps](#) – February 25
  - [Demystifying the ArcGIS Online Sign in Options](#) – March 18
  - [Connecting Geography and Spreadsheets: The Integration of ArcGIS into Microsoft Excel](#) – March 25
- Related training courses
  - [Creating Maps and Visualizations with ArcGIS](#)
  - [ArcGIS Dashboards Essentials](#)

Thank You

- The recording will be available online at: resources.esri.ca/webinars
- If you have any additional questions about the content presented to you, feel free to contact us:
  - Emilie Rabeau, Technical Solutions Specialist – erabeau@esri.ca
  - Mark Ho, Technical Solutions Specialist – mho@esri.ca

Connect with us @esricanada