



# Dynamic Situational Awareness

Through Developer Applications

ESRI USER CONFERENCE

An abstract 3D architectural graphic on the right side of the slide. It features several rectangular blocks in shades of blue, orange, and green, arranged in a perspective view. The blocks are overlaid with white topographic contour lines, suggesting a map or terrain. The overall style is modern and technical.

**GIS  
INSPIRING  
WHAT'S  
NEXT**

# Mission Focused Applications

Building Apps to support operations

Agile



Simple

High-Performance

Defense Developers

# GIS Simplifies Working With All Types of Data

Using Web Maps, Scenes, and Layers

A Common Language for integrating data from multiple sensors

Apps

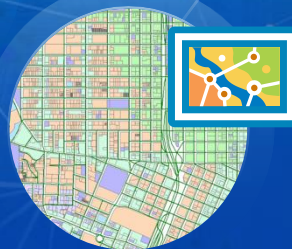
Distributed



Imagery



Tabular



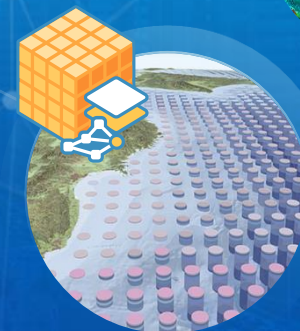
Vector



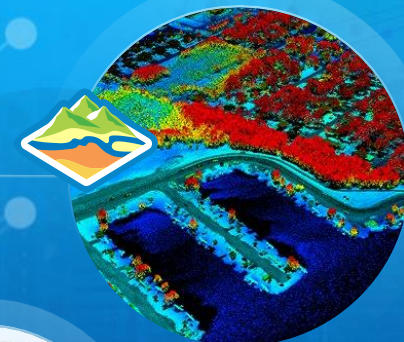
3D



Real-Time



Big Data



Lidar



# Apps Are Bringing the Power of GIS to Everyone

## Extending the Reach of GIS



*Across Organizations and Beyond*

# ArcGIS for Developers

The image features a dark teal background with abstract, colorful geometric shapes and lines in shades of blue, orange, and green. The text "ArcGIS for Developers" is centered in a white, sans-serif font. The overall aesthetic is modern and technical.

# ArcGIS Developer Platform

Extending GIS and Creating New Apps

New

Pro Add-Ins



Pro SDK

Web



JavaScript API

Native Device Apps



Runtime SDK

SDKs

.NET    Xamarin  
Swift    Java    C#  
C++    Qt    Objective-C  
Kotlin    QML

Deployable Independently

Python API



ArcGIS

Connected and Disconnected

Open

For Devices, Web, and Desktop



Dynamic Situational Awareness (DSA) Toolkit

Improved Developer Program

Supporting GIS, Enterprise, and Independent App Developers...

# ArcGIS Is Open and Interoperable

## Open Standards and Formats

XLSForm GML SQL SLD SOAP WMTS KML LAS INSPIRE Shapefiles  
IMDF WCS IFC Web Scene (I3S) LERC CSW WPS REST OneGeology  
WFS WMS OPeNDAP JSON WaterML netCDF GeoPackage CityGML

## Direct Product Integration

MS Office SQL Server SharePoint Azure Power BI Netezza SAP HANA  
Adobe Creative Cloud Jupyter Notebook Teradata R AWS Altibase Python  
Oracle Hadoop AutoCAD Revit PostgreSQL Dameng SQLite

... Many  Certifications

## Open Software Architecture

Open Data Access Open APIs & SDKs Open-Source Integration  
Open-Source Contributions Extensible Architecture Embeddable

... Successfully Integrated into Thousands of Systems

# ArcGIS APIs





# ArcGIS APIs

For Building Apps With the Power of GIS

ArcGIS API for JavaScript



ArcGIS Runtime SDKs

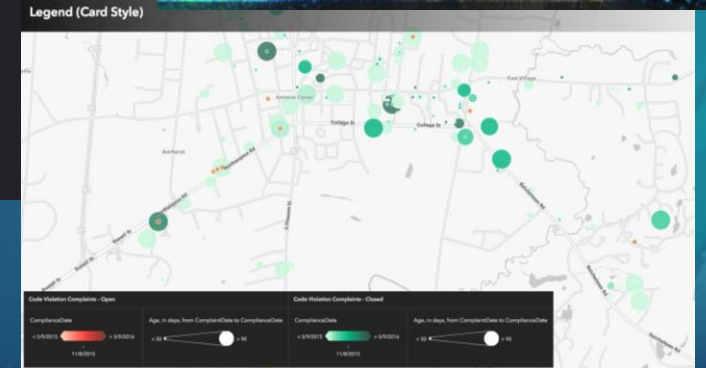
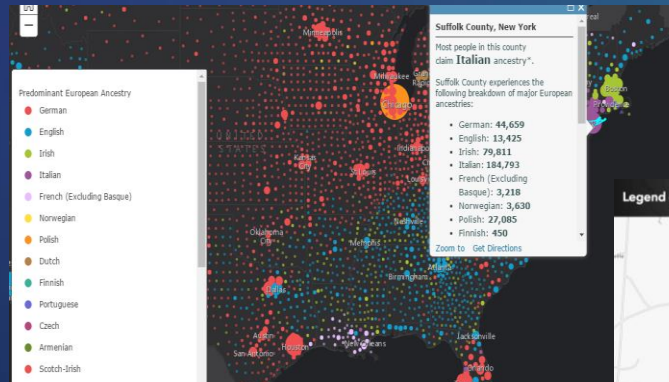
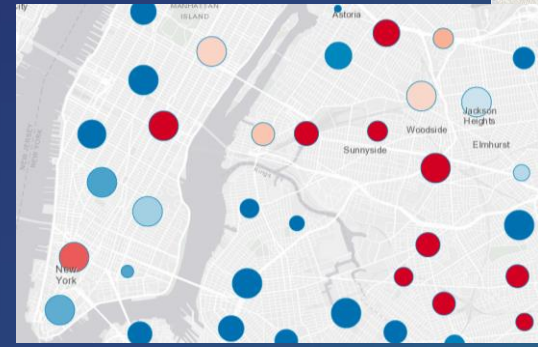
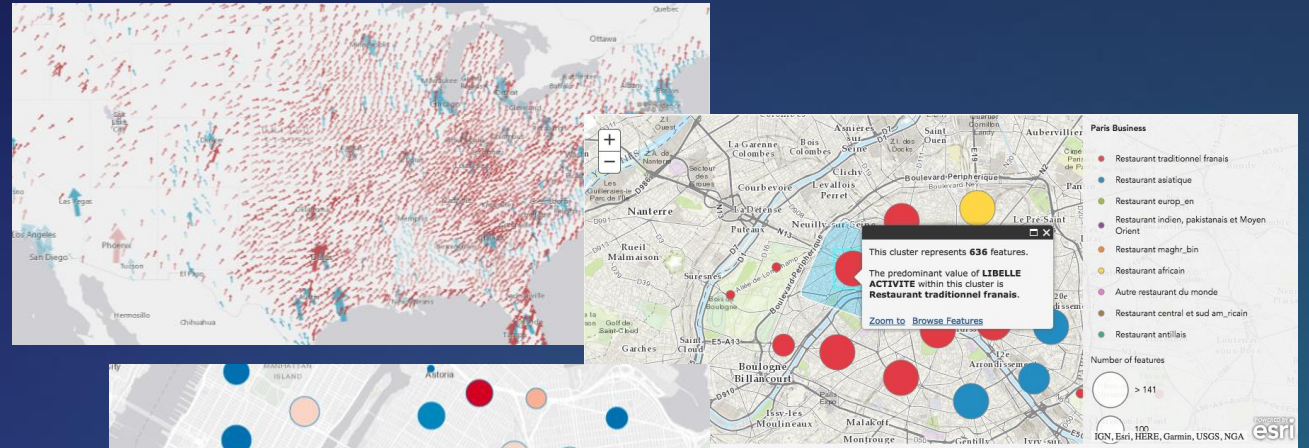


- Leverage modern developer patterns
- Architected to take full advantage of the power of GIS

# ArcGIS JavaScript API



- A modern JavaScript API for Web GIS
- Data driven visualization
  - Turn data into information
  - Feature Layer or Scene Layer
  - Where, What, How Much, and When
  - Smart Mapping
- Analytics - client or server side
  - Local geometry engine
  - Elevation API
  - Geoprocessing on the server
- Compelling apps with responsive widgets
  - Web first design principle



# ArcGIS Runtime – A Native App Development SDK



- **Supports 6 platforms**
  - Android, iOS, macOS, Linux, Universal Windows Platform and Windows
- **6 APIs**
  - .Net, Android, iOS, Java, macOS and Qt
- **Allows you to select the development environment of your choice**
  - Integrates with your solution
  - Makes you productive
- **Your users benefit from the optimum solution**

# Why Build Native App?



- Only native apps can give the best performance
- Fully leverage device capabilities
- Access all peripherals via their native SDKs
- Best debugging experience
- Offline use of ArcGIS



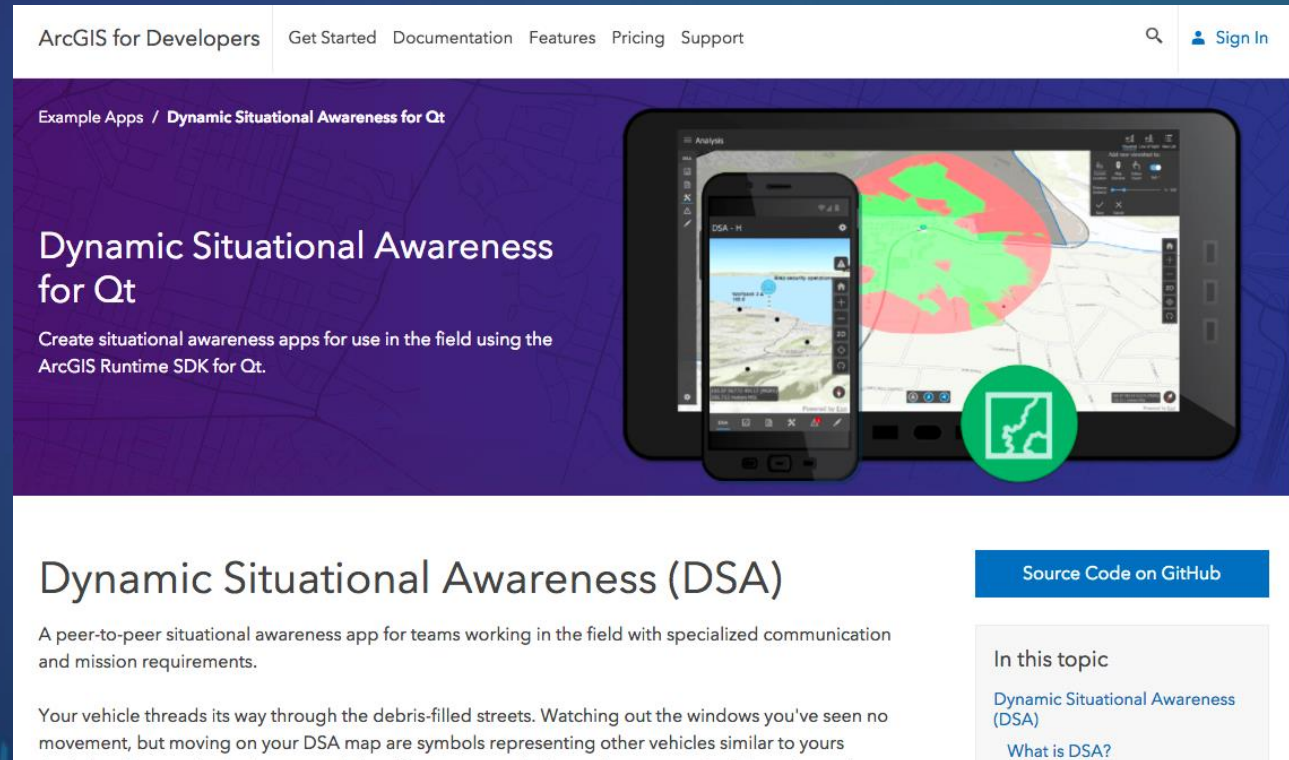
# Dynamic Situational Awareness

Example App for Developers

# What is the Dynamic Situational Awareness Example App?

Complete open source example application

- *Example App* for developers writing solutions to meet Situational Awareness needs in “DIL” (Disconnected, Intermittent, and Low-Bandwidth) environments
- Key Characteristics:
  - Local Data (no reliance on server)
  - Location sharing over peer-to-peer network
  - Exploratory Analysis (Viewshed, Line of Sight)
  - Conditions and Alerts
  - Collaboration (reports, markup, share location)
  - 3D



The screenshot shows the ArcGIS for Developers website. The navigation bar includes links for 'Get Started', 'Documentation', 'Features', 'Pricing', and 'Support', along with a search icon and a 'Sign In' button. The main content area features a purple header with the text 'Example Apps / Dynamic Situational Awareness for Qt'. Below this, the title 'Dynamic Situational Awareness for Qt' is displayed, followed by the subtitle 'Create situational awareness apps for use in the field using the ArcGIS Runtime SDK for Qt.' A large image shows a tablet and a smartphone displaying the app's interface, which includes a map with a red and green viewshed overlay. A green circular icon with a white map symbol is positioned in the bottom right of the image. Below the image, the title 'Dynamic Situational Awareness (DSA)' is shown, followed by a blue button labeled 'Source Code on GitHub'. A paragraph of text describes the app as a peer-to-peer situational awareness tool for field teams. A 'What is DSA?' link is also visible in the bottom right corner.

<https://developers.arcgis.com/example-apps/dsa-app-qt/>

# Dynamic Situational Awareness (DSA) Example App

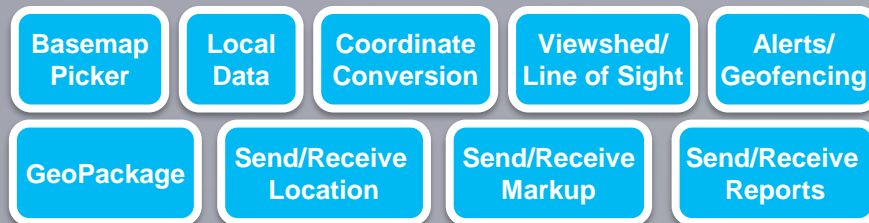
ArcGIS Runtime 100.2.1 Qt

Open Source

Example Apps

Tools

Runtime SDK

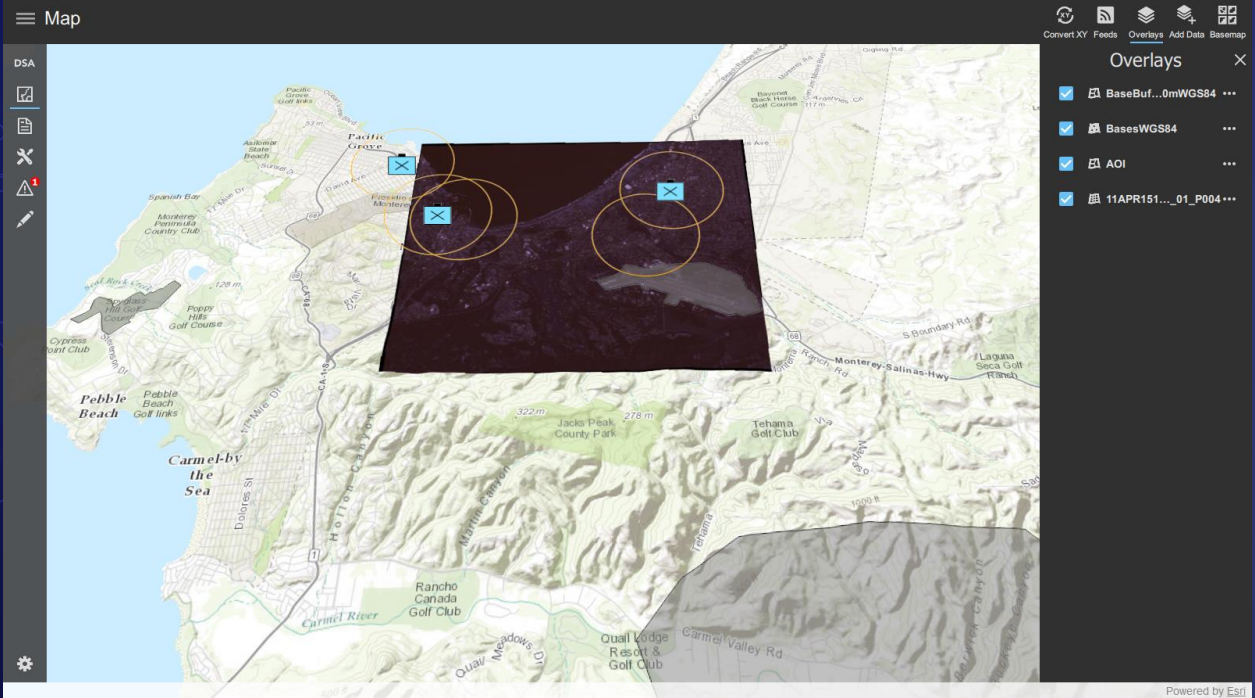


V1.0 Released April 2018

# Key Capabilities

The image features a dark teal background with abstract, colorful geometric shapes and lines in shades of blue, orange, and green. The text "Key Capabilities" is centered in a white, sans-serif font.





# Local Data

# Local Data

Working in a completely disconnected environment

- ArcGIS Runtime supports several local data formats:
  - **GeoPackage**
  - Shapefile
  - **Mobile Geodatabase**
  - ...
  - Mobile Mosaic Datasets
  - RPF
  - NITF
  - DTED
  - GeoTIFF
  - IMG
- **Rasters can also be used as a source to the elevation surface**

## *App Capabilities*

- **Layers and their visibility state are serialized for when app closes and reopens**
- App includes Layer List Control to see name, toggle visibility, reorder and remove layers

## *Runtime API Used*

- FeatureLayer (with URL to local file)
- RasterLayer (with URL to local file)
- **LayerList Model (MVC pattern)**



# Real-time feeds

Peer-2-Peer SA

# Real-time Feeds

"Messages" shared between team members in the field

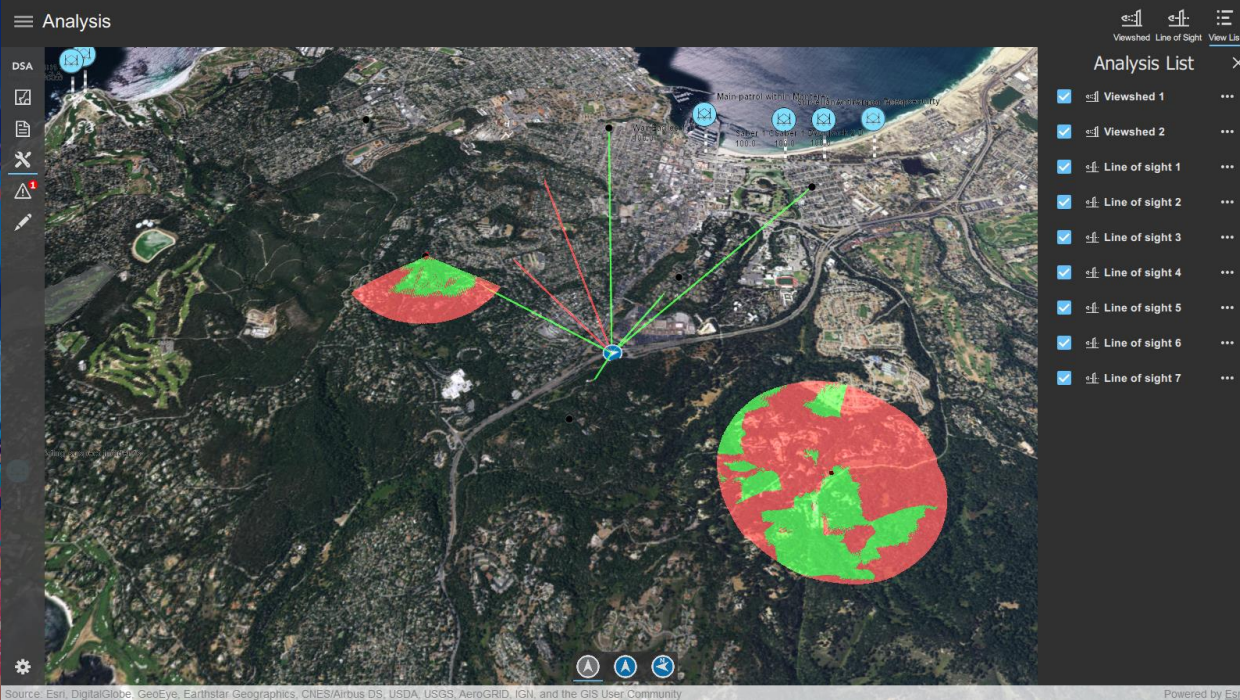
- Receiving and Broadcasting message feeds over Peer-to-Peer network
- Examples of feeds:
  - Friendly Position Reports, Observation Reports, Sensor Observations, ...
  - *Simulated over UDP*

## *App Capabilities*

- Symbology (MIL-STD-2525C)
- Performance - Dynamic Graphics are optimized for performance on device
- Graphics from feeds can participate in other analyses

## *Runtime API Used*

- Graphics Overlay (dynamic rendering mode)
- DictionaryRenderer (military symbology)



# Exploratory Analysis

Viewshed & Line of Sight

# Exploratory Analysis

GPU-based Viewshed & Line of Sight analysis

- **Uses the GPU of the device to calculate visibility analysis on-the-fly**
- *Exploratory*: visual only, using data & LOD rendered to screen (not *conclusive*)
- Two types:
  - "Location" - based on coordinate
  - "GeoElement" - tied to graphic or feature

## *App Capabilities*

- Analysis Overlay List
- **Analysis results can be attached to current location or existing feature or graphic**

## *Runtime API Used*

- AnalysisOverlay
  - LocationViewshed, GeoElementViewshed
  - LocationLineOfSight, GeoElementLightOfSight

The screenshot displays a software interface for monitoring alerts on a map. The main map area shows a satellite view of a coastal region with several circular alert zones in red and green, and numerous blue circular markers. A sidebar on the right, titled "Alerts", provides filtering options. It shows "Viewing 3 of 3" items, a "CLEAR FILTERS" button, and a "Minimum level" dropdown set to "Low". The sidebar lists three conditions: "Distress (17)", "event in aoi (2)", and "event in aoi (5)". The interface includes a top-left menu, a top-right "View" and "Conditions" toggle, and a bottom status bar with coordinates (36 36 42.054N 121 55 19.338W (DMS)) and a "Licensed For Developer Use Only" watermark.

# Alerts and Conditions

# Alerts & Conditions

Critical notifications

- Alerting on conditions/rules against the real time feeds
- Conditions are the rules that are always evaluated
  - Attribute
  - Spatial / GeoFence

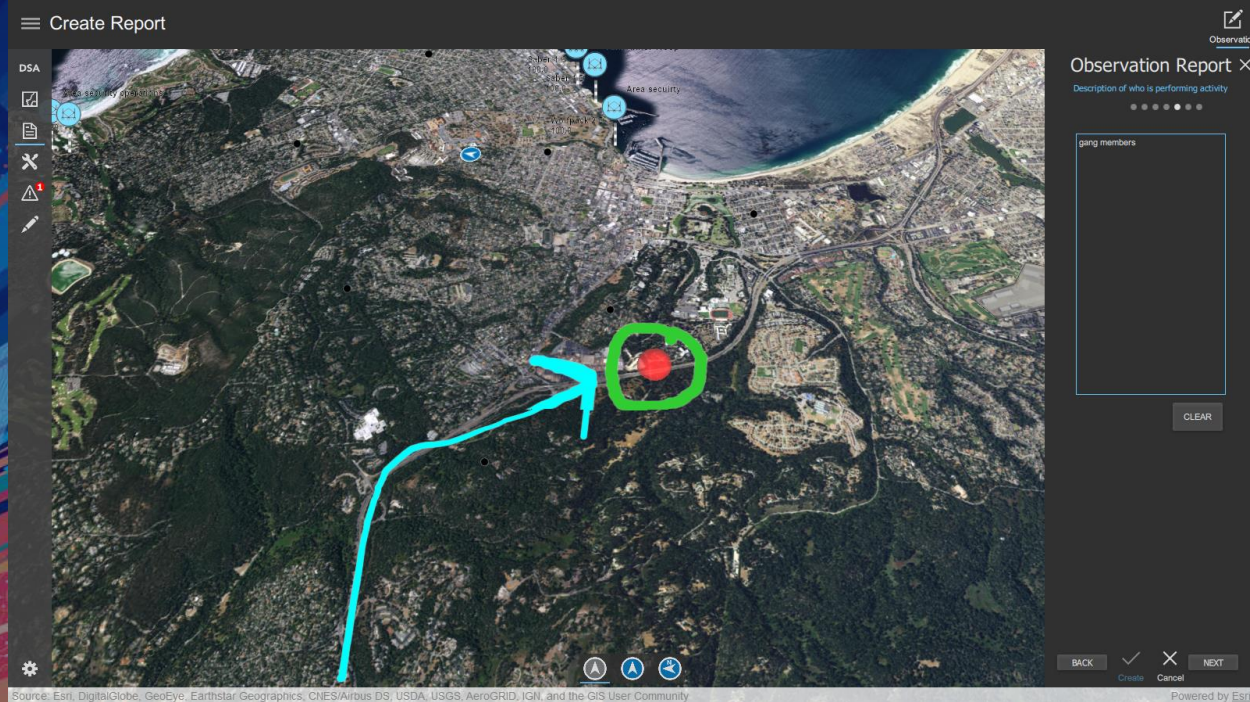
## *App Capabilities*

- Create Conditions
- **View and manage Conditions**
- **View and manage Alerts**

## *Runtime API Used*

- GeometryEngine
- **Graphics signal when attribute or geometry changed**





# Collaboration

Markup and Reports

# Collaboration

## Shared Situational Awareness

- Collaboration is key for situational awareness
  - **Sharing markups and reports over P2P network**

### *App Capabilities*

- **Simple sketch tool to draw and broadcast markups, and save as local overlay**
- **Wizard-driven tool to define an observation report and broadcast to others (P2P)**

### *Runtime API Used*

- **FeatureCollectionLayer**- easy to gather data and define an ad-hoc schema
- **JsonSerializable to Json, fromJson to serialize and persist**
- **Graphics Overlay to draw**

# Additional Resources

ArcGIS for Developers

[Get Started](#) [Documentation](#) [Features](#) [Pricing](#) [Support](#)



[Sign In](#)

A complete  
mapping and  
analytics platform  
for developers

[Sign Up for Free](#)

[Start Developing Your App](#)



# Mission Focused Applications

Building Apps to support operations

Agile



Simple

High-Performance

Defense Developers

# Defense Developer Series

<http://bit.ly/2J1KKhe>

Did you enjoy today's session? Register for our upcoming series and continue to learn about the ways you can use web maps and apps in a collaborative environment to integrate data, sensors, and activities in real time



**May 30- Developing Apps for Any Mission**

**Aug 15- Military Symbology**

**Sep 19 - Build Analysis into Your Applications**

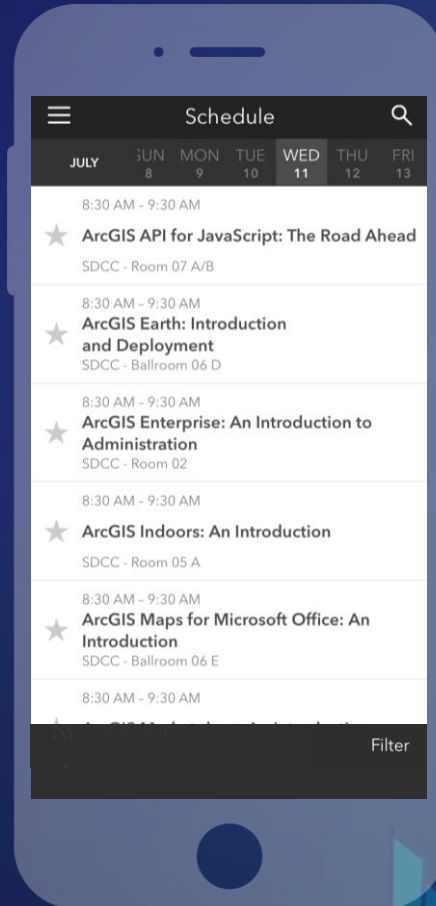
**Oct 17- Working with Offline Data**

# Please Take Our Survey on the App

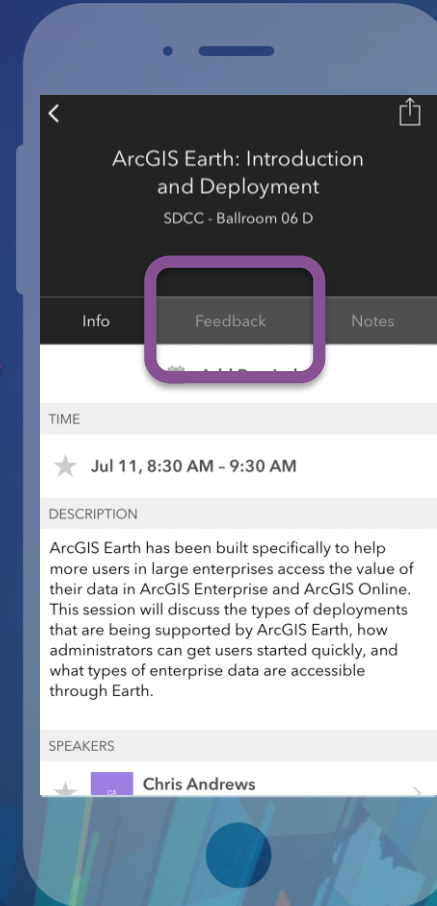
Download the Esri Events app and find your event



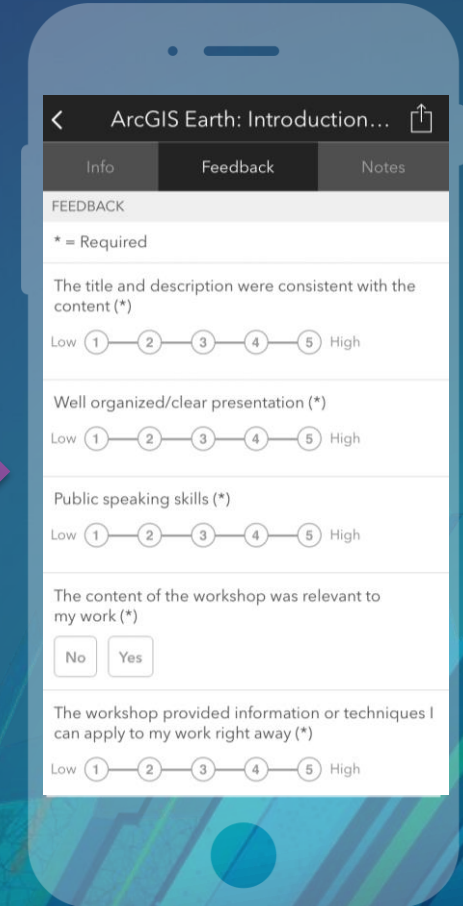
Select the session you attended



Scroll down to find the feedback section



Complete answers and select "Submit"





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SCIENCE  
OF  
WHERE**