Dynamic Situational Awareness
Through Developer Applications
Mission Focused Applications
Building Apps to support operations

Agile

High-Performance

Simple

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 Are Bringing the Power of GIS to Everyone
Extending the Reach of GIS

- Planning & Design
- Visualization
- Crowd Source data
- Dynamic Briefings
- Operational Dashboards
- Statistical & Pattern Analysis
- Field Collection

Across Organizations and Beyond
ArcGIS for Developers
ArcGIS Developer Platform | Extending GIS and Creating New Apps

Deployable Independently

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

For Devices, Web, and Desktop

Connected and Disconnected

Dynamic Situational Awareness (DSA) Toolkit

Improved Developer Program

Supporting GIS, Enterprise, and Independent App Developers . . .
ArcGIS Is Open and Interoperable

Open Standards and Formats

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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

Open Software Architecture

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

... Successfully Integrated into Thousands of Systems

... Many OGC Certifications
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?

**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

[Complete open source example application](https://developers.arcgis.com/example-apps/dsa-app-qt/)
Dynamic Situational Awareness (DSA) Example App

ArcGIS Runtime 100.2.1 Qt

Example Apps
- DSA-Vehicle
- DSA-Handheld
- Simulator

Tools
- Basemap Picker
- Local Data
- Coordinate Conversion
- Viewshed/Line of Sight
- Alerts/Geofencing
- GeoPackage
- Send/Receive Location
- Send/Receive Markup
- Send/Receive Reports

Runtime SDK
- Exploratory Analysis
- Symbology
- GeoPackage
- Shapefile
- Dynamic Graphics Layer

Open Source

V1.0 Released April 2018
Key Capabilities
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

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

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**Runtime API Used**
- AnalysisOverlay
  - LocationViewshed, GeoElementViewshed
  - LocationLineOfSight, GeoElementLightOfSight
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 toJson, fromJson to serialize and persist
- Graphics Overlay to draw
A complete mapping and analytics platform for developers

Sign Up for Free  Start Developing Your App
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Building Apps to support operations

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Defense Developers
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
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