GeoEvent Server:
Introduction

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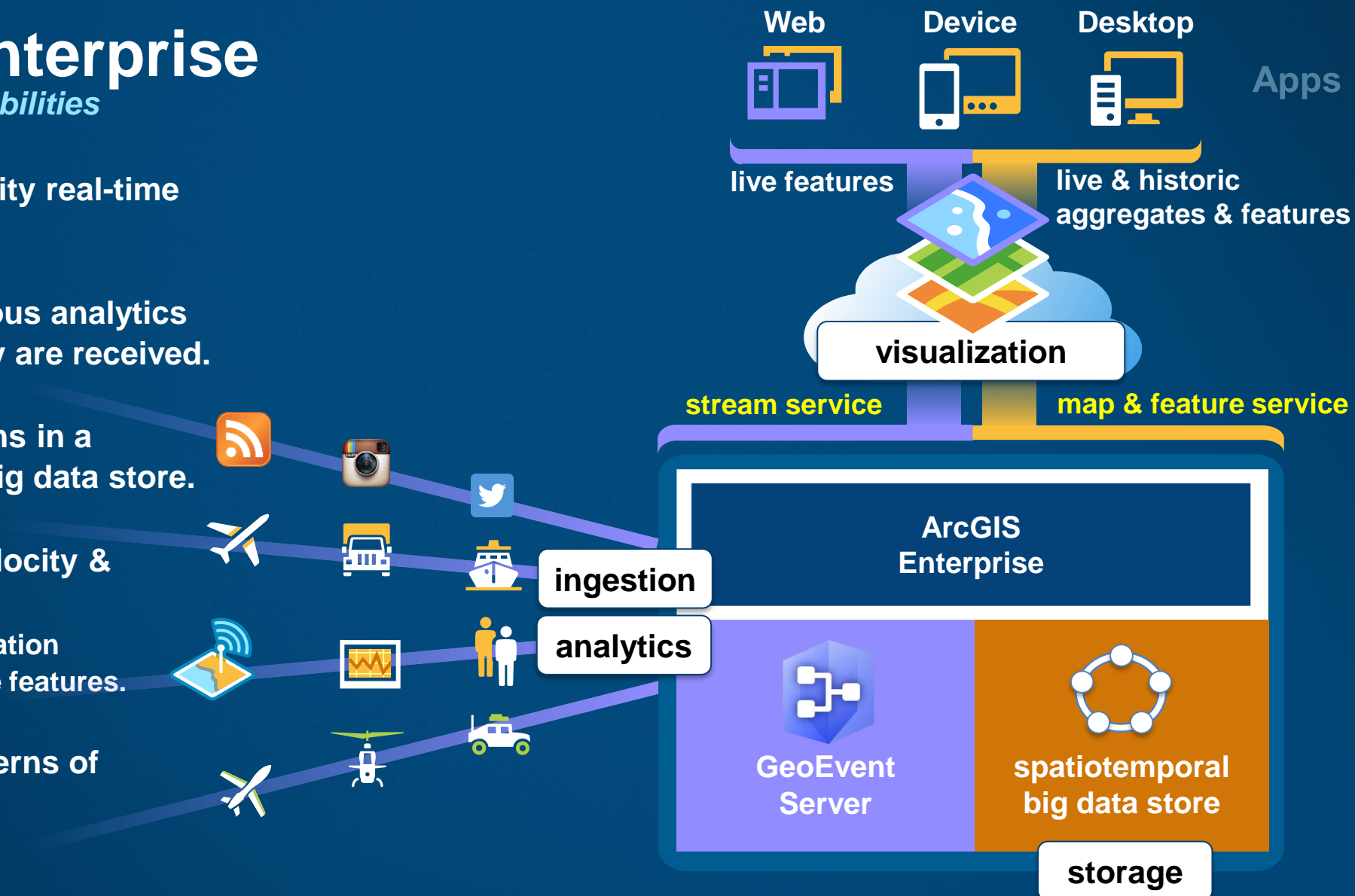sayare@esri.com
@theTechieSagar

Agenda

1 What is Real-Time GIS

ArcGIS Enterprise
with real-time capabilities

- Ingest high velocity real-time data into ArcGIS.

- Perform continuous analytics on events as they are received.

- Store observations in a spatiotemporal big data store.

- Visualize high velocity & volume data:
  - as an aggregation
  - or as discrete features.

- Notify about patterns of interest.

Web **Device** **Desktop**

Apps

live features

live & historic aggregates & features

visualization

stream service

map & feature service

ingestion

analytics

ArcGIS Enterprise

GeoEvent Server

spatiotemporal big data store

storage

GeoEvent Server is a "server role" extending the capabilities of your ArcGIS Enterprise …

GIS data
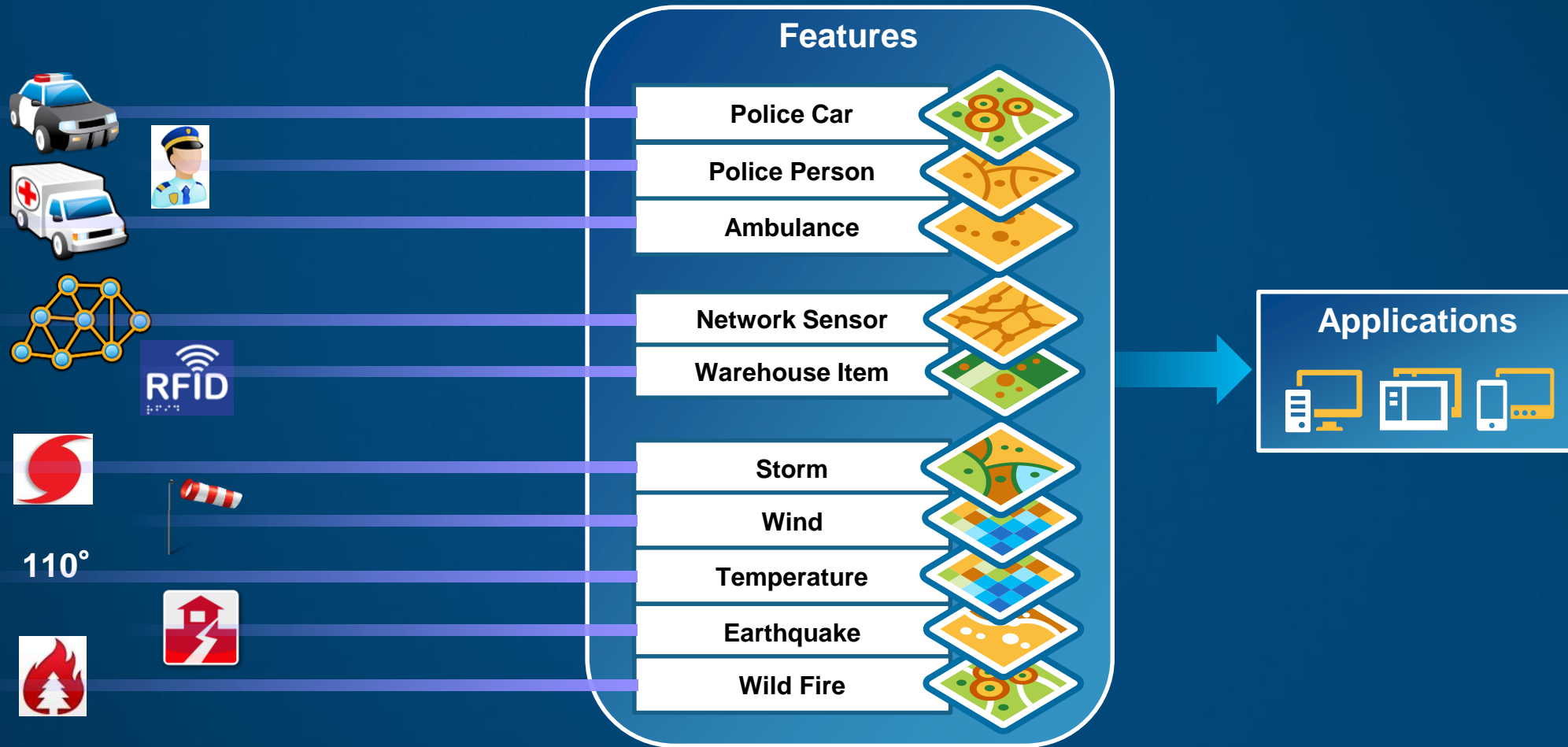*what has happened, what is happening, what will happen*

Credit: iStockphoto/chris_lemmens

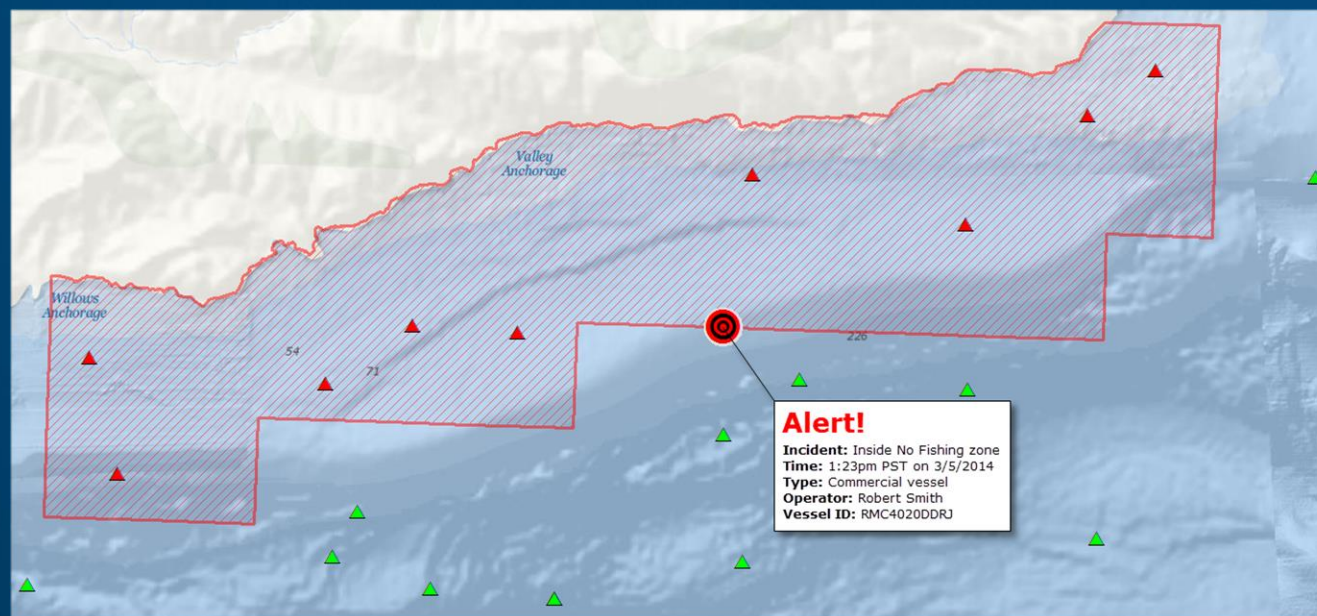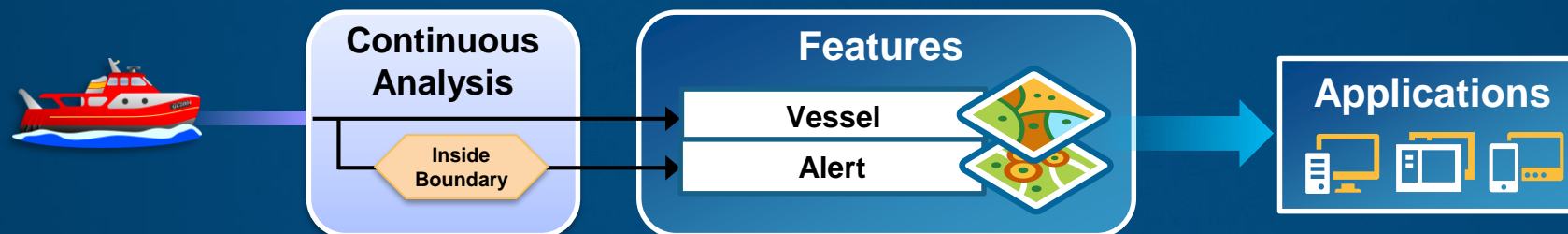*The 'current' snapshot is outdated almost as soon as it's created …*

Real-Time analytics
what fishing vessels are inside designated 'no fishing' zones?

Continuous Analysis

Inside Boundary

Features

Vessel

Alert

Applications

Alert!
Incident: Inside No Fishing zone
Time: 1:23pm PST on 3/5/2014
Type: Commercial vessel
Operator: Robert Smith
Vessel ID: RMC4020DDRJ

Continuous processing on event data as it is received …

Real-Time actions
notify & alert a parent when their child leaves school property
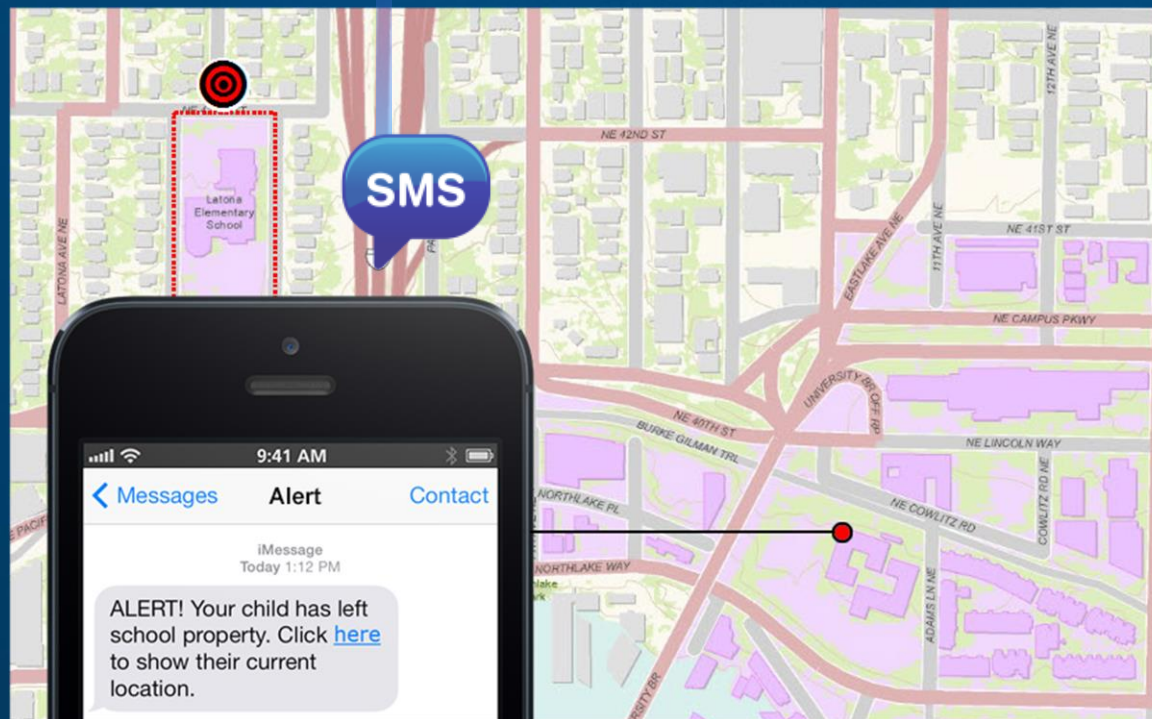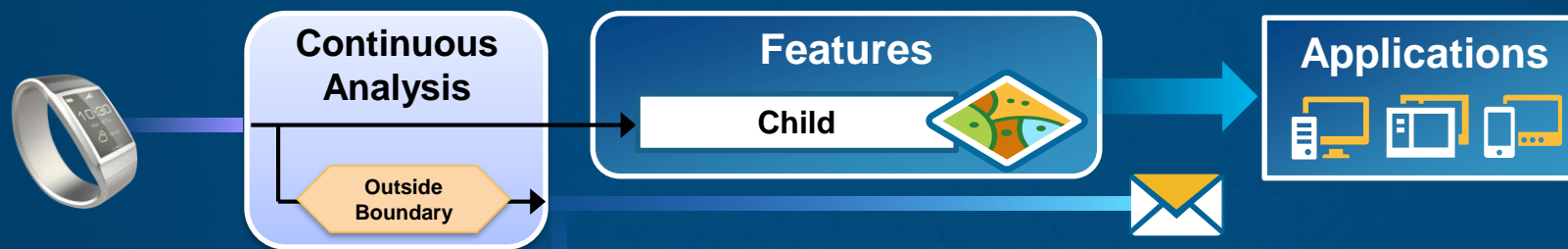
Alerting stakeholders on discovered patterns of interest in real-time …

2 Working with Real-Time Data

Ingestion of real-time data
input connectors

GeoEvent Server

GeoEvent Services

Inputs

Outputs

you can create your own connectors

Out of the Box

	Poll an ArcGIS Server for Features
HTTP	Poll an external website for GeoJSON, JSON, or XML
REST	Receive Features, GeoJSON, JSON, or XML on a REST endpoint
WS	Receive GeoJSON or JSON on a WebSocket
	Receive RSS
	Receive Text from a TCP or UDP Socket
WS	Subscribe to an external WebSocket for GeoJSON or JSON
.csv	Watch a Folder for new CSV, GeoJSON, or JSON Files

Esri Gallery

ActiveMQ	ActiveMQ
AIS	AIS
	Common Alerting Protocol
CoT	Cursor-on-Target
esd	Exploitation Support Data
GTFS	GTFS
	Instagram
	Kafka
KML	KML
MQTT	MQTT
NMEA	NMEA 0183
	RabbitMQ
	Sierra Wireless (RAP)
	Trimble (TAIP)
	Twitter

Partner Gallery

AWS IoT	Amazon IoT
	Azure IoT
CompassCom	CompassLDE
enviroCar	enviroCar
exactEarth	exactEarth AIS
	FAA (ASDI)
GNIP	GNIP
verizon	Networkfleet
OSIsoft.	OSIsoft
	Valarm
waze	Waze
ZONAR	Zonar

Real-Time actions
output connectors

GeoEvent Server

GeoEvent Services

Inputs

Outputs
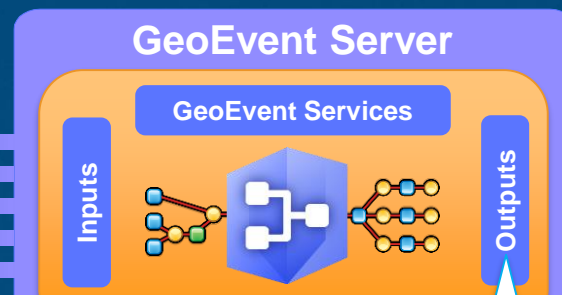
you can create your own connectors

Out of the Box

	Add or Update a Feature
	Publish Text to a UDP Socket
HTTP	Push GeoJSON or JSON to an external Website
WS	Push GeoJSON or JSON to an external WebSocket
	Push Text to an external TCP Socket
SMS	Send a Text Message
	Send an Email
im	Send an Instant Message
	Send Features to a Stream Service
.csv	Write to a CSV, GeoJSON, or JSON File
	Add a Feature to a spatiotemporal big data store
	Update a feature in a spatiotemporal big data store

Esri Gallery

AWS IoT	Amazon IoT
	Azure IoT
ActiveMQ	ActiveMQ
CoT	Cursor-on-Target
	Hadoop
	Kafka
	MongoDB
MQTT	MQTT
	RabbitMQ
	Twitter

Real-Time analytics
geoevent services

- A **GeoEvent Service** configures the flow of real-time data,
  - the **filtering** and **processing** steps to perform,
  - the input(s) where data comes from and the output(s) to which results are sent.

Ambulance Monitor

Monitors vehicles by updating a vehicle feature layer with current information including, alerting when speeding violations are detected, when vehicles enter dangerous areas, and when vehicles are in close proximity to an item of interest.
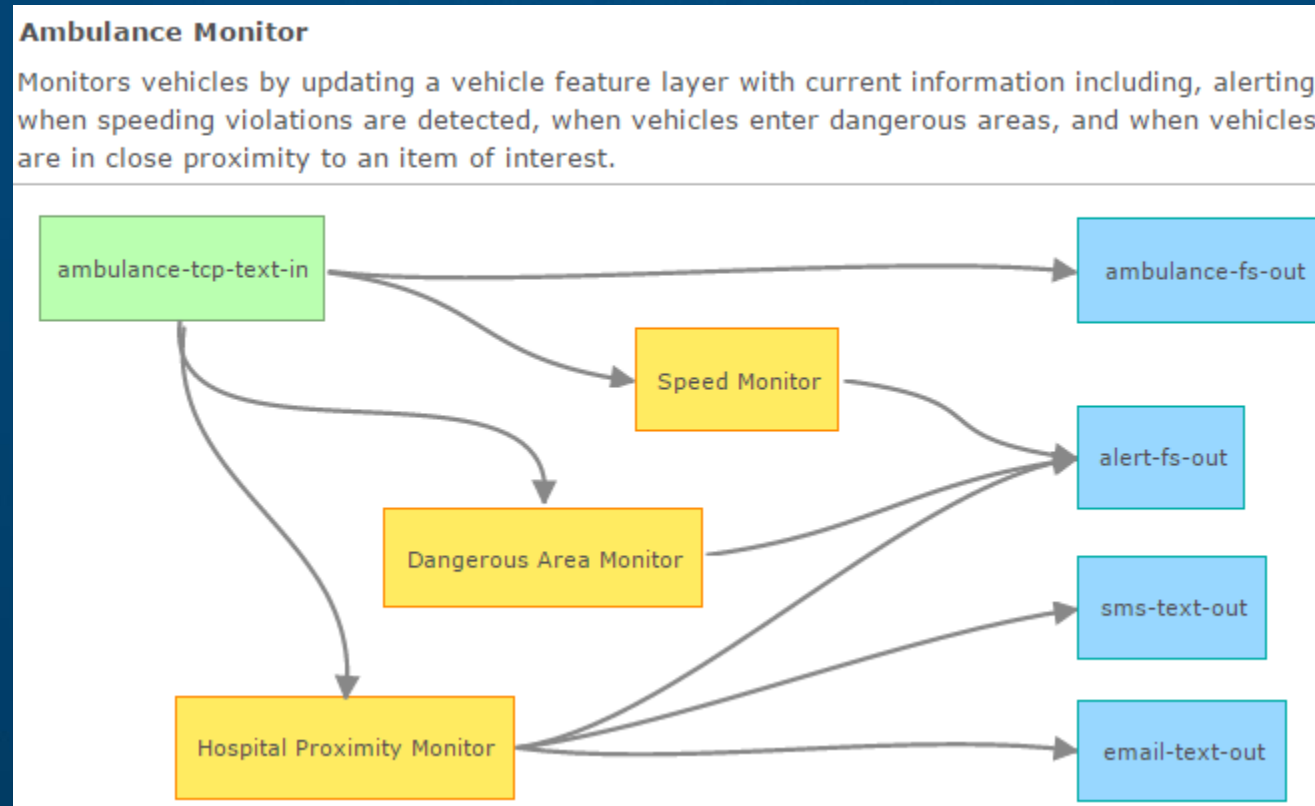
Working with real-time data
visualizing ingested real-time data using a stream, feature or map service

- Configure an **input** to receive real-time data & define a **geoevent definition** accordingly

- Create an **output** and publish a **Stream** / **Feature** / **Map Service** using the **geoevent definition**

- Author and publish a **geoevent service**

- Visualize your **Stream** / **Feature** / **Map Service**

ArcGIS Enterprise
Stream Service
Map Service
Feature Service

visualize

geoevent service

input
geoevent
definition

GeoEvent
Server

output

spatiotemporal
big data store

ingest, analyze

store

3 Applying Real-Time Analytics

Real-Time analytics
filtering

- **A filter eliminates real-time data based on an expression.**
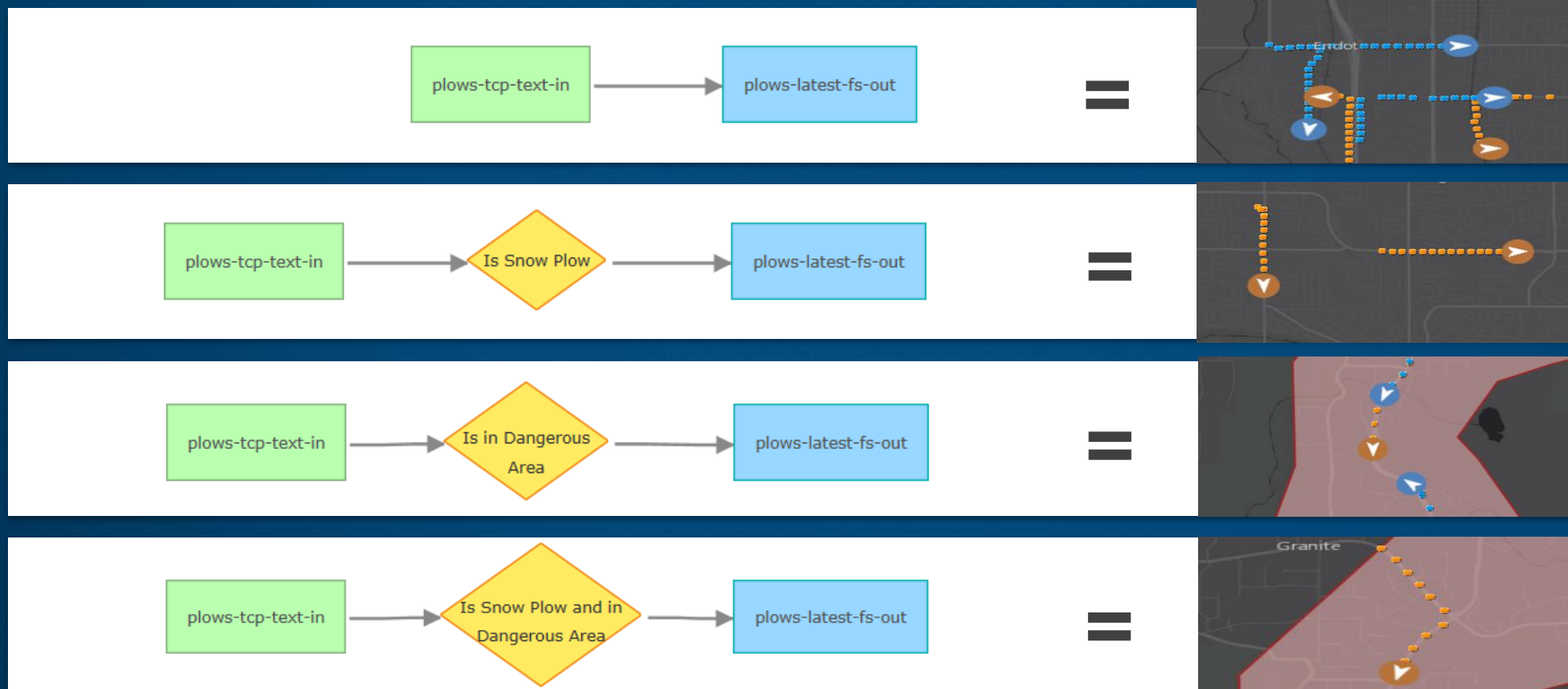
real-time data is allowed to pass through when a filter's expression evaluates TRUE …

Filtering
Using filters for attribute, spatial and combination expressions
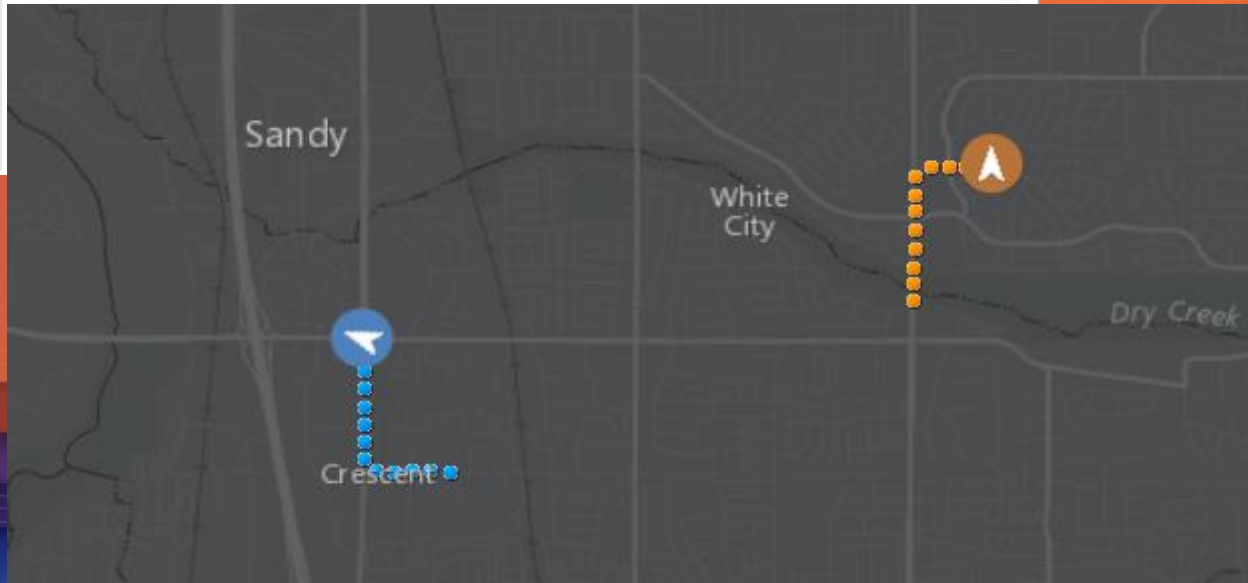
Real-Time analytics

processors

GeoEvent Server

GeoEvent Services

Inputs

Outputs

you can create your own processors

Out of the Box

Buffer Creator	Geotagger
Convex Hull Creator	Incident Detector
Difference Creator	Intersector
Envelope Creator	Projector
Field Calculator	Simplifier
Field Enricher	Symmetric Difference
Field Mapper	Track Gap Detector
Field Reducer	Union Creator

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Add XYZ	Range Fan
Bearing	Reverse Geocoder
Ellipse	Service Area Creator
Event Volume Control	Symbol Lookup
Extent Enricher	Track Idle Detector
Field Grouper	Unit Converter
GeoNames Lookup	Visibility
Motion Calculator	Query Report

processors perform analytics on real-time data
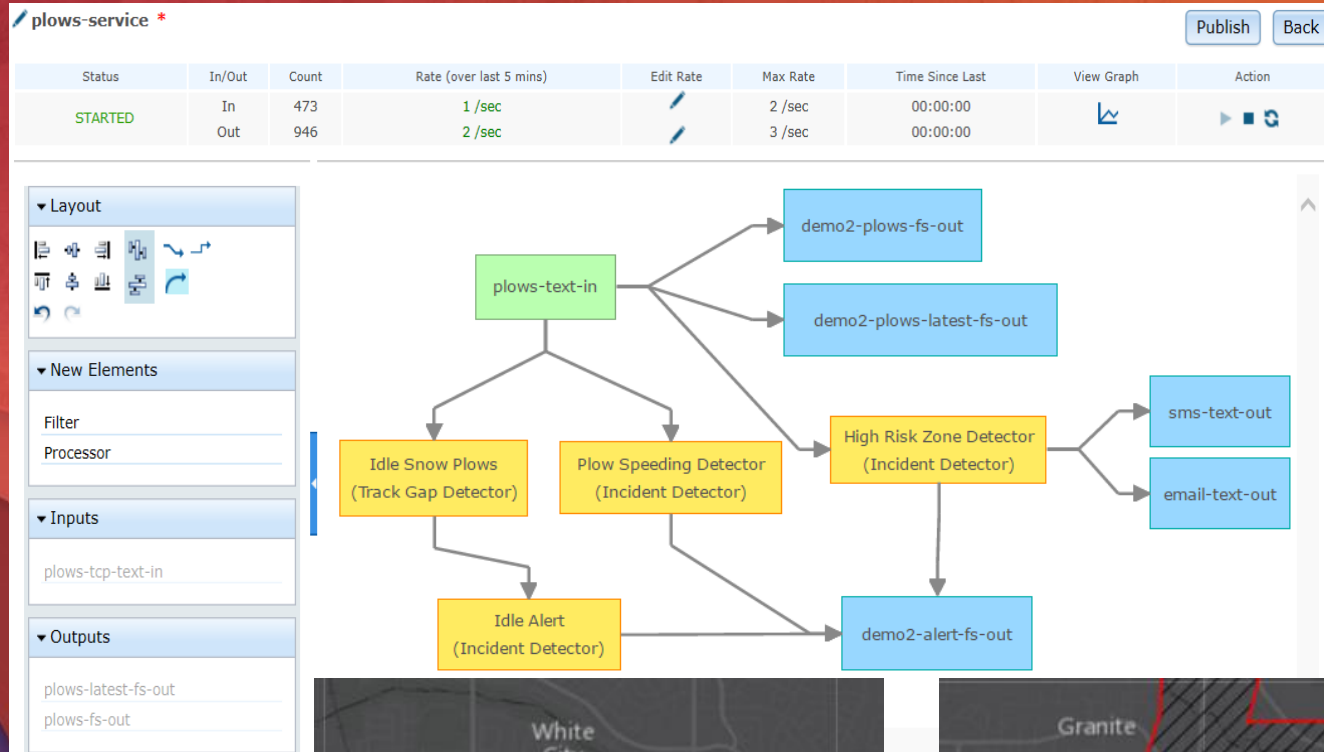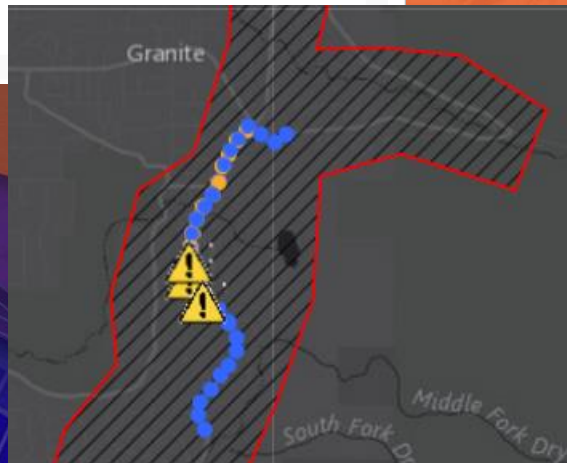
Real-Time analytics
geofencing – spatial operators

inside	outside
enter	exit
intersects	disjoint
touches	contains
crosses	equals
overlaps	within
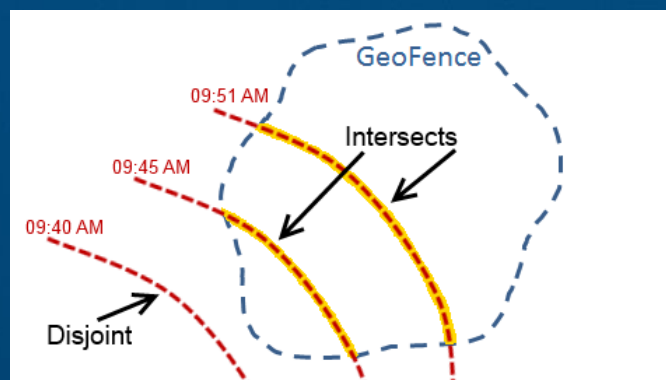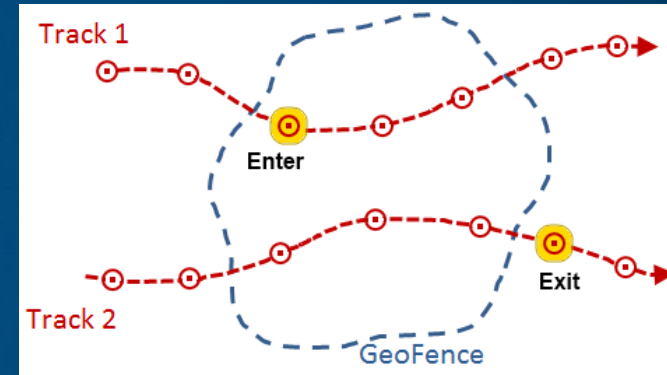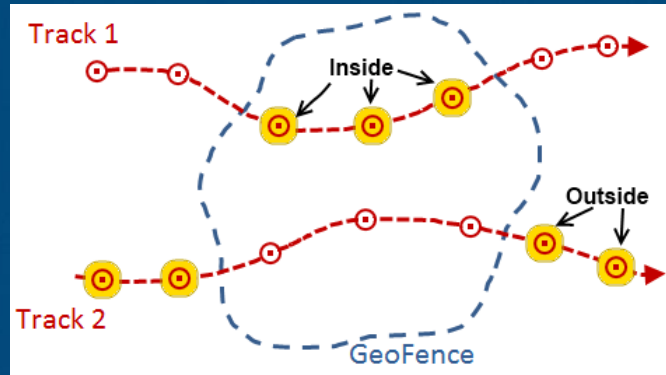
any geometry feature can be used as a geofence …

Real-Time analytics
geofencing – incoming weather hazard intersects ground stations treated as geofences
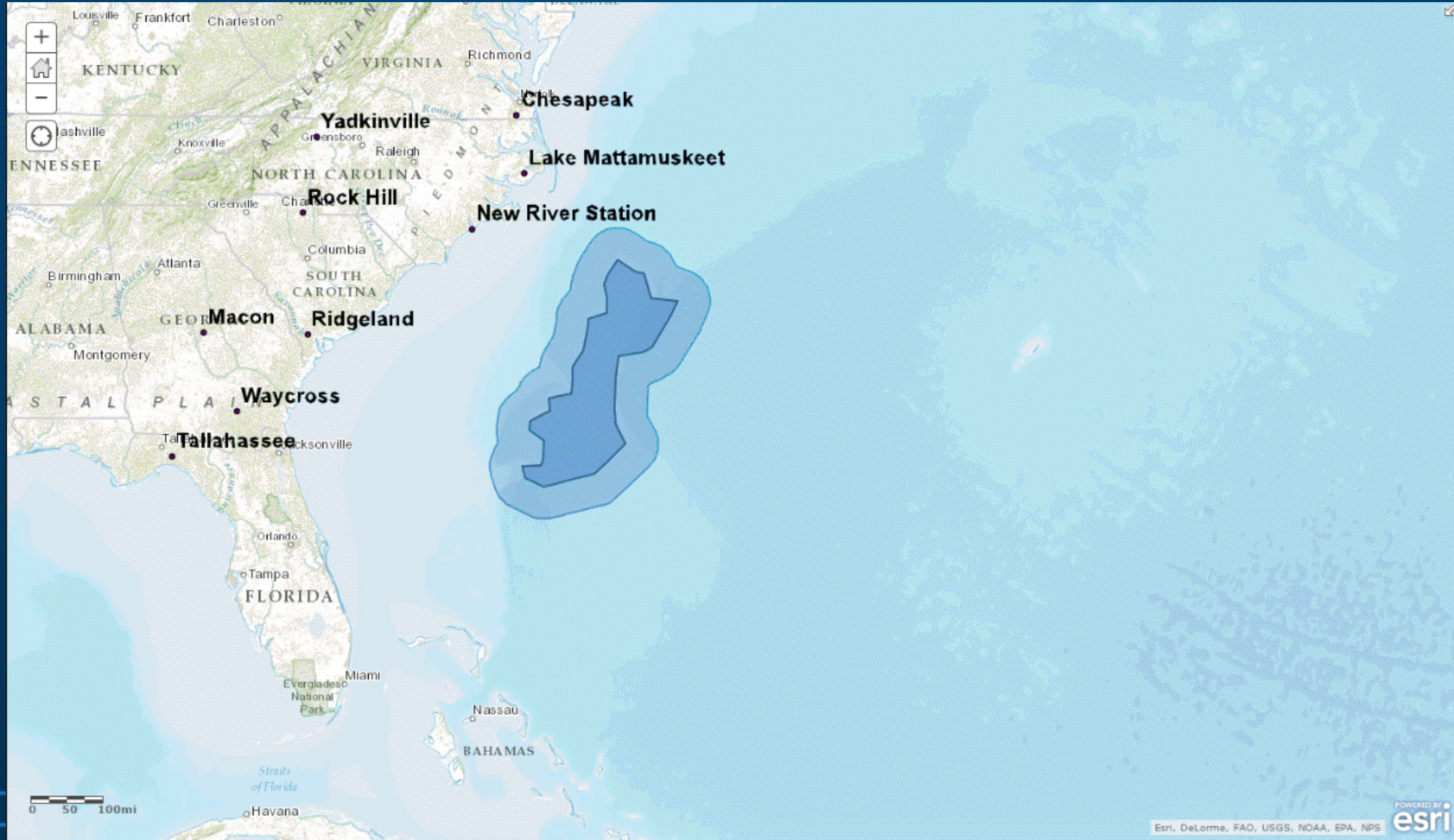
Real-Time analytics
geofencing – spatial operators & scope

- Geofencing scope: **Any** or **All**
- Scope should not be confused with a geofence's **Category** & **Name.**

GEOMETRY INTERSECTS ALL .*/.*

GEOMETRY DISJOINT ANY .*/.*

Real-Time analytics
geofencing – spatial operators & scope

- **Intersects Any geofence**
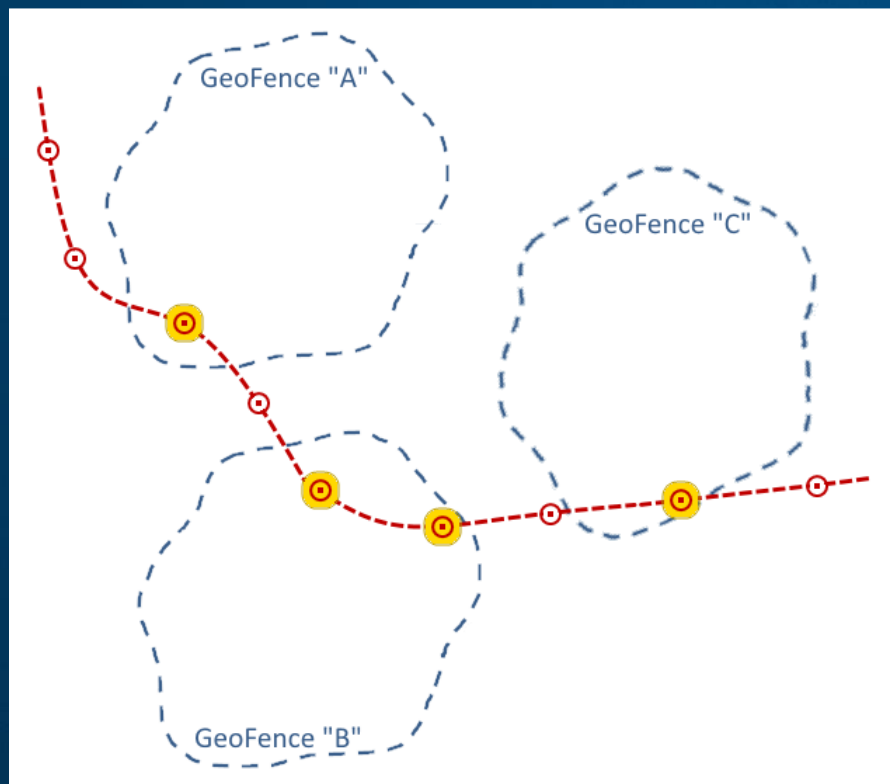
- **Intersects All geofences**
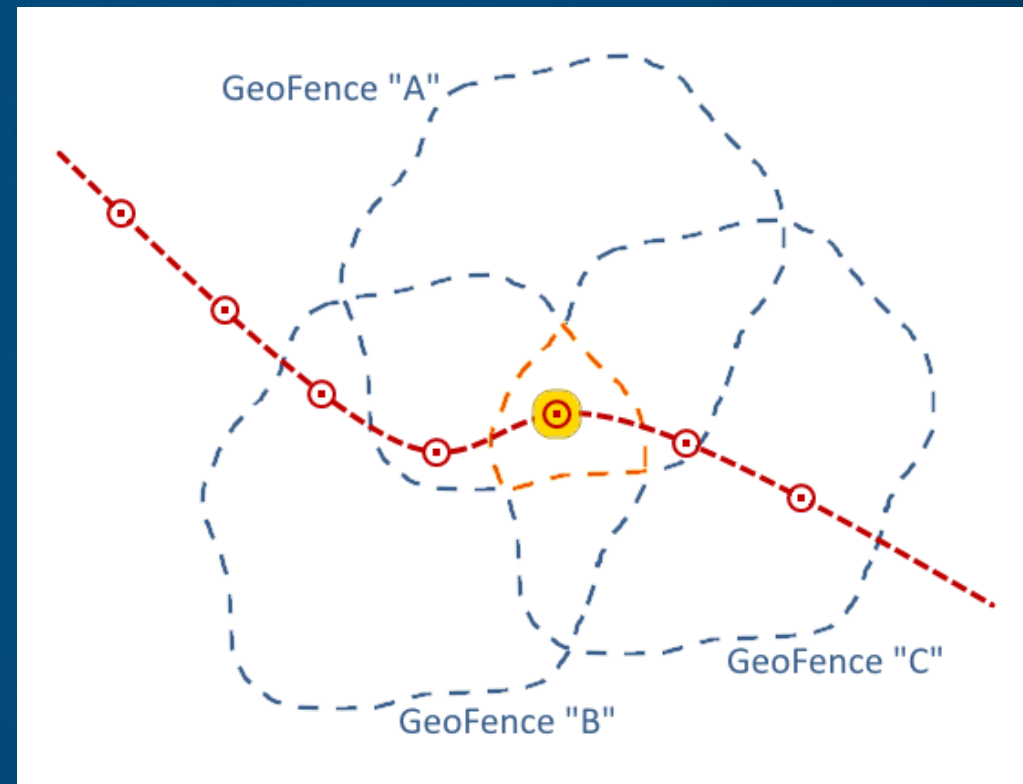
Real-Time analytics
geofencing – notify when construction vehicles become disjoint from a zone vs. all zones

4 Visualizing Real-Time Data

Visualization

choosing a service type: stream service, feature service, map service

- **Stream layers in apps subscribe to stream services to immediately visualize observations.**
  - Does not require storage, is low latency, cannot be replayed.

- **Map & Features layers in apps periodically poll to visualize most current observations.**
  - Backed by an enterprise geodatabase (EGDB) or a spatiotemporal big data store (BDS).
  - History can be retrieved & queried for playback.

Apps

Send Features to a Stream Service

subscribe (push)

web

GeoEvent Server

Add or Update a Feature

EGDB

Stream Service

ArcGIS Enterprise

Map Service
Feature Service

polling (pull)

device

Add a Feature to a BDS
Update a Feature in a BDS

spatiotemporal
big data store

desktop

Stream Layer
Map Layer
Feature Layer

Visualization
stream services

Web Device Desktop

Apps

live features

live & historic
aggregates & features

visualization

stream service

map & feature service

ArcGIS
Enterprise

GeoEvent
Server

spatiotemporal
big data store

5 Wrap-up

Summary
Real-Time GIS: GeoEvent Server

- **ArcGIS Enterprise is a full-featured mapping and analytics platform**

- **GeoEvent Server brings real-time capabilities to the ArcGIS Enterprise**

- **Simplifies real-time data ingest with configurable out-of-the-box inbound connectors**

- **Enables continuous analytics to be executed on event data as it arrives**

- **Extends options for data storage with an enterprise spatiotemporal data store**

- **Provides solutions for high volume data visualization with on-the-fly aggregation**

- **Supports stakeholder notification of patterns of interest as they are discovered in real-time**

GeoEvent Server enables the application of Real-Time GIS in your organization …

Summary
Real-Time GIS: GeoEvent Server

- **Step-by-Step Tutorials, free to download**
  - **Introduction**
  - **Stream services**
  - **Spatiotemporal Big Data Store**
  - **Notifications**

- **Blogs and discussions on the forum**
  - **http://links.esri.com/geoevent-forum**

- **Video recordings of technical workshops**
  - **http://www.esri.com/videos**

ArcGIS® GeoEvent Server
Introduction Tutorial

ArcGIS® GeoEvent Server
Stream Services

ArcGIS® GeoEvent Server
Spatiotemporal Big Data Store

Self-paced training & introductions to GeoEvent Server …

Real-Time & Big Data GIS
other sessions

- **GeoEvent Server: An Introduction**

  Tue, 10:15-11:30am, Room 10
  Thu, 1:30-2:45pm, Hilton – Sapphire Ballroom I

- **Real-Time & Big Data: Leveraging the Spatiotemporal Store**

  Tue, 10:15-11:30am, Room 15 A
  Thu, 1:30-2:45pm, Room 15 A

- **GeoEvent Server: Applying Real-Time Analytics**

  Tue, 1:30-2:45pm, Room 17 B
  Thu, 3:15-4:30pm, Room 14 A

- **Real-Time & Big Data GIS at a Massive Scale**

  Wed, 3:15-4:30pm, Room 3
  Fri, 9:00-10:15am, Room 8

- **GeoEvent Server: Leveraging Stream Services**

  Wed, 3:15-4:30pm, Room 14 B

- **GeoEvent Server: Best Practices**

  Thu, 10:15-11:30am, Room 9

- **GeoEvent Server: Internet of Things (IoT)**

  Thu, 10:15-11:30am, Room 14 B

- **GeoEvent Server: Making 3D Scenes Come Alive**

  Wed, 1:30-2:15pm, Demo Theater 05 - Real-Time

- **GeoAnalytics Server: An Introduction**

  Wed, 10:15-11:30am, Room 4
  Thu, 10:15-11:30am, Hilton – Sapphire Ballroom E
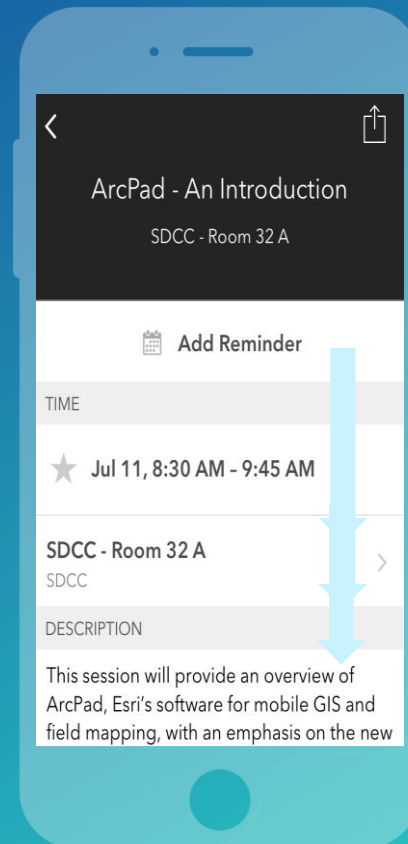
Please Take Our Survey on the **Esri Events App!**
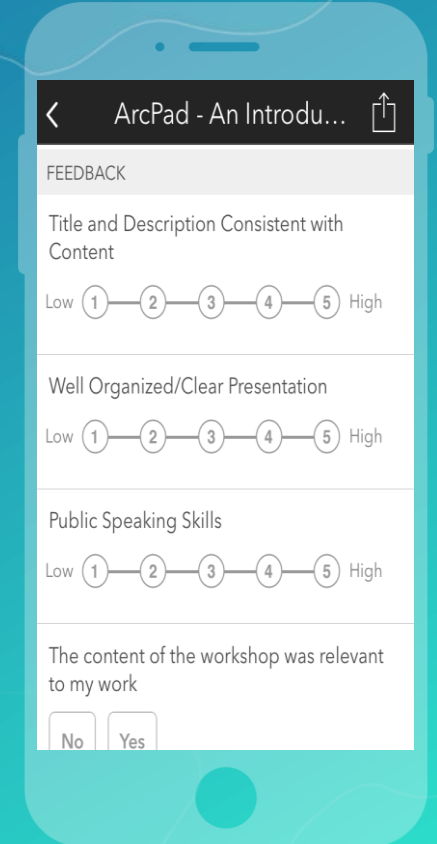
Download the Esri Events app and find your event

Select the session you attended
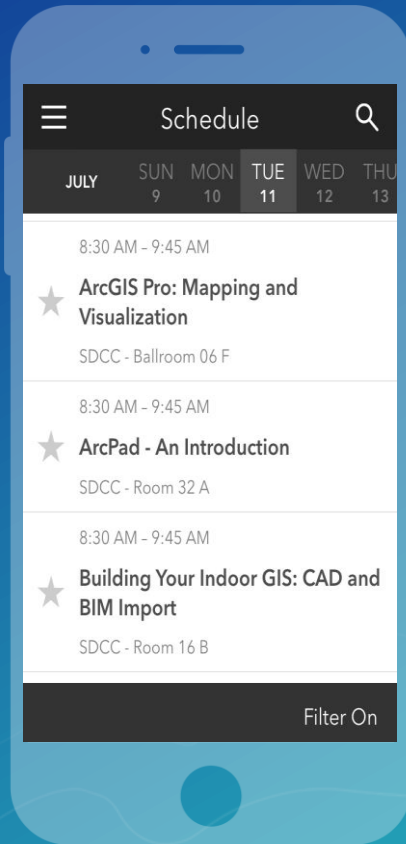
Scroll down to find the survey

Complete Answers and Select "Submit"

and Public Safety Summit
July 8-11, 2017
San Diego, CA

2017 Esri
Business Summit
July 9-11, 2017
San Diego, CA

Esri
User Conference
July 10-14, 2017
San Diego, CA

ALL EVENTS

Schedule

JULY   SUN MON TUE WED THU
         9   10   11   12   13

8:30 AM - 9:45 AM
ArcGIS Pro: Mapping and Visualization
SDCC - Ballroom 06 F

8:30 AM - 9:45 AM
ArcPad - An Introduction
SDCC - Room 32 A

8:30 AM - 9:45 AM
Building Your Indoor GIS: CAD and BIM Import
SDCC - Room 16 B

Filter On

ArcPad - An Introduction
SDCC - Room 32 A

Add Reminder

TIME

Jul 11, 8:30 AM - 9:45 AM

SDCC - Room 32 A
SDCC

DESCRIPTION

This session will provide an overview of ArcPad, Esri's software for mobile GIS and field mapping, with an emphasis on the new

ArcPad - An Introdu...

FEEDBACK

Title and Description Consistent with Content

Low (1)─(2)─(3)─(4)─(5) High

Well Organized/Clear Presentation

Low (1)─(2)─(3)─(4)─(5) High

Public Speaking Skills

Low (1)─(2)─(3)─(4)─(5) High

The content of the workshop was relevant to my work

No   Yes

Questions / Feedback?

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To learn more:
http://links.esri.com/geoevent
http://links.esri.com/geoevent-forum