

# Time & Space

Chris Albert, Esri



# Lots of THINGS generate data...

Measuring Everything that Moves or Changes



# These THINGS are increasingly connected...

50 billion devices will be connected by 2020





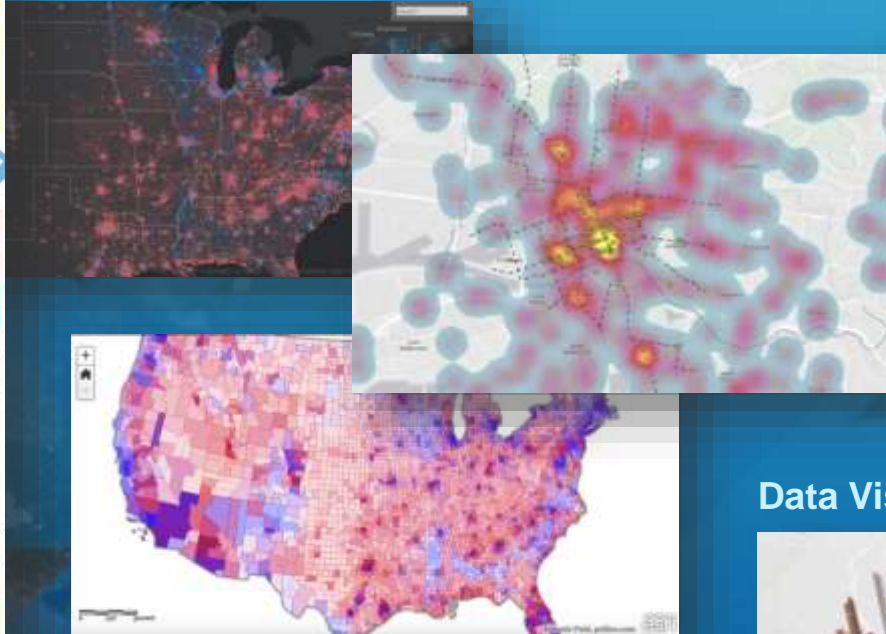
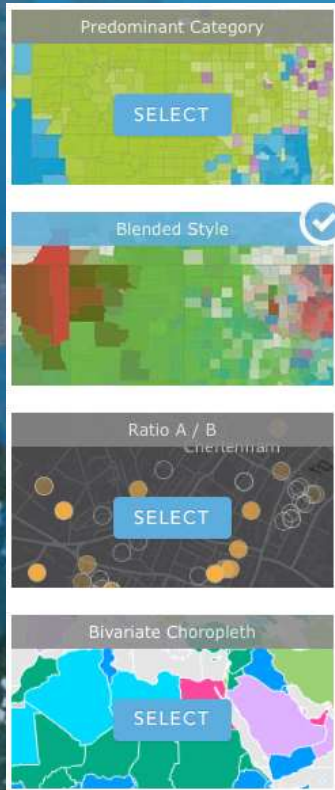
# At Esri, We Look at THINGS Differently

Applying Geography to Everything

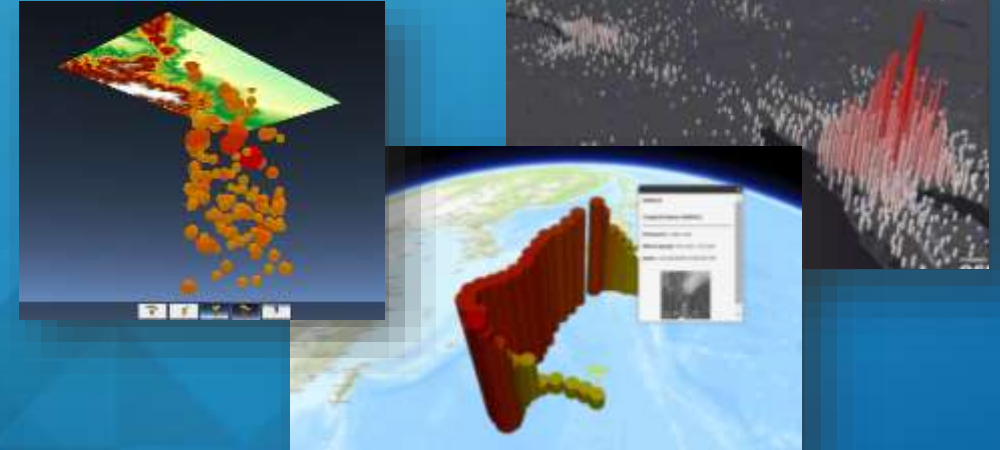


# Visualize in Time & Space

Smart Mapping



3D Cartography



Data Visualization



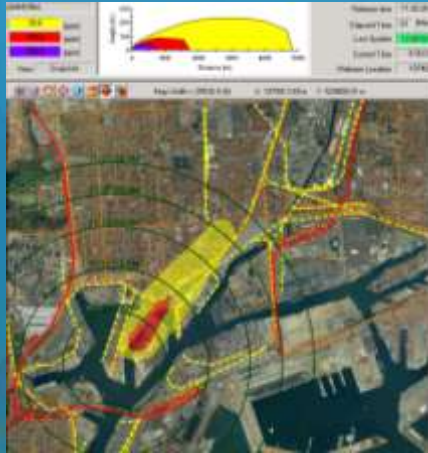
Data Exploration



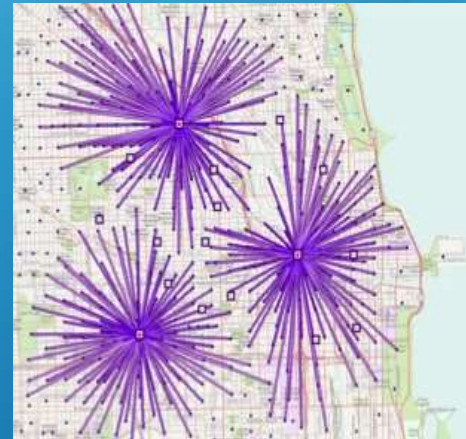


# Analyze in Time & Space

Plume Modeling



Location Allocation



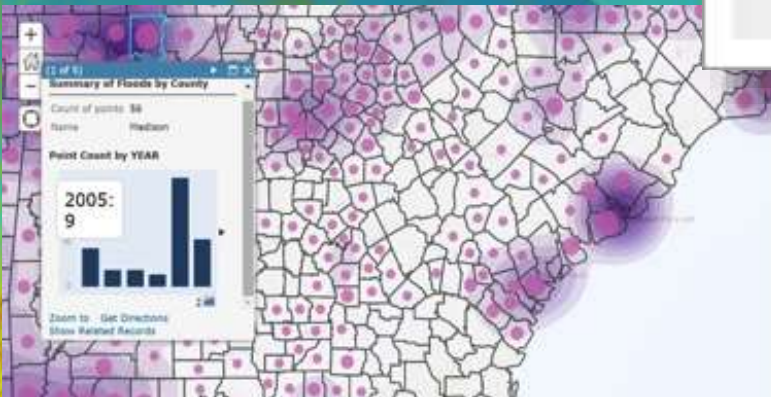
Mobility Analysis



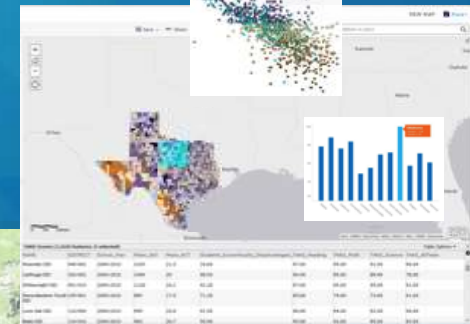
Multi-Modal Routing



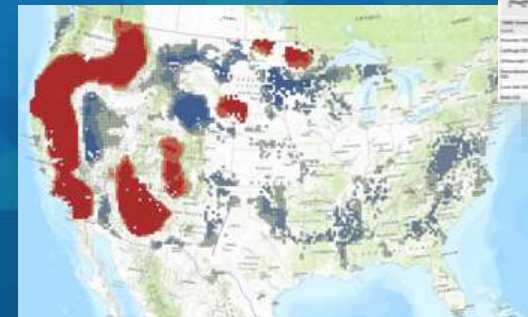
Aggregation



Charting



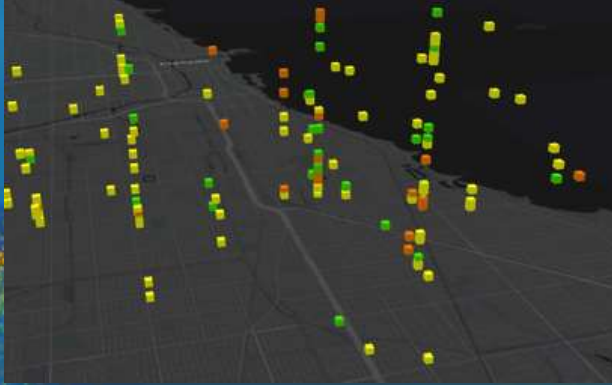
Hot Spots



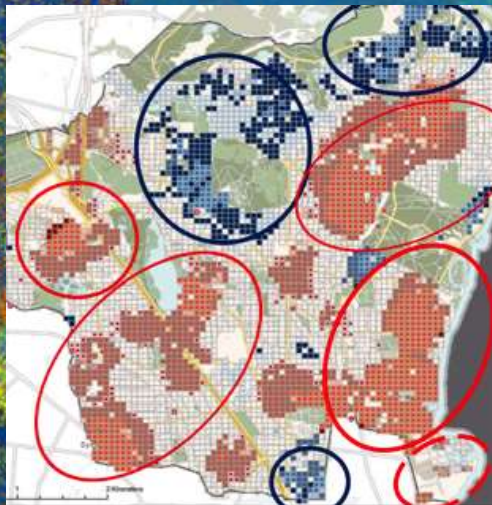


# Find Patterns in Time & Space

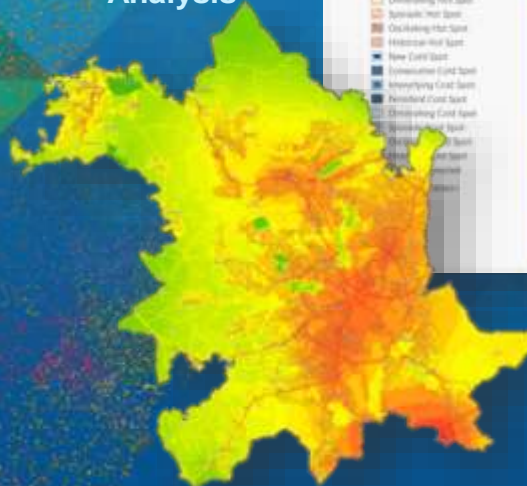
## Anomaly Detection



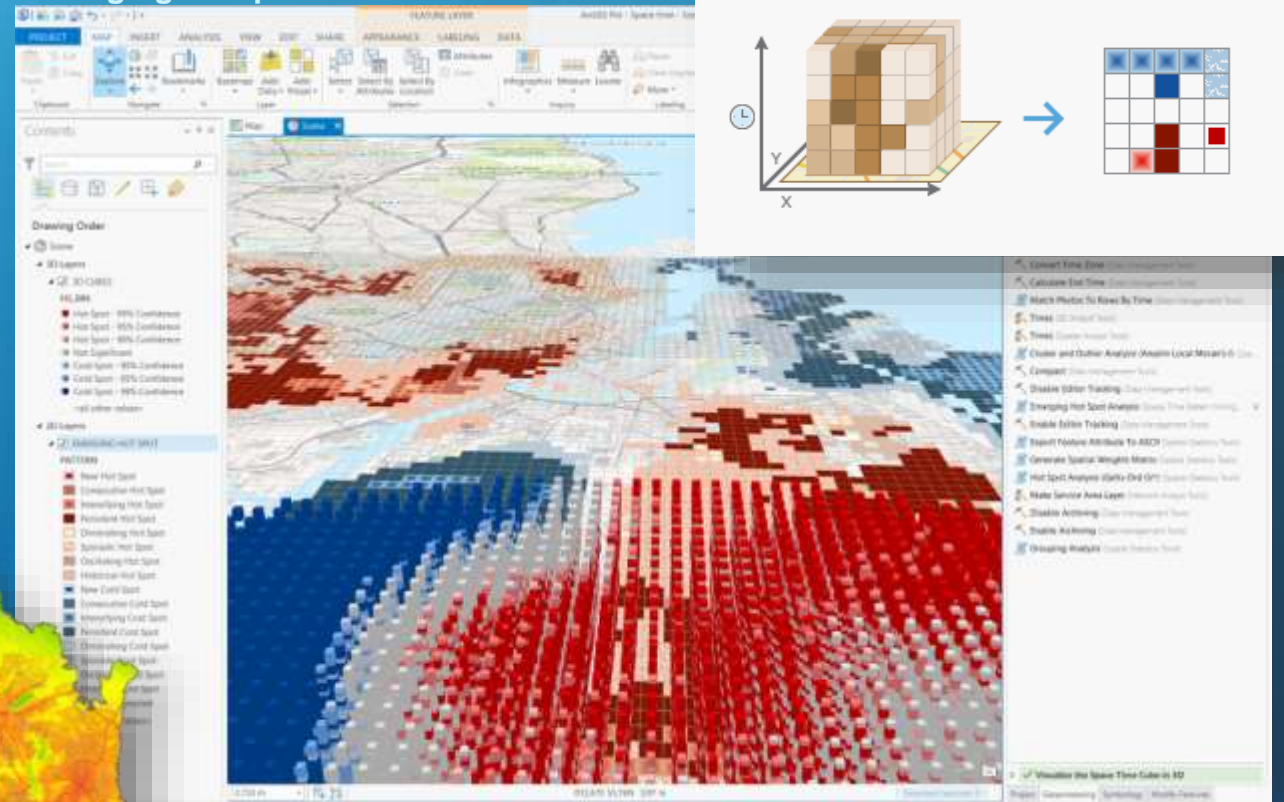
# Statistical Clustering



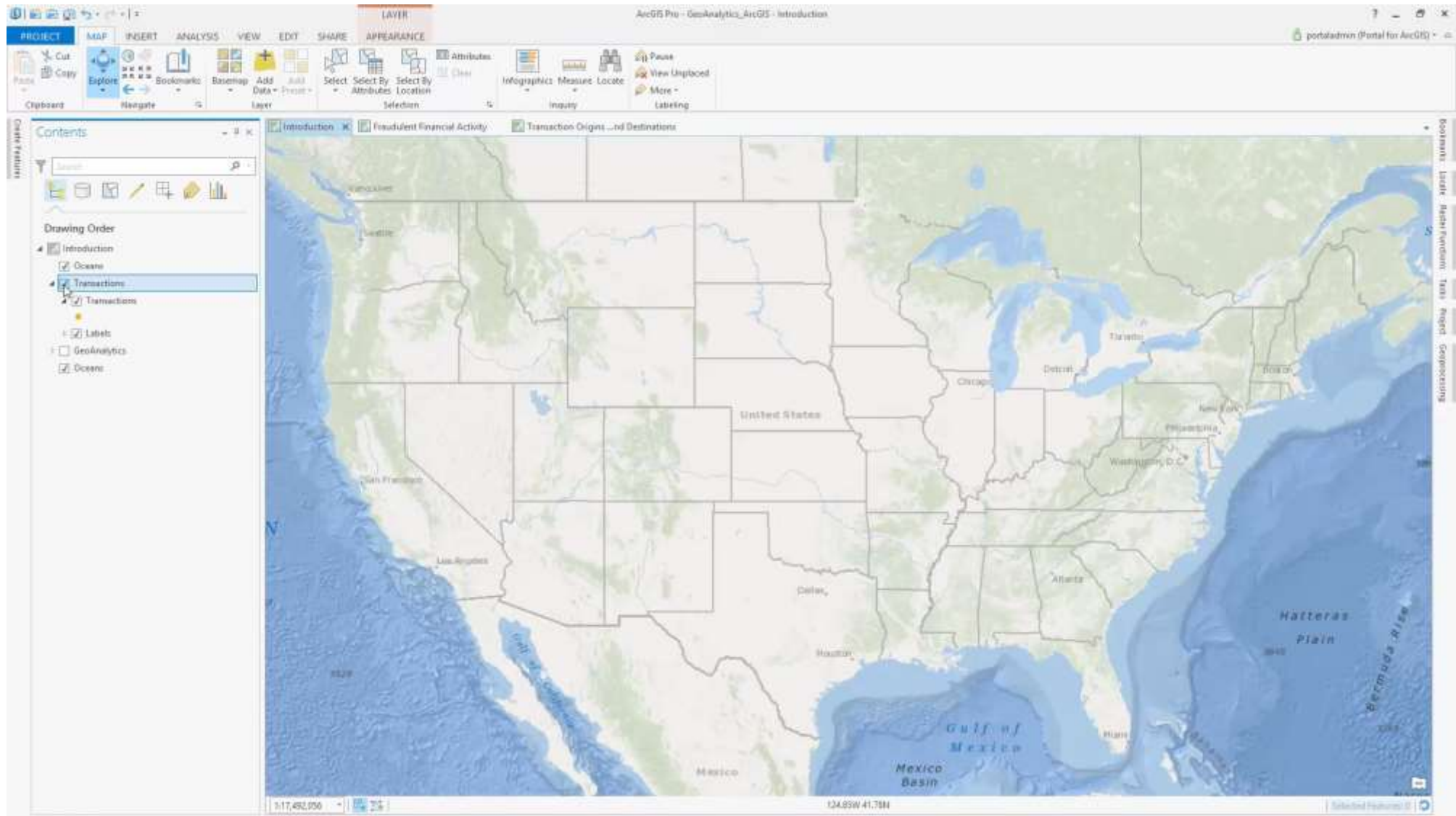
## Regression Analysis



## Emerging Hotspots



# Finding the Needle in the Haystack

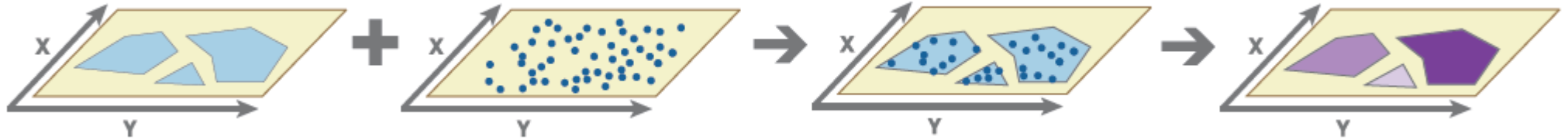




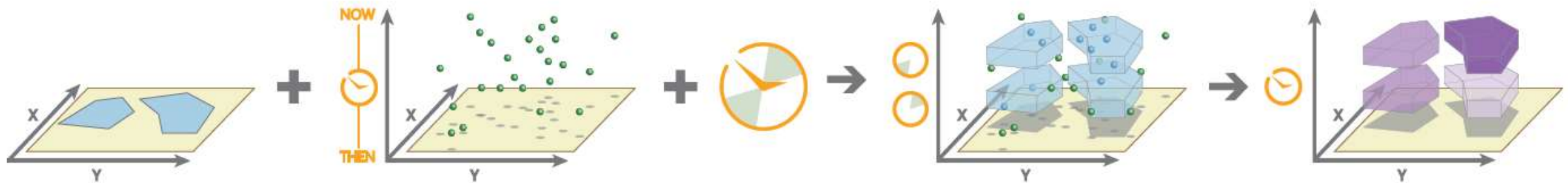
# Cloud-based Analytic Capabilities

*Summarizing and aggregating data*

- **Spatial joins**



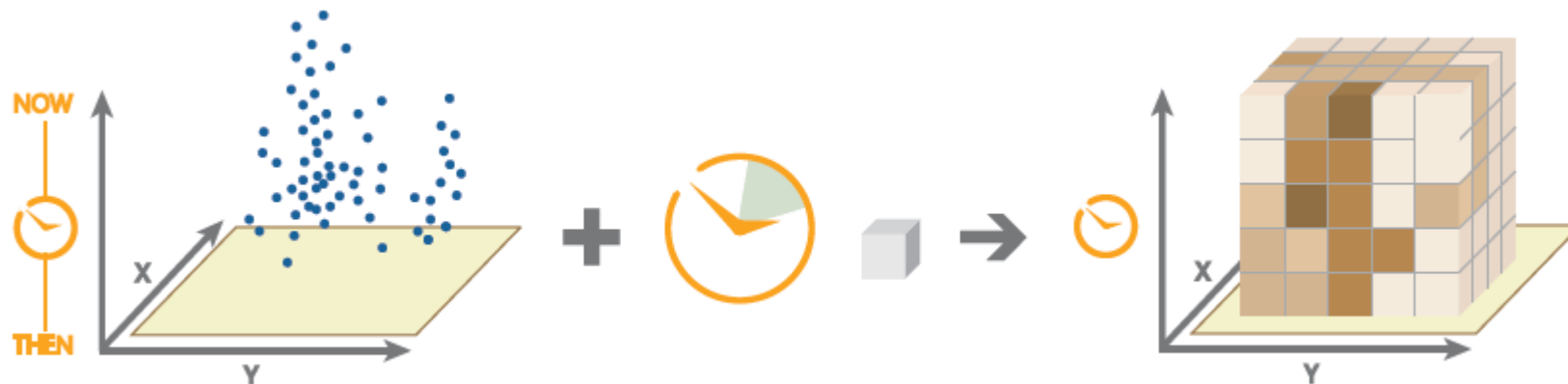
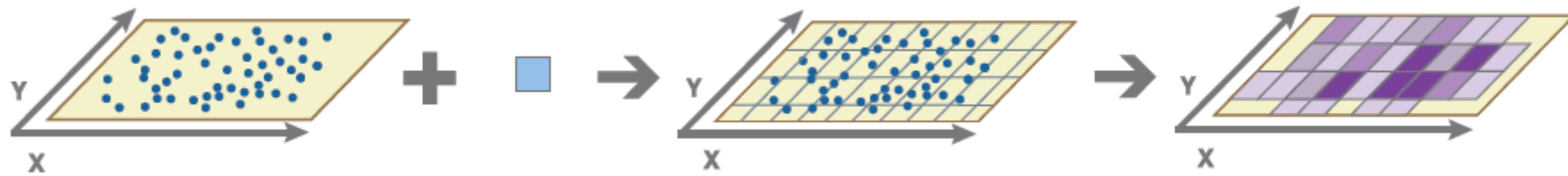
- **Space-time slices**



# Cloud-based Analytic Capabilities

*Summarizing and aggregating data*

- Points into bins







# Time & Space

For Intelligence and National Security

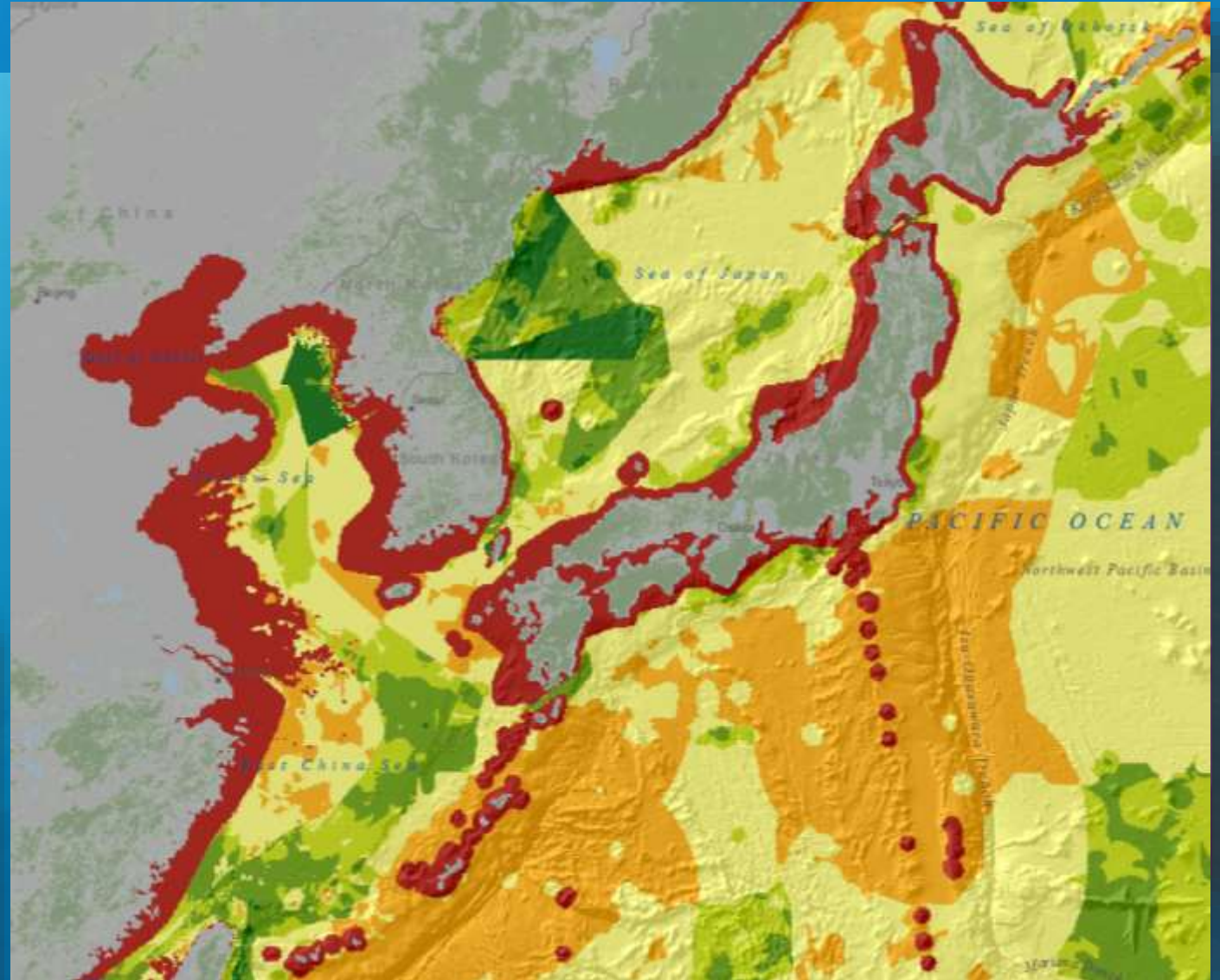


# Intelligence Integration

## NFL Security



## Aircraft and Severe Weather



..Using Geography as a common reference



# Intelligence Reporting

## Zika Virus



## Refugee Crisis

...Providing Dynamic, Interactive Intelligence

# Situational Awareness



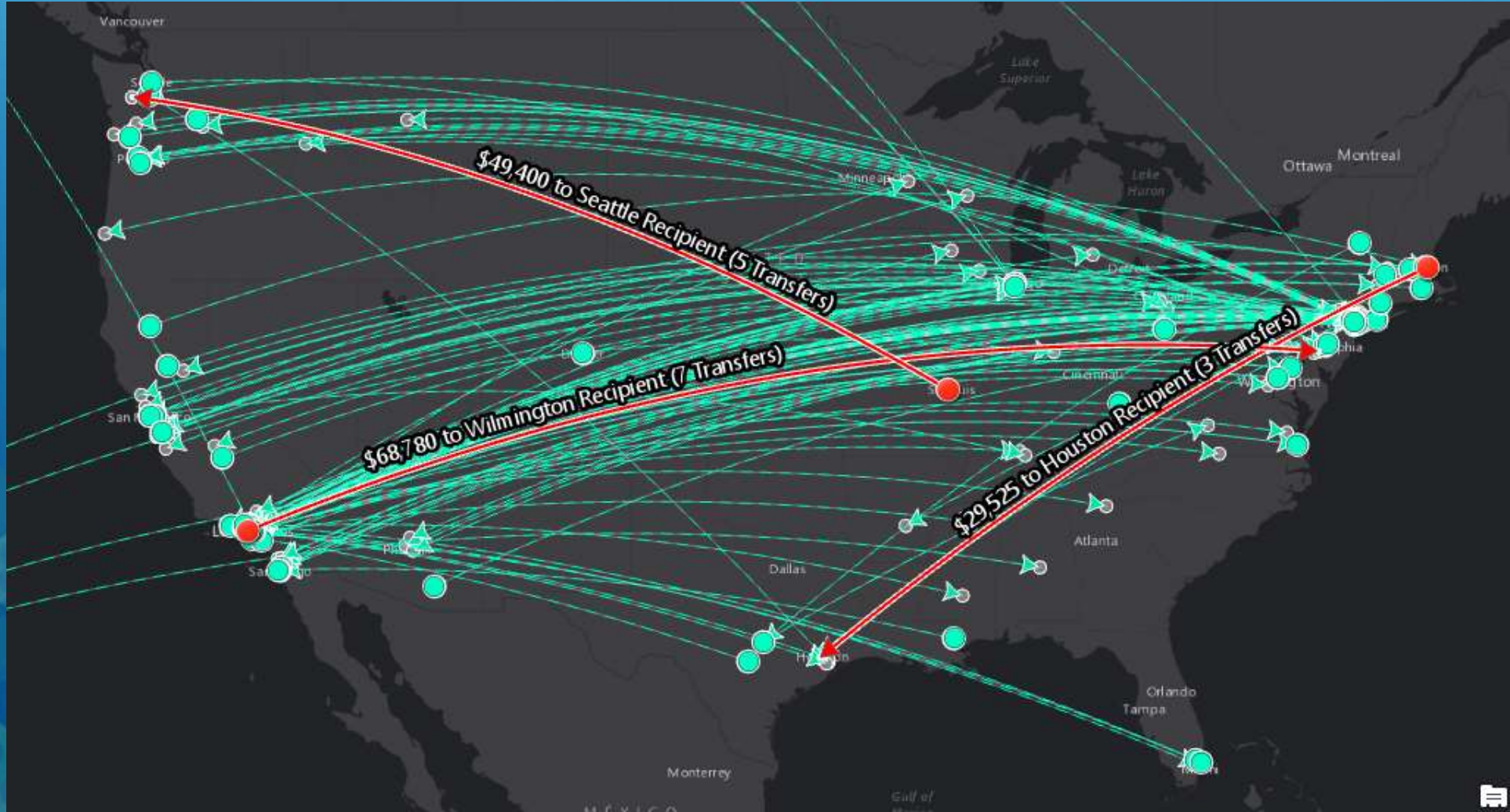
Boston Marathon



*...Up-to-the-Minute Monitoring, Alerting, and Analysis*



# Fraud Detection





PROJECT | MAP | INSERT | ANALYSIS | VIEW | EDIT | SHARE

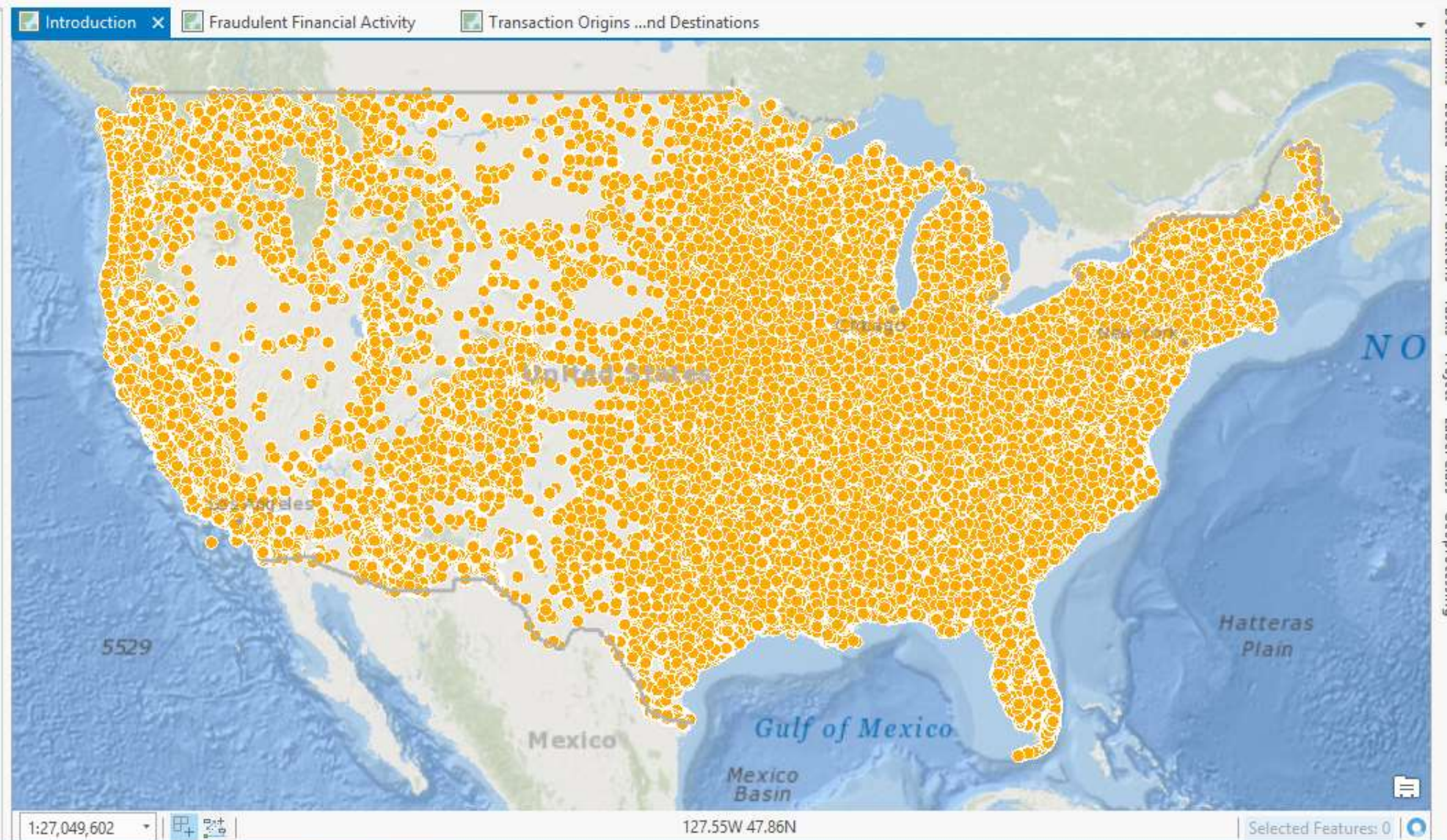
Clipboard | Explore | Navigate | Bookmarks | Basemap | Add Data | Add Preset | Layer | Select | Select By Attributes | Select By Location | Attributes | Clear | Infographics | Measure | Locate | Inquiry | Pause | View Unplaced | More | Labeling

Contents

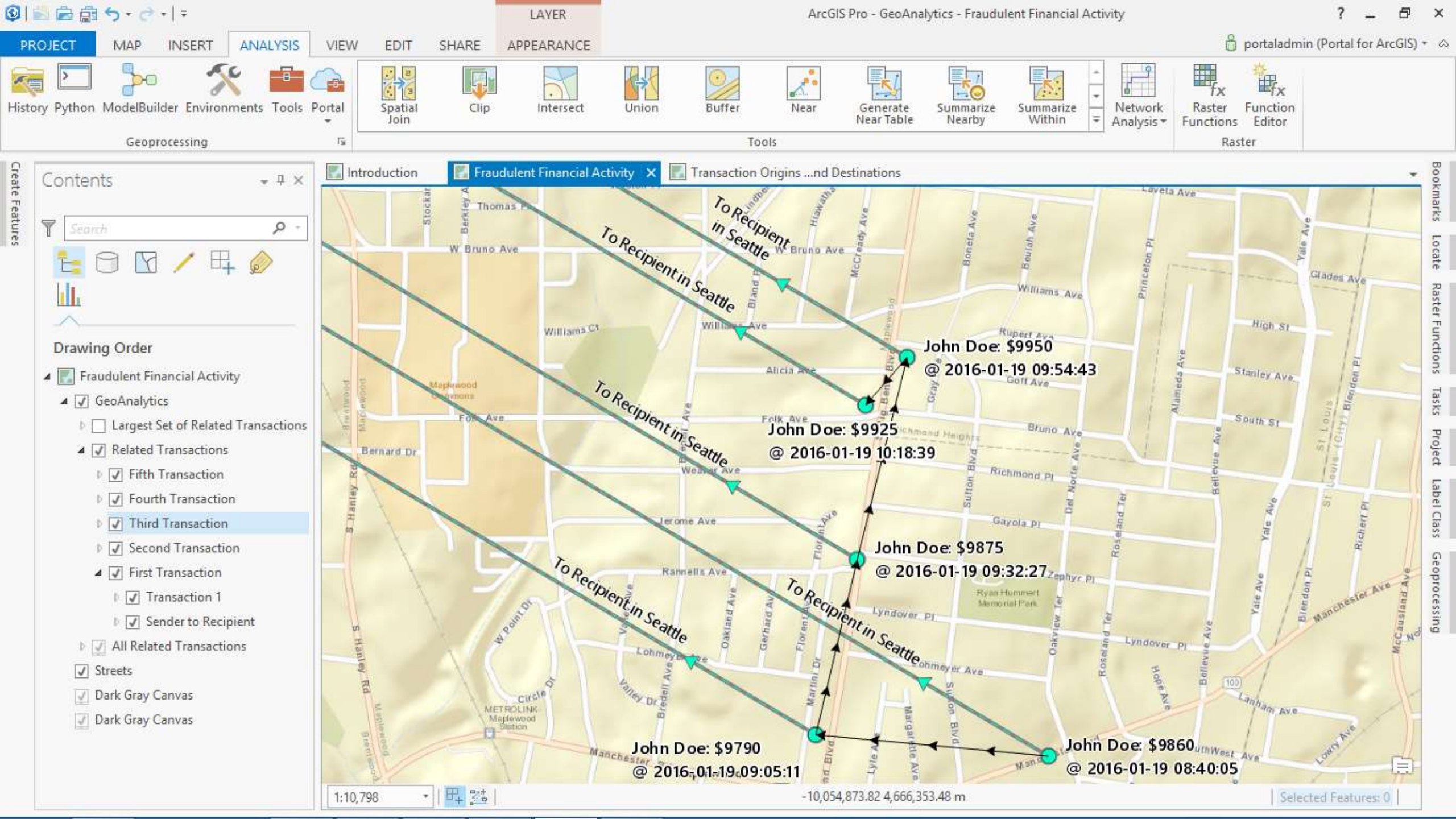
Search

Drawing Order

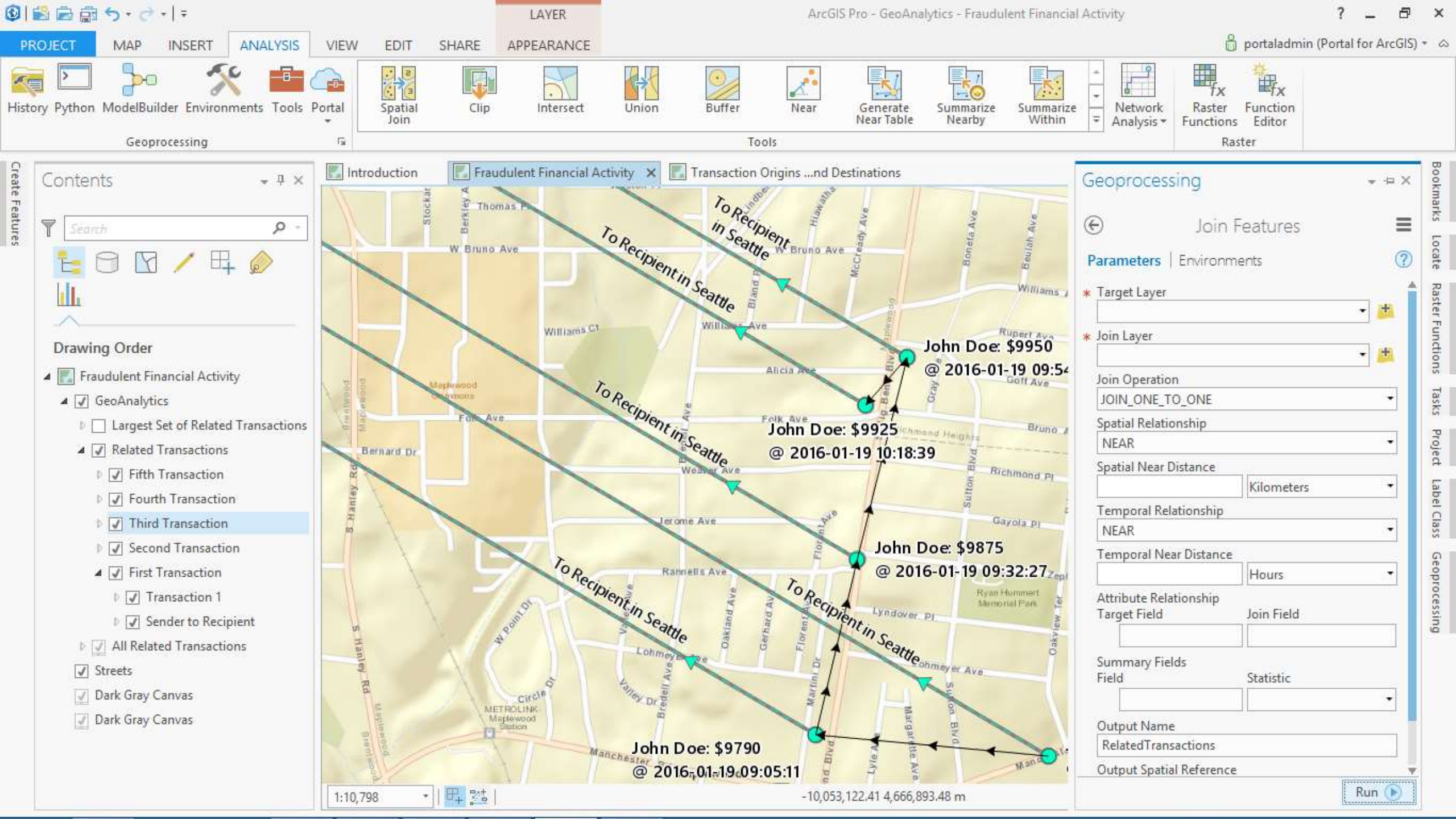
- Introduction
  - ☒ Oceans
- Transaction Data
  - ☒ Transactions
- ☒ Labels
- ☐ GeoAnalytics
- ☒ Oceans













PROJECT MAP INSERT ANALYSIS VIEW EDIT SHARE APPEARANCE LABELING DATA

History Python ModelBuilder Environments Tools Portal

Geoprocessing

Spatial Join Clip Intersect Union Buffer Near Generate Near Table Summarize Nearby Summarize Within

Tools

Network Analysis Raster Functions Function Editor

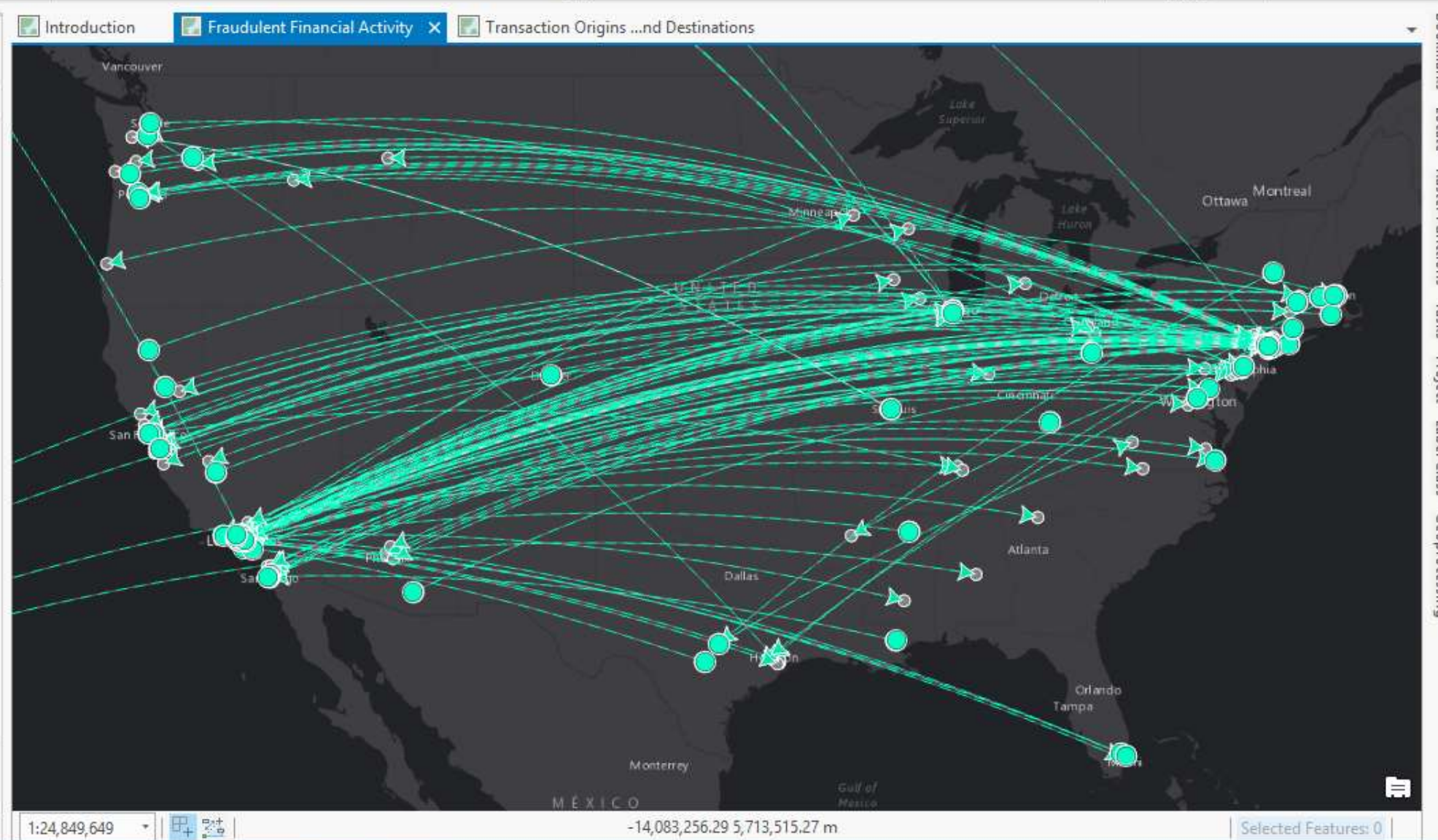
Raster

Contents

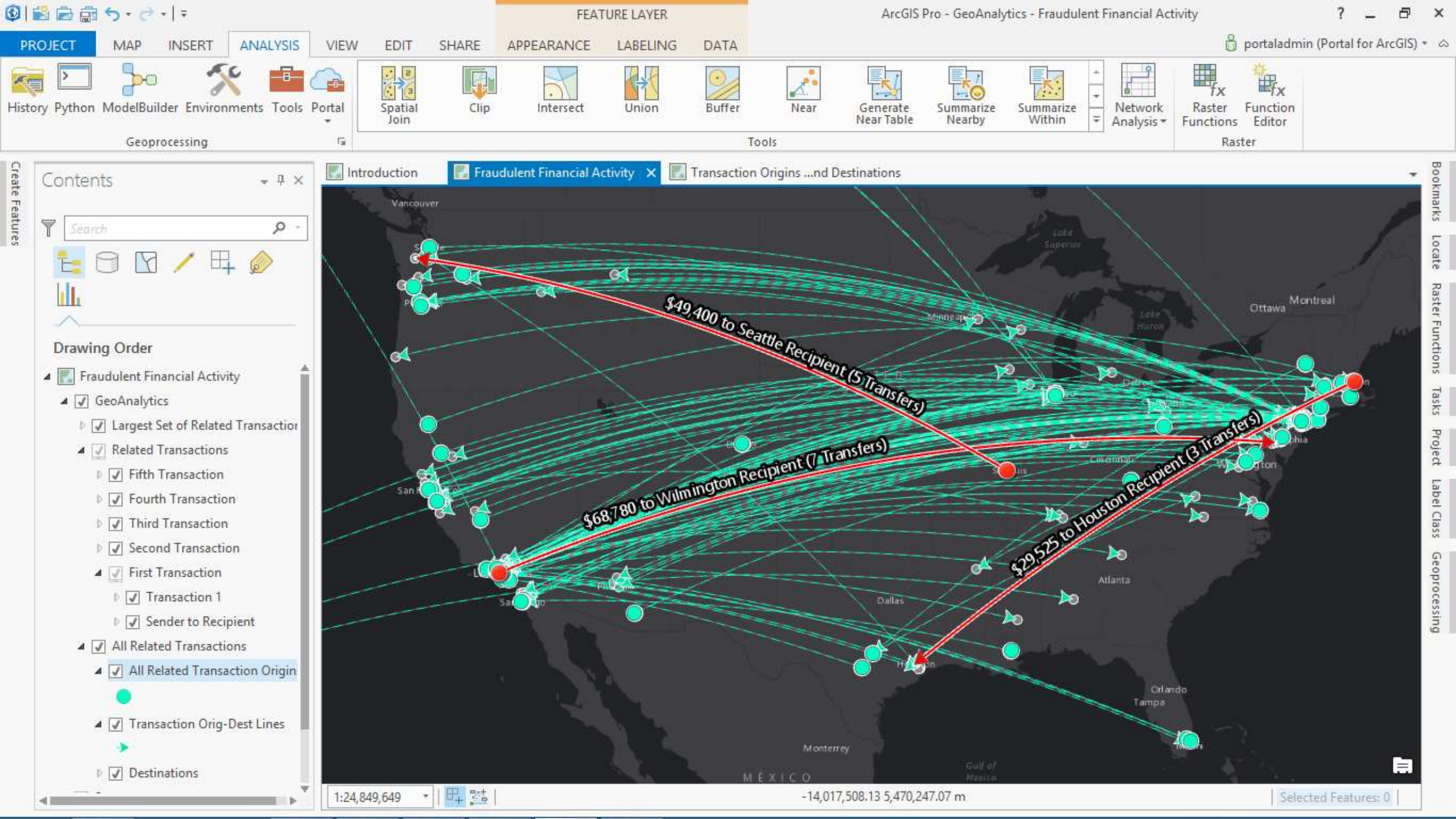
Search

Drawing Order

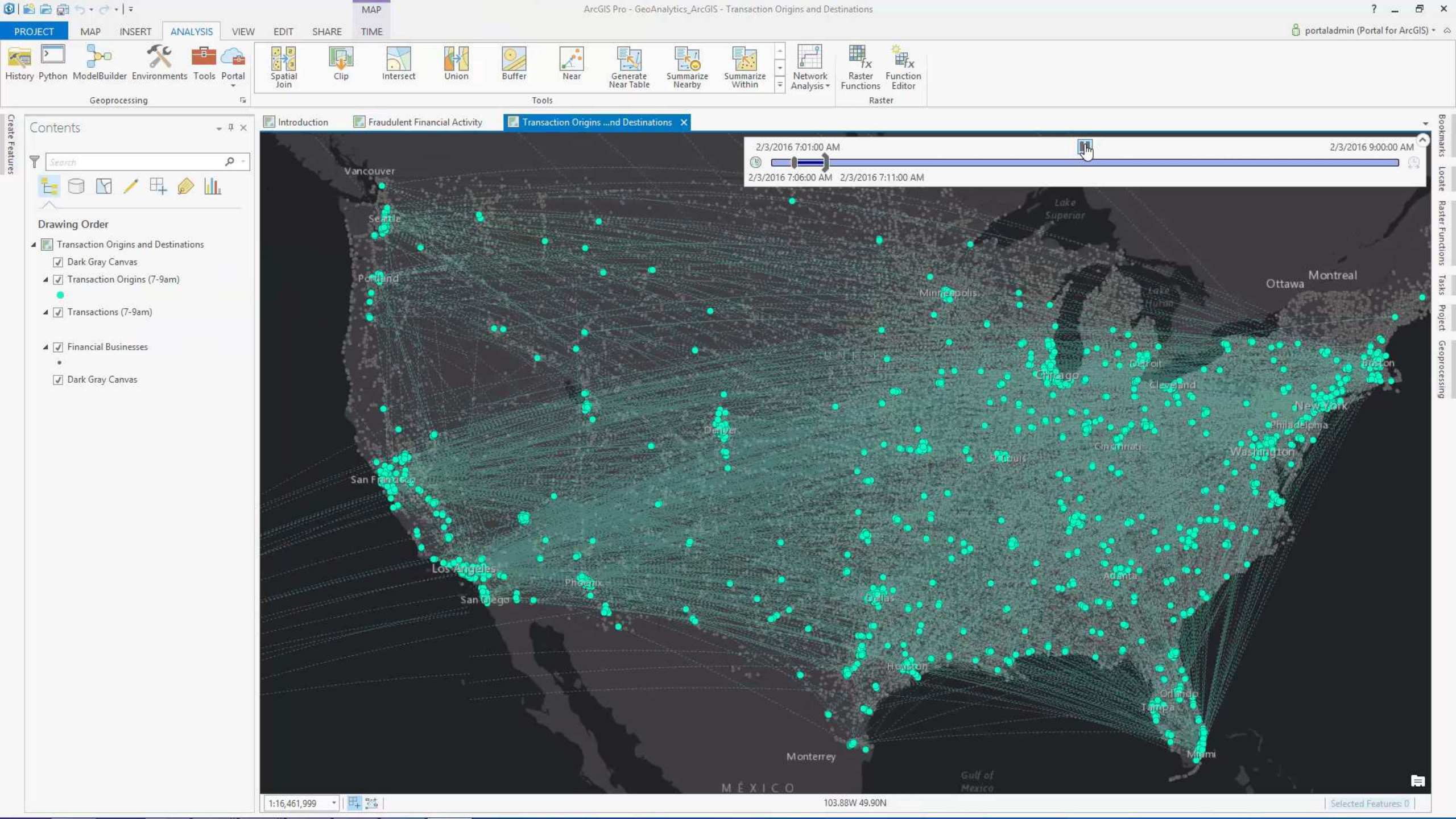
- Fraudulent Financial Activity
  - GeoAnalytics
    - ☐ Largest Set of Related Transaction
    - ☒ Related Transactions
      - ☒ Fifth Transaction
      - ☒ Fourth Transaction
      - ☒ Third Transaction
      - ☒ Second Transaction
      - ☒ First Transaction
        - ☒ Transaction 1
        - ☒ Sender to Recipient
    - ☒ All Related Transactions
      - ☒ All Related Transaction Origin
        - ☒ Transaction Orig-Dest Lines
        - ☒ Destinations



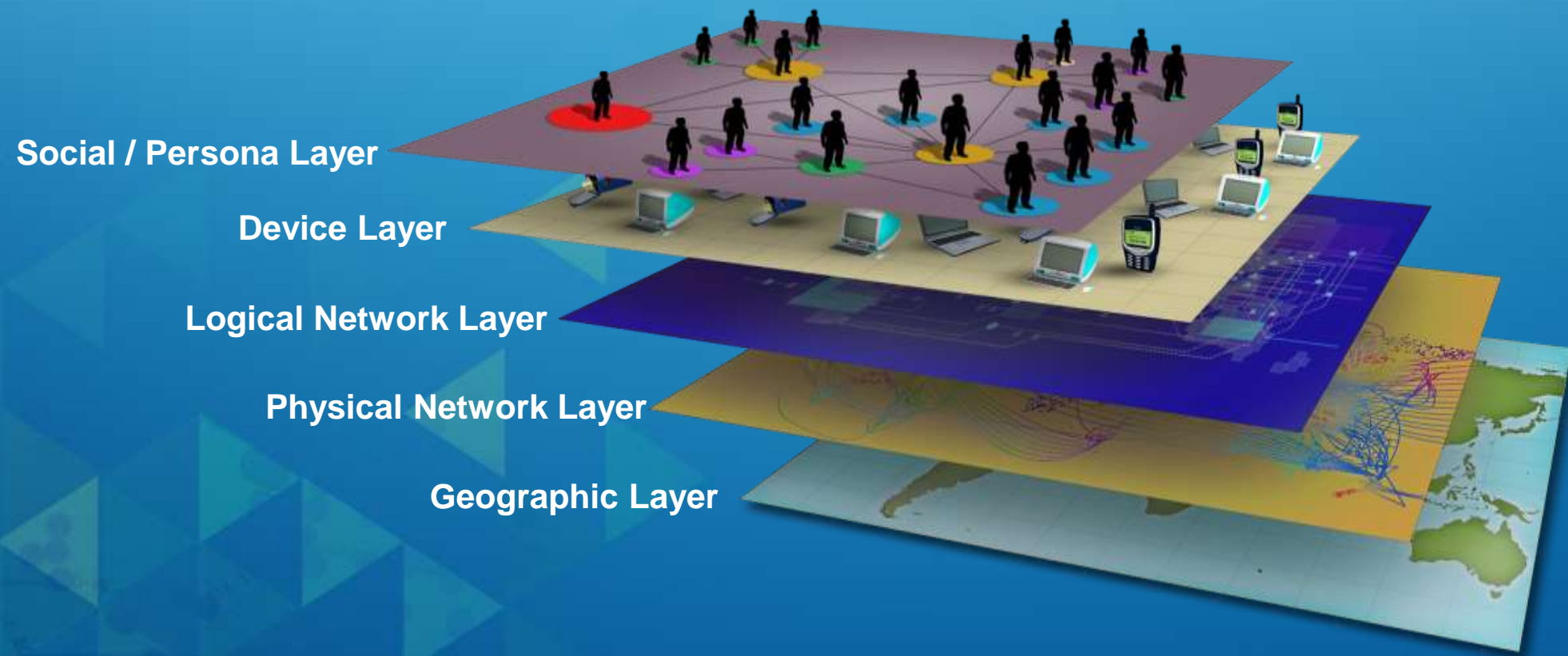






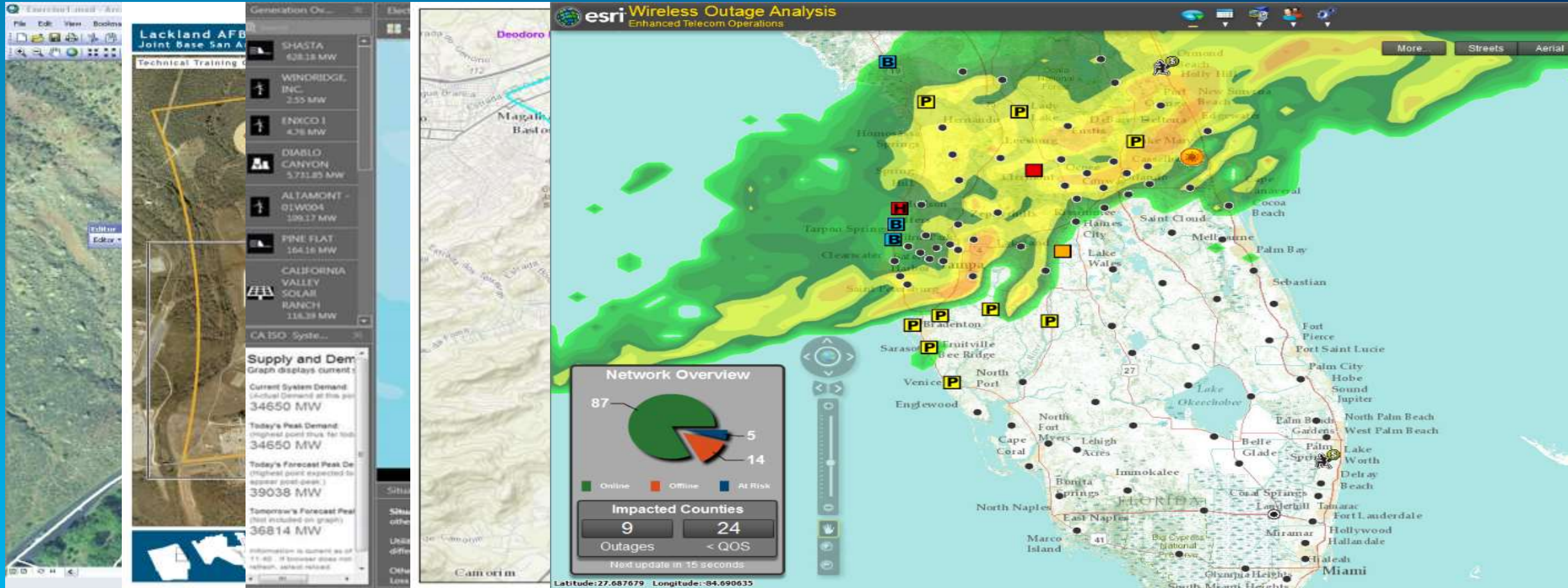


# Cyber



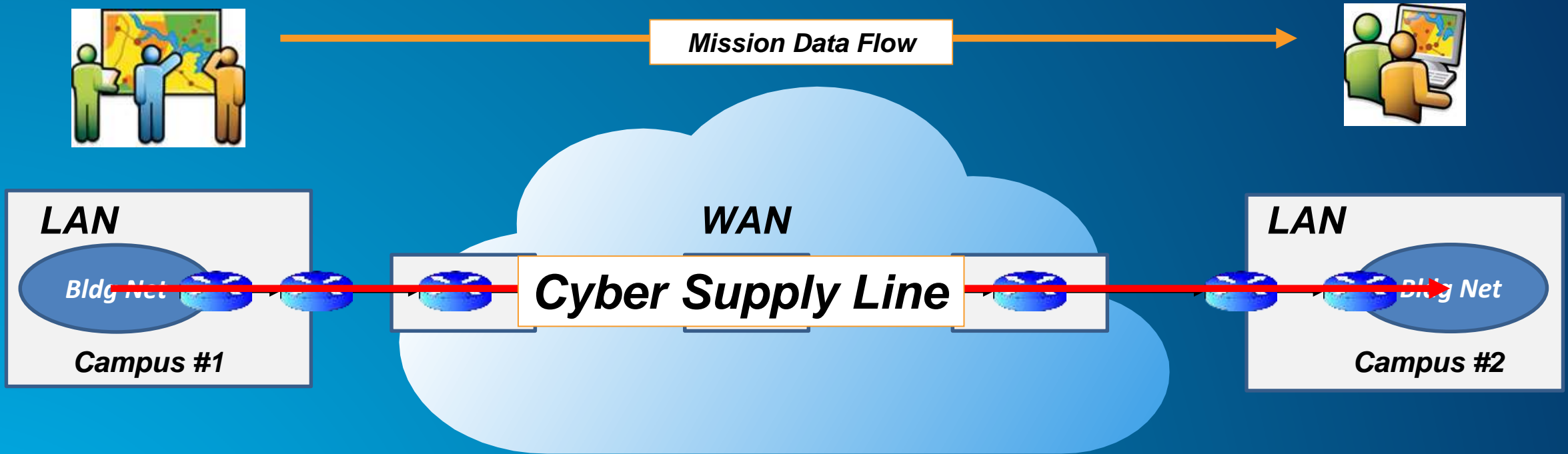


# Cyber Integration



# The Cyber Supply Line

## A vector of devices



- Cyber Supply Line (CSL) is a *consistent* path through the infrastructure
- CSL focuses resources on only the devices that are critical
- Managing data flows is similar to traffic routing; an Esri core competency



- \_\_\_\_\_

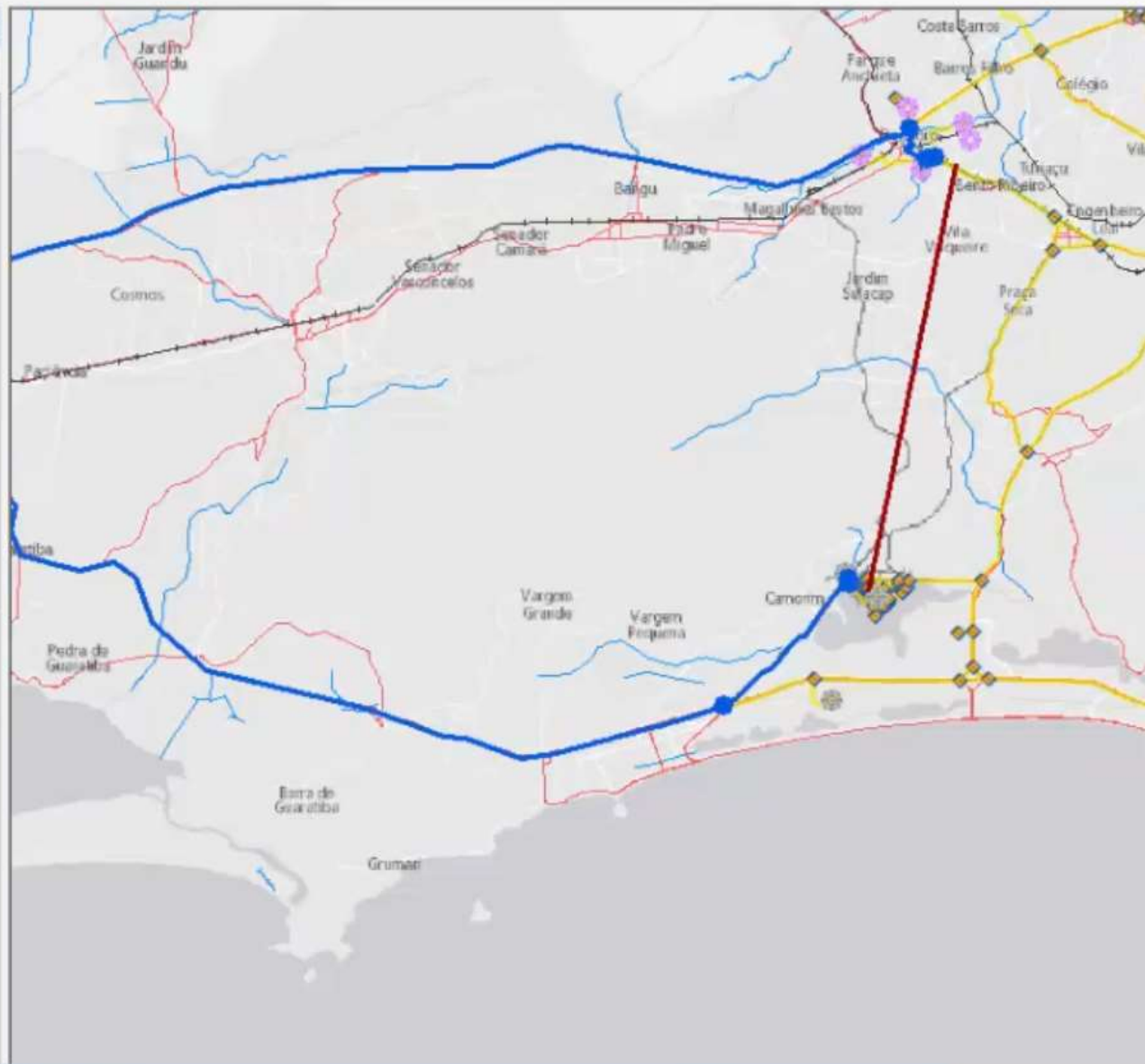


File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help



## Table Of Contents

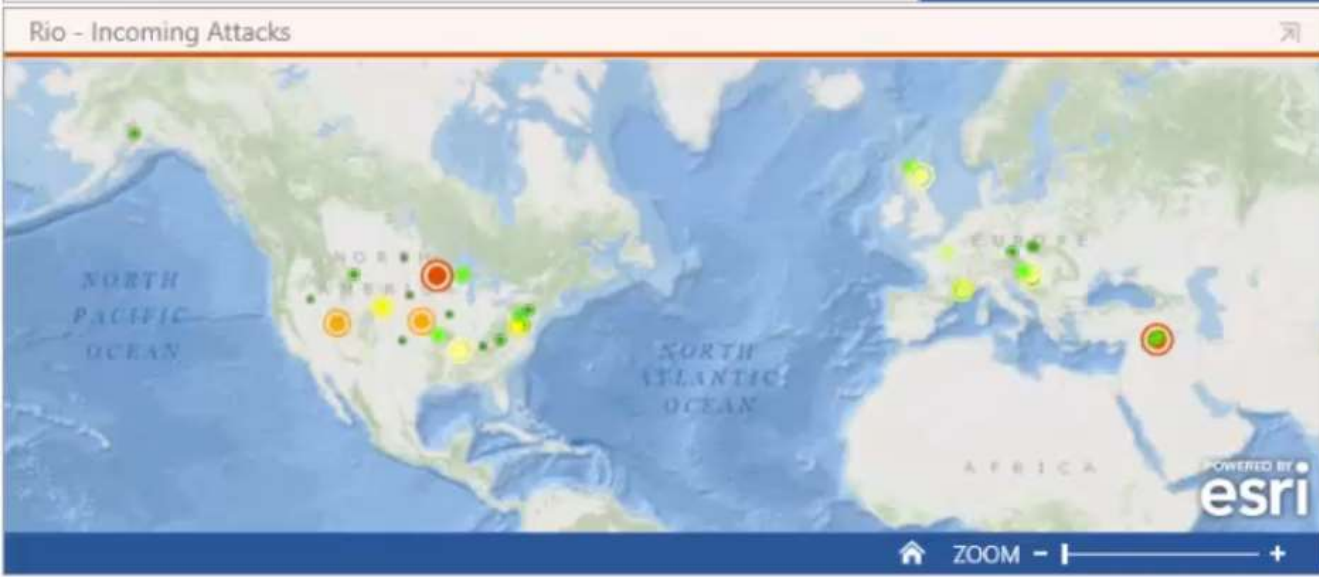
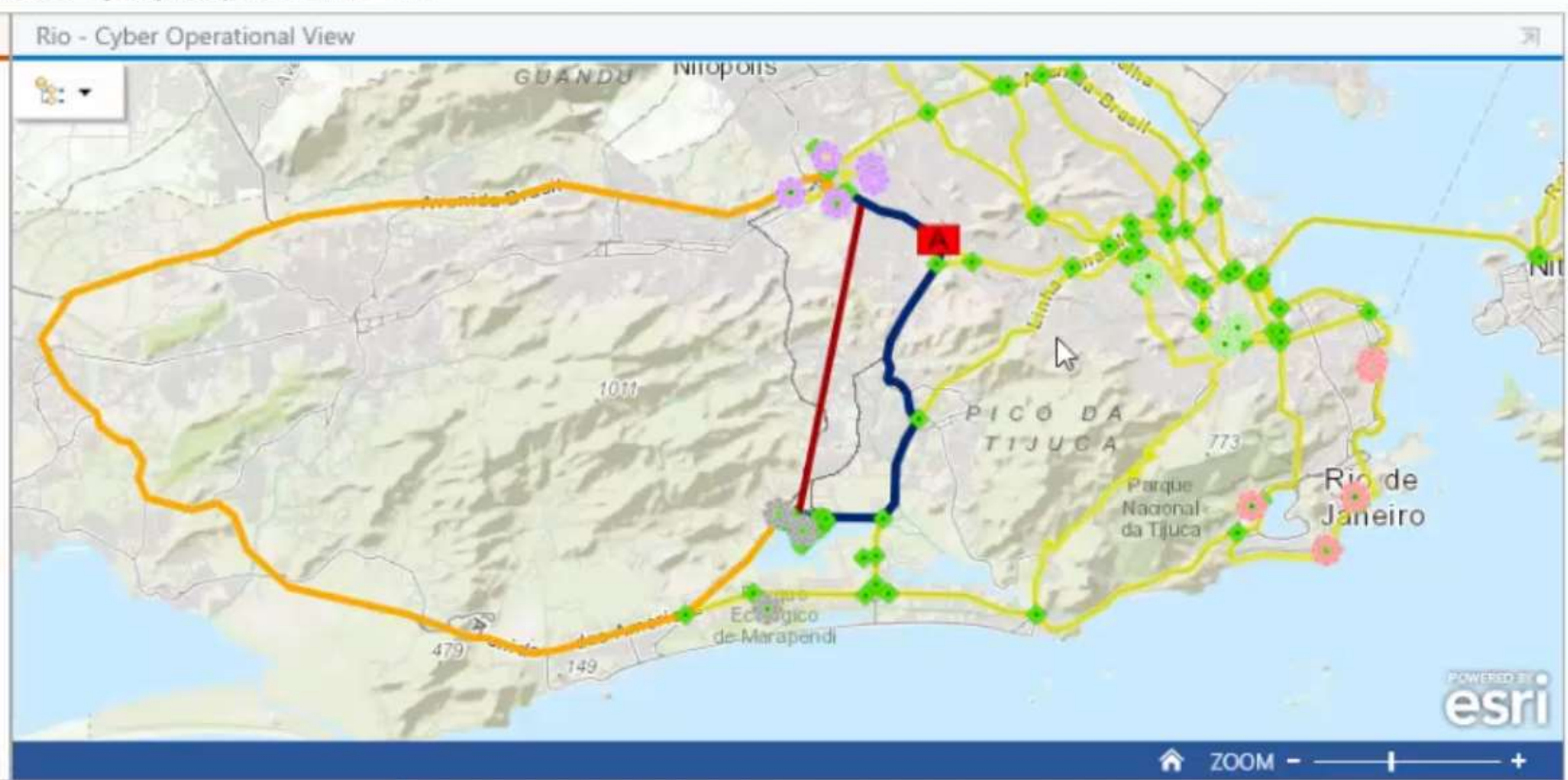
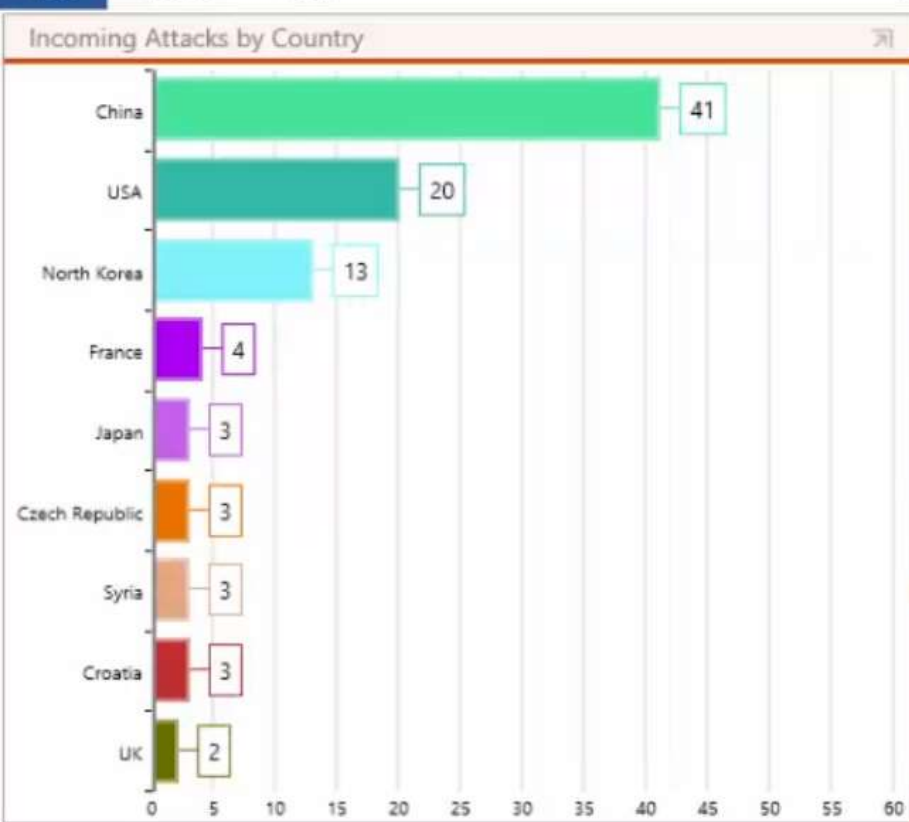
- ☒ Critical Infrastructure Protection
  - ☒ Cyber Supply Line
  - ☒ Created\_CSL
  - ☒ Reference
  - ☒ OlympicVenues
    - ☒ Olympic Venues
      - Barra
      - Copacabana
      - Deodoro
      - Maracana
  - ☒ Cyber Infrastructure
    - ☒ Nodes
    - ☒ Network
    - ☒ RioNodes\_ND
      - Edges
    - ☐ RioNodes\_ND\_Junctions
  - ☒ Transportation
    - ☒ Rio\_Railroads
    - ☒ Rio\_Roads
    - ☒ Rio\_WaterLine
  - ☒ Olympic Park
    - ☒ OlympicVillageBuildings
      - ☒ InternationalBroadcastCent



Find Path

Schematic Editor





### Intrusion Detection System (IDS)

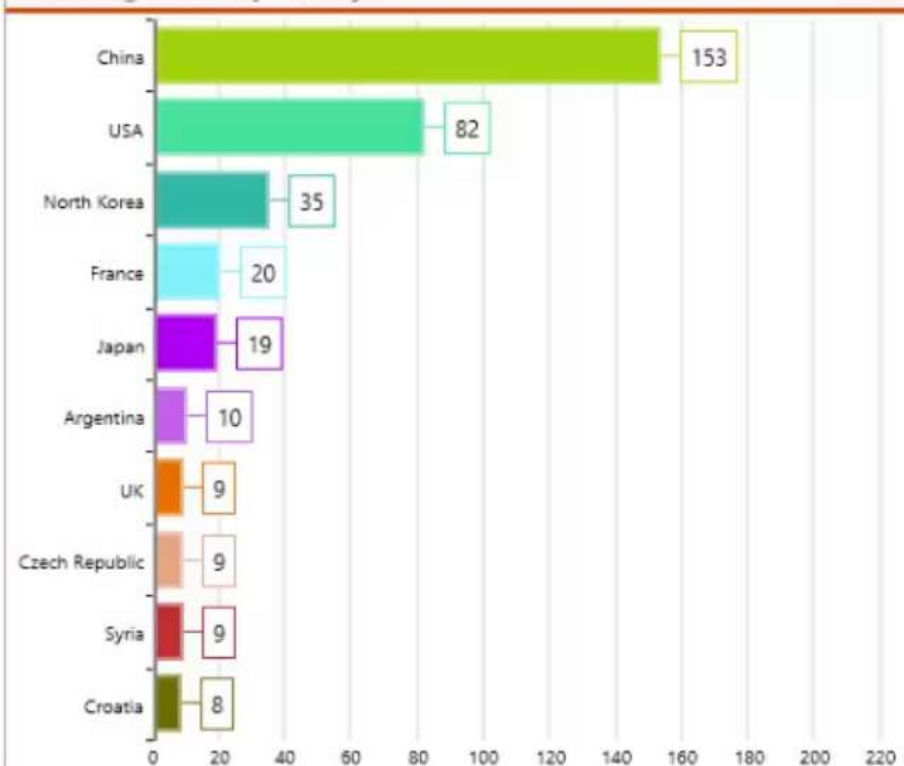
**Endpoint Security Alert: XYZ malware detected on host 192.168.124.168**

---

### Cyber Query Widget

Search by Vulnerability

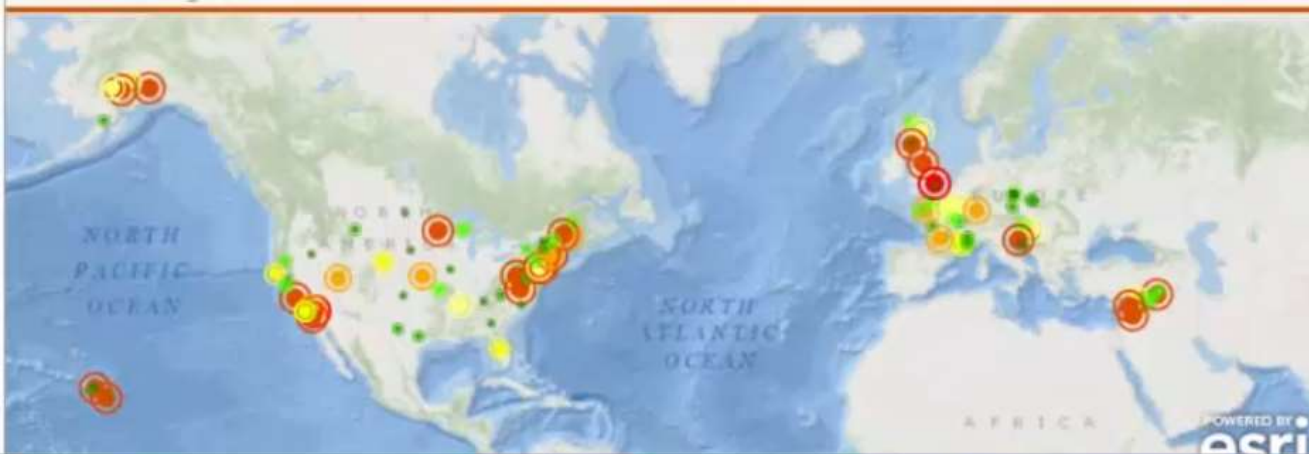
## Incoming Attacks by Country



## Rio - Cyber Operational View



## Rio - Incoming Attacks



## Intrusion Detection System (IDS)

**Endpoint Security Alert: FIXED**

## Cyber Query Widget

Show

Zoom to

Select



# Time & Space

## An Integrating Framework for Intelligence and National Security





Understanding our world.

**Chris Albert**  
**Director, Intelligence Business Development**  
**[calbert@esri.com](mailto:calbert@esri.com)**