ArcGIS Insights – An Introduction

Dara Burlo & Scott Sandusky

ArcGIS Insights focuses on simpler ways to work with your data and share results. This includes drag and drop analytics, on-the-fly filtering and aggregations, interactive visualizations, and fast and intuitive exploratory analysis. You will learn how to get started with ArcGIS Insights, including adding data from numerous sources, exploring some of the available analyses, and seeing how to share results and models.

2020 ESRI DEVELOPER SUMMIT | Palm Springs, CA

Today’s Agenda

- What is Insights?

1. Data preparation
2. Exploratory analysis
3. Spatial & statistical analysis
4. Sharing reports & models

- Roadmap & Resources

What is ArcGIS Insights?

ArcGIS Insights

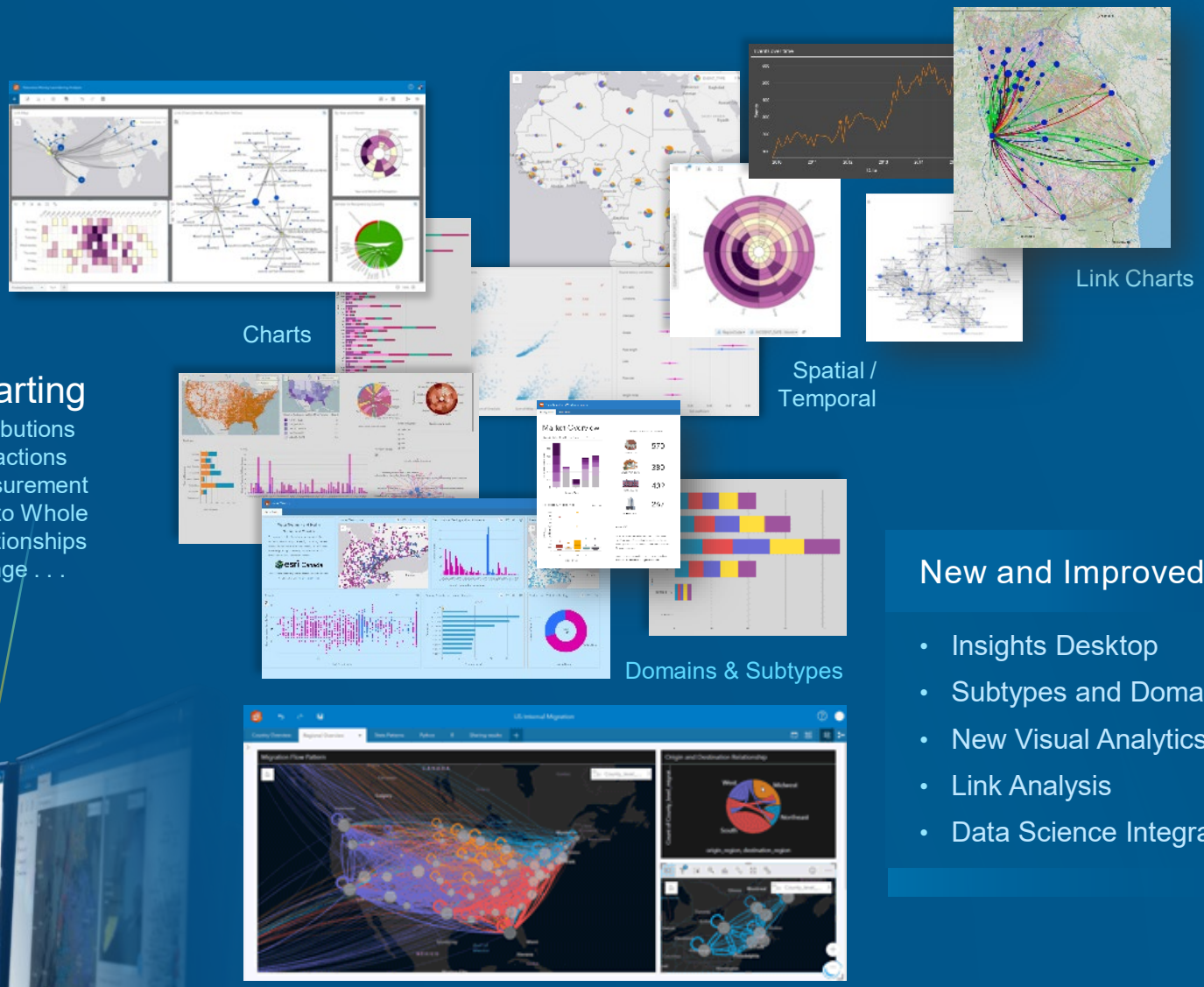
Self-Service

Mapping
Multiple Geometries
Flow Maps
Chart Symbology…

Analytics
Spatial
Temporal
Statistical
Predictive
Link/Graph …

Charting
Distributions
Interactions
Measurement
Part to Whole
Relationships
Change . . .

Data Visualization and Analytics

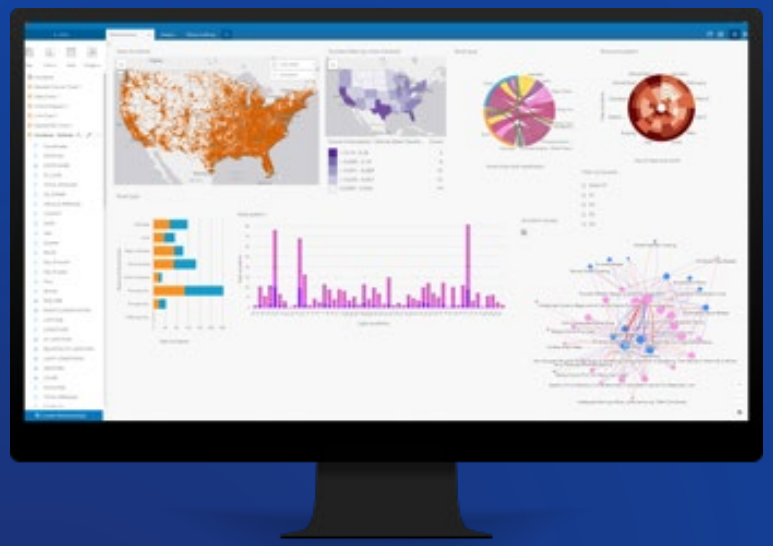


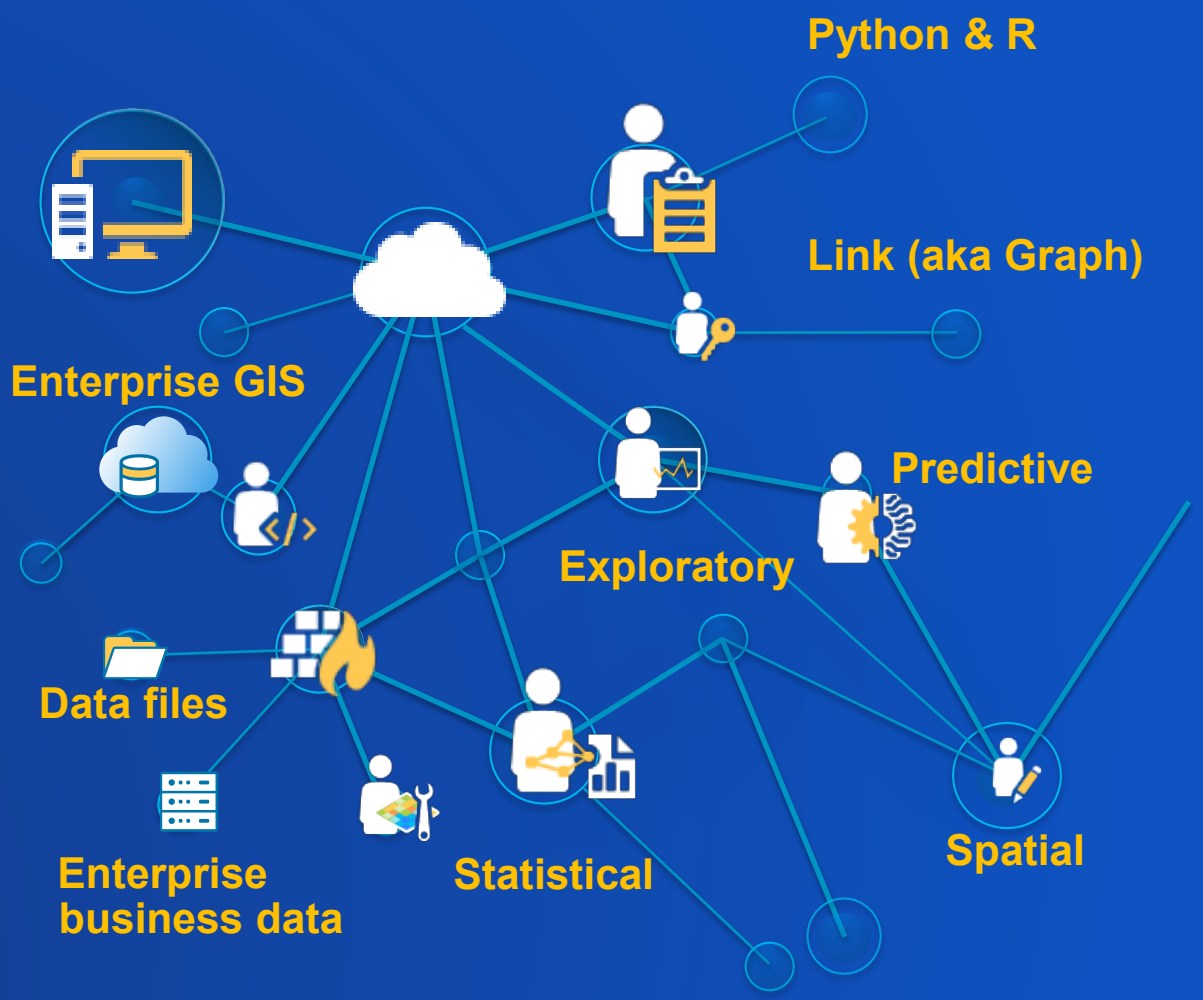
New and Improved

- Insights Desktop
- Subtypes and Domains
- New Visual Analytics
- Link Analysis
- Data Science Integration

Integrate spatial and traditional analysis across your organization . . .

Self-service location analytics





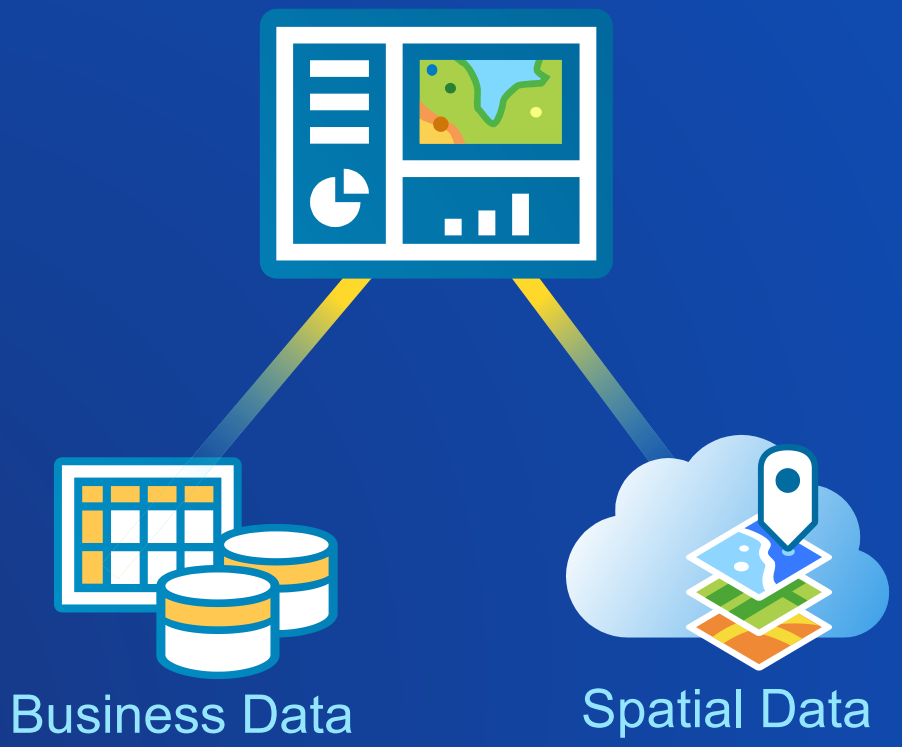
Available as a SaaS, within your Enterprise, and locally on Windows or Mac

Powerful Analysis Made Simple

Usable Across Roles, Titles, and Skill Levels

Perform Analysis – Basic to Advanced

Business Data and Spatial Data Together in One Place




Statistical Analysis
Exploratory Analysis
Spatial Analysis
GeoEnablement
Record & Repeat Analysis
Share Results
Data Preparation

Exploratory Analysis
- Charts, tables, and maps
- Interactivity between visualizations
- Context of the largest digital atlas in world

Statistical Analysis
- Descriptive stats
- Regression
- Link analysis
- Python & R

Spatial Analysis
- How is it distributed?
- How is it related?
- What's nearby?
- How has it changed?
- Python & R

GeoEnablement
- Geocode address
- Convert X,Y
- Join to boundaries
- Enrich proportionally with demographic variables

Record & Repeat Analysis
- Share model to analysts
- Document best practices
- Re-run with new data

Share Results
- Share with executives
- Tell your story
- Share with public

Data Preparation
- Format fields
- Calculate new fields
- Filter data
- Hide fields
- Rename fields and datasets
- Join datasets

ArcGIS Insights is available through SaaS, on your own infrastructure, and locally on a Windows PC or Mac.

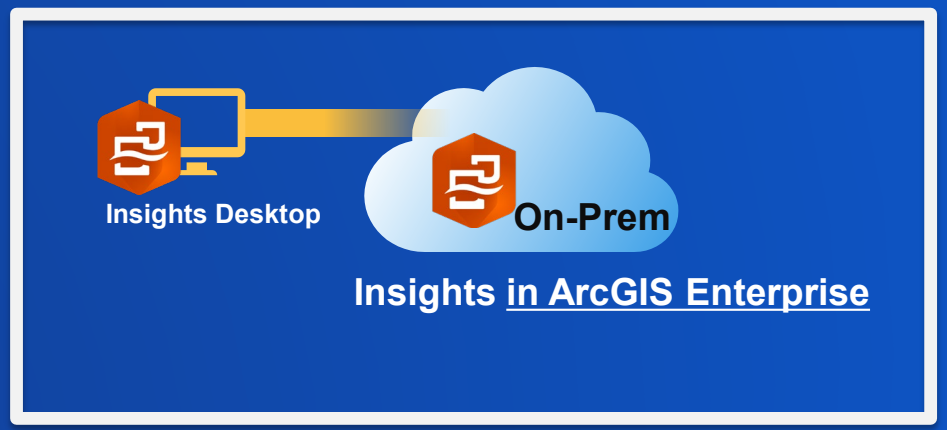
or

or

SaaS	Your Infrastructure (Physical, Virtual, or Cloud)	Locally
ArcGIS Online	ArcGIS Enterprise	Desktop

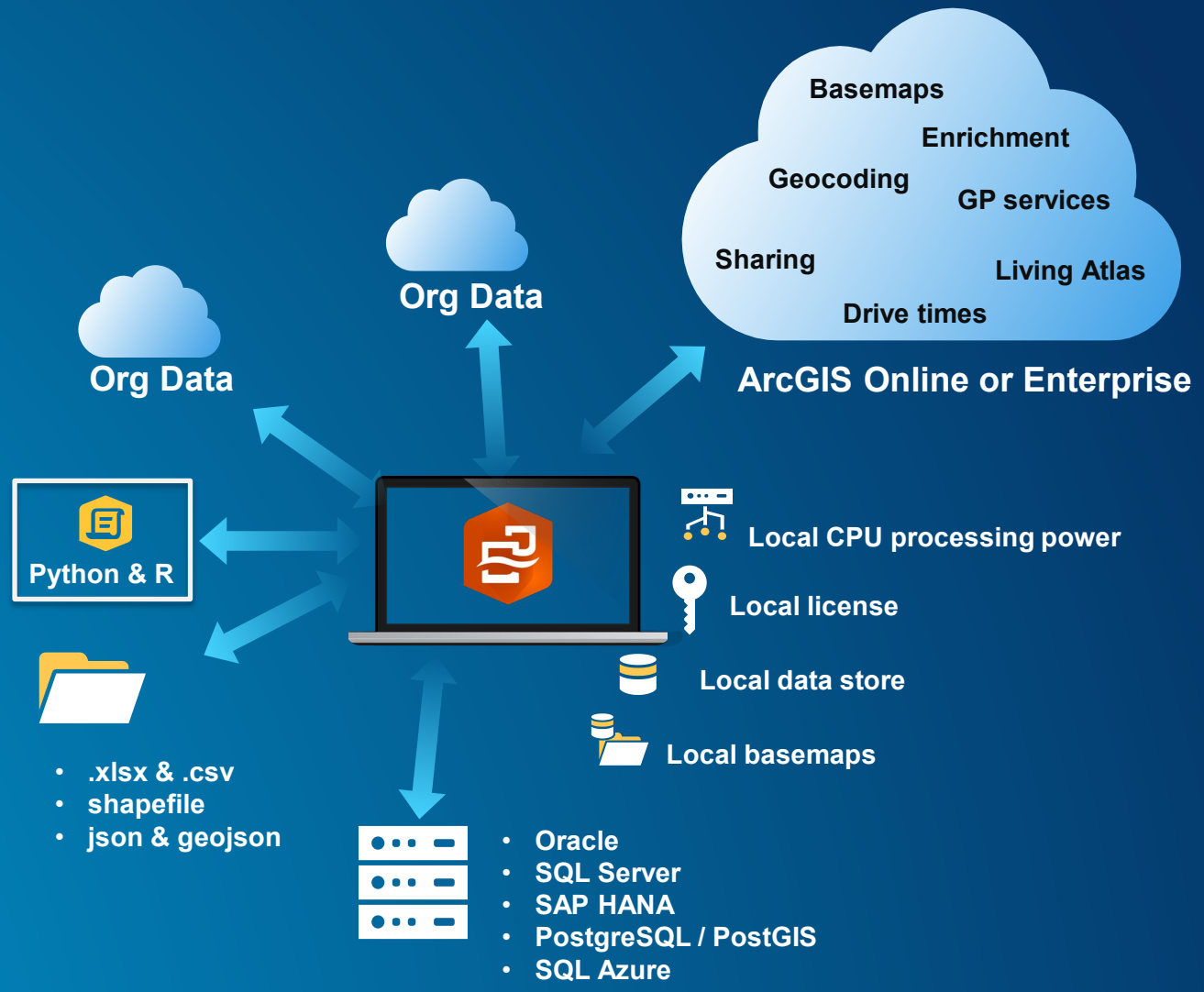
Insights

Insights



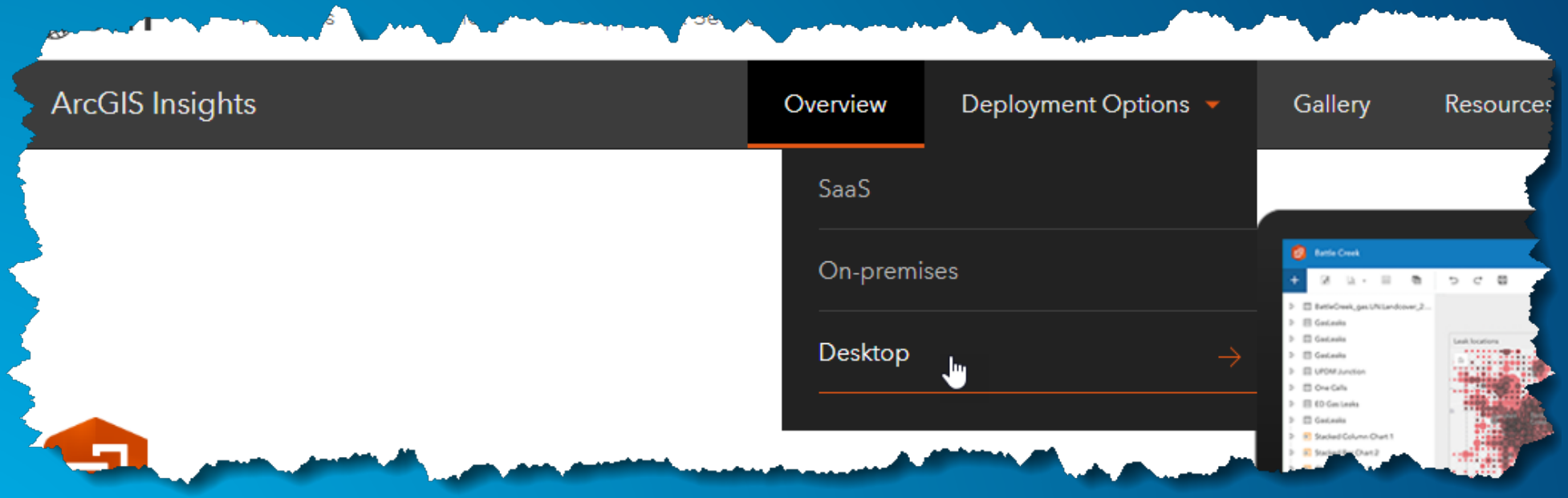
Insights Desktop

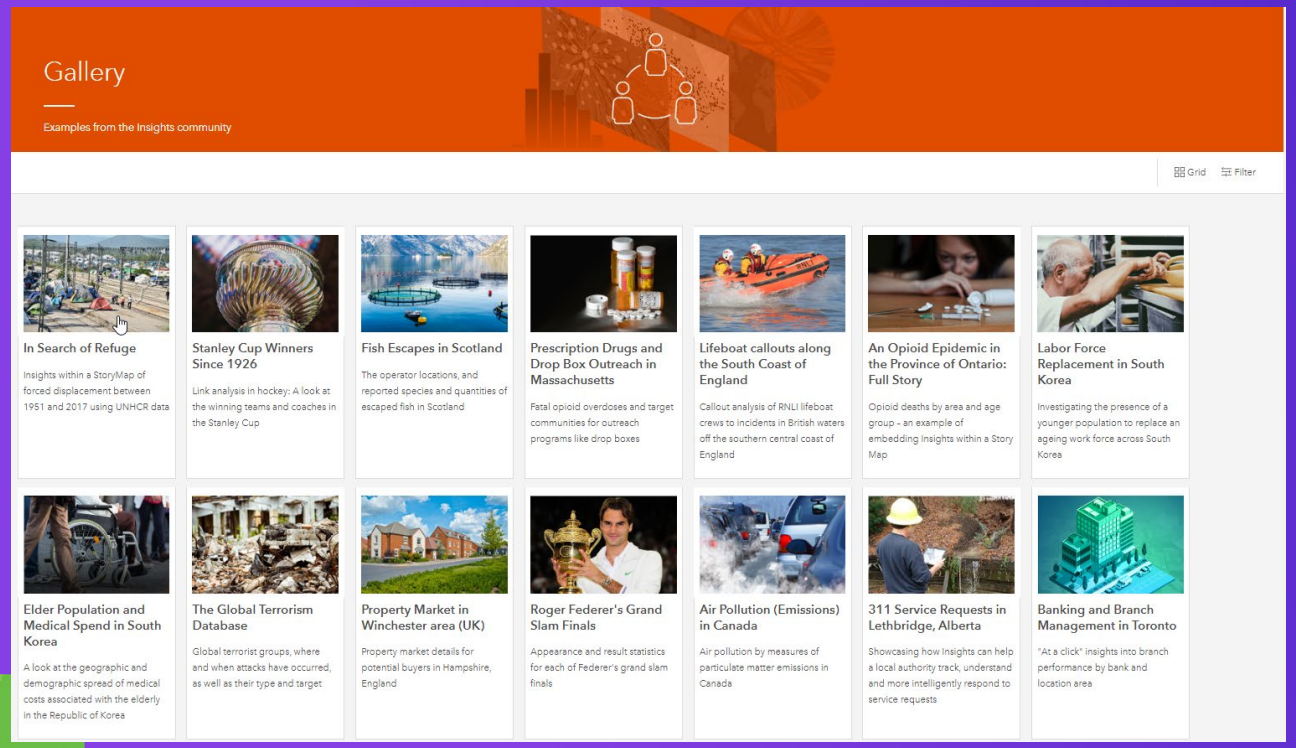
- Work offline
- Performance
- Ease of deployment
- Connect to databases
- No file size limits for add and export
- Leverage Python & R
- Do more when connected
- Connect to multiple orgs



Download today

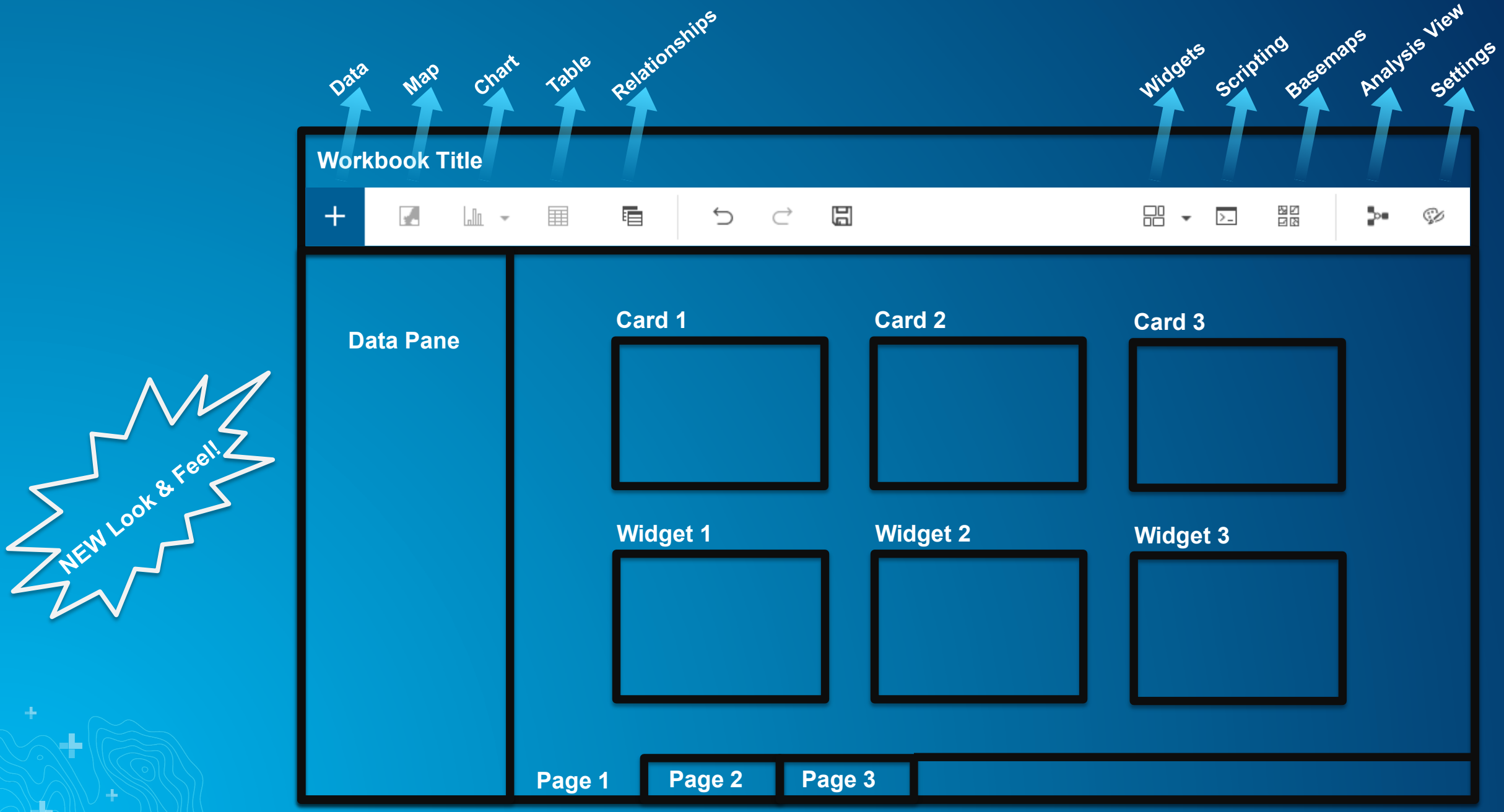
www.esri.com/insights → Deployment Options → Desktop





Example Gallery

Demo


Data
Map
Chart
Table
Relationships
Widgets
Scripting
Basemaps
Analysis View
Settings
Workbook Title
Data Pane
Card 1
Card 2
Card 3
Widget 1
Widget 2
Widget 3
Page 1
Page 2
Page 3
NEW Look & Feel!

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Use Data Where It Lives

Data Files

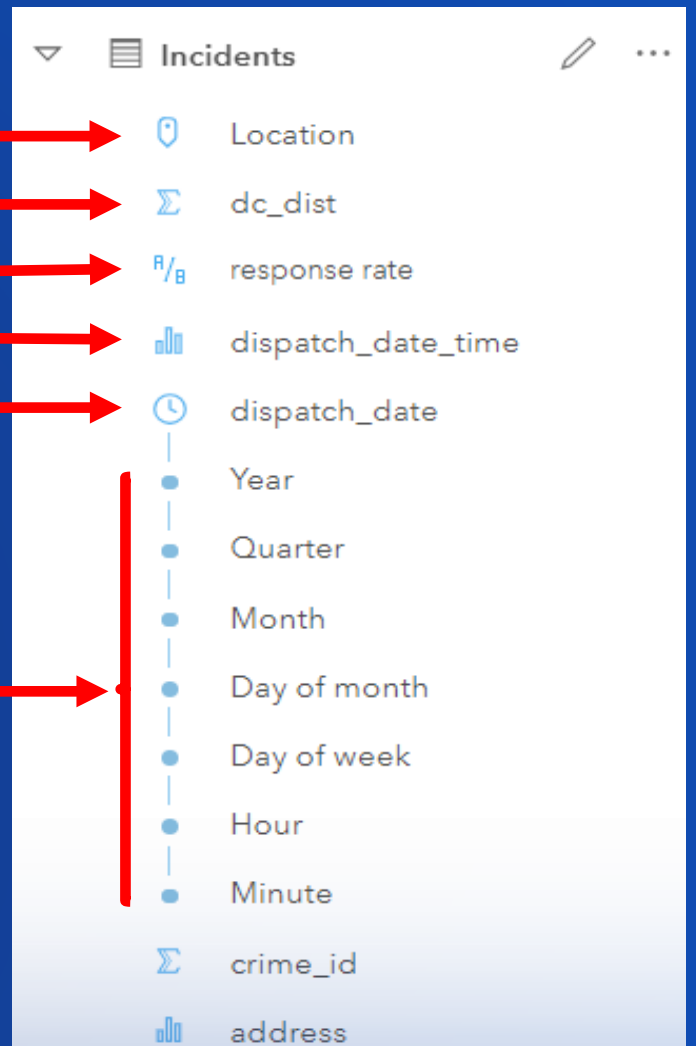
Enterprise GIS

Relational Databases

Python or R

Working with your data

Data pane



Shape

Numeric

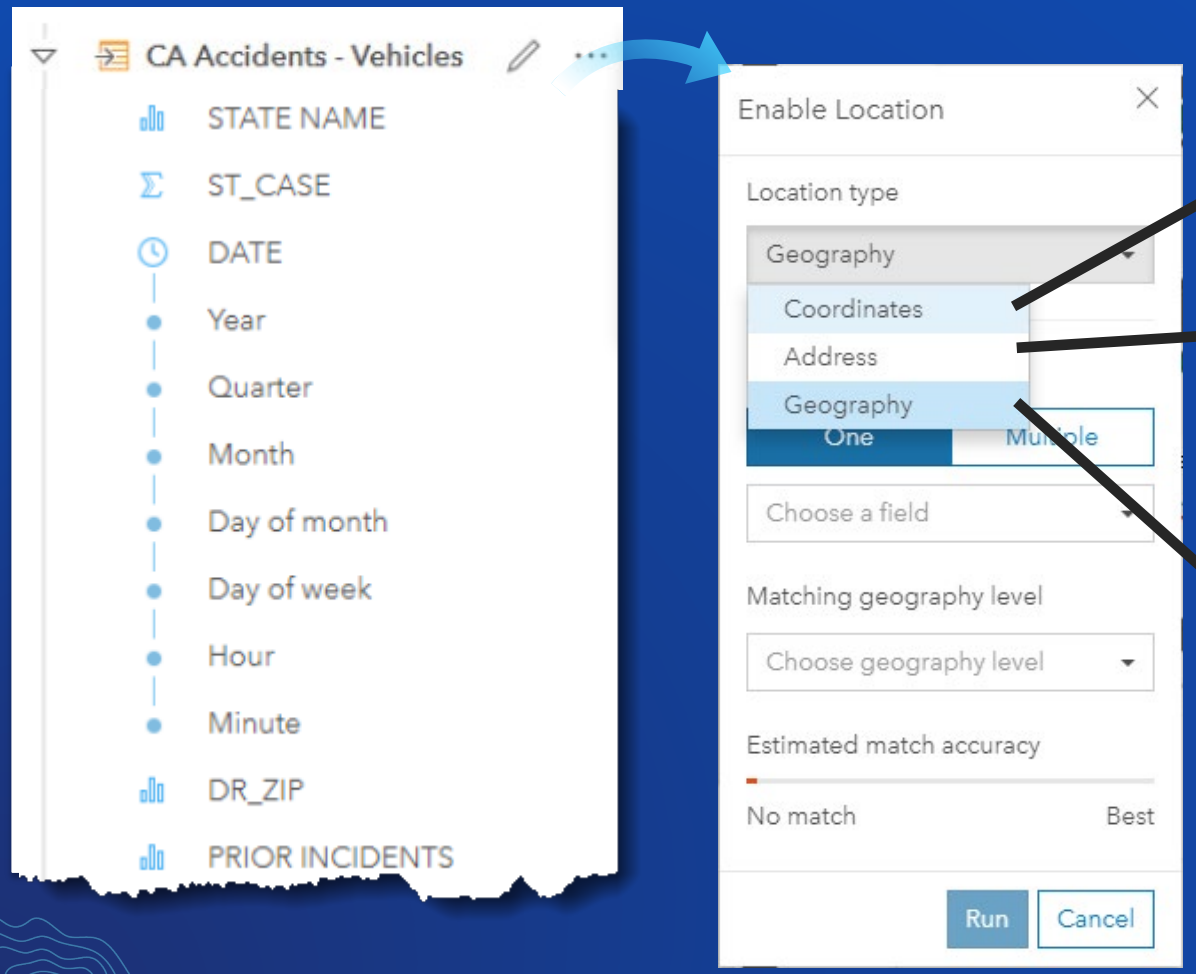
Ratio

Categorical

Date / time

Date components

Enable Location



Coordinates

- Custom spatial references supported

Address

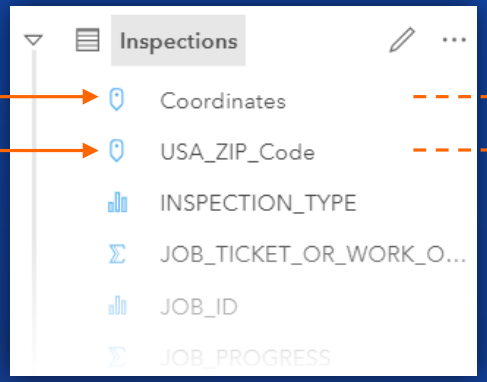
- Granularity down to rooftop / driveway
- Points of interest
- Global
- One or multiple source address fields

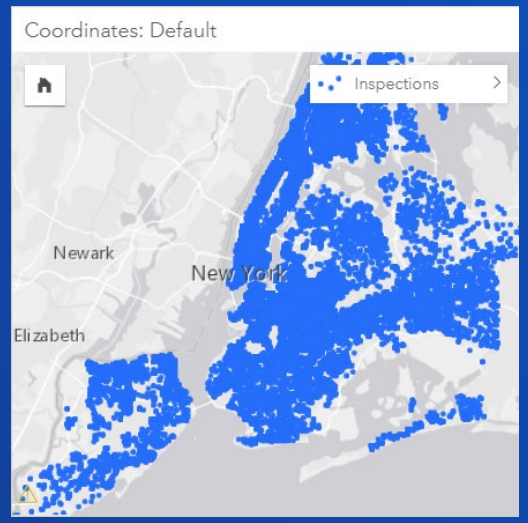
Geography (point, line, or boundary)

- Conflate spatial fields onto your data
- Use boundaries that come with Insights
- Use your own custom geographies

Multiple spatial fields

Shape fields





Enrichment – thousands of data attributes for over 130 countries

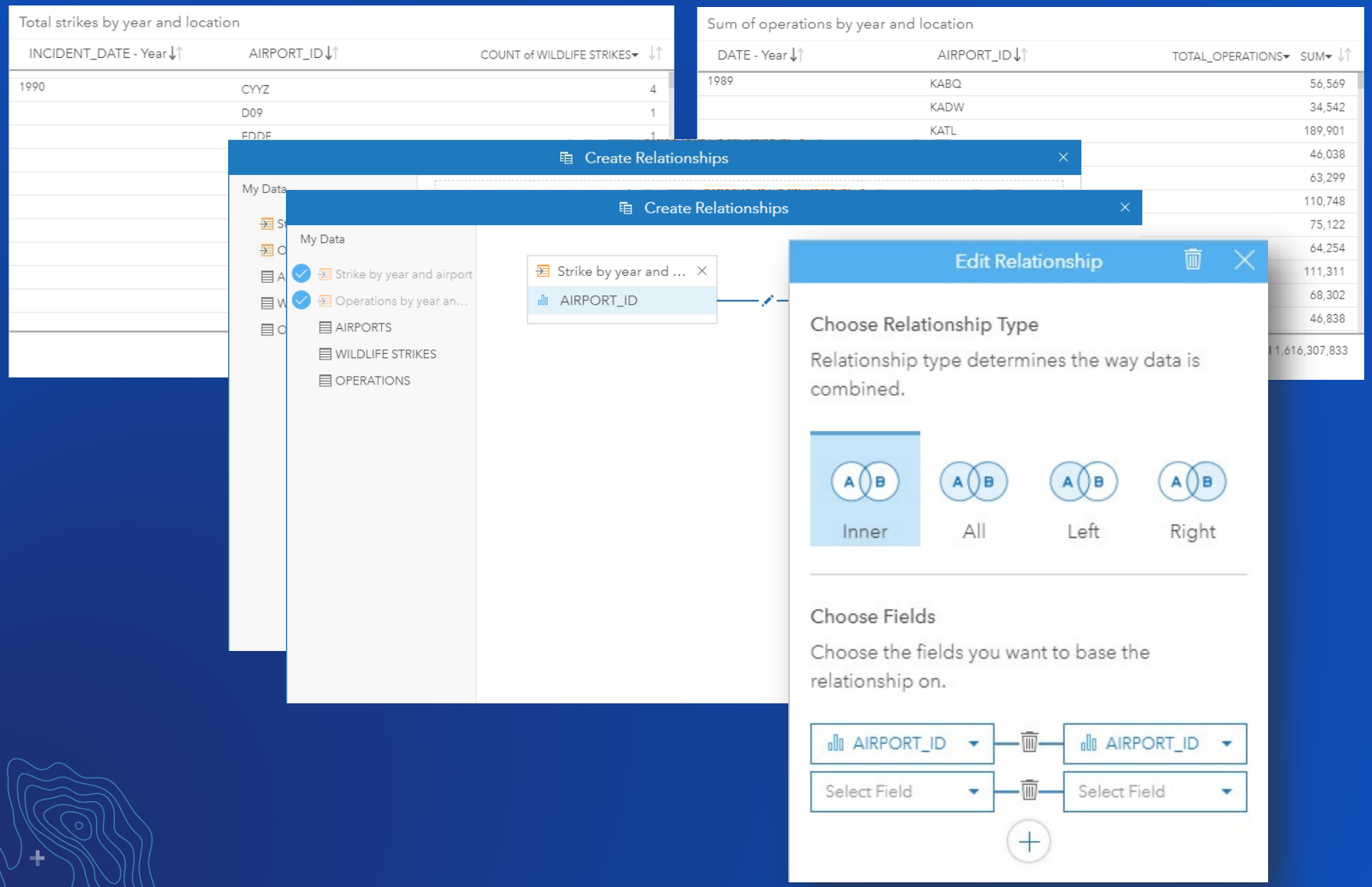
Your Data

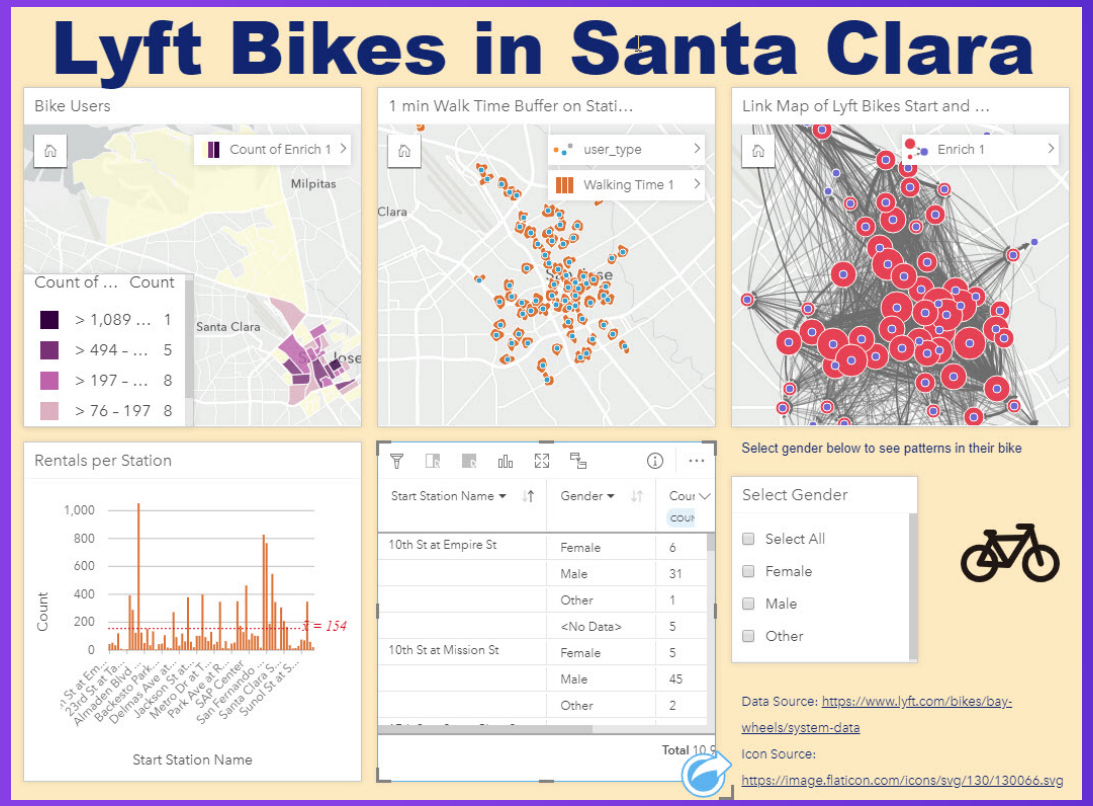
Enrich Variables

Your Data
with Variables

https://doc.arcgis.com/en/esri-demographics/coverage/

Create Relationships





Data Preparation

Demo

Exploratory Analysis

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Exploratory analysis

explore

verb | ex·plore | \ ik-ˈsplȯr \

1. To look into closely; scrutinize; examine
2. To become familiar with by testing or experimenting
3. To travel over (new territory) for adventure or discovery
4. To examine specially for diagnostic purposes

Charts

- Bar & column chart
- Treemap
- Bubble chart
- Heat chart
- Chord diagram
- Key performance indicator
- Scatterplot
- Scatterplot matrix
- Link chart
- Data clock
- Line graph
- Combo chart
- Stacked bar & column chart
- Histogram
- Box plot
- Donut chart
- Time series graph

Maps

Location

Aggregation

Binned

Flow

Heat

Proportional symbol

Choropleth

Density

Spider lines

Unique value

Visualization Options

Insights for ArcGIS®

Data type: Qualitative Quantitative Temporal

Measure: ascertain the size, amount, or degree of (something)

- A bar graph uses either horizontal or vertical bars to show comparisons among categories. They are valuable to identify broad differences between categories at a glance.
- A treemap shows both the hierarchical data as a proportion of a whole and, the structure of data. The proportion of categories can easily be compared by their size.
- Bubble charts represent numerical values of variables by area. With two variables (category and numeric), the circles placed so they are packed together.
- A heat chart shows total frequency in a matrix. Values in each cell of the rectangular grid are symbolized into classes.

Relationship: a connection or similarity between two or more things or, the state of being related to something else

- A choropleth map allows quantitative values to be mapped by area. They should show normalized values not counts collected over unequal areas or populations.
- A chord diagram visualizes the inter-relationships between categories and allows comparison of similarities within a dataset or, between different groups of data.
- Scatterplots allow you to look at relationships between two numeric variables with both scales showing quantitative variables. The level of correlation can also be quantified.
- Link analysis is used to investigate relationships between entities where and an entity is an object, person, place or event. Links connect two or more entities.
- Spider lines , also termed desire lines, show paths between origins and destinations. They show connections between places.

Change: process through which something becomes different, often over time

- A bar graph uses either horizontal or vertical bars to show comparisons among categories. They are valuable to identify broad differences between categories at a glance.
- A heat chart shows total frequency in a matrix. Using a temporal axis values, each cell of the rectangular grid are symbolized into classes over time.
- Bubble charts with three numeric variables are multivariate charts that show the relationship between two values while a third value is shown by the circle area.
- Graduated symbol maps show a quantitative difference between mapped features by varying symbol size. Data are classified with a symbol assigned to each range.
- A Density/heat map calculates spatial concentrations of events or values enabling the distribution to be visualized as a continuous surface.
- A Data clock creates a circular chart of temporal data, commonly used to see the number of events at different periods of time.
- Line graphs visualize a sequence of continuous numeric values and are used primarily for trends over time. They show overall trends and changes from one value to the next.
- A combo chart combines two graphs where they share common information on the x-axis. They allow relationships between two datasets to be shown.

Interaction: flow of information, products or goods between places

- A chord diagram visualizes the inter-relationships between categories and allows comparison of similarities within a dataset or, between different groups of data.
- Spider lines, also termed desire lines, show paths between origins and destinations. Flow maps show directional connections and flow between places.

Distribution: the arrangement of phenomena, could be numerically or spatially

- Histograms show the distribution of a numeric variable. The bar represents the range of the class bin with the height showing the number of data points in the class bin.
- A box plot displays data distribution showing the median, upper and lower quartiles, min and max values and, outliers. Distributions between many groups can be compared.
- A choropleth map allows quantitative values to be mapped by area. They should show normalized values not counts collected over unequal areas or populations.
- Graduated symbol maps show a quantitative difference between mapped features by varying symbol size. Data are classified with a symbol assigned to each range.
- A Density/heat map calculates spatial concentrations of events or values enabling the distribution to be visualized as a continuous surface.
- A unique symbol map (areas or points) allows descriptive (qualitative) information to be shown by location. Areas have different fills and points can be geometric or pictorial.

Part-to-whole: relative proportions or percentages of categories, showing the relationship between parts and whole

- Donut charts are used to show the proportions of categorical data, with the size of each piece representing the proportion of each category.
- A treemap shows both the hierarchical data as a proportion of a whole and, the structure of data. The proportion of categories can easily be compared by their size.

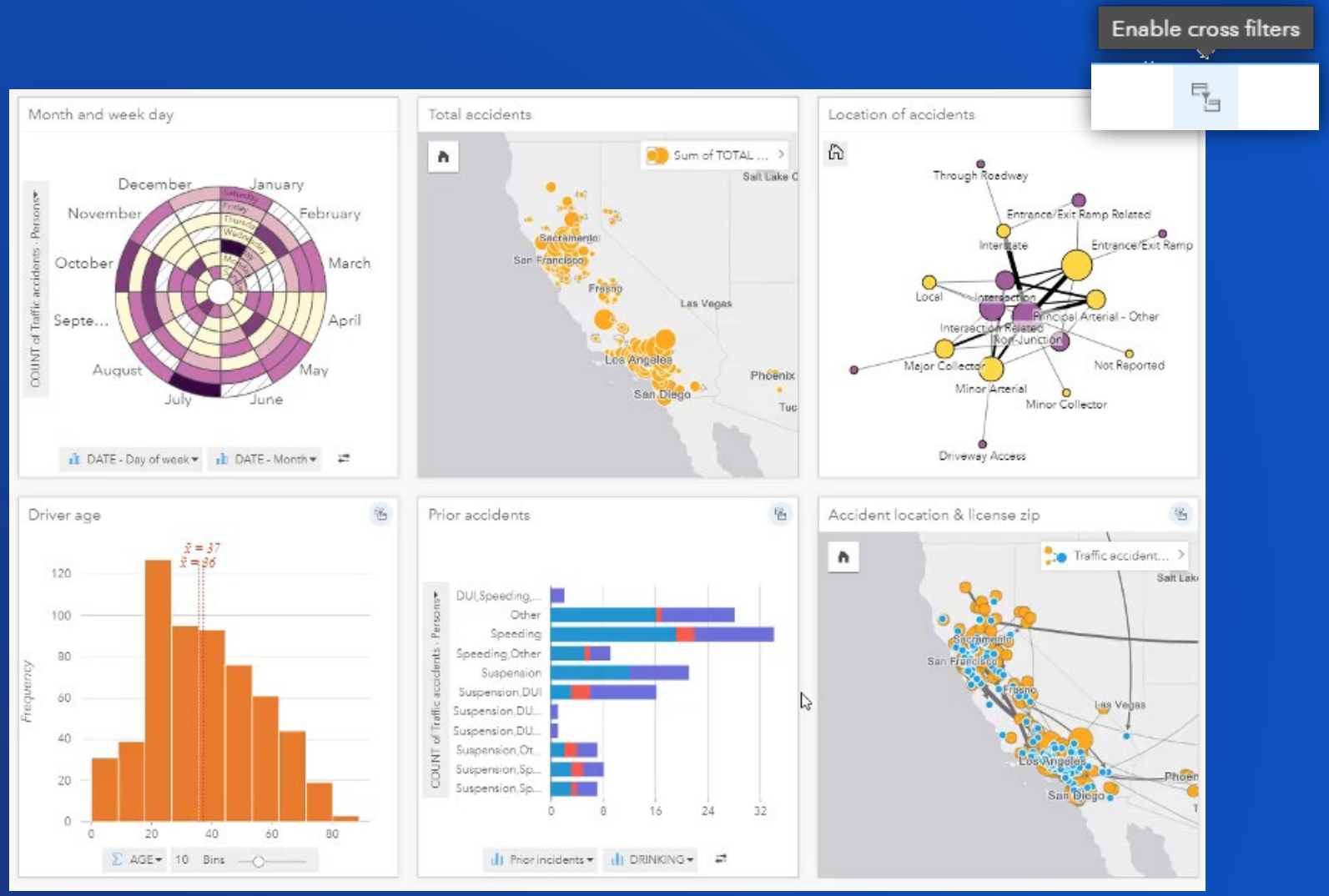
Acknowledgement
Inspired by work by Jon Schwabish and Severino Ribecca, The Graphic Continuum, 2014 and, Alan Smith et al. Visual Vocabulary, The Financial Times, 2016

esri

Linda Beale PhD, 2017

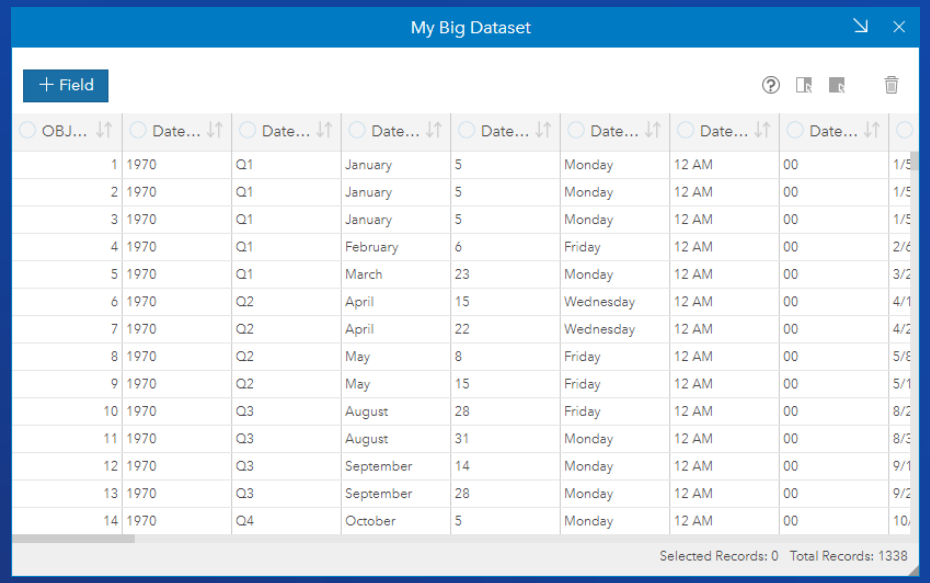
https://www.esri.com/content/dam/esrisites/en-us/media/pdf/data-visualization-options-in-insights-english-3.0.pdf

Cross filters



Tables (there are 2 types)

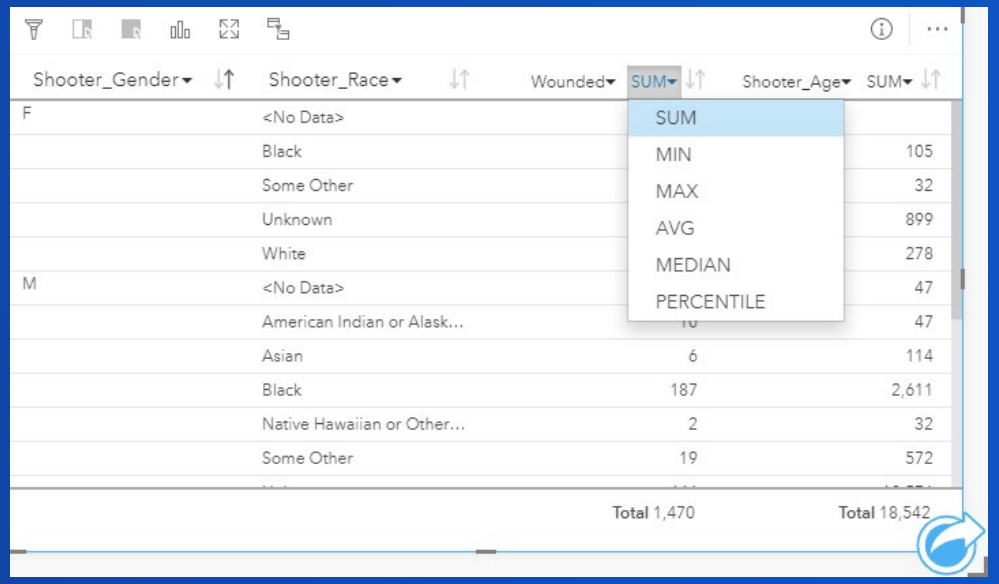
Data Table



OBJ...	Date...	Date...	Date...	Date...	Date...	Date...	Date...	Date...
1	1970	Q1	January	5	Monday	12 AM	00	1/5
2	1970	Q1	January	5	Monday	12 AM	00	1/5
3	1970	Q1	January	5	Monday	12 AM	00	1/5
4	1970	Q1	February	6	Friday	12 AM	00	2/6
5	1970	Q1	March	23	Monday	12 AM	00	3/2
6	1970	Q2	April	15	Wednesday	12 AM	00	4/1
7	1970	Q2	April	22	Wednesday	12 AM	00	4/2
8	1970	Q2	May	8	Friday	12 AM	00	5/8
9	1970	Q2	May	15	Friday	12 AM	00	5/1
10	1970	Q3	August	28	Friday	12 AM	00	8/2
11	1970	Q3	August	31	Monday	12 AM	00	8/3
12	1970	Q3	September	14	Monday	12 AM	00	9/1
13	1970	Q3	September	28	Monday	12 AM	00	9/2
14	1970	Q4	October	5	Monday	12 AM	00	10/

- The entire dataset
- Calc new fields
- Not part of a shared page

Summary Table

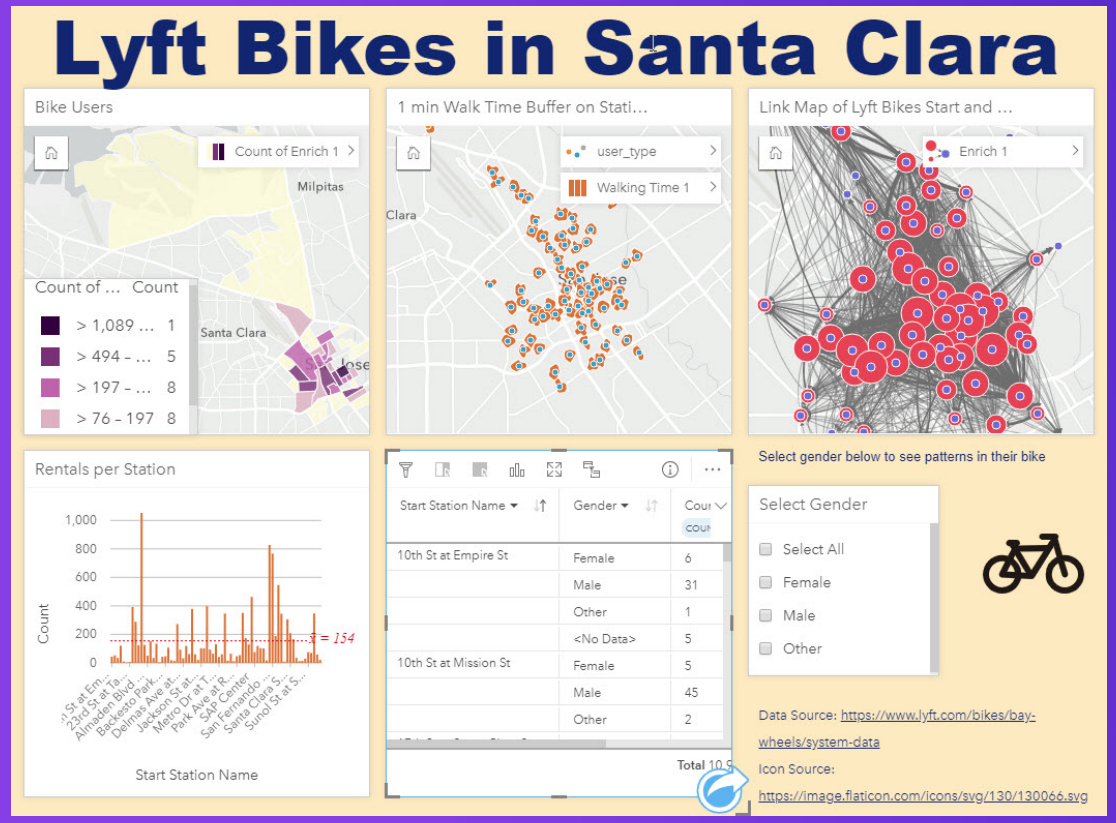


Shooter_Gender	Shooter_Race	Wounded SUM	Shooter_Age SUM
F	<No Data>		
	Black		105
	Some Other		32
	Unknown		899
	White		278
M	<No Data>		47
	American Indian or Alask...	10	47
	Asian	6	114
	Black	187	2,611
	Native Hawaiian or Other...	2	32
	Some Other	19	572
		Total 1,470	Total 18,542

- Extracts significance from detailed dataset
- Pivot, and show descriptive statistics
- Interactive with chart and map cards
- Included with a shared page

Exploratory analysis: Real-world examples

- A boxplot showing outliers of water meters, to identify dead meters
- A scatterplot of home assessment values, to identify where houses need to be reassessed
- A treemap of 311 calls, to show which are the most common types of government service requests



Exploratory Analysis

Demo

Spatial & Statistical Analysis

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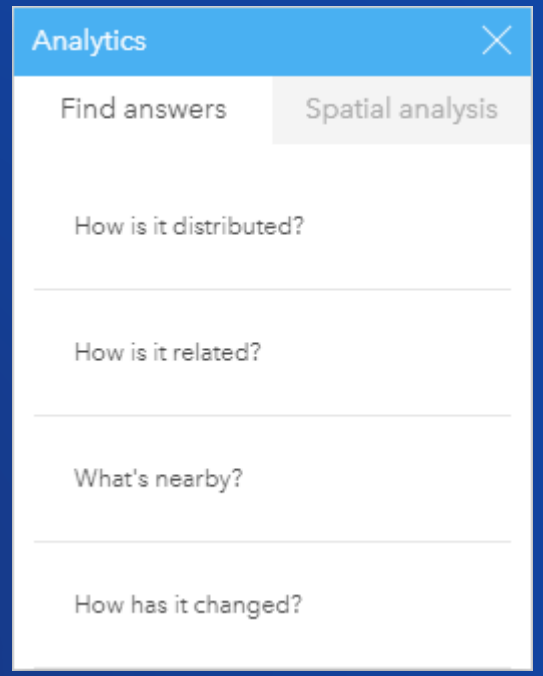
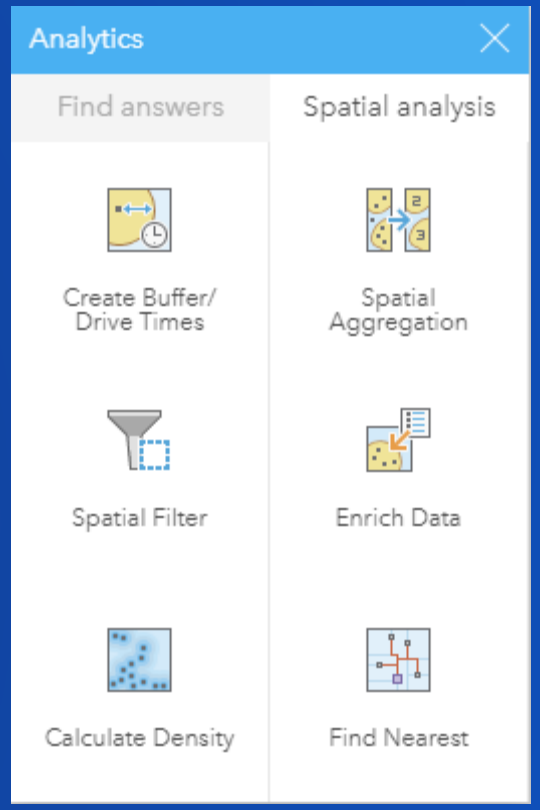
Spatial and statistical analysis

- Answer questions by running a process, method, or procedure
- Analysis results are stored as data and available for you to reuse
  - Either within or outside of Insights
  - Iterative analysis, building upon results

The Action Button





Spatial Analysis Techniques

Enrich Data

Calculate Density

Create Buffer/ Drive Times

Spatial Filter

Spatial Aggregation

Find Nearest

Statistical Analysis Techniques

Calculate Ratio

Predict Variable

View Link Chart

Calculate % Change

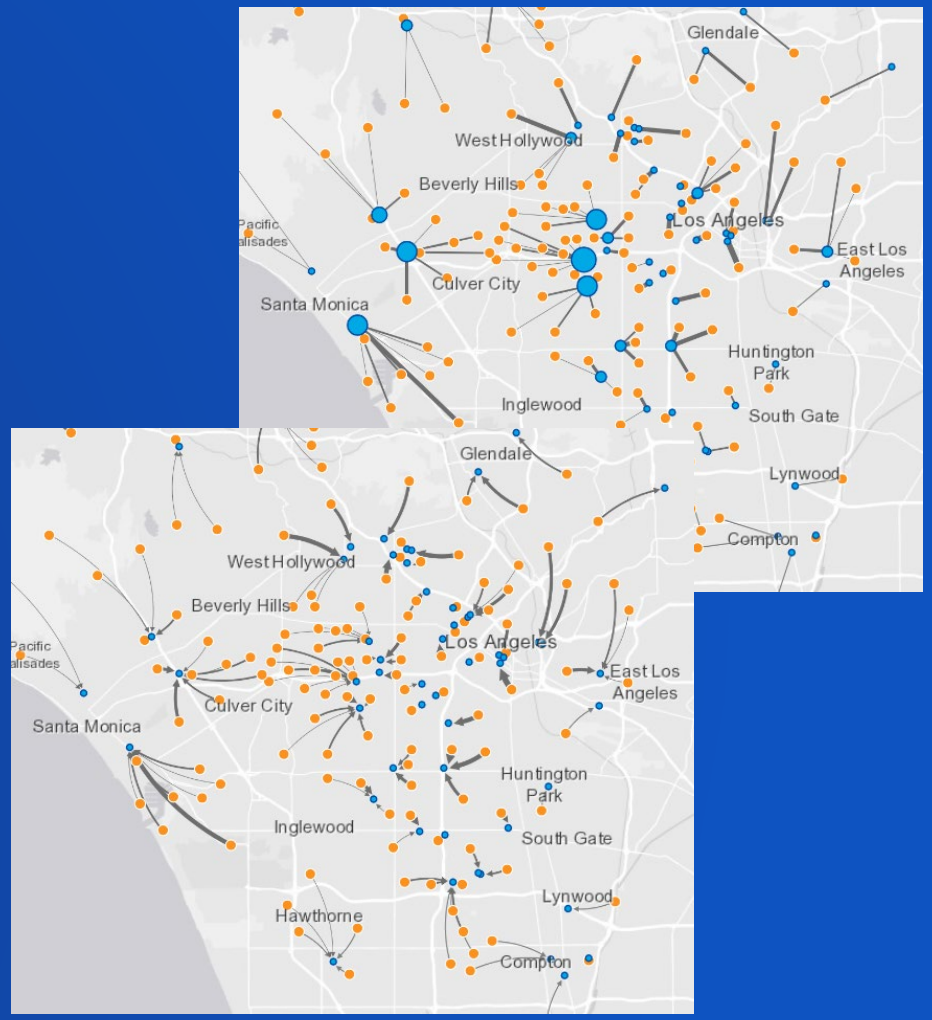
Calculate Z-Score

Create Regression Model

Link maps (aka graph analysis)

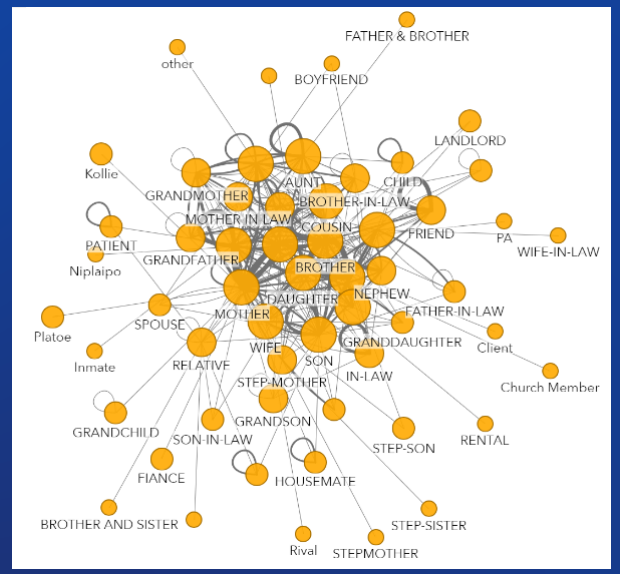
- **Spider lines or desire lines**
  - A desire line map shows straight lines connecting the origins and the destinations
  - Shows the shortest line between origin and destination

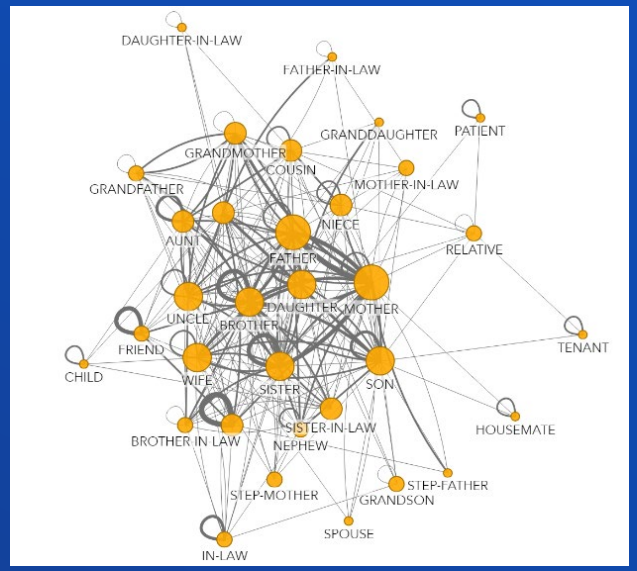
- **Flow maps**
  - Shows movement of people, goods, transport etc.
  - Displays direction of movement and can also show volume



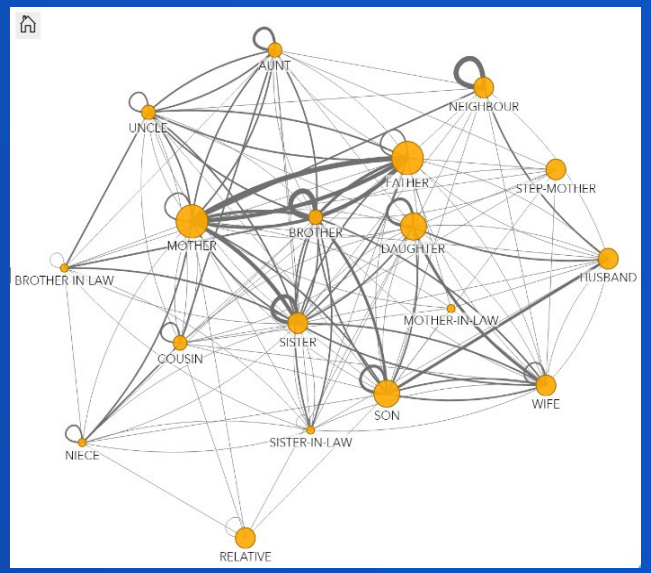
Centrality metrics

Closeness
Important nodes are close to other nodes (topological shortest path)

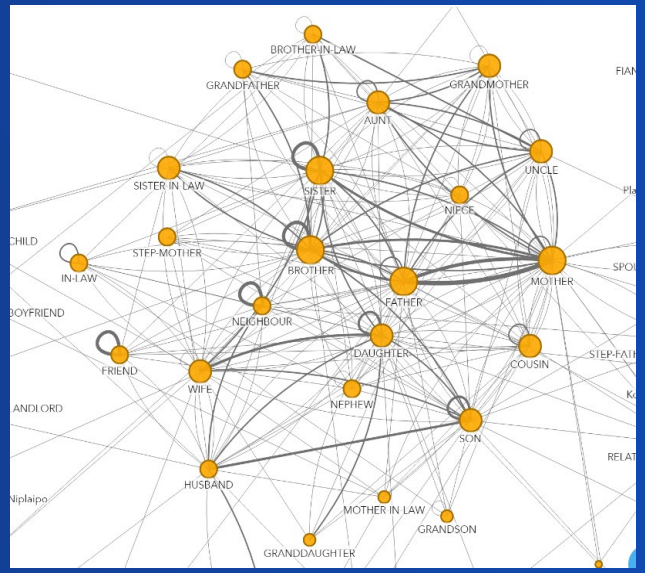




Degree
Important nodes have many connections



Betweeness
Important nodes are connections in the network

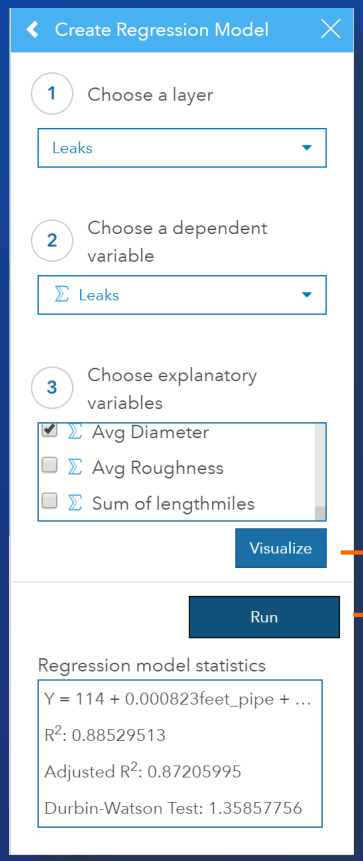


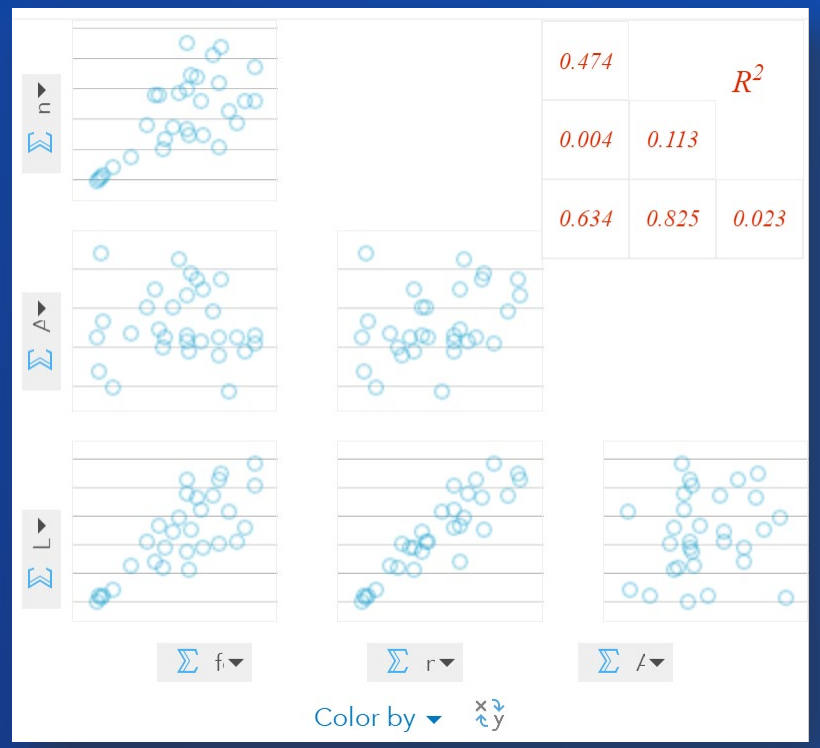
Eigenvector
Important nodes are connected to many nodes who also have high scores

Applicability of link analysis

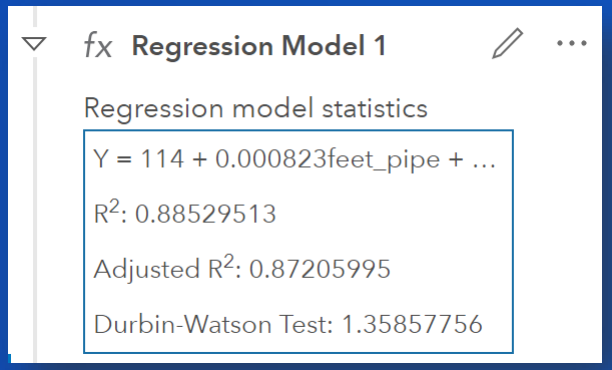
- Which nodes are critical sections of a network?
  - Lines of communication in business or crime networks
  - Electrical transmission or water towers, distribution transformers or water mains etc.
  - Road intersections or bridges
  - Servers that are likely to get the most load
  - Key distribution centers, finding catchment and service areas
  - Spread of epidemic diseases
  - Critical transport routes by affected people
  - Flow of information of goods between people or places

Regression & predict

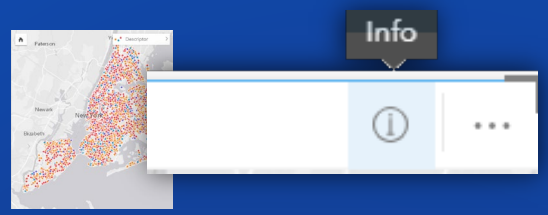


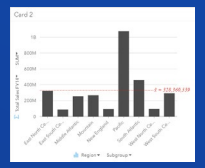


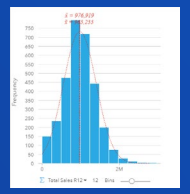
Function in the Data pane

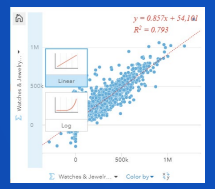


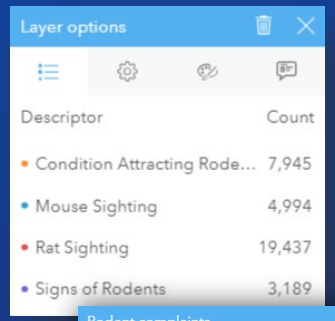
Descriptive statistics on cards

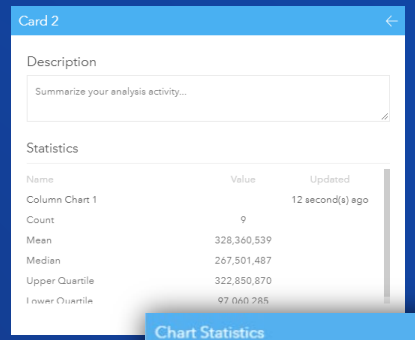


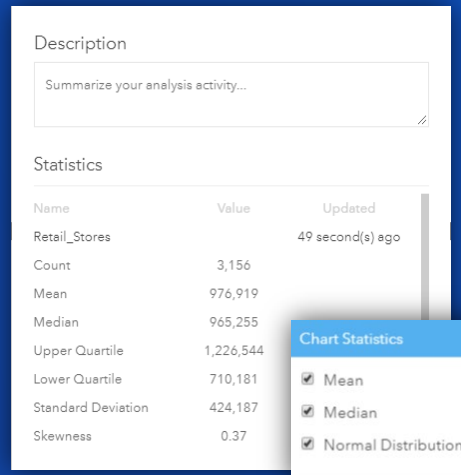


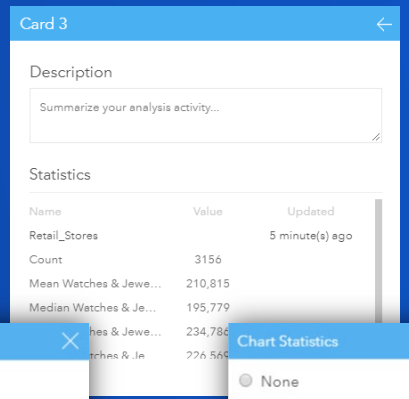


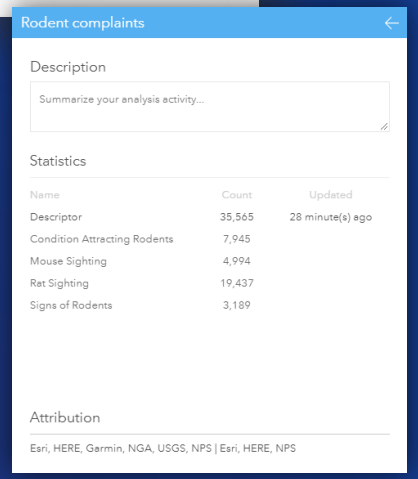


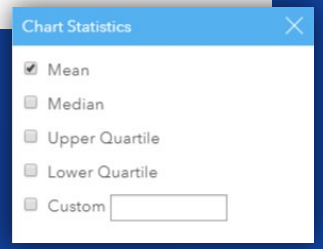


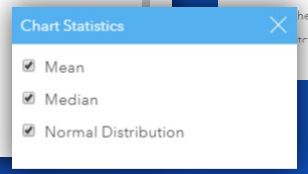


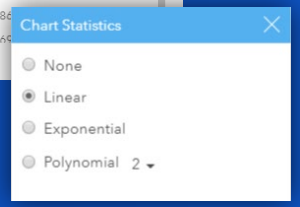






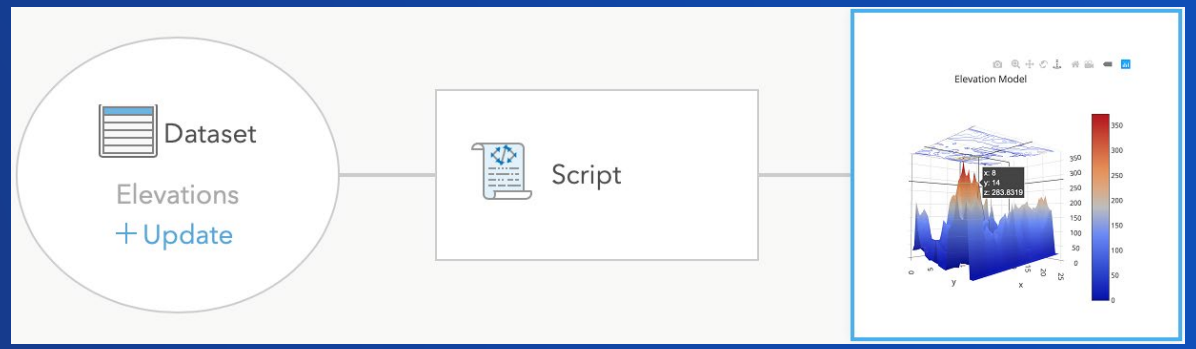






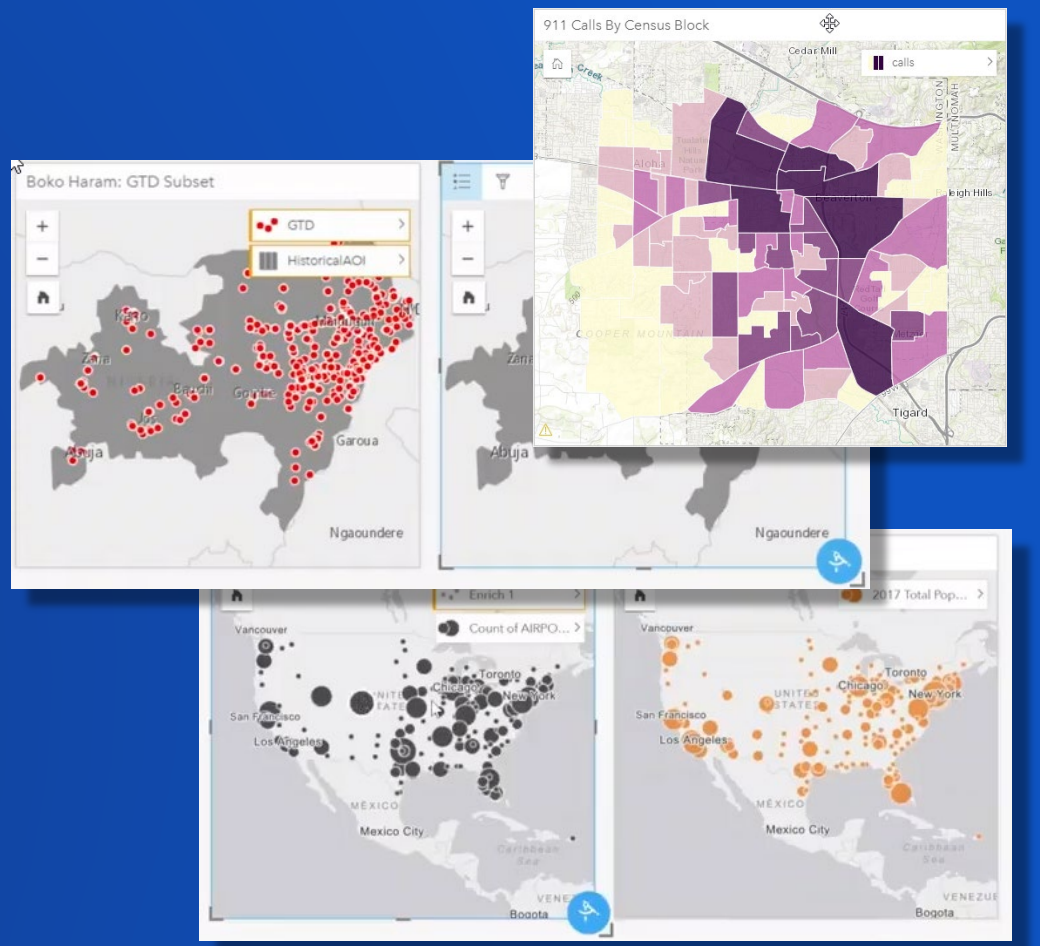
Python & R Integration

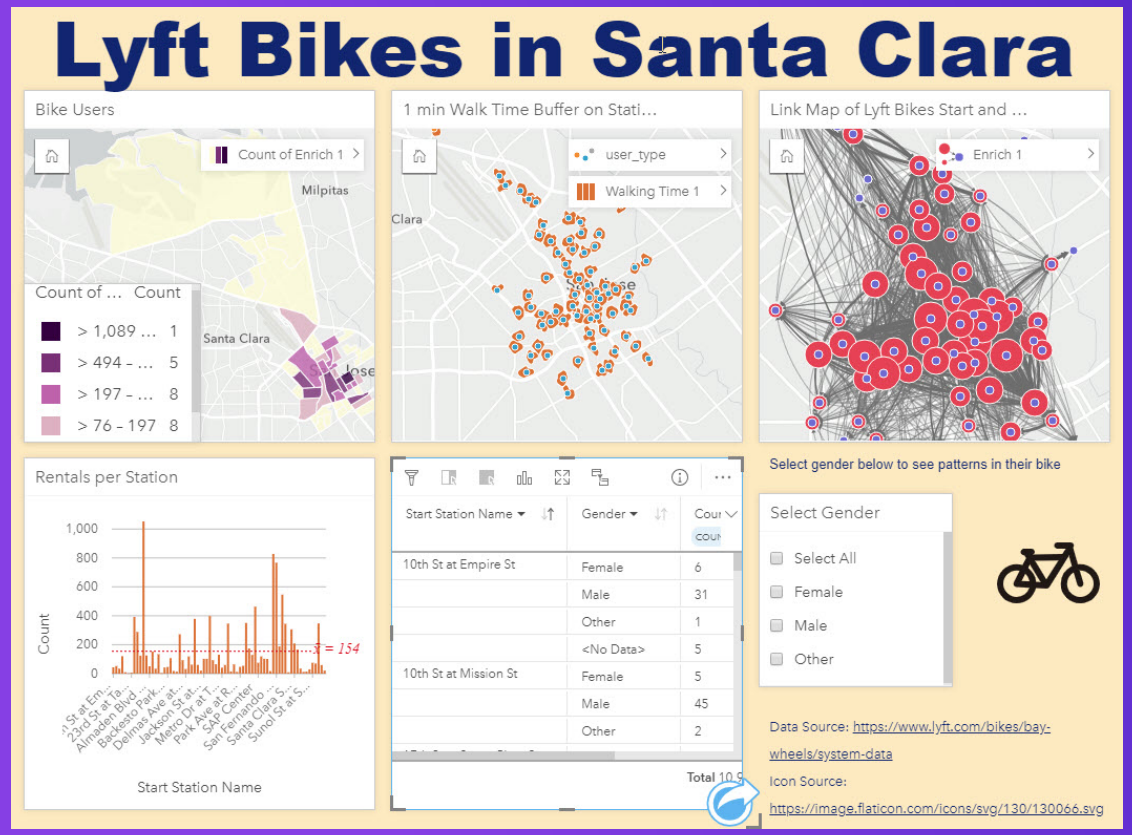
- Connect to data
- Perform analysis with open data science tools
- Embed scripts into an Insights model



Spatial and statistical analysis: Real-world examples

- Predict variable, to forecast where 911 calls are likely to happen, based on projected data
- Spatially filter and spatially aggregate, to summarize and understand patterns of social events and activities
- Enrich data, to add population data and wildlife areas, to measure human impact





Spatial & Statistical Analysis

Demo

Sharing Reports & Models

Exploratory Analysis
- Charts, tables, and maps
- Interactivity between visualizations
- Context of the largest digital atlas in world

Statistical Analysis
- Descriptive stats
- Regression
- Link analysis
- Python & R

Spatial Analysis
- How is it distributed?
- How is it related?
- What's nearby?
- How has it changed?
- Python & R

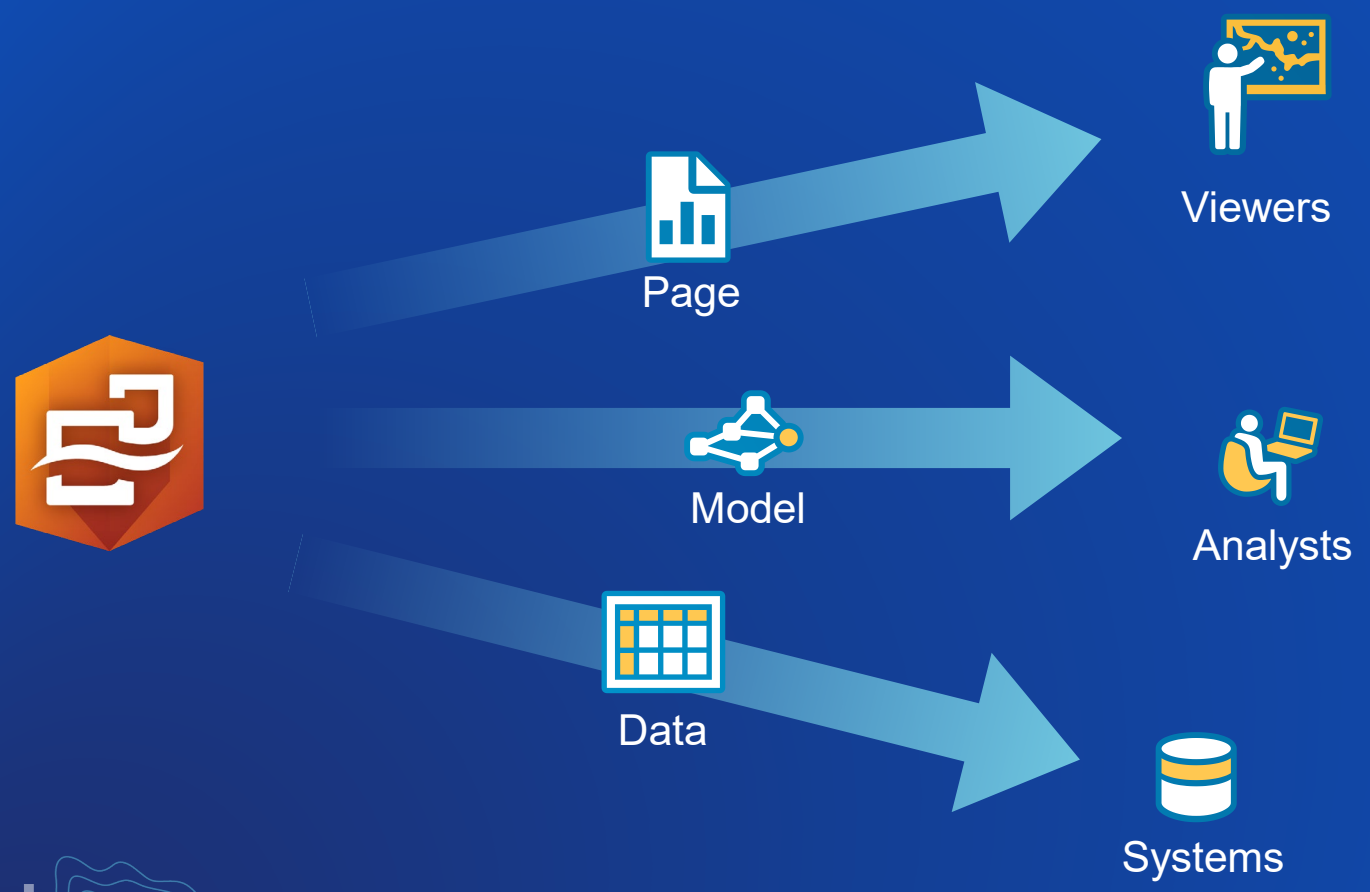
GeoEnablement
- Geocode address
- Convert X,Y
- Join to boundaries
- Enrich proportionally with demographic variables

Record & Repeat Analysis
- Share model to analysts
- Document best practices
- Re-run with new data

Share Results
- Share with executives
- Tell your story
- Share with public

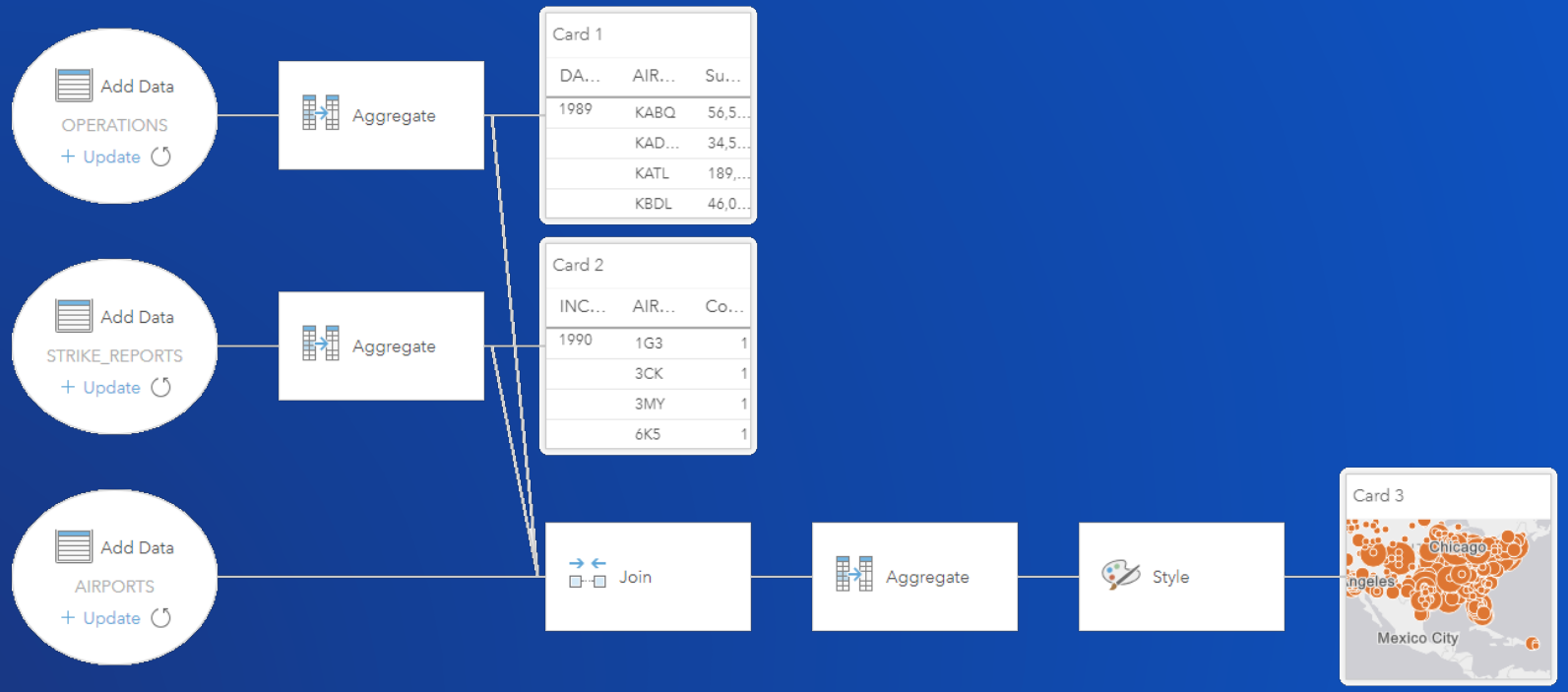
Data Preparation
- Format fields
- Calculate new fields
- Filter data
- Hide fields
- Rename fields and datasets
- Join datasets

Maximizing Your Work With Others



- **Share results**
  - **Interactive cards**
  - **Tell your story**
  - **Internal stakeholders or public**
- **Repeat and understand analysis**
  - **Share models to analysts**
  - **Document your methodology**
  - **Rerun with new data**
- **Export resulting datasets**
  - **Use in different systems**

Methodology – Documented and Repeatable



Refined and finished information products

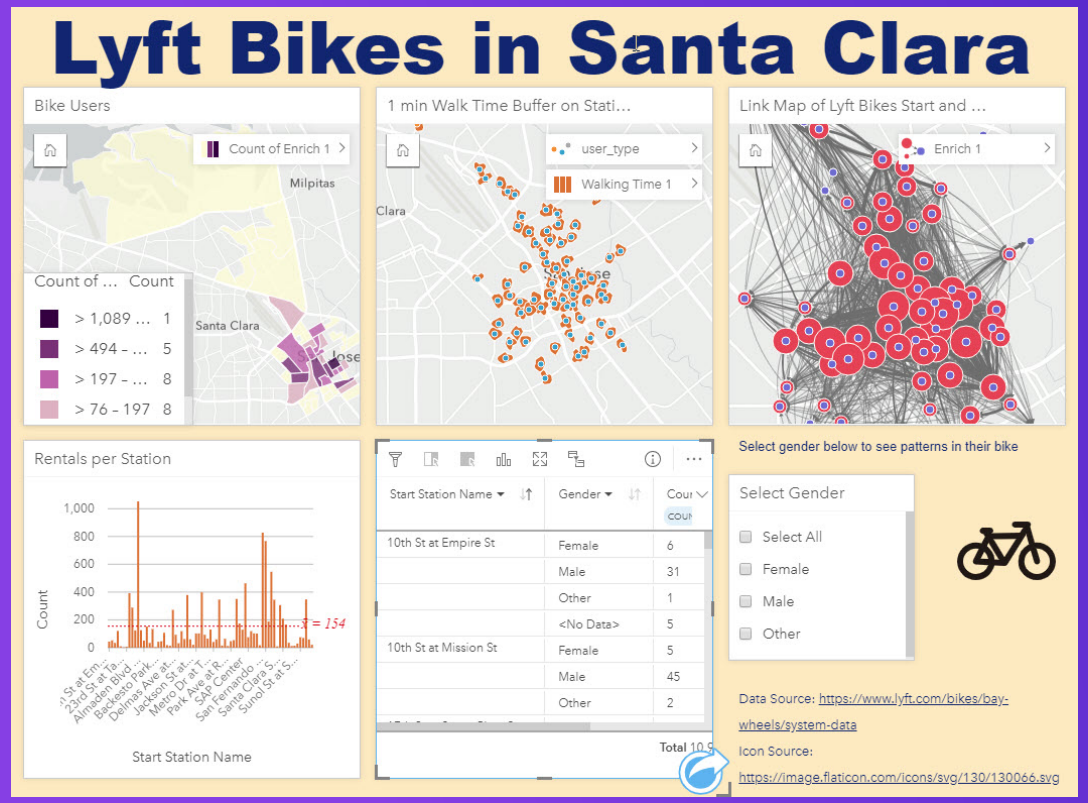
- Organization branding, logo, colors, etc.

ABC Tool
Company, Inc.

- References and site resources

Authors: *L. Bird & M. Johnson*
Data source: *World Wide Sports*

- Context, story, and narrative
  - Hyperlinks, videos, images
  - Descriptions, captions, and how to interpret the visuals



Sharing Reports & Models

Demo

What did we see today?

1. Combine spatial and non-spatial data in one view
2. Add context to your existing data, with new content
3. Breakdown and explore large data, into manageable questions
4. Perform powerful analysis, simply
5. Use intelligent visualization techniques, and communicate results

Roadmap & Resources

Section Subhead

Continuous Development

What's newer
- Stacked percent bar chart
- Easily create combo chart
- Point chart
- Regression analysis interpretability
- Spatial aggregation with weighted values
- Link analysis layout improvements
- Change string field to time
- Seconds component on time fields
- Copy data to workbook
- Desktop in final
- Scripting (Python & R) in final
- Update UI
- Export from data pane
- Domains & subtypes
- Summary table readability
- Multiple Enterprise / Online logins
- User settings

What's planned (July-ish)
- Scheduled refresh of analysis
- Accessibility (tabbing and screen readers)
- Microsoft SQL Server OS Database Authentication
- SharePoint and OneDrive data connectors
- Assign primary field for non-spatial data
- Packaging in Online / Enterprise, and sharing workflows
- Map pop-up improvements and configurability
- Legend improvements
- Card labeling
- Card title configurability
- Authors configure map control for viewers
- Z-ordering of cards
- Predefined filters as a drop-down
- Search for field in data pane and predefined filter
- Reorder page tabs
- Page and card font control
- Calculate length and area
- Spatial mean
- K-means (clustering)
- Kernel density

What's coming (TBD)
- More data connectors
- More analysis
- Better printing support
- We want to hear from you!

Resources & Next Steps

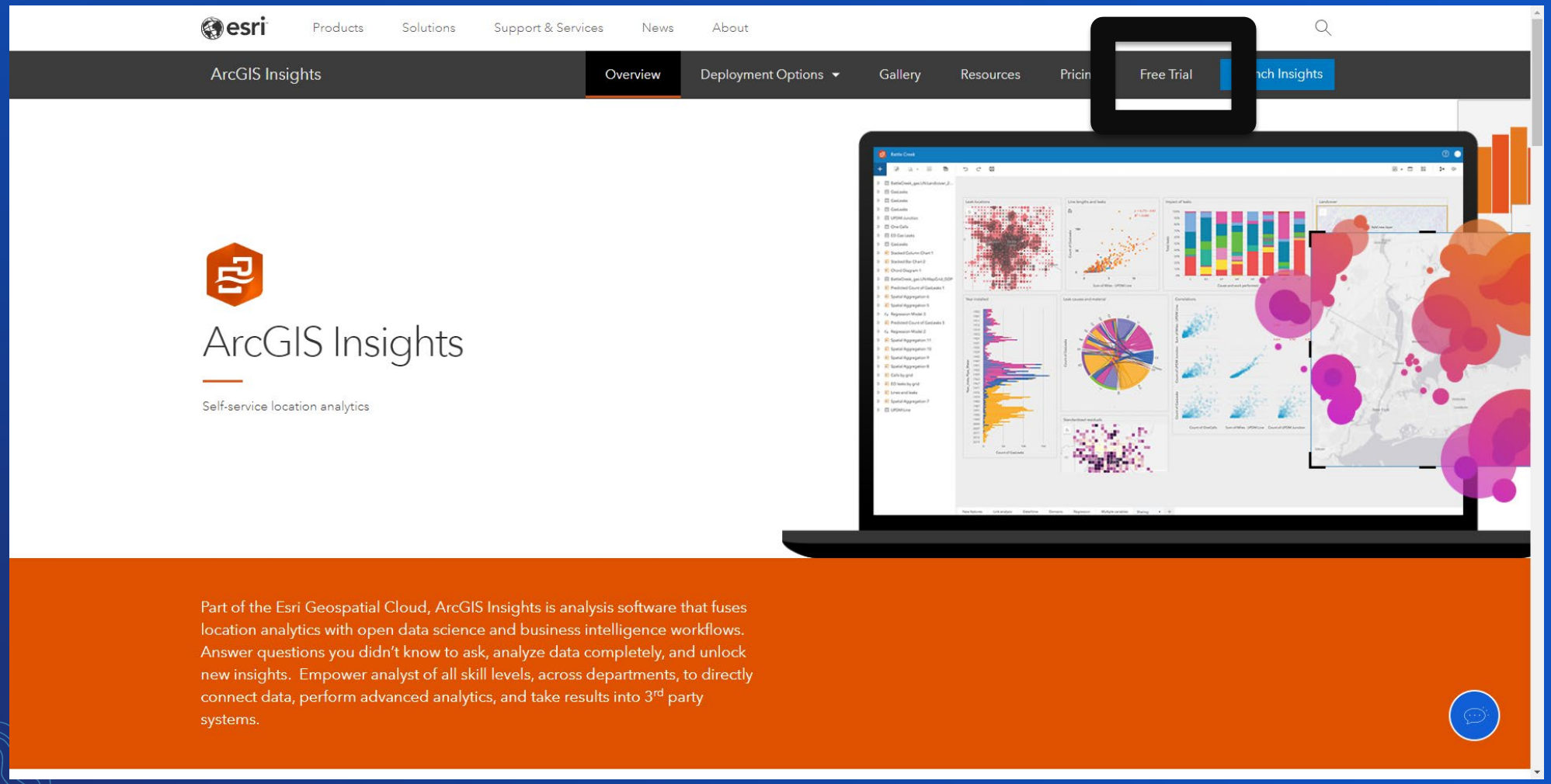
Training

- http://esriurl.com/InsightsLessons

Success Stories

- http://esriurl.com/InsightsStories

Free Trial - esri.com/insights



Thank you!