Thank You to Our

Sponsors
Insights for ArcGIS: Explore a new world in your data

- Discover the power of exploratory analysis
  - Visual and intuitive
- Combine Analysis and Visualization on cards
  - Linked and responsive
- Drive impactful decisions
  - Learn, record, share and collaborate
Insights for ArcGIS

Data - Spatial and Tabular

Visualization & Analysis

Insights page in ArcGIS
Working with Data – Intelligent defaults

Fields, or attributes are defined to a role

- Insights works directly against the fields
- Dimensional model created behind the scenes
  - Geo-Dimension
  - Temporal-Dimension
  - Categorical (Strings)
  - Quantitative (Numbers)

...roles help define actions that can be taken in Insights for ArcGIS
Relationships

Create Relationships

My Data
- well_production
- well_attributes

API

Edit Relationship

Choose Relationship Type
Relationship type determines the way data is combined.

- Intersect
- All
- Left
- Right

Choose Fields
Choose the fields you want to base the relationship on.

API

Cancel  Finish
Analysis: Interactivity
Analysis: Action Button, starts with questions
Results of Analytic Operations are expressed in Cards Visualizations
Sharing

- Workbooks, Pages, Cards, Workflow Templates
  - Insights Viewer
  - Portal Items
- Result Datasets as Feature Layers
- Insights Pages can be embedded in Story Maps
Using Insights for Analysis
Selections and Filters

- **Attribute filters**
  - Data pane versus card
  - Remember date breakdowns
- **Spatial filters**
  - Drag and drop polygons
  - Drawing
- **Attribute selection**
  - Use the interactivity
  - Legends
  - Cards e.g. maps, charts, tables
- **Spatial selection**
  - Drag selection to new map card
Spatial Analysis Tools

- Spatial aggregation
- Create buffer / drive times
  - Fixed distance (preview mode)
  - Drive time (by mode time / distance)
- Enrich data
- Calculate density
- Find Nearest
Result layers

- New temporary result layers are created:
  - When the data takes a new form e.g. summary table, bar chart or spatial selection - fewer features with attributes
  - Analysis tool has been run
- Result layers can be shared back to the portal
- Insights can use data with multiple shape fields e.g. find nearest
Analysis view and models

- Analysis is recorded
  - Steps can be seen in the analysis view
- Models can be shared and input data updated
Demo
Cards
Maps, Charts, Tables
Map Types

CHOICE MATTERS
Map types

- Analysis and, therefore, **thematic** mapping
  - Light / dark gray basemaps
- Vector only (to date)
  - Points, lines and polygons
Map symbol types

- Quantitative and qualitative options
  - Types (Unique symbols)
  - Locations (single symbol)
  - Original symbol
  - Counts and amounts (size)
  - Counts and amounts (color)
Choropleths

- Quantitative data – rates, ratios or percentages

⚠️ **Choropleth maps should show normalized values not counts collected over unequal areas or populations**

- Using normalization (in GIS terminology) we can take into account the differences between the areas (e.g. size of area, population size etc)
- Normalization transforms measures of magnitude (counts or weights) into measures of intensity
Classification

- Quantitative data

- Classification is the method of grouping numeric data into ranges

- Classification methods include:
  - Natural Breaks *
  - Equal Interval
  - Quantile
  - Standard Deviation
  - Unclassed
  - Manual

⚠ Classification is important

* Default
Chart types
WHAT TO USE WHEN
Bar graphs

- Qualitative data *

- Compare information, revealing highs and lows, trends
- A bar graph uses either horizontal or vertical bars to show comparisons among categories
  - Horizontal can be clearer if labels are long
- Along one axis the categories are plotted, and the other axis represents a numerical value
- They are useful for identifying broad differences between categories at a glance
  ✅ Not effective with a large number of categories
Grouped or Stacked Bar Graphs

• Grouped Bar Graphs: Two or more data series are plotted side-by-side and grouped together under categories, all on the same axis.

⚠️ With many bars in any group, they quickly become hard to read

• Stacked Bar Graphs: place the bars of multiple categories on top of each other to show how a larger category is divided into smaller categories and what the relationship of each part has on the total amount.

⚠️ Comparing segments to each other is problematic since they are not aligned.
Treemaps

- Show hierarchical data as a proportion of a whole and the structure of data
- The proportion of categories can easily be compared by their size

⚠️ Not effective for revealing small differences
Bubble charts

- **Qualitative data** or quantitative data

- Represent numerical values of variables by area in circles, randomly placed
- With two variables (e.g. category & count), the circles placed so they are packed together
  - Less perceptually accurate than bar charts (but allow hundreds of values to be visualized)
- If three variables are used (three numeric) then the circles are placed using Cartesian coordinates
  - Hard to read with too many categories
Donut chart

- Qualitative data

- Are used to show relative proportions or percentages of categories

- Ideally, donut charts should have at least three categories and no more than eight

⚠️ The donut represents the whole so the data must constitute the whole
Chord diagram

- Visualizes the inter-relationships between categories
- Allows comparison of similarities within a dataset or between different groups of data

⚠️ With too many connections over-cluttering becomes a problem
A heat chart shows total frequency in a matrix. Values in each cell of the rectangular grid are symbolized into classes.

Data is classified so if data ranges are wide, local variations will be hidden.
Data clock

- Qualitative data

- A Data clock creates a circular chart of temporal data (stored as a qualitative variable)
- Commonly used to see the number of events at different periods of time

⚠️ Remember data is classified; Can be hard to read with too many categories
Histograms

- **Single quantitative field** *

- Show the distribution of your data e.g. mean and median
- The numeric values are classified / binned
- The bar represents the range of the class bin, and the bar height represents the number of data points in the class bin
  - Statistics are reported: mean, median, standard deviation, skewness, kurtosis
  - The statistics are approximations (calculated on the classified data)
  - The normal distribution can be overlaid
- A dataset of the aggregated data is created
Box plot

- Shows the distribution of a set of data, within one box with:
  - the median, upper and lower quartiles, minimum and maximum values, and any outliers
  - Useful for comparing distributions between many groups

- Data can be broken down by a category
  - side-by-side box plots are created, with each box plot representing the spread of data in each category
Scatterplots

- Allows you to look at relationships between two numeric variables (both scales and quantitative)
  - Independent / known on horizontal, dependent / modeled on vertical
  - Points can also be color-coded to increase the number of displayed variables to three
- If the data contain a large range of values, one or both axes can be converted to a log scale (log-normal and log-log)

⚠️ Should be a logical reason for expecting a relationship
Scatterplot: Correlation

- Level of correlation can be quantified comparisons of two paired sets of measures to determine
  - Linear: as one set goes up the other set goes either up or down, equally.
  - Exponential: data values that rise or fall at constantly increasing rates. Data cannot contain zero or negative values.
  - Polynomial (2-4): when data fluctuates. The order of the polynomial is determined by the number of fluctuations.

1. Strength
2. Direction
3. Type
Time series/Line graph

- **Temporal data** *

- Visualize a sequence of numeric values, primarily for trends over time
- A line graph displays the relationship between two types of information by connecting individual numeric data points, showing the sequence of values
- Good to highlight overall trends of values and change from one value to the next

⚠️ They should only be used with continuous variables
Summary Tables

- Qualitative and/or quantitative data

- For analyzing data
  - Or exact values are important

- Additional statistics can be calculated on numeric fields
  - sum, average, min, max
  - Information can be sorted
  - Selections can be inverted or just show selected

- Can summarize data by up to two categories and \( n \) numeric fields

- Data management with new result created
  - Can be joined to create new datasets
Data Table

- Attribute table

- Access to see all the data in the dataset
- Fields can be sorted ascending or descending
- Switch selections or just show selected
- Add and calculate fields
  - Functions can be accessed using the \( \text{fx} \) button
  - Four types are available: string (10), numeric (10), date (4), and logical (3)
  - Creates a join to the original data
Try It Yourself!
Tutorials

- Documentation “Quick exercises”
- Learn ArcGIS lesson
Q & A