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An Overview of Solving Spatial Problems Using ArcGIS

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Real World Example

Using Spatial Analysis for Search and Rescue

Objectives

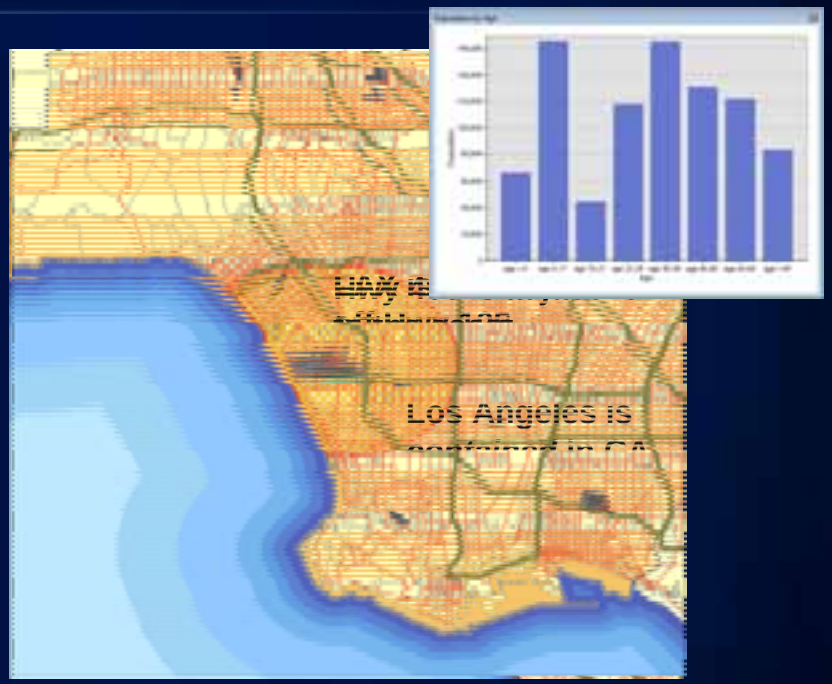
What can you do with Spatial Analysis?

How can it be done?

Where can you go next to learn more? .

The Basis of Spatial Analysis

- Spatial relationships
  - Containment
  - Adjacency
  - Distance
  - Selection and Statistics



The Spatial Analysis Workflow

Break it down

Audience?

Representation

Distribution

Accuracy

Scale

Format

Review question

Common approaches

Data suitable?

Share analysis

Automation:

Use models, code

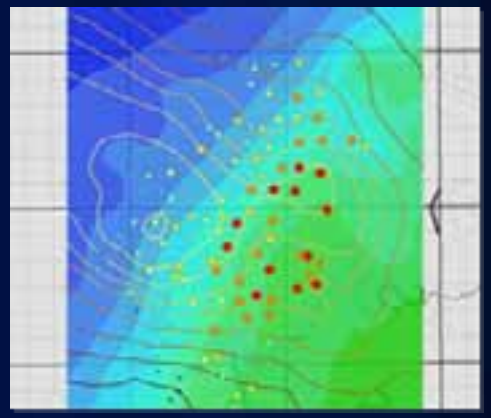
Visually but …

importantly,

statistically

Spatial Analysis is about Solving Problems

- What is inside an area?
- What is nearby?
- Where are the events concentrated?
- Where do things move over time?
- Why things occur where they do?



- How can we estimate values for a whole area?
- What is a suitable location for …?

What is inside an area?

- **Step 1: Frame the question**:

How do gas prices differ in different counties in Southern California?

What is near by?

Step 1: Frame the question

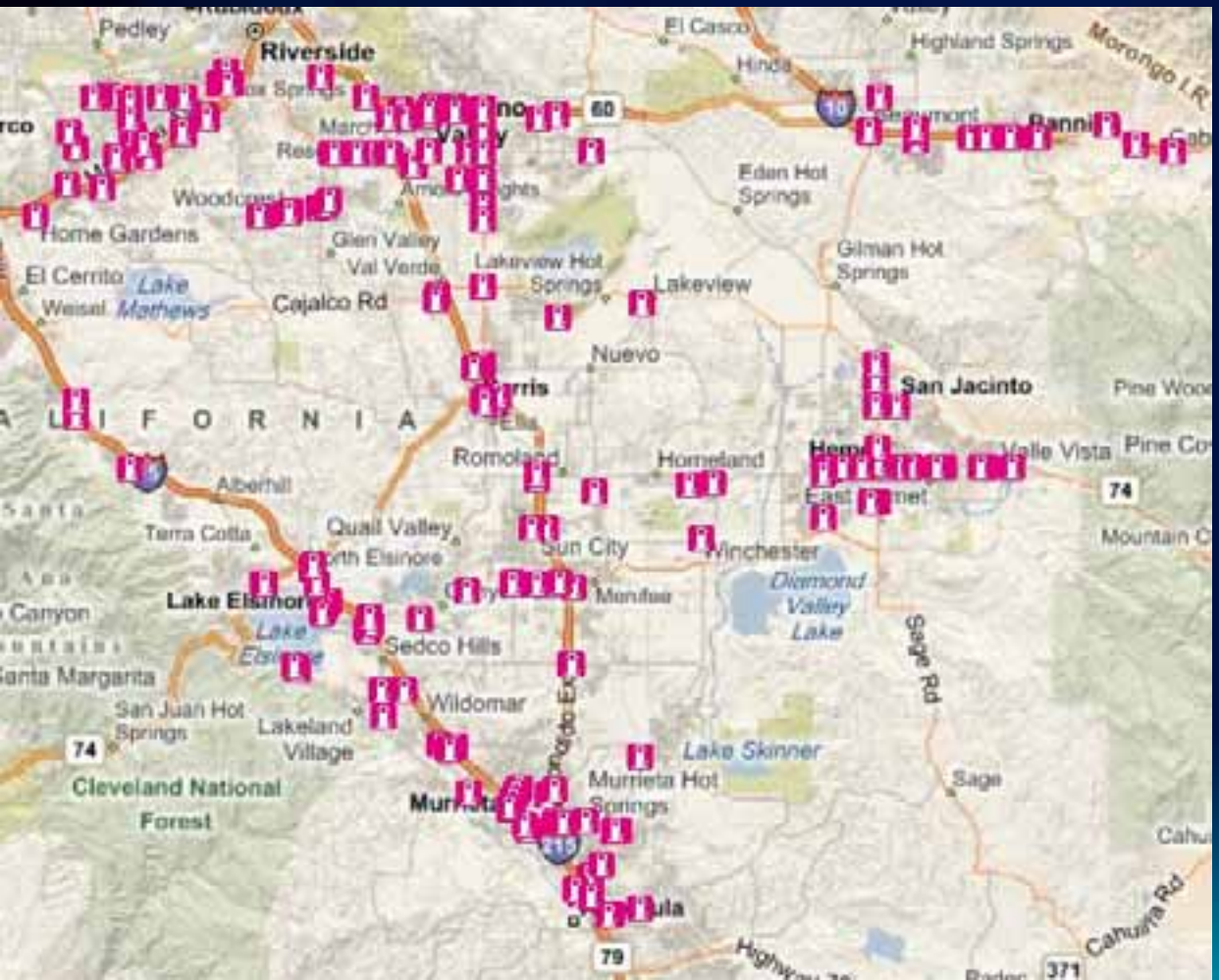
Where is the closest gas stations

for each freeway exit?

What is near by?

Step 2: Explore the data

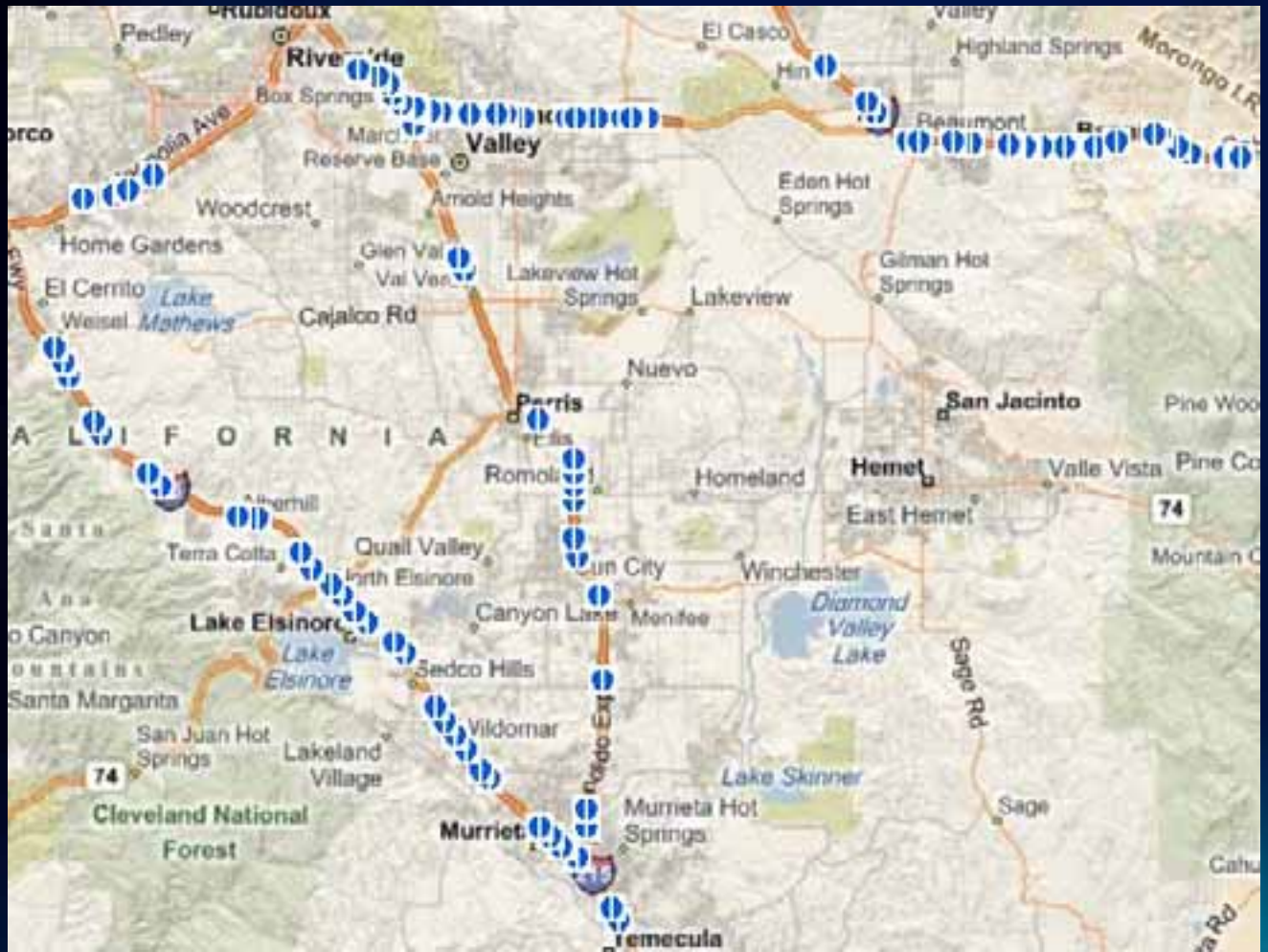
Gas station locations



What is near by?

Step 2: Explore the data

Freeway exits



What is near by?

Step 3: Choose a Method

1) Create a (1 mile) buffer around freeway and locate gas stations inside

What is near by?

Step 3: Choose a Method (within Buffer)

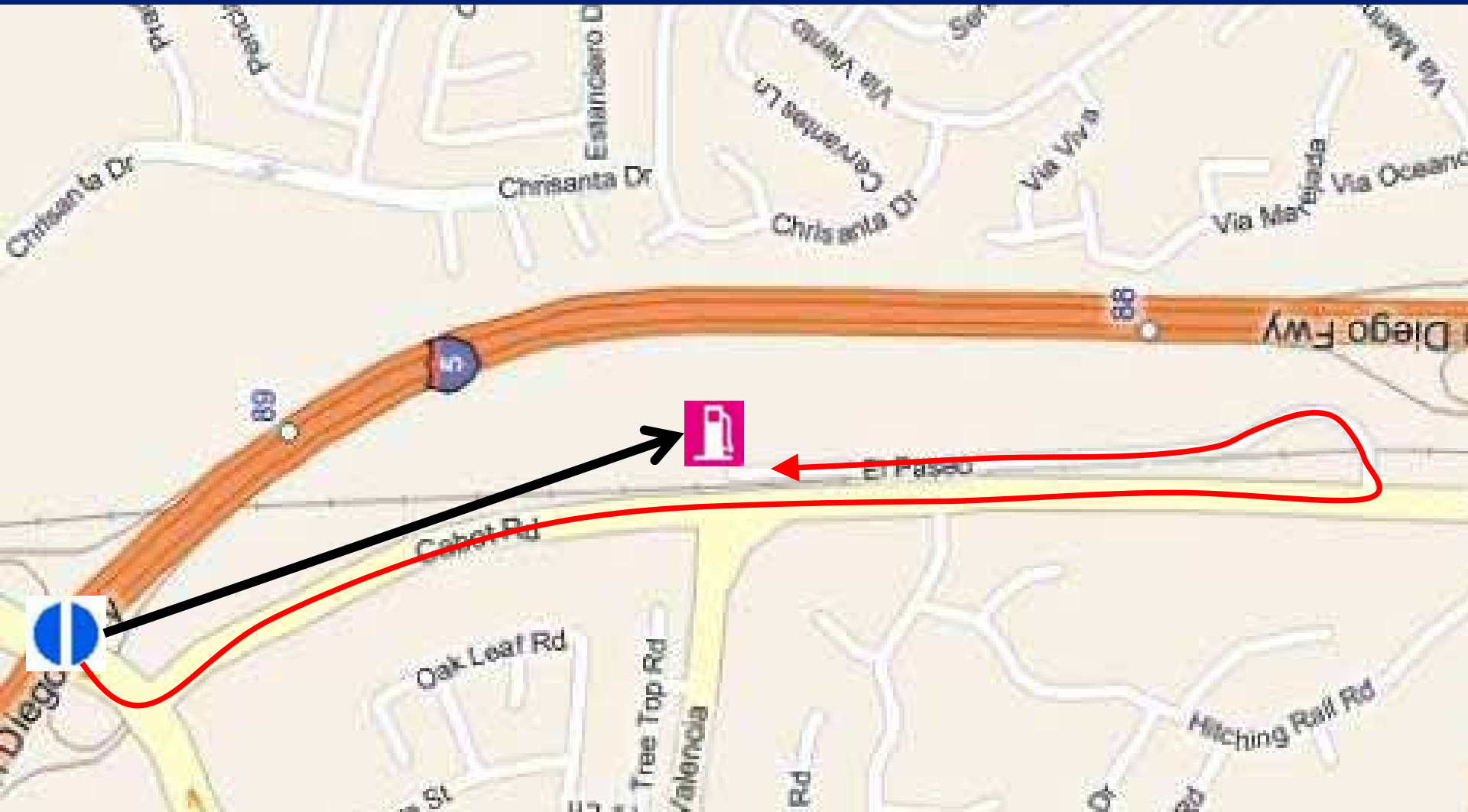
What is near by?

Step 3: Choose a Method

2) Calculate the crow's flight (Euclidean distance) from each exit with the Near tool.

What is near by?

Step 3: Choose a Method (Crow's Flight)



What is near by?

Step 3: Choose a Method

3) Use network analysis tools

(Network Analyst – Closest Facility)

What is the spatial pattern?

- **Step 1: Frame the question**:

Are there areas where gas stations have similar prices (high or low)?

Where are clusters?

- **Step 1: Frame the question**:

Where are areas with high gas prices and where are areas with low prices ?

How do clusters move over time?

- **Step 1: Frame the question**:

- When the gas price goes up, do gas stations in different areas increase the price at the same time?

- If not, which areas are leading the pack? Which areas are trailing behind and catching up later?

How do clusters move over time?

What contributes to the spatial pattern and by how much?

- **Step 1: Frame the question**:

Why the gas price is higher in Beverly Hills than in Pomona ?

Traffic Related Air Pollution Demo

Linda Beale

Overview of our analysis

- We had a clear objective
- Data availability and structure guided our choice of appropriate analysis techniques
- We investigated a variety of different approaches
- We validated our results

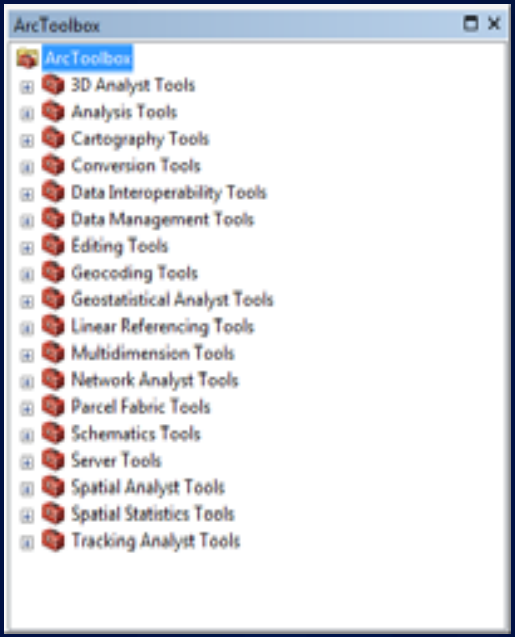
Topics

Overlay	• Combine different data sources • Summarize data in defined areas
Proximity	• Calculate and add distance
Clusters	• Looking at spatial patterns? • Finding where the clusters are?
Regression	• Understand contributors to a spatial pattern • By how much?
Surface Analysis	• 2 or 3D • Discrete or continuous
Interpolation	• Understand your data • What methods are possible
Suitability	• Find best locations • Select and weight factors

Analysis and Geoprocessing

- **Spatial Analysis:**
  - **ArcToolbox**
  - **Extensions**

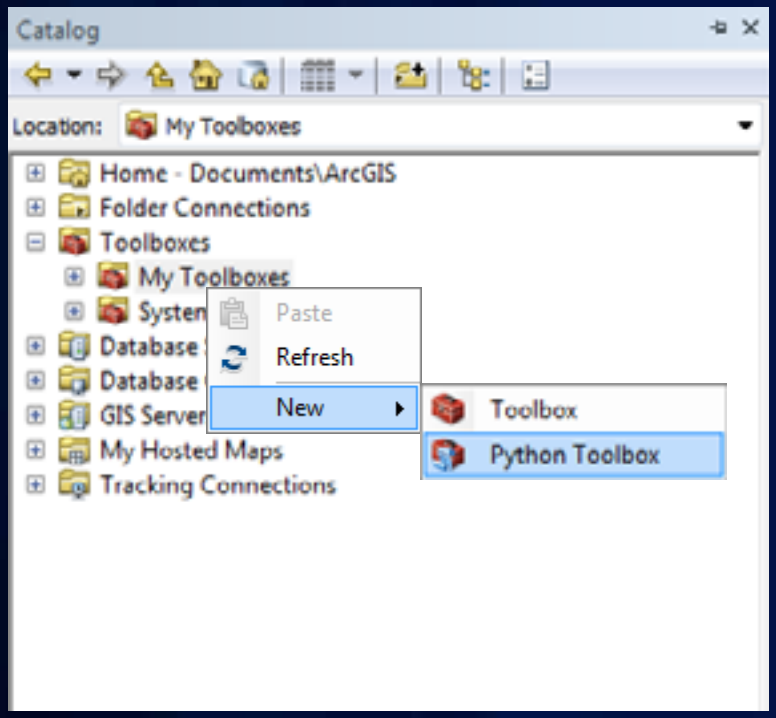
License:



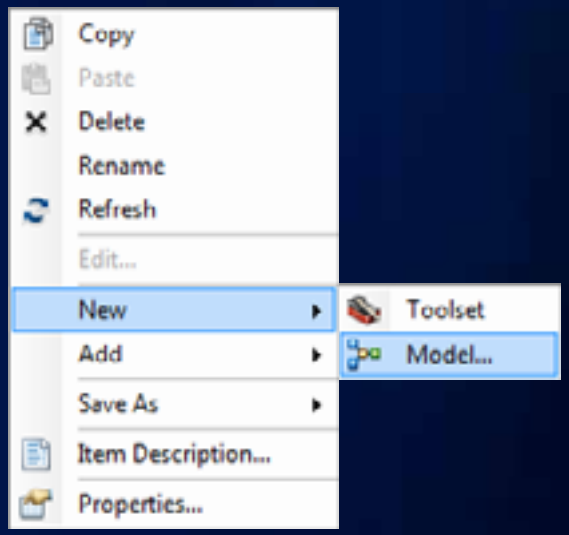
Tip : Use the search

ModelBuilder

- **Create a new toolbox**



Add a new tool

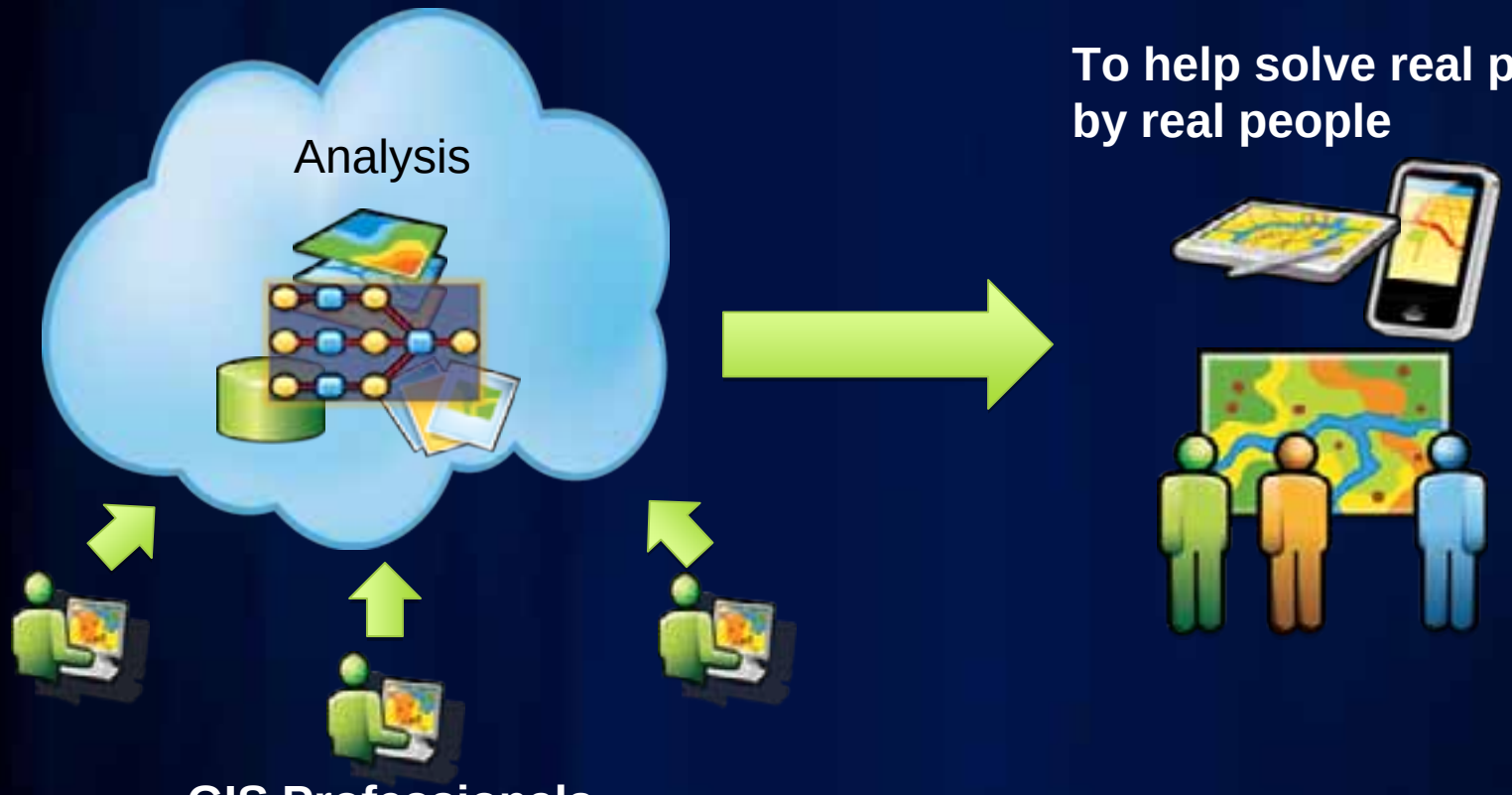


Web resources

Resource Center

ArcGIS.com

The Collaborative Workflow



Final comments

- Analysis is not the end of the story
- Think about how you display the results
  - A data frame is not a map
  - Your map should be changed to suit:
    - Purpose and audience

Remember…

- The accuracy of analysis results is completely dependent on the input data (GIGO)

Questions?

Please complete the session evaluations at:

http://www.esri.com/sessionevals