



# Spatial Analysis in ArcGIS Online

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[www.youtube.com/geographyuberalles](http://www.youtube.com/geographyuberalles)

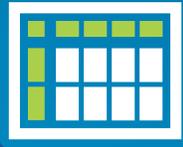
[Twitter.com/josephkerski](https://twitter.com/josephkerski)

[spatialreserves.wordpress.com](http://spatialreserves.wordpress.com)

**GIS  
INSPIRING  
WHAT'S  
NEXT**

- 1. Understand what spatial analysis is and why it is core to GIS instruction.**
- 2. Understand the similarities and differences between spatial analysis in ArcGIS Online vs. ArcGIS Pro and ArcMap.**
- 3. Provide skills so that you will be confident in using spatial analysis techniques in ArcGIS Online.**

# What is GIS?



## Classical Definition:

GIS is a tool that can access, integrate, and distribute layers of map information. The 5 parts of a GIS include hardware, software, data, procedures, and people.

## A more Modern Definition:

GIS lets us visualize, question, analyze, interpret, and understand data in new ways. This can reveal relationships, patterns, and trends.



## Esri Definition of Spatial Analysis:



“The process of examining the locations, attributes, and relationships of features in spatial data through overlay and other analytical techniques in order to address a question or gain useful knowledge. Spatial analysis extracts or creates new information from spatial data.



Or: It is how we understand our world — mapping where things are, how they relate, what it all means, and what actions to take.

**My working definition of spatial thinking and analysis:** “Identifying, analyzing, and understanding the location, scale, patterns, and trends of the geographic and temporal relationships among data, phenomena, and issues.”

## Components of Spatial Analysis

- Understanding where.
- Measuring size, shape, distribution
- Determining how places are related
- Finding the best locations and paths
- Detecting and quantifying patterns
- Making predictions



### Spatial Analysis Explanation:

<http://www.esri.com/library/books/the-language-of-spatial-analysis.pdf>

### Poster

<https://community.esri.com/docs/DOC-11530-the-language-of-spatial-analytics-poster?commentID=59858>

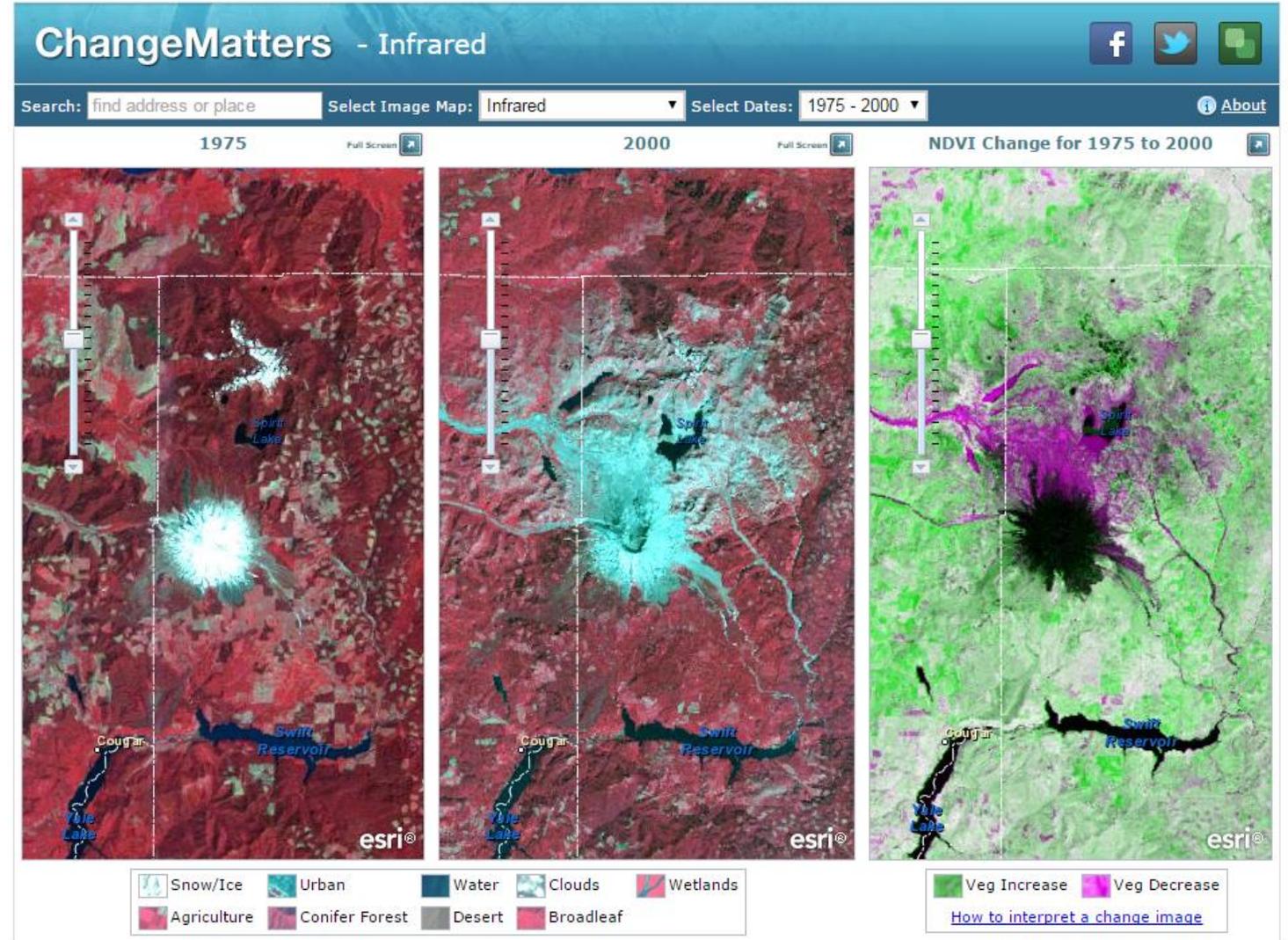
# Is this spatial analysis?

## ChangeMatters Viewer

Pan and zoom around the maps to understand earth changes that have happened over time. Advanced change detection tools are also available by clicking any full screen button.

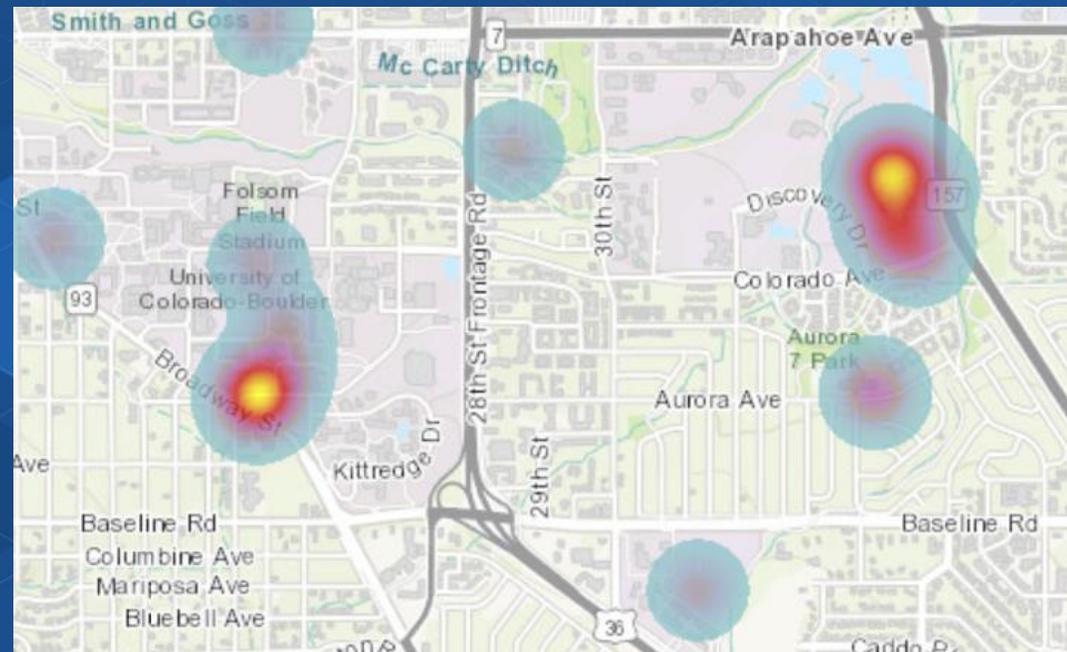
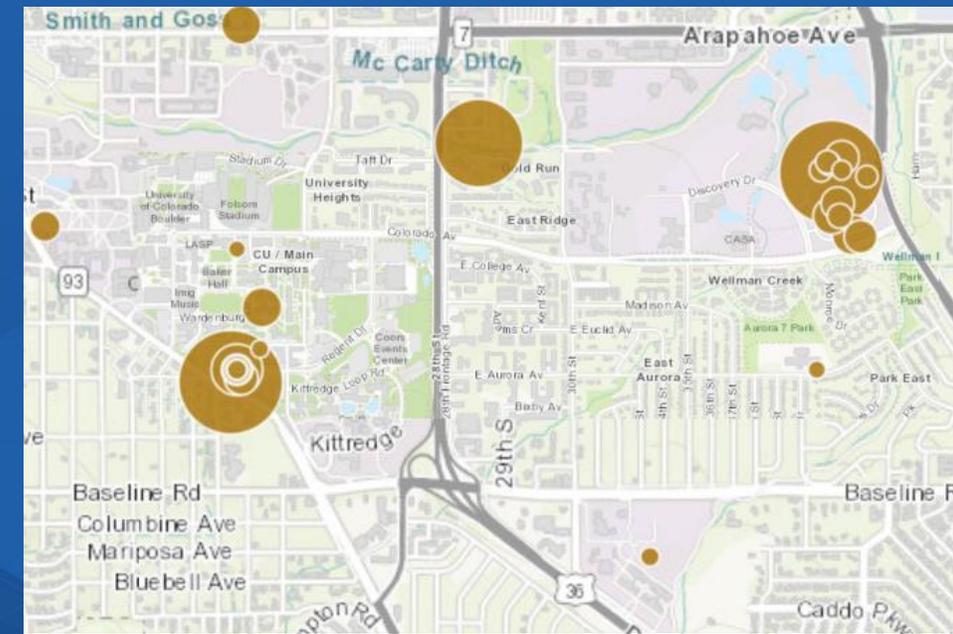
[Instructions](#)

[View larger](#)



# Spatial Analysis Tools

- Symbolize, classify your data on maps
- Investigate statistically significant hotspots
- Proximity, routing, overlay, and other map analysis tools
- Add and analyze additional data

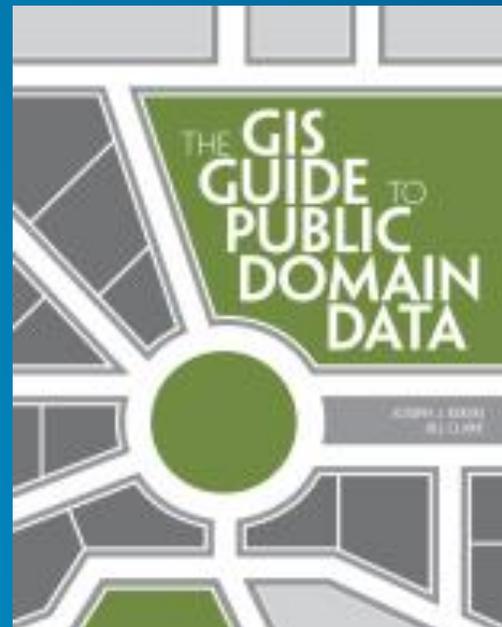


You need **data** to do spatial analysis.

Hybrid model: Some streaming, some download

Blog about data Sources and Issues (privacy, crowdsourcing, cloud vs. desktop, copyright, and how to use).

- ***The GIS Guide to Public Domain Data*, by Joseph Kerski and Jill Clark, Esri Press**
- <http://spatialreserves.wordpress.com>



**Spatial Reserves**  
A guide to public domain spatial data

Home > Public Domain Data > Listing of Free GIS Data Sources from Robin Wilson

### Listing of Free GIS Data Sources from Robin Wilson

November 10, 2013 | josephkerski | Go to comments | Leave a comment

As we discuss in the book *The GIS Guide to Public Domain Data*, listings of spatial data sources have existed since the dawn of the web. Those of you who have been around GIS as long as I have might remember such lists as the Oddens Bookmarks, which already contained over 5,500 categorized references by 1998, and the Alexandria Digital Library Project from UCSB. The objective of these lists has always been, if not to eliminate, to at least reduce the need for each of us in the field to maintain our own lists. While Internet search engines have vastly improved over the past 20 years, listings still have their place and are still useful, because search engines do not always pick up the relevant data and tools that the geospatial community is seeking.

With the crowdsourcing tools available to us nowadays, though, is it not possible for someone or an organization to create a crowdsourced listing of geospatial data? To maximize the utility of such a resource would require someone vetting the list to make certain that only relevant items are approved. Perhaps a reader can comment on this post to let the community know if such a project exists or is in the works.

In the spirit of being helpful to the geospatial community, Robin Wilson, PhD student at the University of Southampton, created the resource "Free GIS Data" at <http://freegisdata.rtwilson.com/>. Robin's index is one of the more useful I have seen and is frequently updated. It contains over 300 sources with headings of physical geography, cultural geography, as well as data about specific places. One of the most helpful things about the resource is Robin's brief but very useful 1-2 sentences about each resource, which serves as a useful bit of metadata to guide the user.

Free GIS Data | Home | Physical | Human | Country-specific | FAQ

This page contains a categorised list of links to over 300 sites providing freely available geographic datasets - all ready for loading into a Geographic Information System.

We have links to everything from aerial perimeter maps to gridded population data - simply scroll through the list, or use the

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- Digital

## Using ArcGIS Online Analytical Tools

- ArcGIS Online is a cloud-based GIS, not just an online set of web maps. Hence, you can use it for conducting spatial analysis.
- The spatial analysis capabilities of ArcGIS Pro and ArcMap still exceed that of ArcGIS Online (50 vs 1100) given Desktop's 30 year head start, but more analytical capabilities are being added quarterly to ArcGIS Online.
- The spatial analytical tools in ArcGIS Online are easy to use. They are accessed from the arrows to the right of specific layers. Whether you see the analytical tools depends on (1) if you are using an ArcGIS Online organizational subscription, and (2) how the data are served in ArcGIS Online (i.e. ideally, as services).

## Educational Advantages for Using ArcGIS Online Analytical Tools

1. Browser based. No software to install. Accessible from any device, anywhere.
2. Provides an easier-to-grasp method of helping students to understand spatial analysis and engage in problem-solving activities.
3. The results can be shared, used in web mapping applications such as story maps, and used in the field.

## The End Goal

**Not** points on the map,  
but *understanding the  
phenomenon, spatial  
patterns, linkages, trends  
in the data you are  
collecting.*

Hence, spatial analysis.



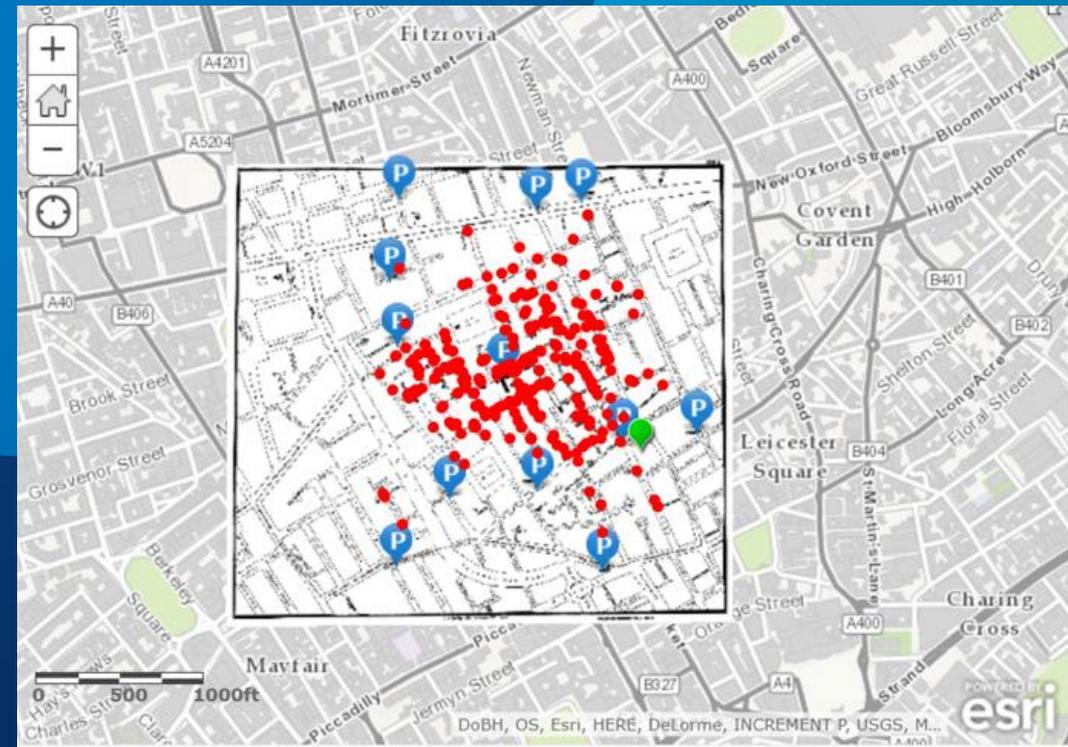
## **Hands-On Activities**

1. London Cholera 1854.
2. Natural Hazards Assessment.

# Hands-On Activity: Cholera Analysis, London 1854

- ◆ Using Analytical capabilities in ArcGIS Online
- ◆ Problem Statement: What percentage of the cholera outbreak cases are associated with the Broad Street well?

You will consider public water pumps, and locations with 1 or more deaths, in your assessment.

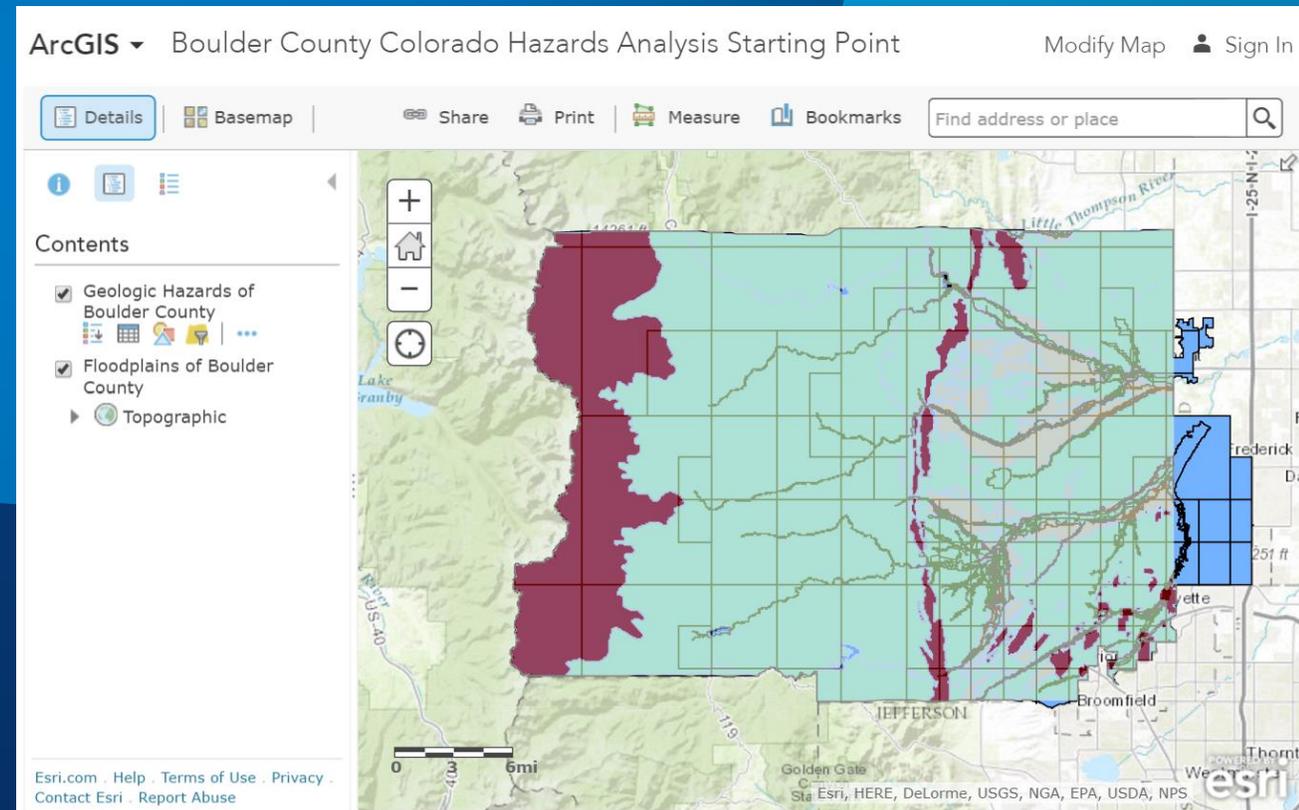


## Analysis Activity: Cholera

1. Symbolize and classify cholera incidents using different methods:  
Heat Map, incidents, natural breaks vs quantile
2. Buffer water wells by 500 feet.
3. Summarize points within each buffer.
4. Determine well closest to each victim.
5. Determine optimal route for Dr Snow to visit each well for water quality testing as quickly as possible – lives are at stake!

# Hands-On Activity: Natural Hazards Assessment

- ◆ Which areas in the county are most vulnerable to 2 types of natural hazards—geology (mudslides) and floods?



## Analysis Activity: Natural Hazards

1. Filter Floodplains layer to only consider the true floodplains.  
Filter geologic hazards layer to only consider Major Hazards.
2. Proximity → Buffer floodplains by 200 meters.
3. Dissolve the buffer's internal polygons.
4. Manage Data → Overlay → Intersect the dissolved floodplain buffers with Major Geologic Hazards.
5. Sort on Analysis Area and only consider the largest polygons.
6. Data Enrichment, with Group Quarters and % Wetlands.

# Discussion



Esri Training: <http://www.esri.com/training>

MOOCs:

<http://www.esri.com/mooc>

-- including *Going Places with Spatial Analysis*.

**Tools:**

We have focused on ArcGIS Online. But analysis is also possible in:

- ArcGIS Pro,
- Community Analyst/Business Analyst Web App,
- Insights.

# Please Take Our Survey on the App

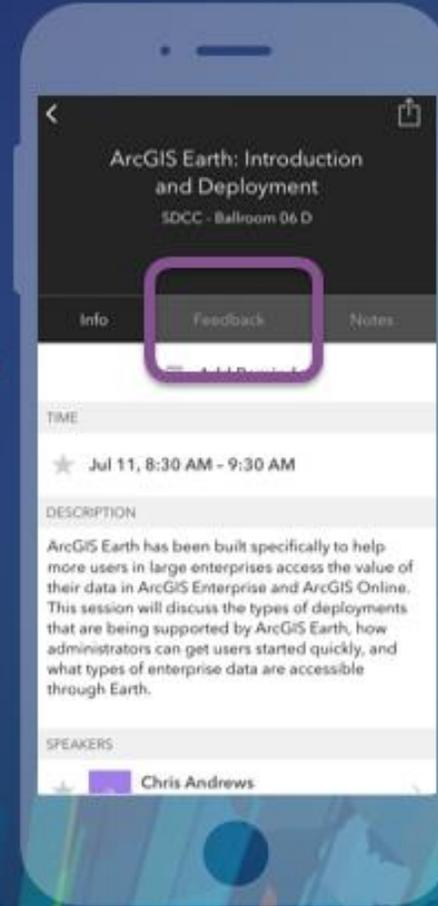
Download the Esri Events app and find your event



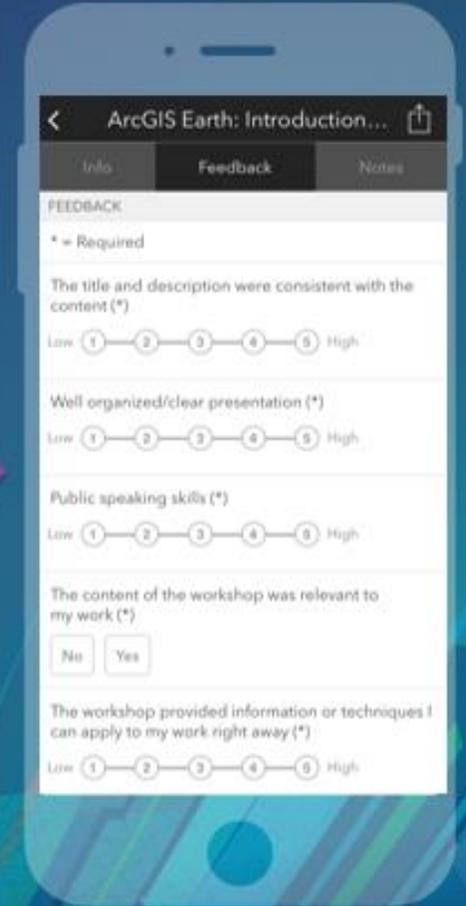
Select the session you attended



Select the Feedback tab



Complete answers and select "Submit"





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