Shapefiles and Features and Services, Oh My!
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Our Assumptions

You are familiar with maps and map layers
You are familiar with at least one ArcGIS application
You are interested in adding and using data to maps
ArcGIS Applications

ArcGIS Online

ArcMaps

ArcGIS Earth

ArcGIS Pro
- Online system for webmaps and webapps
- Browser
- View, create, edit maps and data
- Free to use
- Account needed to save and share
- Indiana agencies: $14.60/mo

ArcGIS.Com  http://arcgis.com
InGov GIS Portal  https://ingov.maps.arcgis.com
InDNRMaps  https://indnr.maps.arcgis.com
IndianaMap  https://indianamap.maps.arcgis.com
• Esri’s Version of Google Earth
• Free
• Anyone can use it
• View, create, and edit maps
• 3D Globe view
• ArcGIS Online members can add additional data
• Requires lightweight software installation
- Mapping piece of ArcGIS Desktop
- Use, build, edit maps
- Analyze data geographically
- Create, edit, convert, and manage data
- High quality printing
- Indiana agencies: $27.10 seat charge
• 64-bit
• Ribbon / Context menus
• 2D/3D, multiple layouts
• Eventual replacement to ArcMap/Catalog
• $51.70/month seat charge (desktop and online)
Map Layers

Management Activities
Assets
Land Use
Transportation
Topography
Soils
Vegetation
Hydrology
Boundaries
Topo/Aerial/Streetmap
Map Layers

But what are these “layers” of which you speak? Where can I find them?
Cloud Data and Local/Network Data

aka data streamed from the internet and data on or connected to the computer
Cloud Data

Advantages
• Don’t reinvent the wheel
• Authoritative data, maybe
• No network connection
• No storage

Disadvantages
• May be limited functionality
• Less control
• Need decent internet connection

The Internet

ArcGIS Online
ArcGIS Earth
ArcMap
ArcGIS Pro
Cloud Data Jargon

Map service = Map image layer in AGOL
• Includes ALL layers and symbology from a published map

Feature service
• functionality for the map layers, e.g. editing

Feature layer
• individual layer from a service when added to AGOL

Image service = Imagery layer in AGOL
• Image, often a mosaic of many different image files
Cloud Data Sources

Indiana GIO Map Services
https://gis.in.gov

Indiana GIO Imagery Services
https://imagery.gis.in.gov

ArcGIS Online
https://server.arcgisonline.com

The National Map
https://services.nationalmap.gov

IndianaMap
https://maps.indiana.edu
Search for Layers

- My Organization (services that have been added as a layer)
- In a GIS server, `<server url>/arcgis`
- ArcGIS Online (services that have been shared in AGOL)
- Living Atlas (curated services from authoritative sources)
Cloud Data to ArcGIS Online

Adding map service to a webmap

Add Layer from web > REST service

- URL for REST map service or image service

```
<server url>/arcgis/rest/services/<folder(s)>/<service name>
```
Cloud Data REST Services Directory

<server url>/arcgis/rest/services/...

https://gis.in.gov/arcgis/rest/services/...
Cloud Data REST map service URL

'https://gis.in.gov/arcgis/rest/services/DNR/DnrRecreationSites/MapServer'

For more details, visit the ArcGIS REST Services Directory.
Cloud Data to ArcGIS Online

Adding feature service to a webmap

Add Layer from web > REST service

• URL for REST map service or image service
  \(<server url>/arcgis/rest/services/<folder(s)><service name>\)

• URL for REST feature layer
  \(<server url>/arcgis/rest/services/<folder(s)><service name>/</#>\)
Cloud Data REST feature layer URL

<server url>/arcgis/rest/services/<folder(s)>/<service name>/#

https://gis.in.gov/arcgis/rest/services/DNR/DnrRecreationSites/MapServer/4
Cloud Data to ArcGIS Earth

Adding to ArcGIS Earth

Add Data

• ArcGIS Online
  *more data available when signed in

• Enter a URL from an ArcGis Server REST service
  <server url>/arcgis/rest/services/<folder(s)><service name>
Cloud Data to ArcMap

- Add from ArcGIS Server connection in Catalog
  `<server url>/arcgis/services`

- Add from ArcGIS Online
  File > Add Data from ArcGIS Online
  *more data available when signed in*

- Add Basemap from ArcGIS Online
  File > Add Data > Basemap
Cloud Data to ArcGIS Pro

Adding to a map in ArcGIS Pro

- Add from ArcGIS Server connection in Catalog
  `<server url>/arcgis/services`

- Add Data from Portal (ArcGIS Online, Living Atlas)
Local and Network Data
Local/Network Data

Advantages
• Can be faster
• Can be simple
• No network connection, maybe
• No internet connection
• Can manage, maybe

Disadvantages
• Reinventing the wheel, maybe
• Static, maybe
• Storage
Local/Network Data Types

- Text/CSV file
- Excel worksheet
- Shapefile
- GPX file
- Feature class/personal geodatabase
- Feature class/file geodatabase
- Feature class
- KML/KMZ file
- Layer Package
- Image file (georeferenced)
- Image mosaic
Feature Class: a GIS point, line, or area dataset

- includes the shape, aka geometry
- includes attribute table
- stored as a shapefile or in a geodatabase
Local/Network Data

Enterprise Geodatabase: Oracle or SQL Server database of feature classes and other data, accessible on the network.

- GIO_Library, DNR_Data, INDOT, IDEM
- multi-user viewing and editing
- better performance
- data managed by authoritative source
- aka SDE
- can be published in web services
File Geodatabase: container of feature classes and other data

- improved version over the Personal Geodatabase
- smaller size on disk vs. shapefiles
- better performance vs. shapefiles
- recommended for non-enterprise data
Local/Network Data

Personal Geodatabase: container of feature classes and other spatial and non-spatial data
- Microsoft Access database
- Replaced by File Geodatabase
- Not recommended
Shapefile: format for a feature class not stored in a geodatabase

- ArcMap and Pro displays as a single file in Catalog
- Windows Explorer shows several individual files that comprise a shapefile
- Compress all of a shapefile’s files into a zip file to add to ArcGIS Online
- ArcGIS Online: limited to 1,000 records
Local/Network Data

Text-CSV address file: comma-separated file with address fields
- Can save an Excel Worksheet as a CSV file
- Geocode using the Indiana Composite Locator: creates a point for each address that has a match
Local/Network Data

Text-CSV X/Y file: comma-separated file with two coordinate fields: longitude/latitude, or UTM easting/northing

• Can save an Excel Worksheet as a CSV file
• ArcMap and ArcGIS Pro: choose Display XY data
• ArcGIS Online: limited to 1,000 records
Local/Network Data

Excel Worksheet: worksheet from an Excel file

- Requires one of the following:
  - address fields for geocoding
  - two coordinate fields (longitude/latitude or easting/northing) for displaying XY data
  - join field to join it as a table to a feature class
Local/Network Data

GPX file: GPS Exchange file created by conversion of GPS data

- **Waypoints, Tracks, and Routes**
- **Only usable in ArcGIS Online. Must be converted to one of the other formats for use in the other applications**
KML/KMZ file: common format of geographic features from non-Esri environments

- Can add directly to ArcGIS Earth and ArcGIS Pro

**Conversion tools in ArcMap to change format and add to map**

**Cloud-based KML services can be added to ArcGIS Online using URL**
Local/Network Data

Layer Package: compressed file of map layer(s) and properties

• May include enterprise data (e.g. GIO_Library) or only point to it
• NOTE: By default, opening it in the map unpacks it to Home drive (H:\ArcGIS\Packages for state folks); can change in ArcMap Options
Local/Network Data

Image file: picture formats such as .tif, .png, .jpg

- Must be georeferenced to fit the space on the earth
Image mosaic: multiple image files stitched together to create a virtual mosaic

- stored in a geodatabase
- individual files may or may not be in same geodatabase
Thank You

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