Data Aggregation with InfraWorks and ArcGIS for Visualization, Analysis, and Planning

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KEYWORD
Silos of data should be history, but integrating geographic information system (GIS) with 3D model-based design can be a real challenge. The ability to aggregate data and visualize multiple sources of information is crucial for decision making within municipal organizations. With ArcGIS Online and InfraWorks software, you have the edge: the cloud-based ability to easily aggregate personal, organizational, and public data previously locked in GIS files or servers. For urban development, environmental planning, or capital projects, this capacity can enhance the value of your GIS data to create rich 3D design models for critical infrastructure projects. In this session, we will demonstrate the use of InfraWorks software to aggregate ArcGIS Online. You will learn how to configure local GIS servers for ArcGIS Online access. We'll also show you how to configure ArcGIS orthophoto and terrain services for use in InfraWorks. Finally, we’ll demonstrate the process using a specific road-design example from a large North American city.
Learning Objectives

- Learn how to aggregate public, personal, and organizational GIS data from ArcGIS Online within InfraWorks
- Learn how to link ArcGIS services you have published to ArcGIS Online and access them from InfraWorks
- See a comprehensive workflow for visualizing a transportation plan for a major North American city
Stephen Brockwell founded Brockwell IT Consulting to provide independent business and technical leadership for the Geospatial community. His leadership at Autodesk, where he was a Senior Business Development Manager and Director of Product Management, provided the path for advanced GIS initiatives. Before joining Autodesk, Stephen was on the team for SHL VISION* Solutions, developers of the first all-relational GIS based on Oracle. Qwest Communications and First Energy, among others, still use the underlying technology he developed. Recently, Stephen has been involved in enterprise-level projects for Nevada Energy and First Energy; field mobility projects for City of Alexandria and Welland Hydro; and product development for Autodesk. With his experience in the Geospatial industry including government and private sector, Stephen has been a regular instructor at Autodesk University. He is committed to efficient, low-cost solutions to implement GIS technology for infrastructure design.
InfraWorks and ArcGIS Online Use Cases
InfraWorks Use Cases

Infrastructure Design Pre-planning
- ArcGIS Online serves as data repository
  - Secure access to private or organizational data
  - Data is widely available throughout organization
- Data aggregation allows for access to the latest version
  - No confusion on the latest version of the datasets
- Search and discovery capability allows for access to data that may not exist in your organization
InfraWorks Use Cases

Civil Design and Stakeholder Coordination

- Include rich data sets for better presentation
  - Abundant datasets allow for a view for the public that more closely represents real life.
- Bring information from all different sources in to one environment
- Model builder takes the data aggregation and a central platform for the visualization of the data
Poll

- Have any of you used ArcGIS data with Infraworks

- If so, how?
ArcGIS data in InfraWorks

- Using the Data Sources Panel
  - All imported data is file based or from a database source
  - SHP files are able to be imported but not from a cloud source such as ArcGIS Online
  - Not easy to connect to raster ArcGIS data sources in their native form
  - ESRI databases can be used but licensed components required
  - ArcGIS Online is not an option yet
  - Need to prepare data to be able to use
What is ArcGIS Online?

- Esri’s web GIS platform
- Most importantly, a platform for sharing and discovering geographic data
- Also provides:
  - Ready-to-use data and maps
  - Analysis tools
  - Apps
  - A vast API for developing rich applications
Geospatial Layer Types

- Elevation layers: single-band raster layers representing elevation values
Geospatial Layer Types

- Imagery layers: raster layers such as aerial orthophotos
Geospatial Layer Types

- Feature layers: vector layers such as roads or building footprints
ArcGIS Online vs. Portal for ArcGIS

- Portal for ArcGIS is essentially a deployment of ArcGIS Online on your organization’s own infrastructure
- Both provide the benefits of sharing and discovering geographic data
- ArcGIS Online:
  - Host web services on Esri’s cloud infrastructure
  - Search for and use data that other people or organizations have made publicly available
Hosting Data in ArcGIS Online

- Hosted layers
  - Hosted in Esri’s cloud infrastructure
  - Feature, tile, and elevation layers
Hosting Data in ArcGIS Online

- ArcGIS Server services
  - Hosted in your own infrastructure, linked to from ArcGIS Online
  - Feature services, geocoding services, geodatabase services, geometry services, geoprocessing services, image services, map services, and network analysis services

ArcGIS Server Web Service
Sharing via open standards

- GeoJSON
- OGC standards
  - Web Feature Services (WFS)
  - Web Coverage Services (WCS)
  - Web Map Services (WMS)
  - Web Map Tile Services (WMTS)
- KML
You can control access to ArcGIS Online data that you share:

- Private
- Organization
- Group
- Public
- Collaboration (for early adopters at ArcGIS 10.5.1)
Sharing Data in ArcGIS Online – Workflow Example

- User A creates a GIS dataset and shares it using ArcGIS Online
- User B (in the same organization) searches for datasets, selects the dataset shared by user A, and incorporates it into his or her model
Without ArcGIS Online

- No federation of geographic data
  - Geographic data exists in lots of places
  - Difficult to make data widely available, even within an organization
- No search and discovery capability
  - Users have to know what data exists and where to find it
- Which version is the correct version?
  - “sneakernet” can cause a proliferation of multiple versions and vintages of the same dataset
With ArcGIS Online

- Single repository of geographic data
  - Secure access to private, group, organizational, and public data
  - Hosted in ArcGIS Online or distributed to an organization’s own infrastructure
- Search and discovery of geographic datasets
- Canonical datasets
  - Publisher uses metadata to describe the dataset, origin, lineage, caveats and appropriate usage
- Rich source of data for enhancing models
Prepare datasets in ArcGIS Online

- Types of ArcGIS Online services
  - **Feature layers** (e.g., streets, building footprints)
  - **Imagery layers** (e.g., satellite photos)
  - Elevation layers

- Data location
  - **Hosted layers** (hosted by ArcGIS Online in the cloud)
  - **ArcGIS Server web services** (hosted on your own infrastructure)
Preparing ArcGIS Data for Use in InfraWorks

1. Create datasets in ArcGIS
2. Publish data to ArcGIS Online
3. Share data
Publish Data to ArcGIS Online – Hosted Layers

- Publish data from ArcGIS Pro
- Publish data from ArcMap
Poll

- For those using ArcGIS today, do you plan to adopt ArcGIS Online?

- What concerns do you have about adopting ArcGIS Online?
The Approach to Data Aggregation with ArcGIS Online
Integration with ArcGIS Online

- Integration with ArcGIS is meaningful because...
- Exchanging a lot of file data or data connections – set up of connections is challenging
1. Sign in to ArcGIS Online Web Application
2. Navigate to Area of Interest (AOI)
3. Select one or more datasets (raster, feature layers)
4. Name custom group
5. Download data in SHP or GeoJSON format
6. Create a model in InfraWorks
7. Add datasources
   1. (optional) style data based on ArcGIS attributes
Data Aggregation workflow

- Simple, intuitive central location for individual and group access to content
- Reduces complexity and time cost of managing numerous individual datasources
User Authentication

- User authentication is handled by ArcGIS Online / Enterprise
- Sign in grants access to the web application
Using ArcGIS Online with Data Aggregation
ArcGIS Location Search
Defining the Area of Interest

- Users have four options when defining the area to query for ArcGIS data
  - Viewport (default)
  - Draw Rectangle
  - Draw Polygon
  - Import Shapefile
- Maximum area is 200 sq. km
Dataset Selection

SELECT DATA SETS

Enter a search term

User
Organization
Shared
Public

SELECT DATA SETS

Enter a search term

User
Organization
Vancouver Buildings
Vancouver building footprints, 2009.
Vancouver City Furniture
Vancouver city furniture
Vancouver City Streets
Vancouver city streets
Vancouver Property Information
Vancouver property information
Vancouver Railways
Vancouver Railways
Vancouver Rapid Transit
Vancouver rapid transit system
Data Extraction and Download

- After defining the area of interest and selecting one or more datasets, the user provides a name for the group.
- Option to download in GeoJSON or shapefile format.
- Raster data will download separately.
Using ArcGIS Online Data within InfraWorks
3D Modeling with ArcGIS Online data

1. Import data into a new model within InfraWorks
2. Configure data sources with appropriate data type
   - ArcGIS attributes can be leveraged for source-specific styling
3. Refresh model
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Video Demos
Instructional text box (remove in your presentation)

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Summary

- ArcGIS Online data is a better fit for GIS data used within InfraWorks